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-do what he did!

Tom Perkins liked the good things of life—he liked to attend the theatre; he liked to wear good clothes; he liked to travel on fast trains and live at good hotels. He liked all these—but that was as far as he got. The buck of money stood in his way.

His wife liked the good things of life too—he loved silk stockings and sealskin coats; she liked to live in a cozy little home of her own; she liked the things that make life worth living. She liked all these—but she had to depend on Tom to earn them for her.

Tom had done the best he could. He always had a job of one kind or another—and he always gave an honest day's work in return for an honest day's pay. What more could he do? Was it any fault of his that he could never earn more than just enough to buy himself and his family the bare necessities of life?

The turning point in Tom's career came quite unexpectedly. A boyhood playmate, who had lived in the same town several years before, came back one week-end for a visit and told Tom what a great success he had made in the garage business as the result of taking the M. S. A. S. Home Study Course in Automobiles. Then and there Tom decided to investigate the possibilities in the automobile field himself—and he was greatly surprised at what he found.

A Wonderful Business
He found, among other things, that the automobile industry is the third largest business in the country today. He found that there are no less than twelve million cars and trucks in use in the United States and that the automobile factories were adding to this number at the rate of about ten thousand every day. He found that as the number of automobiles increased, more and more work was piled up for automobile mechanics to do. And, most important of all, so far as he was concerned, he found that the men who had trained themselves for this work were among the highest paid men in any line of industry.

Here, then, was a line of work that offered a real chance to get ahead in the world. There were jobs enough and to spare for all the men that the automobile training schools could turn out for years to come. And if there was no chance of failure—unless people should some day stop driving cars, and he couldn't imagine anything like that happening.

It struck Tom that this was a good business to get into. Within two weeks he had enrolled in the M. S. A. S. Home Study Course and was spending his spare time evenings learning the automobile business—and it seemed only a short time until he had completed his training and had received his diploma.

$40 per Week to Start
This done, he went to the leading garage in the town, applied for a job, and got it—at $40 a week, more than he had ever earned before. For the first time in his life he felt that he was really on the road to success.

At the end of a month, his pay was raised to $55 and, in another month, it was again raised—to $75 a week. Tom was truly getting up in the world.

That was three years ago. Today Tom is the owner of his own garage and has two mechanics working for him. Besides, he has secured the agency for Chevrolet cars and Willard Storage Batteries and has built up one of the leading auto electric service stations in his section of the country. He has won for himself the reputation of knowing his business—and, as a consequence, he gets not only the bulk of automobile repair work in his own town but also a great deal of work from car owners in neighboring towns where there are no first class garages.

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No Experience Necessary
But, you may say, Tom must have been an exceptional man—he must have known something about automobiles before he took the M. S. A. S. Study Course. Quite the contrary—he had no experience at all in automobile work. In fact, he couldn't even drive an automobile at that time and, as he himself says, he didn't know the difference between a carburetor and a wheel-base—didn't even know a car had a wheel-base. The only difference between him and the other young fellows in his town who are still working at $10 to $25 a week is that Tom made a step to better himself. He got off the short ladder that he was trying to climb and got his foot on a tall ladder where there was room to do some real climbing.

Any young man can start climbing the automobile ladder that leads to money and success by doing just what Tom did. As soon as he heard about the big money-making opportunity in the automobile business, he wasted no time in investigating it.

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show you how the S & S line of saleboard 
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KEEP Young In Spite Of Years. Get our startling new scheme saving Safe, Scientific System for all men. Address the M. Applicable Company, 1527 Ring Blvd., S. F., Calif.

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THE Canadian Pacific Railway now offers you a Farm Home in Western Canada on a New Long-Term Plan of Easy Payment that is Extraordinary. Every farmer must be interested in any plan that makes it possible to own a farm home without taking all his profits to meet his land payments and still enable him to give his family the comforts and enjoyments of life. Under this New Plan this is made possible.

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M. E. THORNTON, Superintendent of Colonization
Room 43B, Canadian Pacific Railway Bldg.
CALGARY, ALBERTA, CANADA

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WHERE EAST MEETS WEST IN THE ORIENT

Looking Down the Pearl River into the Homes of Some 400,000 Persons Who Live Crowded Together in Boats at Canton, China, Surrounded by Age-Old Traditions

(See page 15)
Weird Rites Mark the Departure of Liners for Orient

WEIRD ceremonies, conducted by Chinese members of the crew, are one of the most interesting features of the departure of big ocean liners sailing out of Pacific-coast ports for the Orient. These observances have come down through thousands of years of tradition and are for the purpose of pleasing the good spirits of the sea and baffling the evil ones.

The "Wind God," according to the Chinese, follows a vessel and constantly attempts to swamp the ship, so this deity must be placated and the pursuit made as difficult as possible. The appetite of the Wind God is tempted with sacrifices of barbecued pork, fruits, and candies. And then thousands of firecrackers are set off—to frighten him. Huge white papers, traced with hand-drawn designs, are also offered up, to mislead the Wind God as to the route the ship will follow, the belief being that the stupid god will follow the lines and lose all trace of the ship, so that it will have a peaceful and untroubled voyage.

Next the spirit of "Good Luck," symbolized by a dragon, is invoked by means of a dance to the strains of music, while a dancer appears on deck with a huge papier-mâché dragon head. A Chinese bears the silken body of the dragon.

The music grows stronger and the dragon shakes with fury. Then the music becomes soft, the dragon becomes docile, and a head of lettuce is thrown in his path. The dragon takes it in his jaws and the ceremony is ended, the spirit of Good Luck having succumbed to the lure of the food offering.

When the liners touch at any port in China, the strange performances are continued, the members of the crew being joined by the other natives in their efforts to outwit the evil spirits and gain the favor of the good ones.

Because of these strange superstitions, the very origin of which is lost in antiquity, navigation in Chinese waters presents many problems to the European mind. Even the speed of the ships must be cut down for fear of fatal accidents caused by the Chinese belief in the power of invisible pursuers.

A native fisherman, for instance, wakes up every morning convinced that nothing can be accomplished during the day until the evil spirits are thrown off his trail and that unless this is speedily accomplished they may even cause his death or serious injury. To do this he repeatedly risks his life.

One of the queer sights of China is a crowded junk risking to be cut down to cross the bow of an approaching steamer. Despite much profanity, many accidents and heavy loss of life, this practice continues because of the belief that, having passed in front of the larger boat, the evil spirits following the fishing craft will be deceived and pursue the steamer.

When the maneuver is successfully accomplished, the natives display the greatest joy, laughing at the wrath of steamer captains who have narrowly missed running down the junk, for they believe that they are then free to go about their business in peace for the day without any further thought for the evil spirits they have tricked.

The captain of one liner steaming up the coast to Hongkong, once noticed upon approaching a headland a wildly gesticulating figure, evidently signaling to some one below. Suddenly, as the liner approached, a large junk, its sails bellying out to the breeze and its rowers working frantically, dashed out.

Right across the bow of the liner the crazy craft was urged, and it was only the prompt action of the officers that prevented it from being cut in two. Then the junk drew off accompanied by the lurid comments of the steamer's captain.
SEEKING THE FAVOR OF THE "WIND GOD"

Music is supplied by a Chinese Drum, Cymbals, and a Brass Gong, with the tune improvised as the dance proceeds.

The Dragon, Symbol of "Good Luck," is borne by a Dancer and His Assistant. In the inset above is a food offering to the "Wind God."
While heretofore the single eye of the ordinary camera has been able to record only two flat dimensions, length and width, a California inventor claims to have added a third—"depth." The result is said to give a stereoscopic effect, bringing the details of the picture into sharp relief. Previous efforts along this line have required the use of two strips of film and some special device before the eyes of the spectator. But the new invention is declared to use only a single strip of film.

LOCKED GOLF-BAG POCKETS USED TO CARRY "TOGS"

What bids fair to draw the hearty applause of every golfer, who has wanted to carry extra "togs," balls, and sundry other incidental supplies while pursuing the old Scotch game, is a new departure in golf bags. A "ripper" lock, that opens the bag from end to end, gives access to pockets of varied sizes. These pockets may contain quite a number of accessories, eliminating the necessity of carrying an additional bag. A "vanity" pocket finds particular favor with women.

Baseballs Dropped from Different Heights and Rebounds Measured to Test Liveliness

realize the effect just a slight difference in the tightness of its cover, a tiny change in the weight of its rubber core, or the tension with which it is wound, may make in the hitting. But in an obscure corner

Gauge Registers Force Necessary to Tear One of the Stitches from Cover of Ball
of Washington, D. C., there is a room filled with strange instruments presided over by learned government scientists. Perhaps they have never seen a big-

These tests are conducted as a guide for the government in buying baseballs for the army, which uses thousands of them each year, but the experiments have developed many interesting facts. The lacing cords used in sewing the cover are said to be the weakest point of the ball. Tight covers prevent the pitchers from "roughing" the surface of the sphere in order to gain an advantage in throwing curves.

To determine the liveliness of the balls, a rebound test has been devised. Balls are dropped from different heights and the rebound measured on a yardstick. The liveliness of the ball, it has been learned, depends upon the size and the elastic nature of the rubber center, and the quality and tension of the yarn with which it is wrapped.

AVIATION PIONEER'S DEATH RECALLS HIS FEATS

With the death of Maj. Thomas Scott Baldwin, inventor of the modern parachute and one of the early pioneers in American military aviation, Army Air Service officials recalled many of his deeds.

According to the records, he had the distinction of being the first man in the United States to descend in a parachute, a feat he performed at San Francisco, Nov. 30, 1883. After lengthy experiments with balloons, and careful study of Santos Dumont's experiences along similar lines, he began the construction of his first airship in 1902. The machine cost $5,000 to build, the balloon part being made of silk canvas covered with netting of heavy Irish linen. It was 25 feet wide and 90 feet long. Below the bag was slung a framework and a propeller operated by foot power, like a bicycle.

After giving exhibitions in various parts of the country, Major Baldwin engaged in the manufacture of airplanes for several years. During the World War he supervised the construction and inspection of the entire balloon program of the army.

Among his many prized keepsakes was a ring presented to him by the king of England in recognition of his early flying feats in that country. At the time of his death army officials asserted that there probably was no individual in the world who possessed the knowledge and experience of Major Baldwin in connection with the building and flying of heavier-than-air machines.
To the majority of students, geometry has been a difficult study, dry as dust. This has largely been due to the methods of teaching, and to the difficulty of presenting an abstract subject to youthful minds. A Boston instructor, however, has devised a method of teaching geometry by means of the motion-picture film, using so-called animated pictures similar to those seen in the picture theaters.

This brings to the geometry lesson the stimulating quality of animation, without which it does not enter the class of so-called interesting subjects, at least so far as the ordinary student is concerned. For example, a circle thrown on the screen with a written or verbal explanation of how it is drawn does not create the same interest as a picture showing the actual drawing of the circle.

With this principle in mind, a whole series of pictures were prepared, to explain and illustrate the definitions and ordinary problems of plane geometry. These are so planned that they may be continued right through more advanced studies.

One of the films starts with the picture of a Japanese performer lying on his back, juggling geometrical figures with his feet. These include spheres, circles, cones, prisms, cubes, and other shapes. Then are shown pictures of the great mathematicians of history, such as Pythagoras, Euclid, Plato, and others. A brief caption accompanies each subject, and an occasional explanatory sentence to enliven interest. Next appears the old theorem, that the square of the hypotenuse of a right triangle is equal to the sum of the squares of its sides. First the
triangle is shown, then a hand draws the squares on its three sides, finally taking the squares from two sides and placing them upon the hypothenuse to prove the theorem correct.

Other geometric truths are illustrated and verified in the same interesting way. When angles are shown, they are made to merge into intersecting streets, dotted with trees, and passing over a stone viaduct. The picture of a table is shown with a straight edge moving on it to illustrate a plane surface. Another part shows a hand drawing a straight line, starting from a point and moving along until the line is formed. A T-square is shown moving along the edge of a drawing board and many other familiar geometric elements are similarly illustrated.

The same hand, moving about in this mysterious, interesting fashion, makes curves of all kinds and then broken lines. In natural progression 360 degrees of a circle are shown, by the drawing of the circle in the picture, then a 180-degree arc. A clock is also used, with its hands in various positions to make different sectors of a circle.

Three glasses of different sizes, the larger of which contains a dark liquid are used to make clear the theory of "incommensurables"—or things which do not contain the same unit of measure a whole number of times. This is shown by the fact that after the two smaller glasses have been filled, there is part of the liquid left over in the larger container, as illustrated in one of the accompanying pictures.

In another instance, a hand is shown drawing lines to prove that if the adjacent angles are equal and both lines are straight, each angle contains 90 degrees and is called a right angle.

**JAPANESE VIEW OF WAR PICTURED IN RUG**

A family of acrobats from Japan, now appearing in Paris, is displaying a rug, upon which is designed the Japanese conception of the World War. Two tigers, representing France and England, are watching an eagle, representing Germany, carrying off a tiger cub, Belgium. The Japs have refused many attractive offers for the work of art.

Costly Rug Displayed by a Troupe of Acrobats in a Paris Circus: The Design Depicts the Japanese Conception of the World War in Such an Artistic Manner, That Many Connoisseurs have Tried to Purchase It.
SKYSCRAPER IS PLANNED FOR UNIVERSITY

One of the tallest university buildings in the United States, if not in the world, is included in a $10,000,000 group of new structures to be built for the Northwestern University of Evanston, Ill., on its so-called downtown campus on Lake Shore Drive, Chicago. Elevators and other conveniences of modern business structures will be part of the equipment.

One of a Towering Group of Buildings Planned for Northwestern University of Evanston, at Chicago

RARE RUSSIAN DECORATION APPEARS IN NEW YORK

What is claimed to be the only decoration of its kind outside of Russian territory, is a highly ornamented chain of solid gold medals, given by the late czar to the Grand Duke Michael Nicolai-wich, and now owned by an American in New York. The decoration is that of the Order of St. Andrew, of Russia, and weighs two pounds. Twenty-three medals, wonderfully inlaid and worked, and one big jewel, make up the chain, which is intended to encircle the neck. Only five of the decorations have ever been made.

A new image of Buddha, made entirely of human bones, is soon to be dedicated at Jogwanji temple in Fukagawa, Japan. These are from the bodies of more than 2,600 persons who have died in the last 10 years, and were stored in the temple's charnel house.

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Funeral Chariot of a Burial Prince, Ready for Its Appointed Place in the Procession to the Grave: Note the Various Indications of Rank of the Dead Potentate, and the Numerous Wooden Horses Which have been Fashioned for the Occasion. The Master's Horse is Supposed to be Offered Up as a Sacrifice at the Grave, but the Thrifty Burials Burn the Wooden Ones Instead.
BURIATS OF MONGOLIA HAVE QUEER CUSTOMS

Dwelling in the vicinity of the Baikal Lake, on the northern borders of the Gobi Desert of Asia, is a peculiar tribe of Mongolians, called Buriats. They are called the “cowboys of Asia,” being expert riders and living almost constantly on horseback. The Buriat horse is famous for its powers of endurance, and the attachment between master and animal is very great. At death the horse should, according to their religion, be sacrificed at its owner’s grave; but the frugal Buriat heir usually substitutes an old hack. At other times he goes through the pretense of tying up his valuable steed to the grave to starve, but he does so with the thinnest of cords, so that the animal soon breaks its tether and gallops off to join the other horses. In religion the Buriats are mainly Buddhists.

Great pomp and ceremony are displayed at a Buriat funeral, and sometimes a number of wooden horses accompany the procession to the grave, where they are burned to provide ample mounts for the spirit in his future life. An umbrella tops the hearse, and its size is an indication of the rank of the deceased. In the case of a dead chieftain or other important potentate, silk pendants adorn the funeral chariot, as well as umbrellas of varying size, and numerous other religious symbols. The Buriats are a peaceful tribe; broad-shouldered and inclined to stoutness, with small slanting eyes, thick lips, high cheek bones, and scanty beards. The men shave their heads and wear a pigtail. Their principal occupation is the raising of horses and cattle. Customs are much the same today among these people of the Gobi Desert as they were 2,000 years ago, and western culture has touched them but little.

NATURE HEATS WATER FOR SWIMMING POOL

Water, flowing from a natural-gas well at a temperature of 96° F. the year around, supplies a swimming pool at Pierre, S. D., and makes outdoor bathing possible in the coldest of weather. The pool is built of concrete and was constructed when it was discovered an unlimited supply of warm water was available at all times. Electric lights, strung around the pool, enable patrons to bathe at night. A small wading pool has been built, in conjunction with the swimming pool, for the use of children.

The American City
Sept. 1922
OLD DEEP-SEA SHIP CUT UP FOR AUTO MATERIAL

Old, worn, and useless, the "Santa Clara," familiar to shipping men for many years, is being demolished, and its all-

steel hull will be converted into automobile parts. The "Santa Clara" was a schooner, 312 feet long, and plied the waters for 27 years in the tropical-fruit trade. When first put into service, in the early '90s, it was considered a marvel of construction, and the launching was an event. Acetylene torches are being used to cut up the hull and propellers into easily movable sections. The latter are of manganese bronze, a metal much used in the construction of automobile parts.

ELECTRIC PEN THAT WRITES IN GOLD OR SILVER

Gold, silver, or other colored designs or writing can be made on wood, leather, paper, ivory, parchment, silk, or metal by a new electrically operated pen. The pen is attached to any lamp socket by means of a flexible cord, and is operated by running the electrically heated point over a sheet of colored transfer paper. The pen is insulated so that no current comes in contact with the user or the material with which he is working. The heat of the hot point can be regulated so that a maximum of 900° F. can be reached. The pen is no larger than an ordinary fountain pen.

RUNAWAY LOCOMOTIVE "DIVES" INTO LAKE

Imagine a 100,000-pound locomotive running wild down a six-per-cent grade, followed closely by a runaway train of six loaded freight cars. This happened in British Columbia recently, and the inevitable smash-up occurred on a trestle over Harrison Lake. Engine and cars landed in about 35 feet of water, but by a strange freak of circumstances, were

sandwiched in three layers. Two cars of rails were undermost, then came the engine, and four cars loaded with logs piled on top. Divers were rushed to the scene, and proceeded to salvage the wreck promptly, although with some doubt at first, and with considerable difficulty. A submerged track was laid out into the lake, and the wrecked equipment gradually worked to shallow water. All repairs were made on the lake shore.
BIG ELECTROSTATIC MACHINE ALLAYS VETERANS' ILLS

At the Kingsbridge hospital, London, for mental and nervous diseases, there is employed for the treatment of rheumatism and minor spinal troubles, one of the largest electrostatic machines in the world. When receiving this treatment the patient sits on a chair placed on the platform of the machine, and the afflicted parts are massaged with electricity discharged from a tube which is held by an attendant.

PERFUMES WILL ADD REALITY TO MOTION PICTURES

Pleasant odors, typical of the scene being shown, may be used in motion-picture theaters shortly, to add reality to the screened picture story. This will be accomplished by working keys at the organ, which will be connected to suitable spraying apparatus. When an ocean scene appears, the bracing odor of salt air, with its pleasant tang, will be wafted through the theater, as a natural accompaniment of the setting. Similarly, a country background will call forth the characteristic fragrance of freshly mown hay. Exotic perfumes and incense will be used in Oriental presentations. At a demonstration given recently, picture-theater owners expressed the belief that this touch of reality would add materially to the enjoyment of the film.

LARGE BALL THRUST BEARING OF ENORMOUS STRENGTH

With each ball built to withstand a pressure of 100,000 pounds without injury, the largest ball bearing of its kind in the world has been completed by an eastern machinery company and put into service. There are 40 balls in the bearing, each one 4 inches in diameter. It is estimated that it would require a pressure of 40,960,000 pounds to cause the bearing to collapse.

Pulverized coal, mixed with water, will be conveyed 200 miles in huge steel pipes, according to plans now being formulated by Dutch interests in Zululand, Africa. There will be a coal port on the coast, but export coal will be transported by railway. The project will involve an outlay of about 100,000,000 dollars.
On the one hundred and ninetieth anniversary of Washington's birth, last year, the news was flashed from the nation's capital that the Masonic orders of the United States had accepted plans for a magnificent memorial edifice, the George Washington Masonic National Memorial, to be constructed at Alexandria, Va.

Now the memorial, which was described from the architects' plans in the October, 1922, issue of this magazine, is under construction and soon will be ready for the housing of the priceless collection of relics of George Washington, which have been assembled under the direction of our first president's old lodge, the Alexandria-Washington Lodge, No. 22 (No. 39 in Washington's day).

While the idea has grown beyond the housing of the Washington relics, still there will be incorporated in the memorial building an exact replica of the original room in which Washington occupied the chair as master. This will be located in the southeast corner of the structure, on the ground floor. Even the wall paper used in the old lodge room will be faithfully reproduced, and there the relics of the "Father of His Country" will have a permanent home.

Collection of notable things used by Washington began almost at the moment of his death, when Dr. Elisha Cullen Dick, his lifelong friend and physician, and master of the Alexandria-Washington lodge at the time, cut the pendulum of the old clock that stood in the bed-chamber of the first president. It was 10:20 o'clock in the night, and the hands of the clock still point to the minute and hour that marked the close of that inspiring life.
After General Washington's funeral, Mrs. Washington presented the clock to Doctor Dick for the lodge of which Washington had been a devoted and beloved member, and of which he served as master for 20 months. He had become a first, or charter, member of the lodge in 1778, shortly after the application for its opening had been made to the Grand Lodge of Virginia. Upon the lodge walls still hangs the document containing his name, signed by Edmund Randolph, then governor of Virginia.

Among the most interesting features of the collection is Washington's Masonic apron, worn by him as a master and at the laying of the cornerstone of the nation's capitol. It is heavily fringed and embroidered in gold, of cream-colored satin, with the French and American flags intertwined. A beehive and fairies adorn the center. The apron was presented to the lodge in 1812 by a nephew of the general and husband of his adopted daughter.

Other relics now in the collection include Washington's farm spurs, boot-strap or garter, field compass, master chair as presiding officer of the lodge, the knife was given to Washington in token of his obedience to his mother's request not to join the English navy after all preparations had been made, and a commission obtained for him. He carried it throughout his life, and when at Valley Forge, after signing his resignation when a timid congress failed to provide food and shelter for his half-starving troops, he was reminded of his mother's words when she gave him the knife, "Always obey your superiors," he tore up his resignation.

Presented to the first president by Lafayette, a key to the Bastille in Paris and said to be one of the five in existence, is another of the prized relics.

In 1871, the old lodge in which many of these relics were kept was visited by a disastrous fire, but the collection was saved. Then for nearly 40 years, the relics were closed to the public, but in 1907 they were opened for inspection under charge of a member of the lodge. During the Civil War, although Alexandria was overrun constantly by both armies, not a single article was harmed or removed from the lodge.

Striking in design, the new memorial wedding gloves, pruning knife, and a black glove worn at his mother's funeral, a little pearl-handled knife, a present from his mother; and a piece of sealing wax taken from his desk and used by the general before his death.

overlooks the scene of many of Washington's achievements. Erected at a cost of over $2,000,000, it is surmounted by a square tower, notable for its simplicity and dignity.
SPIRIT HANDS, "ECTOPLASM," AND RUBBER GLOVES

ITS dainty fingers crooked, the wrist smaller than that of any grown person, a waxlike mold of a woman's hand lay on the table, while an awed group of persons looked at it, fascinated. Forty seconds before, there had been nothing on the table but a glass jar of hot, melted paraffin, another similar jar of cold water and— "ectoplasm."

It had been explained to the little band of spectators that the mold of the hand had been made by a "spirit." The medium had produced some ectoplasm while in a trance, the spirit had been in the ectoplasm. The ghostly visitor, to prove itself a "real something," had put its hand into the hot paraffin, then dipped it into the cold water, thus hardening the coating of the wax, finally pulling its spiritual hand out of the hard-paraffin mold through the wrist opening, leaving the shell as evidence.

"No human hand could have made that mold," the medium's friends had pointed out, "because no human hand could have been withdrawn from that cast through that tiny wrist. Notice how the fingers and thumb are crooked—no human hand so held could have been pulled out of that mold without breaking it. Again, to dip the human hand into that jar of melted paraffin would certainly scald and burn unbearably."

Father C. M. de Heredia does not assert that beings from the "other world" could not or do not make these hands, but he does say he can.
Left to Right: Father de Heredia Feels the Approach of the Ectoplasmic Mystery; the “Ectoplasm” Makes Its Appearance, Taking On the Form of a Human Being, Yet Folded Up; and a Visitor from Realms of Ectoplasm All Puffed Up

make them, and in the laboratory of Popular Mechanics Magazine he made them, many of them, and produced ectoplasm of the most convincing sort.

The human hand does not serve as the mold for the paraffin, Father de Heredia admits, but the “human rubber glove” does. Filling a rubber glove with water, the priest dipped it into the jar of the liquid wax. A thin coat adhered to the lifelike “hand.” A few seconds later he plunged the glove with its coating of wax into the jar of water. Then Father de Heredia emptied the water from the glove. As it collapsed it was easy to extract it from the molded hand. And in a trice, the “spirit” hand was produced.

By artfully “palming” the rubber glove, Father de Heredia was able to do the trick with ease and to the complete mystification of the beholder.

Then, the ectoplasm —

Within the rolled top of an ordinary 10-cent hair comb, the priest pulled out enough shreds of cloth — ectoplasm — to fill a good-sized hat. From a trick finger, such as are used by magicians, he extracted some excellent spirit pictures and yards and yards of other ectoplasm.

Entangled in the ectoplasm are knotted strings. Securing a knot between her teeth, a medium might run the string up through her hair to the comb bearing its secreted load of “astral matter,” as the shredded cloth and newspaper clippings are lovingly termed.

In the hour or more of time during which the séance lasts, she might gradually work out the strange, unearthly material with its attached spirit pictures. Another concealed string pulls forth the astral finger — the before-mentioned magician’s digit — to point tremblingly at the bewildered audience. “I do not say the spirits do not do these things, but I do say anybody who knows how can do them;” that is the attitude of Father de Heredia. The quantity of ectoplasm that can be concealed in an ordinary 10-cent comb on one of these fingers is astonishing. And they are quite easy to handle in a séance.

Above: Ectoplasm and “Spirit Faces.” Below: Magician’s Finger and the Hollow-Topped Comb

The “Spirit Hand”: Note the Small Wrist Hole and the Crooked Fingers — “Evidence” of Astral Origin
MODEL HELPS IN HANDLING JAMS ON SUBWAYS

Many ways for speeding up the heavy traffic which occurs at rush hours on subways have resulted from a study of a small model of one of London's new "tube" stations. With this before them, the engineers have been able to trace the exact movement of crowds and plan for improvements. Moving stairways, change-making devices, platforms, and runways are all reproduced in the model, which is a graphic example of the application of this art to the needs of everyday life. When, with the increase in population, the passenger-carrying capacity of the trains had reached its limit, the experts turned their attention to the stations, seeking to care for the crowds more quickly, and it was to aid in the solution of this problem that the miniature station was constructed.

MOTORCYCLE FILM PLANT MAKES QUICK MOVIES

To shorten the delay caused by having to send motion-picture films back from the spot where they were taken to a distant laboratory for developing, an English inventor has equipped a motorcycle sidecar with a miniature film-manufacturing plant. It is claimed that the plant will develop and print film at the rate of 200 feet an hour, assisting greatly in the quick production of news-reel features. By its aid news events have been thrown on the screen within two hours after they happened. The plant consists of a developing tank, the printer, and the drying drum around which the film is wound. A hood and screen also are fitted to the sidecar for use as a dark room. Because costly film is easily spoiled, especially in hot climates, it also is claimed that this portable plant will result in avoiding heavy losses. It may be set up anywhere water is obtainable. Where the water is not pure, a filter and a pump are provided. These are run by the motor of the cycle car.
MINERAL TOURMALINE HAS QUEER PROPERTIES

Tourmaline is a mineral of much interest to the physicist on account of its optical and electrical qualities. It has a great range of color, and in many cases the crystals are curiously particolored; sometimes it is colorless. A ray of light passing through it becomes bent at different angles, depending upon whether it enters the crystal parallel to or perpendicular to its axis. It is also known that when heated in peat ashes it acquires magnetic properties. Another strange property of tourmaline is that it becomes electric under pressure.

GERMAN AUTOMOBILE BUILT ON EXTREME LINES

Peculiar designs in automobile bodies continue to appear. The latest comes from Germany, and is designed to offer the minimum of wind resistance when in motion. Even the wheels have been arranged to diminish it. The body is built like one of the lately developed thick airplane wings, partly with the end in view of preventing the large cloud of dust that usually trails behind a speeding auto by confining it under the rear end.

HENS CONTINUE TO BREAK LARGEST-EGG RECORDS

While new dancing, aviation, and sporting records are a matter of almost daily occurrence, the attention of poultry raisers in all parts of the country has been challenged by our recent publication of a story of an egg which measured 7.87 inches by 6.75 inches and weighed 4½ ounces. One hen in the Far West has presented its owner, E. T. Harvey, of Cottage Grove, Ore., with a sample egg measuring 8.25 by 7.5 inches and weighing fully five ounces.

SECRET'S HIDDEN IN BLANKETS UNRaveled BY SCIENCE

To the average person a blanket is a covering that affords protection from cold and wind; to the scientist it is an arrangement of fibers of wool, cotton, or other material, and has lately been under investigation at the Bureau of Standards. There, textile experts have been working to find out facts regarding the ability to transmit heat and exclude air, the moisture-absorbing properties, and the tendency to cling to the body, for different kinds of woven goods or felts used in the making of blankets.

In determining to what degree such materials prevent penetration of air, a metal cylinder 8 inches in diameter is used. Over its head the test piece is tightly stretched, and the amount of air that leaks through under standard pressure, is measured by a gas meter. The apparatus used for the moisture test is more elaborate and consists of a metal pan, in the top of which are eleven holes each holding a glass beaker. Heat supplied within the pan evaporates the water in the glasses, and the amount escaping measures the moisture-absorbing property of the sample of cloth stretched across the top of the glass. In order to test its ability to transmit heat, a sample of the blanket is stretched over an electrically heated metal surface, that is maintained at the normal temperature of the human body, and the heat that radiates from the top of the blanket is accurately measured by means of suitable electrical thermometers.
WITH steamship and railway companies prepared to care for a record-breaking rush of American tourists to the centers of old-world culture, as well as to the very outposts of civilization, this summer, a steadily rising tide of travel has turned toward the Orient, South America, and Europe.

The charm, romance, limitless wilds, background of age-old history and balmy climate, already have called shipload after shipload of tourists to South America, where the refinement of Europe, the traditions of Asia, and the savagery of Africa are more than matched by the continent over which the lofty Andes stand guard.

But the lure of the Orient has proved just as potent with thousands of others who are now crowding the luxurious liners sailing for Honolulu and the Far East from San Francisco and other Pacific-coast ports. Japan—the “Land of the Rising Sun”—situated at the crossroads of world traffic and the meeting place of two civilizations, has been the Mecca of many of these voyagers.

There they have found a country of picturesque quaintness, of kimonos, tea houses, cherry blossoms, wisteria, and geishas, over all of which towers the sacred Mount Fujiyama, a beacon and a symbol of manifold and endless charm. From Yokohama, the principal port, the fascination of China beckons like an ancient door slowly opening on what is the oldest civilization in the world, a culture that was vigorous before Rome was born.

Like a never-ending picture, in China there are a thousand things to see—rivers dotted with junks, camel caravans, temples, huge images, forbidden cities, monuments so old the human mind can hardly go back to their origin, dynastic tombs, and flowery pagodas.

Shanghai is a city of contrasts; a city with telephones—and firecrackers at funerals; a city with street cars—and silver dollars hung about children’s necks to fool the devils into thinking them dogs.

The East and the West meet again at Manila where the harbor is full of strange craft, and the streets of the people of every race and tribe. From Hongkong and Manila the liners steam to Singapore, the most southern point of Asia, where the sun rises and sets at the same hour every day of the year.

But while the first rush of tourists this year has been toward the South and Far East, a greater number than ever before, it is estimated, are preparing to journey across the Atlantic to Paris, London, Stockholm, Rome, and other points in Europe.

From these places many will continue their journey to Algiers, the “African Paris,” where Arabs, Turks, Moors, and Bedouins throng the narrow, winding streets, and then cross the Mediterranean to visit Monaco and Naples.

Next, the usual course of the tourist is through the Suez Canal, Red and Arabian seas to India, land of many races, religions, and customs; a place of mystery, splendor, and squalor, strangely blended. Afterward comes Ceylon, so perfect that the natives say it is only “40 miles from heaven.”

In transporting and safeguarding the untold thousands of tourists, every device of modern civilization will be taxed to the uttermost. Great liners equipped with stabilizing devices to prevent seasickness, oil-burning boilers to avoid dirt, and, in some cases, electrically driven to eliminate vibration, will be at their disposal.

Baseball scores, stock quotations, and the latest news events will be brought daily by radio and printed in small newspapers aboard the liners, or posted on bulletin boards. For amusement, there will be games, concerts, and orchestras.

Luxuries dreamed of a generation ago will be placed at the command of every tourist. The monotony of long train journeys will be broken by moving pictures projected in dining cars, while the trains are speeding over plains and mountains, and the radio will bring concerts and opera to passengers aboard both trains and liners.

Journeys which, within the memory of men still alive, could be made only by months of peril and hardship and at the risk of life itself, may now be undertaken in safety and completed in comparatively few hours. The telegraph, telephone, and radio all assist in protecting tourists and adding to their comfort and safety.

Vast armies of trainmen, seamen, dispatchers, telegraph and telephone operators, and lighthouse tenders keep ceaseless vigil over those whose lives depend upon their watchfulness. Most of these are men, but many women have found their way into some of the professions whose duty it is to protect others.

At the Golden Gate to San Francisco, for instance, a girl helps to guide the destinies of a thousand deep-sea craft from a lofty tower overlooking the bay. She is Miss Hilda Gehrman, and is officially known as the secretary of the Board of State Harbor Commissioners.
SAILING OF LINER DRAWS WATERFRONT CROWDS

Now Flying the British Flag, the "Majestic," a Former German Liner Which was Purchased by England from the Reparations Commission, Attracted Much Attention When It Steamed Out of Hamburg Harbor, Germany, Recently, with Its Siren Shrieking a Farewell.
OLD NAVAL BASES TURN TO INDUSTRY

Stettin, Germany, Known as the Most Important Commercial Harbor on the Baltic: During the War It was Used as a Naval Base, but Now It has been Made an Industrial Center

Marseilles, the Greatest of the French Ports on the Mediterranean, Is Not Only a Mecca of Interest for the Tourist but a Beehive of Commercial Activity
One of the Most Picturesque Sights in Balboa, Spain, Is the Long Lines of Women Unloading the Steamers. They Carry the Goods on Their Heads in Big Baskets.
FLAGS OF ALL NATIONS MEET IN PORTS

Where the Ships of Many Nations Meet in the Harbor of Hobart, Tasmania, a Part of Australia, on Their Way to and from the Orient.

One of the Ports of Malta, an Island in the Sunny Mediterranean, Where a Great Stadium has been Built in the Form of a Circle.
GLEAMING MINARETS MARK THE GOLDEN HORN

Constantinople and Its Harbor. Long Objects of Contention among the European Powers, Provide Striking Contrasts between Splendor and Squalor, the Civilization of the West and the Color of the Orient.
Upon the Arrival of Any American Steamer, the Docks at Singapore Are Always the Scene of Great Activity by the Natives.

Natives Coaling a Liner from the United States at Nagasaki, Japan, Known to Travelers as One of the Most Picturesque of All Oriental Ports.
SOUTHERN PORTS ARE BUSY MARTS OF TRADE

Buenos Aires Harbor, Argentina, Known as One of the Costliest in the World, Which Is a Center of Trade with Europe and the United States

Rio de Janeiro, Brazil, Showing the Suburb of Botafogo and Sugar Loaf Mountain, Which Towers above the Waterfront Like a Sturdy Sentinel
LIKE A BARE FOREST, THE STRIPPED MASTS OF HUNDREDS OF FISHING BOATS FILL THE HARBOR OF PARA, BRAZIL, ON MARKET DAYS, WHILE THE COLORFUL COSTUMES OF THEIR OWNERS GIVE A ROMANTIC TOUCH TO THE SCENE.
SELF-SEALING INNER TUBE
DEFIES PUNCTURES

Self-sealing qualities are claimed for an inner tube of English make, which has a series of overlapping flaps arranged on its inner surface. When the tube is punctured, the flaplike wall is pushed aside at that point, and when the piercing element is withdrawn, the flap shuts tight over the puncture. The surfaces of the flaps are moistened with glycerine at the time of manufacture. The tube made a creditable showing in an official test run of 100 miles, 19 stops being made at five-mile intervals for the purpose of driving a nail into the tube and withdrawing the nail driven at the preceding stop.

ICE-CREAM "NOODLES" MADE WITH NEW DEVICE

Ice cream served in a new manner seems to make that dish more palatable, and sought for. The latest novelty along this line is an aluminum contrivance which produces ice cream in a noodlelike form. The cream comes out in long coils, which fold and intertwine on the plate.

A View at Night of the 15-Foot Mirrored Sphere, Revolving and Gleaming on Its Lofty Station

The surface of the globe is completely covered by 450 mirrors, each 12 inches square, and at its circumference the word "Ice" appears several times in large letters. The continuously revolving globe reflects the sun's rays by day, and at night the light from electric flood lamps is directed on it from the four corners of the tower.

SOUND TIMBER 500 YEARS OLD FOUND IN LONDON

Recent tests of the original oak timber used in building the huge roof of Westminster Hall, London, proved that there had been no loss of strength in the wood during the more than five centuries since it was cut. While the roof itself is intact, its supports have been destroyed by the "deathwatch" beetle and have been replaced by steel.
Ample protection is afforded the firemen of an eastern city with the adoption of an interesting type of fire-fighting equipment. The unit is portable, and mounted on a two-wheeled cart, so that it can be brought up quickly to be used against a fire at close range. The cart accommodates a fireman who sits in it, and is able to handle a powerful stream of water from a nozzle directly in front of him. A “gusher” pipe is mounted on the cart behind him, which sprays a curtain of water all around him, so that a “safety wall” of water protects him and serves amply to prevent blisters and burns. The nozzle proper is mounted in a ball socket, so that it can be swung in any direction with equal facility. Although adapted primarily for fire boats, its present service has proved a very desirable addition as a fire-fighting tool. It can be connected to four, and even six lines of hose, and throws a stream of water 125 feet into the air.

How the Fire-Fighting Apparatus is Used at Close Range: It Protects the Firemen against Injury from the Flames

Competitive kite flying—the first ever held in the United States under official sanction, with official observers and according to the rules of the International Aeronautic Federation—will be a feature of the home-coming festival at Clarksburg, W. Va., June 10-16. The performances will be authenticated in the same manner as air-craft records.

HEAT OF MOTOR CUTS DOWN SUPPLY OF GAS

To make automobile starting easy in cold weather and at the same time prevent too rich a mixture of gas when the motor is warmed up, an automatic control has been devised. The heat of the motor as it warms up expands a spring which cuts down the amount of gasoline fed to the carburetor. When the motor is cold, the spring contracts and admits more gasoline.
WHEN this big Mallet-type locomotive takes a curve in the track, it cannot make the turn as its smaller brothers do. Its boilers swing on pivots independently of the wheels, as here shown. The engine—one of the largest ever built—is 108 feet long. It has 12 driving wheels, weighs 850,000 pounds—425 tons—and carries 12,000 gallons of water and 4,000 gallons of oil. Its use has largely been confined to freight hauling, and it easily handles a hundred cars through the mountains of the West. The artist has pictured this giant of man's invention as it roars through a gorge on the line of a western road.
The Views Shown on This Page will Bring Home Some Conception of the Unusually Attractive Design of This Japanese Hotel. The Upper Scene Is a View from the Front. The Pool of Water Is One of a Series Designed to Catch Rainwater and Deliver It to an Underground Cistern. It will Then be Filtered and Pumped throughout the Hotel for Bathing Purposes. The Lower View Shows One of the Promenade Lounges, of Luxurious Simplicity, and the Small View to the Left Is a Portion of the Beautiful Outer Wall. All Materials Used will Be of the Most Durable Type, Such as Brick, Bronze, and Marble, Fashioned to Represent Strength, Simplicity, and Beauty.
"WORLD'S FINEST HOTEL" FOR JAPAN

To an American, a prominent architect of Chicago, goes the credit for the design of a princely hotel now under construction in Tokyo. Its name—the Imperial—is in keeping with its regal appointments and fittings; but overornateness and excessive decorative effects have been omitted, as not in good taste. The guiding thought of its designer has been to impart character to the structure, and for this reason many conventional ideas as to hotel layout have been discarded, without, however, in any way sacrificing either beauty or comfort. All the power and service requirements of the hotel will be developed and supplied within the structure itself, so that, in reality, it will be a wholly self-contained and self-dependent hostelry. Beautiful gardens are being planned to surround the property and thus afford a suitable setting for its beauty.

Returning after an 18-months' survey in northern Siberia, a Russian mining expedition reported the discovery of new coal deposits about 4,000 square miles in extent. In the Yenisei region, graphite seams about 46 feet deep were also found. It is believed that these could be worked, even under polar conditions.

TAGGING FISH WITH BUTTONS FOR IDENTIFICATION

Various more or less unsatisfactory methods of branding and marking domesticated fish for identification and proof of ownership have long been in use. A practical and comprehensive plan is now suggested by the Bureau of Fisheries, to help in studying the habits of various fish such as salmon, codfish, pollock and haddock. A device similar to a bachelor button of aluminum is riveted into the fish's tail. With this system the oceanic migration of fish, their rate of growth in various localities, and age can be determined. The bureau pays 25 cents each for tags sent in if accompanied by place and date of capture, length, weight and sex of fish, and how marked. Four thousand salmon were marked in 1922, and 10,000 more will be marked in 1923, each with the initials U. S. B. F. and a serial number.
Each year a large caravan of tourists, mainly from Michigan, but including several other states, conduct an elaborate tour, en masse, and travel together over the entire route. All details, such as camp sites and delivery of mail while on the road, are planned in advance, so that the individual tourist may enjoy the outing to the limit, without petty worries to mar the trip. Similarly, deliveries of gasoline, oil, food supplies of all kinds, and other necessities, are made in camp, so that tourists do not even have to stop for any of these items. The 1923 tour will be from Battle Creek, Mich., to Washington, D. C., and a limit of 210 cars and 800 campers has been set for it.
LETTERED GLASS PROJECTS HILLSIDE SIGN

In laying out a hillside sign with letters more than 70 feet high, a western real-estate man resorted to an unusual method in order to get the sign to appear in the proper perspective when viewed from the foot of the slope. The word "Lots," which was the only one in this advertisement, was printed on a small piece of glass and supported in front of a surveyor's transit located at some distance from the foot of the hill. An observer looking through the transit directed the placing of stakes by a man on the hillside. The letters thus outlined were later covered with boards and painted white, standing out undistorted from a distance.

POWER PLANTS ARE RUN BY PHONE KEYS

Engineers have successfully adapted the use of a central telephone system to the control of a group of small power plants. The dispatching system, in charge of one man, is equipped with a small box containing several phone keys and an automatic dial. By connecting the device with any station desired, a series of tone pulses in the receiver indicate the power conditions. This is said to be quicker than if all orders had to be relayed verbally to the operators.

SAFETY ARM AIDS DELIVERY OF TRAIN ORDERS

Overcoming the disadvantages in the present method of delivering orders to conductors and engineers on moving trains, is the object of a safety device recently introduced. It consists of a forked arm provided with clips which hold the hoops to which the train orders are attached. Side springs permit lateral movement of the clips in two ways, thus allowing the hoop to be easily withdrawn by a man on a passing train. The apparatus is attached to the signal bracket and is operated from inside the station. At night, it will be illuminated.
BOTTLED FLUID HAS POWER TO LIFT 30,000 POUNDS

Sindbad's genii flask has been outdone in real life by the invention of an expand-

Child Lifting Truck with Force of Expanding Fluid in Steel Container Which is Easily Recharged

ing fluid easily carried in steel bottles by a child. The power may be released by a valve and used with jacks or other lifting devices to raise street cars, autos, and heavy weights. It is estimated that the power of the expanding fluid will raise 30,000 pounds in three seconds if properly applied.

RAVAGES OF KILLER WHALE CAUSE REA FOR BOUNTY

To hold in check the ravages of the ocra, or killer whale, the government has been urged to pay whalers a bounty to destroy this terrible "wolf" of the north Pacific seas. More than 75,000 fur seals are declared to have been destroyed annually by the killer whale, which preys upon the fur seals in the Bering Sea.

LINERS TO CARRY PLANES FOR MAIL DELIVERY

Mail delivery to ports, located off the regular line of call of mail steamers, would be greatly speeded up by use of an aircraft-carrying steamer, the design of which has been submitted to naval architects in London. The plan calls for many changes in the customary lines of steamship construction, but engineers declare these variations can be made successfully. The funnels and ventilators of the new ship would be placed below the top deck, toward the stern, and would discharge either to the starboard or port side, according to the direction of the wind. The landing deck on top of the vessel would thus be clear from obstructions. The idea in developing the plane carrier is that such a ship, running from Great Britain to New York City, could send off airplanes which would reach Montreal and Canadian points before the steamer docked at New York.

SMELL TO LURE BOLL WEEVIL TO ITS DEATH

Government chemists are now at work on a new method of attack on the cotton-boll weevil. An attempt is to be made to find out whether any odor from the cotton plant attracts the weevil, and just what it is. It is then hoped to duplicate the odor in the laboratory, and lure the insect to its doom with poisoned bait, if necessary.

LIGHT IN RADIATOR CAP FOR ADVERTISING

To act both as a warning signal and for the display of advertisements, monograms, and lodge emblems, an illuminated radiator cap has been devised for motorists. Current from the storage battery of the car is used in the small electric light hidden in the cap.
RICH RELICS FOUND IN MEXICAN PYRAMID

Excavations in the "Pyramid of the Sun," recently discovered in Mexico, are daily bringing to light a wealth of relics through which it is hoped to learn something of one of the earliest civilizations on the American continent. Strange utensils and wonderfully carved images have been found by the excavators. The carved "writings" of the builders fill the walls of the pyramid.

A Section of the "Pyramid of the Sun," Recently Discovered in Mexico: The Carved Images and Fresco Work Are in a State of Almost Perfect Preservation. Many Strange Relics were Found

"BOAT-TAIL" BULLETS INCREASE RIFLE ACCURACY

Tests conducted by the army, and the experience in competitive rifle matches, indicate that tapering the base of a bullet has a marked effect on its range and accuracy. This is because the "streamline" shape reduces air friction, a principle long adopted by airplane and automobile-body builders. A 6° taper has increased the range of the new bullet about 1,400 yards, making a maximum range of 4,800 yards when used with an army rifle. In addition, the path of travel is much flatter, so that greater accuracy is possible. Changing the shape of the bullet has resulted in a "whispering" sound, and will therefore afford no information as to range or source.

Fighting airplanes may be fitted with inverted engines, if these prove successful in tests. The upside-down engine, which is an exact reversal of the ordinary one, has its crankcase at the top and its cylinders beneath. Its principal advantage is that it gives a pilot an unobstructed view forward.

Enlarged View, Showing How the "Boat-Tail" Bullet Looks in Flight: Its Speed at the Muzzle Is About 30 Miles per Minute
ON the west slope of that strange and forbidding region in California known as Death Valley, an industrial development is taking place different in many respects from anything else in the world.

Death Valley's fame as a repository of exceedingly pure borax is now to be supplemented by the fact that immense deposits of high-grade Epsom salts have been found there. For years pictures of long mule trains hauling borax have been familiar features in school geographies. Now modern science has introduced into the region a new mode of transportation, a monorail system which is a hundred times more efficient than the multiple-mule team. This will be used not only to transport borax and Epsom salts, but also other minerals found there.

Many miles of the monorail which now taps this wealth is already in operation. Small tractors, altered to meet the demands of this single-rail line are used for power. The cars hauled by these engines are built in the form of an "A" which is balanced at the apex on the one rail, the load being carried on either side. The trains ordinarily travel at a speed of 10 to 15 miles an hour.

In removing the salt deposits it is proposed to use the hydraulic method of cutting down the hillsides by constructing a reservoir on the high ground and piping the water into the valley. Powerful streams of water will be directed against the hillsides, washing the mineral salts into sluiceways and then into settling tanks or vats. As it has been found that the salts dissolve more rapidly in hot water, the supply will be heated by using great solar heaters consisting of copper coils under glass set at an angle that will admit a maximum of exposure to the sun.

Desert heat also will be utilized to evaporate the brine carrying the salts in the settling tanks. The resulting deposits will then be taken to a refinery and subjected to several treatments designed to produce the desired separations. One of
the products resulting will be magnesium carbonate, large quantities of which are used in making automobile tires and other rubber goods.

By the use of these scientific methods it is expected that the cost of removing the salts will be considerably lowered, the carrying expense alone being placed at less than $1 a ton.

JAPANESE GARDEN ON NEW YORK HOTEL ROOF

Unusually novel settings have been devised to add beauty to New York's hotel roofs, and the latest to appear makes a similar claim to attention. A Japanese landscape architect designed it to represent a tropical garden of the "Flowy Kingdom." It is supposed to be an exact likeness of a portion of the Imperial Garden at Tokyo, and is alive with typical Japanese flowers, plants, and other vegetation. Ducklings paddle about in a miniature lake to add reality to the scene.

Aerial photography as a means of fire prevention in cities is being investigated by the fire-insurance companies. Fire hazards that escape the casual observer on the ground become strikingly apparent on a map made from photographs taken from an airplane.

UNEARTH ADDING MACHINE IN OLD INCA TOMB

That the ancient Inca civilization in Peru possessed an adding and calculating machine has been revealed in the recent discovery by excavators of a knotted cord, or "quipu," in the ruins of a prehistoric tomb. The cord is 16 yards long and contains 100 knots. Divided into 10 unequal sections, these knots represent the odd numbers from 1 to 19. The sections are of different colors, including red, brown, yellow, blue, and green, and are separated by silver beads, which represent the even numbers from 2 to 20. By using this simple way of counting, based on the decimal system, rapid calculations can be made.

ELECTRIC LIFEBOAT LIGHTS AS SAFETY BEACONS

Designed to add to the safety of passengers in case of accident, an invention for the automatic lighting of lifeboats has been tested in London. By the new device, two small electric lights are switched on when the boat touches the water. A float, incased in a tube at the stern of the boat, operates the switch. Storage batteries, capable of giving 24 hours' continuous light, are carried on board.
FOSSILS PROVE ASIA ONCE PART OF AMERICA

Fossils unearthed by the Third Asiatic Expedition, working in Mongolia, prove that a broad land connection once existed between North America and Asia. Part of the remains has been identified as that of the "titanothere," which eventually roamed over Utah and Montana several million years ago. Perhaps the most important find is the skull of a "baluchitherium," a giant rhinoceros and one of the largest land mammals that ever lived. This animal is estimated to have measured at least 12 feet high and about 24 feet long.

OWNER DISGUISES HIS CAR WITH ALUMINUM BODY

In a search for variety, an owner of a small automobile recently built a body of aluminum for it which gave the machine the appearance of a far more costly car. Practically the only change he made in the chassis was to lengthen the frame several inches. Of the roadster type, with pointed radiator and disk wheels, the body naturally improved the appearance of the car quite considerably.

SOW HAWAIIAN FIG GROVES FROM ARMY PLANES

Sowing seeds is one of the latest services that United States army fliers have been asked to perform. When the Department of Agriculture recently wished to plant a number of barren areas in Hawaii with fig trees, it was found the project would require months of hard work in places that were almost inaccessible. Two planes with four airmen were assigned the task and planted the grounds in less than three hours. When matured, the fig trees bear large quantities of fruit each year, and will help in preserving the moisture of the islands. Some of them cover an area of 2,000 square feet and have been known to bear 10,000 pounds of figs in a single year.

MILLIONS OF FLIES MADE TO TEMPT FISHES

Search for the gamey trout, bass, or salmon has turned the making of artificial flies into an industry employing hundreds of persons. Every color of the rainbow, and every possible variety of bug or fly is cleverly imitated to lure the fish to the hook. Feathers form an important part of such bait. They come from the neck of the chicken, from peacocks, ducks, ostriches, gold and silver pheasants, and even African jungle birds—all to suit the whims of the angler. Formerly they were hard to get; but the industry has grown to such proportions that feather dealers now supply any kind wanted. They are dyed in more than 150 different shades and colors. For other necessary materials, not only the United States and Canada, but Norway and Spain as well are combed. Northern Europe furnishes just the right kind of hook, and the southern country silkworm gut. One of the largest American factories making artificial bait was started by a woman who first made them for her father. This plant alone now turns out upward of 5,000,000 artificial flies a year.

Erection of a giant pipe organ is being planned for the so-called cathedral rocks in Zion National Park, Utah.
SALVATION ARMY DOUGHNUTS
IN CHURCH CARVING

To commemorate the war service of the Salvation Army, a church in New York has placed a wood carving in its choir. The central figure is a woman in uniform carrying a tray filled with doughnuts. On each side are figures of doughboys in attitudes of appreciation and gratitude, and to the right, in the center of a scroll, is a group comprising a trumpet, a tambourine, and a bible, representing the principles and methods of the Salvation Army.

NEW TYPE OF JOINT MAKES
ROD VERY FLEXIBLE

A new steel rod for bait casting with "staggered" joints, or joints that vary in length, has been invented. The first joint, in the heavy section, is short, the second one longer, and the third still longer, which gives the rod unusual balance and flexibility. This flexibility is further increased by wafer-thin sleeves of steel at the ferrules which reinforce the joints. These improvements are said to combine advantages of a bamboo rod's lightness and a steel rod's strength.

Out of a total of $76,757,040 expended by the Rockefeller Foundation in the past 10 years, over $18,000,000 was distributed in the interest of public health.

RAT KILLER AND FOOT-SET
RAT TRAP INVENTED

A mechanical rat killer with a heavy spring and a rotating double hammer which strikes the animal on the head and throws him from 5 to 8 feet, is the latest in traps. This device automatically resets itself for the next blow, and two safety catches prevent accidental discharge. The rat is thrown away at once and leaves no odor to scare away other rats. The trap is made in two sizes, one for rats and one for mice.

Another unusual trap, made of all steel, is set by foot pressure, thus avoiding all danger of injury to the fingers. The jaw, when set, is at an angle of 90° instead of 180°, as in old-style traps, and the action is much quicker. The trap, being steel, is easily disinfected by dipping in hot water.

This Rat Killer Knocks Its Victim on the Head, Then Flings It Promptly Away from the Machine. On the Left Is a Close-Up of the Device When Set.
RUBBER PAVEMENT MAY SAVE COST OF NEW BRIDGE

It is believed that rubber pavement, with which considerable experimenting has been done in recent years, may provide a solution for a bridge problem at Boston and save that city and Cambridge over $6,000,000. Spanning the Charles River and connecting the two cities is a bridge that vibrates so excessively under street-car and vehicular traffic, that none of the types of pavement tried has remained long in place, and even the safety of the steel structure is threatened. The city of London, Eng., has experimented with pavements of rubber blocks for some time past, and found them durable and satisfactory in every way.

Recent tests made by the Imperial Institute indicate that the talipot palm, or fan palm, of South India may prove a promising paper-making material. The leaf stalks give a good yield of pulp, from which can be made a good quality of brown paper.

PANAMA'S TORRENT GREATER THAN THAT OF NIAGARA

Tremendous as is the volume of water constantly rushing over Niagara Falls, recent statistics indicated that it is exceeded by that passing through the eight spillways of the Panama Canal. It has been estimated by engineers that these gates pour out a flood amounting to 103,000 cubic feet of water every second. This figure will be considerably higher when present plans to increase the capacity of the canal locks are carried out.
WILDERNESS WONDERS
TO BE MADE ACCESSIBLE

By J. Cecil Alter

ONE of the world's most extensive known groups of natural bridges is to be made accessible to automobile tourists soon, according to present plans. These gigantic rock spans, notable for their scenic beauty, are in Utah, about 140 miles from the nearest railway.

To reach them it will be necessary to blaze a trail through a western wilderness, across several deep and rugged canyons, and span sandy washes, to Elk Mountain, which is about half a mile from the bridges.

From the top of this peak, a forest-covered table-land, there is a magnificent view for 50 or 75 miles, south into Arizona, and west into the central part of the state. Clad in a blanket of bushy cedars, the appearance is pleasing, but the close-set trees with their vicious snags and prongs repel invaders.

So extraordinary are the carvings and foldings of the watercourses in this region that many grotesque figures appear. Winding through intricate labyrinths of rocks, the burrowing streams, in entrenching themselves, have formed amazing cradlelike folds, overhung with wonderful arches and cornices in scores of places.

Cattlemen in quest of wandering stock first penetrated to the inspiring natural bridges in 1883. First to be encountered was the Edwin, which was formed by a channel piercing the wall into Armstrong Canyon. Ages have elapsed since this breaking through occurred, and the channel is now 40 or 50 feet deeper than the original outlet, and the arch has been greatly widened. Bared by the weather, the span is exceptionally graceful, its abutments having been chiseled away by nature in outlines and dimensions so symmetrical as to suggest a studied engineering feat.

Rising more than 100 feet above the tourist's campfire, the span is 200 feet and the extreme width in the middle 30 feet. Horses are easily ridden to the top for the thrill afforded the rider in crossing the narrow causeway.

Fittingly named, the Sitting Duck is a colossal figure near the Edwin, the bird's bill and neck forming the abutment and a section of the span of what appears to be a fallen bridge. This monarch was evidently produced when a gooseneck in the canyon was holed through by the waters, finally leaving a causeway 200 feet above the stream.

Four miles away by a difficult trail is the Caroline Bridge, the opening of which is rather small compared with the other dimensions, and it is therefore considered to be one of the youngest. Its span is 250 feet, height 165 feet, and
ing the Natural Bridges National Monument, which was created in 1908-09.

Previously, a group of scientists had penetrated the surrounding wilderness, ascertained the dimensions of the bridges, made the first photographs and paintings, and then christened these stupendous freaks of nature. In 1921, state officials visited the bridges and conceived the project for an automobile road.

Numerous relics of the cliff dwellers who formerly peopled the canyons have been found. Food caches in cribs and cairns appear in the crevices high along the walls and in the great cavernous overhanging shelves near the bridges.

Although work on a small section of the road way already has been begun, it may be several years before it

width 60 feet.

About two miles farther on is the Augusta, said to be the most graceful and pleasing of the trio. It also is the largest and the most gorgeously decorated. Two great hummocks of sandstone surmount the abutments, tending to belittle the bridge when viewed from the canyon walls.

Access to the top is gained only by sure-footed travelers, or with the aid of ropes and skilled guides. Viewed from below, its enormous size seems to defy familiarity and close acquaintance, towering to the height of a 15-story building.

In all these 40 years since the first of the bridges was discovered, a mere handful of tourists have visited the forbidding, inhospitable region to view them.

One party made an outline survey of the section for designat-

The Beautiful Caroline Arch, at the Junction of Armstrong and White Canyons, Looking North: The Party of Tourists Look Like Pygmies under Its Lofty Portal
is completed because of the engineering difficulties encountered.

Winding through the wilderness, the road, when completed, will run through the frontier town of Blanding, the nearest point of civilization, and Elk Mountain, noted for its scenic beauties. Local, state, and government officials are cooperating in the opening of the highway, as it will be of service not only to

tourists but to timber cutters and cattlemen as well.

Heretofore tourists who have penetrated to this region have had to use horses and go afoot part of the way. Few have penetrated farther than the Kigalia ranger station on Elk Mountain, from where they were afforded a clear view of the surrounding forests and rock formations.

Automobile tourists have not been able to reach this spot, but can do so as soon as the first section of road, now under construction, is completed. The first stretch of highway will cover 12 miles.

The Scene Above Shows How Striking Is the View of the Edwin Natural Bridge, as Seen from a Knoll at Its Eastern End. Water from the Canyon at the Right Holed through the Thin Wall of the Rock Ledge, Forming the Bridge. At the Left Is the Ladder Ruin, Used by the Cliff Dwellers Ages Ago. Its Upper Shelf Is 90 Feet above the Canyon Floor. The Ancient Ladder Is Still Strong Enough to Carry a Heavy Man

Here Is the “Wine Glass” Fashioned by Wind, Rain, and Sand Out of Solid Rock: Its Stem in Particular Is “Lifelike” in Formation
NEW RACK FOR PRESSROOM HOLDS MANY ROLLERS

Rollers for printing presses must be removed from time to time for cleaning, or while the presses are idle. To aid in this work, an improved type of rack has been devised by the head of the press-room in Popular Mechanics' new building. Several brackets are arranged on the uprights of the rack, so that they are able to carry as many as 24 rollers. The platform is mounted on casters, so that it can be moved about easily, and is fitted with a drip pan for receiving the excess oil when the rollers are being cleaned.

BASEBALL IN "CRACKED" PANE ATTRACTS ATTENTION

Sawing a baseball in two and gluing the two halves opposite each other on a glass-window front was the clever trick resorted to by a sporting-goods merchant to attract attention to his store. Chalk-lined "cracks" were drawn radiating from the baseball, and gave a realistic appearance to the fracture. During the first few days crowds gathered and commented on the freakish result of the "throw."

EGGS ARE GROWING LONGER, U. S. SCIENTISTS FIND

Due to scientific breeding and improved methods in the poultry industry, eggs are growing longer, government investigators have found. Research authorities, studying the cause of increased breakage of eggs packed for shipment, disclosed the fact that standard crates with honeycomb sections are no longer an assurance against damage in transportation. As a result, poultry growers, who wish to ship long eggs, have been urged either to pack a smaller number in each crate or to increase the size of the crate by nailing strips, about 1 inch high, on top of the two ends and the center dividing board. If these steps are not taken, it is advised that the farmer sell his long eggs locally and ship the shorter ones.

Tests of a form of lead in the treatment of cancer are being made in England.
ONLY a few months ago, a well-known advertising man, Will H. Dilg, found it impossible to any longer restrain himself and, on his own account, started a long-cherished campaign to save our great outdoors. The immediate results of his efforts were so amazing that a small group of wealthy men contributed $25,000 to carry on the work. A few days ago the first national convention of the Izaak Walton League of America was held in Chicago, with hundreds of delegates, representing nearly every state. The local branches of the league are known as chapters. Already there are hundreds of these chapters, some of them reporting over 500 members, while the total membership is now over 100,000, with the prospect of a membership of 2,000,000 or more within another year or two.

While various bills have been introduced from time to time in state legislatures, and national legislation has helped preserve the migratory birds, there has never been, until the organization of the Walton League, a consistent, national effort to save those features of the great outdoors that are rapidly approaching the vanishing point by wanton destruction and needless waste. Our mountains, lakes, and rivers remain, though the streams are rapidly becoming deadly to all fish life through pollution; and our forests, or what is left of them, will soon be only vast tracts of ugly stumps. It is to check this rapid, and largely needless, waste of bird, game, and water life, and the utter destruction of forests that the league was organized. In proportion as trees diminish, birds and streams decrease; and as the birds decrease, the number and ravages of all insect pests increase.

It is not generally known that the greater portion of wild game served on club and hotel tables in this country is imported from Europe. But by reason of well-considered regulations and protective measures, Europe, which has been taking game for centuries, actually shows a yearly increase, while in our country, comparatively a child in years of settlement, it is rapidly becoming extinct.

It is that the boys and girls of a generation hence may enjoy the same attraction of the outdoors which their grandfathers did, that the league has been formed. Cities try to meet this inborn desire with parks and bathing beaches. Excellent as far as they go; but no park is more than a poor imitation of nature, unless it be a reservation of virgin forests, occasionally snatched in time. Such an example is the Superior National Forest, in Minnesota, which owes its preservation, a few weeks ago, largely to the efforts of the Izaak Walton League.

Streams which only five or ten years ago teemed with fish are now almost or entirely fishless due to deadly chemicals discharged from factories, or sewer pollution from towns and cities. The league intends to restore these streams and see that they are restocked—but not in a day or year. It will use its influence to immediately stop further contamination, and allow a reasonable number of years for present offenders to otherwise dispose of their destructive waste matter. Incidentally, when this is accomplished, the factories and mills will discover an actual saving in dollars by the recovery of by-products now going to waste.

The league is not primarily for rich men and the residents of cities, though they need the native outdoors more than the dweller on farm and in smaller towns; quite the contrary. It is frankly acknowledged at Washington that many species of game birds would now be extinct in this country but for the efforts of rich men in maintaining preserves—in some cases entire large islands; the benefit which is enjoyed by hunters one and two thousand miles away. The league plan contemplates an abundance of game and fish for everybody, in every state, within a very few years. It will also foster bird life other than game birds; it will restore our streams, making them fit to drink; it will conserve our remaining forests and secure the replanting of cut-over and other waste lands. It even hopes to line our country highways with beautiful shade and fruit trees. In short, its objects redound to the good of all, without depriving any (except the pot hunters) of any present pleasure.

There should be a chapter in every community. Ladies can join, and "juniors" are recognized and provided for as members. The movement is such an ideal one, and at the same time so practical and attractive, it deserves the support of all.
The league has a large monthly magazine contributed to voluntarily by such writers as Zane Grey, Dr. David Starr Jordan, Dr. Henry Van Dyke, Mrs. Jean Stratton Porter, Irvin S. Cobb, Mary Roberts Rinehart, James Oliver Curwood, and a host of equally brilliant writers who love the outdoors. Annual membership in the league, including the magazine, is two dollars; a large number of women have already enrolled. If no chapter has been organized in your community, there should be one, and full information will be sent, on request, from the Izaak Walton League, 336 West Madison St., Chicago.

A GOOD part of the money contributed for the support of churches comes from people who make a real sacrifice to do so. In these days of practical conduct of affairs, church managements may well apply more of the successful business methods of successful business men.

The word "syndicate" was once construed as an organization formed to "do" good people; this impression later came to mean often a desirable and laudable undertaking; the syndicate to be suggested has but one purpose and that is to do people good.

The telephone company is a fine example of what consolidation of small rival companies in the same town has accomplished in effecting great economies, improved service, and ability to provide the latest and best equipment, which the small individual companies would still be without.

This is a day of syndicate work, of which the country "daily" is a good illustration. The work of cartoonists and authors who are so high-salaried that only a few big metropolitan dailies could afford them, is now sent broadcast into every community, and read daily by millions instead of thousands. Yet the expense to the smaller papers is not prohibitive, because it is divided among so many.

The movies furnish another instance, bringing to even villages, at a small price, major attractions with star actors and scenery costing hundreds of thousands of dollars to produce.

In a small town in Illinois, there were five Protestant churches, each with its own building and minister. The membership of each was too small to properly compensate their clergy; which meant the clergymen were disgracefully underpaid, or the churches had to be satisfied with less qualified men. Also five buildings had to be lighted, heated, and kept in repair; five organists, five choirs, and new music for each had to be maintained. Now the five churches have combined to meet in one edifice, and will be able to pay enough to properly maintain one able clergyman and have the best of music, with ample funds to take care of the necessary local charities in a businesslike manner.

Is there any logical reason why our religious bodies cannot adopt the syndicate idea to advantage? It has seemed to me for a long time, that the method is simple and practical. It could be operated either by a combination of denominations working as one united interest, or by each denomination for its own churches exclusively. The plan is to select from their clergy the most brilliant men of national reputation, to furnish one sermon each per week. This sermon would be printed and syndicated to all the smaller churches and read by their pastors at the morning service. For the evening service the local pastor could provide his own discourse. But this would accomplish two things: first one very strong sermon each week; and second, the local pastor would have so much more time for the ever-increasing parish work of visiting the sick, conducting funerals, making secular addresses, and the endless demands on his time which no one but the clergyman himself can fully realize. It would be no more reflection on the ability of the local pastor than it is to invite a bishop or leading preacher from some large city to occupy his pulpit when the bishop happens to be visiting a small town.

These syndicate sermons would not only be the best thought of rare, unusual men, but each of them would take the time, and spare no effort, to produce the very best that is in him, for he would realize he was appealing to several million people instead of hundreds. Each denomination could easily furnish enough men to each prepare one or two sermons a year; they might even be sermons he delivered to his own congregation—and if a union of denominations was effected for the purpose of these syndicate sermons, even the best men could not hope to contribute more than once in any year. These kings of thought and oratory would not only contribute wonderful sermons but could also serve as a board of review—not as movie censors do, to eliminate the bad, but to strengthen and if possible
improve the matter submitted, with a view to making it as nearly perfect as possible. Obviously appointment on such a national board would be an honor as greatly prized as membership in the most learned and exclusive scientific societies. The expense of printing and mailing need not exceed three cents a week per church served.

In addition, if consolidations of local bodies were accomplished, as in the case described, the saving in money would be great, while the drawing power of such union churches would be tremendously increased.

The plan is not intended to serve large city churches—they do not need it—but if the thousands of small churches could adopt business methods to a greater extent, is it not at least probable that many pews at present empty might be filled?

TODAY came a blotter, very fair as blotters go, but what impressed me was its message—a veritable tirade against motor cars—the modern juggernaut; the rich man's funeral car.” The protest against the tremendous and rapidly increasing loss of life cannot be too strongly expressed, but the reference to rich men is hardly fair. There are over ten million cars now in operation and several thousand trucks, and I am sure there are not ten million “rich” men in this country; the revenue department numbers them only in hundreds. As a matter of fact, I, personally, have had to jump from the path of numberless flivvers, but seldom from in front of any rich man’s car. The well-to-do, barring an occasional wild-oats young man, are usually very considerate of pedestrians; and their drivers, generally experienced men, are required to use the utmost caution.

There are exceptions of course, as in all rules, and the penalty recently meted out to a Philadelphia banker, who was sentenced to several years in the penitentiary for what was proved to be inexcusable carelessness, should meet with universal approval. The mere incident that he was a rich man did not save him from punishment, and is to the credit of the Pennsylvania courts; and it is to be hoped the good work will be continued and widely extended, to take in all offenders, high and low. It makes little difference to a bereaved family what a man's social standing is, when his criminal carelessness has crushed the life from one of its members.

In the large cities the majority of fatalities to children seems to come from motor trucks, many drivers of which appear to assume, for some reason, that a loaded truck has the right of way over pedestrians and other cars. It is inevitable that some accidents must occur even with the utmost care, by reason of the vast number of motor vehicles operated. I suppose if there were ten million teams of horses in service on our streets and highways, there would be many fatalities, although a horse will usually endeavor to avoid running over a person, if it sees him in time. The truck has no such intuition, and far too often its driver seems about as regardless as the machine.

For a long time it has been evident that a fine of a few dollars utterly fails to stop or even check the mad impulse to go fast. Various expedients have been offered, such as a gear construction which will render a car unable to go faster than a determined speed under any circumstances; and a telltale light, inside or outside the car, which will burn when the speed limit is exceeded; loud-sounding gongs which ring at higher speeds have been proposed, and several other automatic safeguards to warn both drivers and police. But thus far little has been done except a very few convictions, the revocation of some licenses, and fines to be paid in money. There is one thing the great majority fear, and that is a jail sentence. Indeed, it is about the only penalty which comes close enough to all to really assert and impress itself. As cars increase to still more millions, conditions will inevitably become worse and worse. In the meantime, at the present rate, many thousand citizens are doomed to lose their lives. All the efforts exerted in welfare work will not compensate for this motor murder.

Why then prolong the slaughter? The earlier all the states enact and execute strict laws in this matter, the sooner the reform will come. We are already “lawed” almost to the point of extinction, but this is one law which is really needed. One accident-insurance company estimates the number of deaths from motors in 1923 at not less than 14,000—an increase over last year of 4,000 fatalities.

H. H. WINDSOR
WORLD'S CHAMPION WHISKERS IN CALIFORNIA

Two residents of San Francisco, who participated in the famous gold rush of 49, lay claim to what is believed to be the champion whiskers of the world. A total of 28 feet 3 inches of whiskers is owned between them, the length of one set being 17 feet, and the other measuring 11 feet 3 inches. Each tapers down to a ropelike coil, which is thrown around the shoulders.

DEVICE THAT TESTS VOICE IS AID TO SINGERS

To make it possible to study the human voice, a new instrument has been constructed in Vienna. It is declared to be a valuable asset in treating voice defects of singers, and also in the study of the causes of epilepsy. Deaf persons, using the instrument, can tell just how loudly they are speaking and pitch their voices accordingly. Epileptics, it is said, have a peculiar kind of speech record, indicating that the disease is not a brain defect, and that it is curable.

DIAMONDS SET WITH TOOL ATTACHED TO LATHE

To enable jewelers easily to set diamonds and other stones in the new-style basket-ring mountings, an inventor has patented a tool which is attached to the ordinary jeweler's lathe. At present this work is done by hand, for the most part by skilled artisans and manufacturers. With the new tool, the mounting is set in the lathe and a seat drilled for the stone. At the same time, a shoulder is made, which is turned back over the edges of the jewel with a blunt instrument.

HANG YOUR TIRE ON TOTEM POLE, PLEA FOR CHARITY

Red Cross workers in California have struck upon a novel plan for salvaging old tires, as a source of revenue for charity. A totem pole was set up on one of the main thoroughfares and passing motorists are invited to make a "ringer" with their worn-out casings. The tires are collected daily by the society and sold to junk dealers for the benefit of its funds.
RARE METALS IN OIL SHALES

Aroused by the reports that various investigators have obtained gold, silver, platinum, and potash in paying quantities from oil shales, the Bureau of Mines has conducted tests that disprove these claims. All the assays indicated it was not commercially possible to recover any of these materials.

PORTABLE LIFT TRUCK LOADS HEAVY CRATES

A portable loading truck for quickly handling piano cases, heavy packing cases, and similar large, bulky loads, has been developed and placed on the market. A heavy U-shaped carriage forms the frame of the truck, which is mounted on a double swiveled wheel in front and two fixed wheels in the rear. At the front and inside the “U” is a foot piece. Attached to the frame is a steel yoke, roller-mounted, which travels back and forth on the carriage. In operation, the open end of the “U” is backed up to the load until it embraces the object. The foot piece is then pushed under the load, and by means of suitable mechanism the piece lifts the end of the load sufficiently to allow the steel yoke to be slipped back along the arms of the “U” until it supports the rear of the load near its open end. The foot piece is then lowered until the load is level. The truck weighs 300 pounds and can carry 2,000 pounds.
BARN WITH GRAIN ELEVATOR IS AUTOMATIC FEEDER

By application of the grain-elevator principle to a barn, an agriculturist has made a self-feeder for the stock in the stable on the ground floor. A second story of the structure has along its center a driveway that can be reached by teams hauling loads of corn or oats by an inclined driveway from the barnyard. In the second story is a power-driven elevator which carries the grain to a cupola above, from which it is distributed to bins along either side of the driveway. From these bins, chutes lead to the mangers in the stable below, and at feeding time all that is necessary is to open the chutes as required. A feed grinder also may be mounted between the second floor and the roof, and connected with a spout from the top of the elevator.

AUTOMATIC AIR SERVICE NEEDS NO PILOTS

Maj. Gen. Mason M. Patrick, chief of the army air forces, made the astonishing announcement recently that a bombing air service has been developed that needs no pilots. The automatic service has been so highly perfected, he said, that even now, it would be possible to send a pilotless plane from Boston to New York. The plane could carry a cargo of bombs, fly at a given altitude, hold to a set course at a predetermined speed, and, at a given time, discharge its destructive cargo. Radio control is the secret of this scheme. A whole fleet of airplanes could be similarly controlled, with exactness. The air service is also planning airplane-carrying dirigibles helium-filled, for making long cruises.

COLLAR MAKES IT EASY TO WITHDRAW NAIL

A small metal collar, which slips on the nail before driving, has been made to hold the head of the nail away from the wood so that the claw of the hammer may grasp it easily. Aside from the time saved when tearing down scaffolding and other temporary structures, it is thought that the device will eliminate all necessity for hammering the boards apart, and accordingly will increase the life of the wood. The collar is made in three sizes to fit nails from 6 to 60 pennyweight.

TO ERECT GREAT LIGHTHOUSE IN HONOR OF COLUMBUS

Delegates from Santo Domingo to the recent Pan-American conference proposed that a lighthouse of unequaled height and power be erected on the island of Santo Domingo to commemorate the landing and founding there of the first Spanish city in the new world by Christopher Columbus, who lies buried there. The light would be 385 feet high and would be seen by all vessels traveling from Europe to the Panama Canal. The design suggested is that of a lighthouse built upon a globe, 150 feet in diameter, the light to be of the flash type, which will spell out in Morse code the word "Colon," in honor of the great discoverer.
EELGRASS: A NEW ENGLAND COAST SEA “CROP”

Botanists, having the scientist’s viewpoint, call it *Zostera marina*, while seafaring folk prefer the terms “barnacle grass” or “grass wrack”; but the hardy natives of the northern New England coast, who know this interesting and valuable sea plant, have long called it “eelgrass.” This latter name neatly describes it. Eelgrass is a salt-water plant, with long, narrow leaves, so long, in fact, that even in a tangled, crinkly state they attain a length of more than 10 feet. The New England tides toss it about and hurl it, in shredded masses, on shore, so that harvesting this peculiar “crop” is a simple matter.

The early settlers of Massachusetts were probably the first to discover and make use of its efficient heat-insulating qualities. The old Pierce House in Dorchester, built in 1635, was found to have its walls stuffed with eelgrass, which was in perfect condition after more than two and a half centuries of service. It has since been found to be a very good sound deadener, and a large industry has grown up around the product.

A simple process makes the grass ready for commercial use. Curing, or drying, is the first step, and is done by spreading and separating the masses into small piles, beyond the reach of either water or spray. Here the long, tough, clinging fibers dry out, and in doing so, are made fireproof because their cell structure becomes filled with the crystallized salts left by the drying sea water. The process also toughens them.

Next, the dried grass is hauled to the storage sheds, various types of conveyance being used for this purpose. At one point motorboats carry loads across the bay, while at another the double-yoked ox team may still be seen in use. The grass
must then be baled—great, shaggy bales it makes—and shipped to the manufacturing plant for further treatment. At the factory the bales are opened, then fed through a “picking” machine, which breaks up the lumps formed by the heavy pressing needed in baling. As the grass comes through the “picker,” it is spread out evenly, passing between two heavy sheets of tough paper, later to be sewed into “quilts.” Stitching is necessary, the sewing being reinforced by gluing the thread to the paper. For special purposes fireproofed burlap, waterproofed paper, or asbestos is used in the making of the quilt.

The long roll is then hot-pressed, and crimped lengthwise, so that the layers of grass will better retain their positions. Eelgrass quilting has a wide range of uses. Being a resister of heat, cold, and sound, it is valuable for lining the walls and floors of houses, schools, hospitals, cold-storage plants, and similar structures. An added value is that it is not subject to decay.

MACHINE CASTS CONCRETE POLES IN PLACE

There is on the market a new machine which casts concrete poles in place, thereby enabling the pole to be built solidly of concrete and with considerably less reinforcing steel than is required when poles are precast and must be made strong enough to be handled as a beam. The machine, which is mounted on a trailer truck, provides an air compressor for a pneumatic mixer served by a loader at one end of the truck, all driven by a gasoline engine. The concrete is delivered to the form through a vertical pipe mounted on a tower, and a hose that terminates in a nozzle, which is geared to move up the form as the concrete fills in. The mix is discharged from the nozzle with such force as to produce a dense concrete.

CASSENA PLANT A DELIGHTFUL SUBSTITUTE FOR TEA

Cassena, a new rival of tea, and resembling tea in many respects, is said by the laboratory of the Department of Agriculture to produce a delightful beverage. It is a wild plant growing abundantly in the Gulf and south Atlantic States from Texas to Virginia. During Civil War days, when tea and coffee were scarce, it was drunk by the people of the South as a beverage, and the Indians have also used it.

It must be properly cured, however. Further investigations made by an experimental plant near Charleston, S. C., indicate that it is practical to cure it in quantities large enough to supply the general market. A hot-water extract drawn from properly cured cassena leaves is also being used as a base or flavor in carbonated beverages, and cassena-flavored sodas will be manufactured.

NATIONS PLAN TO PROMOTE CIVIL AIR TRANSPORT

At the recent meeting of the International Commercial Congress, at Rome, Italy, a resolution was adopted to the effect that national funds spent on aviation should in part be devoted to developing civil air transport. It was further agreed to establish a permanent international committee to furnish advice on financial, industrial, legal, and technical features of aviation. Air travel is regarded as more international in character than any other form of transportation.
NEW SOLVENT REMOVES PAINT AND CLEANS CYLINDERS

A new solution, which dissolves and removes paint, japan, or varnish, as well as rubber, both pure and vulcanized, and resinous and glue binder substances, has been discovered by a scientist of the University of Wisconsin. Natural resins, glues, gelatin, celluloid, varnish, lacquer, and paints can also be dissolved. Selenium oxychloride, the solvent in question, is also effective in removing carbon from cylinders of gas engines, for it dissolves the partly carbonized or hardened oils which cause the clogging of the cylinders, and cleans them out. These hardened deposits are usually particles of carbon which have been cemented together with hydrocarbon, and selenium oxychloride dissolves this cementing element so that the carbon loosens and comes out.

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MOTORCYCLE SADDLE ADDS TO COMFORT

Several interesting improvements have been added to the motorcycle saddle to make that seat more comfortable. A high back to hold the rider when jumping into high speed, or when going upgrade, is one of them.

In addition, two pairs of springs are used, one within the other, for giving the necessary resiliency. These pairs are separated, so that the vibration of one will not affect the other.

By the granting of an annual pension to a resident of Manchuria, the local authorities proved their belief in the man's claim that he was 162 years old. His case was thoroughly investigated, and the records proved his claim to be true.
X-RAYING HEART ACTION
OF SCHOOL CHILDREN

Fifty to 70 per cent of school children
are to some extent physically defective.

By means of a metal framework the
body of the child is made to support the
picture-taking apparatus, so arranged that
the box containing the X-ray tube hangs
on his back, whereas the film holder is
suspended in front of the
heart region. The child
is then directed to "ride"
the bicycle as fast and
hard as he can, and the
picture of the heart is
taken while he is in
action. Changes in size and
shape, which help to tell
the story of health or
disease, are thus easily
recorded. The bicycle is
also used to measure the
child's capacity for phys-
ical work, and to deter-
mine the effect of exer-
cise on pulse rate and
blood pressure.

Interesting deductions
have been made from the
series of experiments
conducted in one of the
Minneapolis schools. It
was found, for example,
that the amount of work
performed was in direct
proportion to the child's
age, to the chest circumference, and to
the breathing capacity; and, in the case of
pedaling experiments and similar "leg
work," to the circumference of the thigh.
Contrary to general opinion, height and
weight showed little relation to capacity
for work. In children up to nine years of
age the capacity for work varied with
height and weight, but in older children it
did not depend on these factors.

A Minneapolis Innovation: Here Is a Boy Ready to Have His Heart
X-Rayed and Photographed While He Pedals on the Stationary Bicycle

a portion have curvature of the spine or
other less obvious deformities, while fully
two per cent suffer from diseases of the
heart. Impressed by these facts, physi-
cians of Minneapolis have introduced a
new system of physical examination.
Chief among new devices for this purpose
is an X-ray camera for taking pictures of
a child's heart while he is engaged in
pedaling a stationary bicycle.

DUSTSTORM ENGULFS
OKLAHOMA TOWN

A duststorm, heralded by the
rapid approach of a low, seeth-
ing mass of brownish-mottled
clouds rolling upward in most
sections but tumbling earthward
in others, recently engulfed the
prairie town of Guymon, Okla.
The dust was so dense that in-
habitants could not see more
than 100 feet in any direction,
and the particles were so fine as
to penetrate the best-built houses,
covering everything and making
it difficult to breathe. The storm
made its appearance late in the
afternoon.
SERVICE STATION SPECIALIZES ON CRANKCASE OIL

Specialization is the object of a large automobile-service station in Indianapolis, which makes a business of dealing exclusively in crankcase oil. The plan of the structure was based upon that idea, and the station accommodates 20 cars at one time. Five driveways lead into it, each of which permits operations under the entering car. Funnels connected to swinging pipes drain the oil, then a fresh supply is pumped in, and the car is off. The level below the street floor has no dividing walls, so that a service man may quickly step from under one driveway to any other.

DYNAMITE BREAKS UP SHIP'S CARGO OF POTASH

Dynamite has frequently been used with success for loosening up solid masses of bulk material, but generally in more or less open spaces. A daring departure was made recently when the method was used for prying loose a cargo of hardened potash in a ship's hold. At first picks were used in an attempt to loosen the mass, but were finally discarded as being too slow and costly. Dynamite was then suggested and used, although it proved difficult to persuade the captain that no injury would result to the ship. The charges were placed some 3 or 4 feet back from the ship's skin, and at about the same depth.
A special trailer, weighing five tons and carrying a gross weight of 50 tons, was used in recent experiments on the Pittsburgh Test Highway. The trailer, which was built on two wheels, was attached to the truck by means of a large bolt extending through two heavy cross members at the rear of the truck frame. The truck was able to pull the load until the trailer wheels broke through the pavement, when it could not be moved by the combined efforts of four trucks and two tractors. At certain points the pavement was completely broken up under the pressure of the trailer wheels, which were prevented from sinking too deeply by planks and steel plates wired to the axle for this particular purpose.

"CURIOUSLY DESIGNED HAT TO ATTRACT TOURISTS"

A hat made to represent the dome of the state capitol is being worn by a young woman of Sacramento, Calif., to attract tourist travel to that city. The young woman lectures throughout the state, using the hat as a "come-on." Surmounting the crown is a small orange, illuminated from a pocket storage battery.

PRESSURE FORCES PIPE UP FROM BOTTOM OF POND

Recently the engineer of a town in Massachusetts, on starting as usual to pump water from the aqueduct, saw the end of the main, which runs through the pond to the aqueduct, rise above the water. He found this was due to the pipe having been emptied by mistake. The pipe weighs but 27 pounds per running foot, whereas the water displaced by each foot of pipe weighs 67 pounds, leaving a net upward pressure of 40 pounds, which forced the pipe to rise. The danger was that water from the pond might have been pumped into the town mains and used by the public.
NOISELESS STREET CARS FOR TWIN CITIES

Practically noiseless street cars are to be introduced in Minneapolis, St. Paul, and suburban territories, according to plans now rapidly nearing completion. The new car is of greatly reduced weight and will be rubber-cushioned over the spiral roller that supports the trucks, the car, and the passenger load. These new trolleys will weigh only 25,000 pounds, as compared with 43,000 pounds for the old car, yet they will have the same carrying capacity and will resist wear and tear equally well. Another important noise eliminator is the band brake, which will work on the wheel drum. This feature eliminates the shrieking brake shoes which work on the wheel face. Rattling will be greatly reduced by incasing the windows in rubber. The car trucks are equipped with what is known as a swinging spring plank, permitting the use of a combination of springs that take up the overload, and are easily adjustable.

VIBRATION-PROOF WASHER FOR BOLTS AND SCREWS

The problem of locking nuts, bolts, and screws, on machines subject to great vibration, has always been a puzzling one, particularly on pneumatic tools and similar devices. A simple type of washer is now being marketed which is said to solve this difficulty. It is made of thin, clock-spring steel, rust-proofed, and looks much like a watch gear, except for having longer teeth. These teeth are made to bend various ways so that when the head of the nut tightens down over them, they resist straightening. Part of the teeth becomes imbedded in the lower surface, and this condition tends to keep the nut tight even under vibration.

SMALL INDUSTRIAL TRUCK HAS CRANE ATTACHMENT

Widely varied uses of the industrial truck in and about factories and yards are made possible by a crane-body which is easily applied. The two-wheel crane itself has a support, depending for firmness on the truck body proper, which it partly rests upon, and from which it receives a swiveling support. Storage batteries furnish the necessary power. The crane has a maximum capacity of 1,800 pounds, and can lift 1,500 pounds at a distance of 12 feet from its base.

LARGEST CABLE IN THE WORLD FOR ATLANTIC OCEAN

Completion of the laying of a new cable in the Atlantic Ocean, between New York and London, is expected by August 1, next, according to a recent announcement. It will be the largest ever laid in the Atlantic, or anywhere else in the world, and will have a capacity twice that of any other cable now in service between the United States and Europe. Engineers charged with the design of the new cable estimate that it will permit a sending speed of approximately 600 letters per minute in both directions at the same time, or a total of 1,200 letters per minute. This high transmission capacity will make it the fastest cable in the world. As is to be expected, its dimensions will exceed that of any other transoceanic cable now in use. Its conductor requires an average of about 1,100 pounds of copper per mile, as against an average of about 700 pounds of copper per mile for the heaviest now in service.
AIRPLANE MAIL SERVICE ACROSS THE CONTINENT

Brilliant illumination along a pathway nearly 1,000 miles long will be one of the features of the cross-continent air-mail service to be inaugurated by the Post Office Department shortly. A line of beacons will extend from Chicago to Cheyenne, covering one-third of the route from New York to San Francisco. Over this part of the course mail-carrying planes will travel at night. The schedule calls for departure from New York daily at noon, and arrival at Frisco toward evening of the following day—an elapsed time of only 28 hours.

Previous transcontinental air-mail service has not been through service, but auxiliary to the regular schedules of the established railway mail routes. Early-morning mail planes have picked up late mails in New York, for example; have carried them to Cleveland, and then placed them on the Chicago express train which left New York the night before. The new system will lift the air mail out of its auxiliary status and give it the standing of an independent service from coast to coast.

As a result of the preparations undertaken during the last 12 months, night flights between Chicago and Cheyenne will be made under conditions offering scarcely more hazard than day flying. The pilot will be guided by a pathway of powerful lights which will point the way to the terminal fields. Each plane will carry powerful searchlights for use in making a forced landing, but emergency fields, also, have been located and lighted every 25 miles along the route. In addition to these precautions, the success of night flying is assured by the
natural advantages of the traversed country. Noted for its levelness, it will provide natural landing fields, while the low humidity of the air will add to the value of the illumination plan. The most powerful lights will be located at each of the five regular flying fields—Chicago, Iowa City, Omaha, North Platte, and Cheyenne. Each is to be of 600,000,000 candlepower, and will swing slowly around on top of a tower mounting, where it will be visible for 50 miles. Not depending on these terminal lights alone, less powerful lights will be located at 25-mile intervals. They, too, will be of the swinging type, with a visibility range of 30 miles, and will mark the locations of the emergency landing fields.

When the “ceiling” is low—that is, when the clouds hang low—it may be necessary for a pilot to bring his plane close to the ground, in which case he might lose sight of the emergency field lights. As a final safeguard, therefore, flashing traffic lights, directed upward, will be located every three miles along the line of flight. On a clear night an air-mail pilot, 7,000 feet up in the sky, will be able to see a narrow line of light stretching for many miles over the prairie.

Perhaps the most impressive sight, however, will be the view of Maywood Field, Chicago, at night. This huge field will be outlined with lights spaced 200 feet apart. A 50-foot windmill tower will support the 600,000,000-candlepower beacon swinging its light around the sky. Hangars and shops will stand out almost in daylight perspective, illuminated on every side by powerful gooseneck floodlights. Tall chimneys and similar dangerous obstacles will carry red warning lights. In one corner of the field a large well-lighted arrow, pivoted like a weathercock, will give the pilot wind directions. Two cinder runways, 2,000 feet long, will traverse the field. These will be outlined with lights sunk in the ground, covered with glass and protected with a heavy iron grating, level with the surface.

Two purposes will be served by the establishment of through air-mail service from coast to coast; first, the American public will receive the fastest mail service in the world, over extensive distances, and secondly, another step will have been made toward keeping American pioneer work in the field of aviation in its premier position. During 1922 the air-mail personnel won recognition for the greatest achievement in American aviation, by flying 2,000,000 miles on the coast-to-coast route without a fatal accident.

CATCH DEVILFISH TO EARN PIN MONEY

Devilfish are all fearsome creatures. Nevertheless there are numbers of feminine devilfishers of Salmon Beach, Wash., and some of these women have caught hundreds of the fish, being able to make from $40 to $50 a month at it.

The octopus come to shore with the tide and fasten themselves to the rocks with the suckers which cover the undersides of their tentacles. Thus anchored, they lie and wait for the soft-shell crabs, mussels, and small fish which swim right into their mouths. They are plainly visible, and can easily be “gaffed.” They put up a stiff fight, but no worse than does a bullhead or a big salmon. They cannot bite, although they are able to raise cruel blisters, if they succeed in fastening a sucker on the bare flesh.

A day’s catch is sometimes as much as six or seven fish, weighing from 45 to 50 pounds each. The market for devilfish is steady, and they bring 10 cents a pound, the Chinese and Japanese markets taking all they can get.

A woman robber chief, it is reported from Hongkong, China, led the band of pirates that boarded the British excursion steamer “Sui An” not long ago.
SCREENED ROCKING-CHAIR FOILS INSECT PESTS

Campers may have the benefit of a comfortable outside seat in mosquito or fly-infested regions by investing in a recently developed folding rocking-chair which, when set up, is entirely screened. The four sides, top, and bottom of the screen rest on two rockers, made slightly larger than usual. Inside is an adjustable seat and a rack for holding newspapers or other reading material.

METAL TUBE FASTENER
A BIG IMPROVEMENT

Something new in end fasteners for mailing tubes has been brought out recently. Instead of the common method of pasting paper at each end and tucking it in around the enclosure, a narrow metal clamp is used, one end of which is attached to the end of the tube. This is easily bent inward about the rolled contents of the tube, and saves the user much time.

PROFITABLE USE FOUND FOR WILD RABBITS

Each fall a drive on wild rabbits is made in various parts of eastern Washington, and thousands of the pests are slain to prevent them from overrunning the country. Large quantities have been sold in western markets, but enormous quantities have gone to waste. The Bureau of Biological Survey has now begun to trap the rabbits, in order to ship them alive to islands off the Alaskan coast. Many of these are devoted exclusively to the breeding of blue and gray foxes, and the rabbits will be turned loose to serve as food for them. Alaskan breeders will be saved thousands of dollars yearly by this procedure.

WOOD LATHING ELIMINATED BY WIRE STAPLES

A special wire-furring staple has been invented to replace the wood lathing commonly used to secure the building paper and wire when plastering exterior walls. The staple is 4½ inches long and is raised in the center to hold the wire at a proper distance from the paper sheathing. Using this new device is said to result in a more uniform thickness of plaster, and the elimination of unsightly wood stains and cracked walls, due to the swelling of the laths by moisture.

A new type of “earth-induction compass,” similar to those used in airplanes, has been designed for use on war vessels. It is more heavily built, however, and is actuated by an alternating current instead of by wind cups. The generator may be put in a fighting top, while the control dial can be located on the navigating bridge.
THOSE things typical of the twentieth century—desire for speed, comfort, and the spirit of friendly competition—have spread even to the lonely and icy waters of the Canadian Arctic, where this summer Eskimos will imitate the famous Atlantic boat race sailed last year by Nova Scotian and American fishermen.

To anyone familiar with auxiliary schooners one of the illustrations tells the story better than words. In it are shown the schooners "Henry Ford," "Bluenose," and "Mayflower," the Eskimo examples, in name and intent at least, of the noted Atlantic boats. Around the naming of these three vessels the story is woven.

It is best for the full understanding of how rapidly methods are changing in the North to note the picture of the Eskimos in their kyaks. Only a few years ago they lived as had their forefathers for hundreds of years. With the coming of the white man the Eskimo was quick to make use of the rifle, and so increased his food and fur-gathering facilities. American whalers, pushing their way through Bering Strait, loaned them some of the ships' boats while the mother vessel was in the outside world selling a cargo. The understanding was that half of any valuable catch taken was to be given to the boat owners on their return. Eventually, some Eskimos became possessors of whale boats of their own. Soon the first motorboats were introduced into the region of Beaufort Sea. The Eskimos were quick to see the value of the white man's small schooners. They began buying them, and several firms catered to their trade, which proved very profitable—for the Eskimos had money, getting cash for large quantities of white-fox skins and other furs annually.

Today there are 43 little schooners, built in the outside world, which have traveled to the Arctic regions in Beaufort Sea and adjacent waters, to be taken over by Eskimo purchasers. A number of these boats came to the Arctic under their own power over the rivers and lakes stretching from Fort McMurray and Peace River Crossing to the mouth of the Mackenzie. Some of them were shipped in "knockdown" shape and assembled at their destination.

When the steamer "Northland Trader" arrived last year at the Eskimo metropolis of Aklavik on the delta of the Mackenzie, the natives overheard its white crew discussing the Atlantic boat race. Now, the Eskimo is a keen sailorman, and loves a race. So, a few nights after the
steamer's arrival, the Eskimos, too, were talking racing.

Then there arrived one day at the "Northland Trader" three prominent Eskimos. They came separately, and the first to arrive was Innitok, already owner of four auxiliary schooners. Innitok stated that he wanted a very fast schooner, "same like white man talked," with which he could beat the other fellows. And Innitok particularly stipulated that this ship should carry "a white man name."

"You mean you want it called 'Henry Ford?'" the captain said, more in jest than earnest.

But Innitok was in earnest: "Yes; yes, that's it, white man ship 'Henry Ford,' race other fellow."

So Innitok gave his order, and went his way. Shortly thereafter came Amatik, another man of substance in Eskimo land, also noted as a sailor. Amatik, too, had been filled with desire for fame.

At any rate, he put in an order for "fast boat with white man's name," and was assured that next year he should receive a vessel duly christened "Bluenose."

Third and last came Pougiak, also a mighty sailor and leader in the community. He ordered the "Mayflower."

The orders for the three auxiliary schooners came to Edmonton, where they were built in the yards of Capt. John Matheson. The vessels have been hauled on sleighs to the railway, and thence to the banks of the Clearwater River. From that point they will go down the great inland waterway of the northland under their own power to their eagerly awaiting owners, who will give cash and fox skins in payment for them.

Today an Eskimo knows a white man's boat. Before he pays, he thoroughly tests out its sailing qualities, and the engine, which he now fully understands, must be of the best. In addition, he insists on many "extras," such as batteries, coils, barometer, compass, and other modern aids to navigation.

Thus has the old order of the Stone Age passed in the North. And this summer, Innitok, Amatik, and Pougiak will take their families aboard the "Henry Ford," "Bluenose," and "Mayflower" and stage a counterpart of the Atlantic fishermen's classic. The race will be from Herschel Island to King Williams Land and back, and the contestants will not be hampered by any of the rules of the Atlantic race.
Duplicating actual fire conditions, the United States Bureau of Standards staged a miniature office fire, and tested the office to destruction. A small building was erected for the purpose, having hollow brick walls and concrete roof and floor. A top floor of wood was provided, which was separated from the concrete by a layer of cinders. When the building was completed, it was fitted up as an office, with desks, chairs, wooden and metal filing cases, bookcases, and fireproof safes. The latter were of steel, but asbestos sheets were built into the sides, doors, and tops. Thermocouples, for measuring temperature, were installed at suitable points. The fire was started rapidly, using a mass of oil-soaked waste, and had gained full headway in 15 minutes. A temperature of 1,900° F. was attained and kept up for a full hour before the flames began to recede and the temperature to fall. After the test, it was found that everything of a combustible nature had been destroyed, including the contents of the metal files, but the papers in the safes remained undamaged, and were clearly legible. Although the heat had warped the outer shells of the safes, the asbestos insulation amply protected the contents. Experts attached great value to the test, as it furnished valuable data regarding the fire-resisting properties of the structure and its fixtures. Additional tests will be made, in the hope of developing information regarding the efficiency of various types of fireproofing. The little office building will be remodeled for these tests, and will be used again to serve for another experimental fire, similar to the one described, but which will have in view the determination of different data.

BALLOON MOTOR SHIP
TO FIGHT MOTHS

Serious ravages by gypsy moths of the forests of northern New England has prompted the Department of Agriculture to wage active war against them. A motor balloon, equipped with two 75-horsepower engines, will soon take the air for the purpose of spraying the pests with various chemicals. The craft is supplied with a new type of mobile field equipment, so that it can be anchored to a folding mooring mast carried along by truck. The trucks will also carry a gas-compressor outfit for replenishing the hydrogen supply in the balloon. This feature will make the outfit entirely self-contained. A maximum crew of five men will be sufficient to man the ships. Airplanes have been used experimentally for similar purposes.
CABIN ON AUTO PROVIDES HOME FOR HUNTERS

By mounting a bunk house on an automobile chassis, four men from Minnesota have solved for themselves what is usually a constant problem for hunters in the big woods. The cruising cabin always insures them a comfortable shelter at any camp site they may select when the day's hunt is over, and also serves as a convenient means of transporting their equipment and provisions, as well as the game they have bagged.

ORNATE HEARSE GIVES WAY TO SIMPLE LIMOUSINE BODY

The ordinary hearse, whose sumptuous carvings called instant attention to its sad mission, is a thing of the past in a certain Iowa town. The local undertaker, observing the gloomy effect it made in whatever neighborhood it appeared, had a hearse built to order, with limousine body. Except for a rear door, it gives no indication of its character. The interior upholstering is simple, being of plain cloth. As a consequence, its presence in the street does not advertise its mission.

WORLD'S LARGEST BUILDING FOR FURNITURE TRADE

Ground was broken recently, in Chicago, for what promises to be the world's largest building, to be known as the "American Furniture Mart." The structure, although only 16 stories high, will contain 1,500,000 square feet of floor space, which will be used to house furniture exhibits of various manufacturers. In point of floor area, its nearest office-building rival is a motor-manufacturer's building in Detroit, with about 200,000 square feet less space.
FIVE MILLION MILES IN AIR
U. S. MAIL RECORD

Five million miles through the air is the sum total of the activities of the air-mail service since its inauguration May 15, 1918, to Dec. 31, 1922. The present schedule, it is estimated, requires nearly 2,000,000 miles a year, and it is planned to increase this total to 6,000,000 miles yearly as soon as new planes are completed.

RAIL AND TIMBER HOOKS
HANDLE HEAVY LOADS

Operating somewhat on the principle of the farmer's hayfork, a hook for unloading rails is a device which saves time and an immense amount of lifting. When the lock block on the jaws is down, the latter are locked tight on the rail. When the rail has been lifted and swung to the right place, the operator pulls a trip line running through a pulley on the crane, and the load is dropped.

Another hook working on the same principle, but with differently shaped jaws and block, handles heavy timbers.

MATADOR ISLAND WIPE FROM CHARTS

Disappearance of Matador Island, of the East Caroline group in the western Pacific Ocean, is now a matter of official record. The U. S. Hydrographic Office, after making a survey to determine the accuracy of previous reports of its disappearance, verified them, and has therefore erased the island from its charts. Many of the islands within the general group are subject to volcanic activity, as are the islands forming a long chain southeastward. Submarine vents on the ocean floor sometimes break forth, locally raising the level of the sea bottom and forming temporary islands or shoals; or submerging existing islands.

ARTIFICIAL LIMB MADE OF SPRING-STEEL WIRE

Patterning his model closely after the bone and muscle structure and natural action of the human leg and foot, an inventor has produced an artificial limb, which is constructed of piano spring-steel wire, and is claimed to work "as well as the old leg." This limb does away with troublesome joints, and is neatly formed. The wires work like natural muscles, being "waved" at the heel and having a curl at the toe so as to permit easy walking. The inventor claims the limb will last anywhere from 10 to 20 years, on account of the elimination of joints. These have been a source of considerable trouble in the past.
PLATES AROUSE INTEREST IN MORMON CHURCH

The discovery of two small pieces of copper plate, crudely stamped with imperfectly made Greek letters, on Cumorah, or Mormon, Hill, four miles south of Palmyra, N. Y., has increased interest in the early history of the Mormon church. The plates are said to have been found by a Methodist evangelist. One of the plates bore the Greek word, which, translated, means "Repent Ye." Mormon residents of the community attach no importance to the plates, the second of which also was inscribed with Greek words, meaning "Must Be from Above."

LIGHT AIDS MOTORISTS TO SEE AROUND A CURVE

To minimize the danger of automobile accidents, a reflector for automobile headlights has been devised to improve the vision of the driver at night. It is claimed that one reflector clearly revealed objects a distance of 470 feet from the car during a recent test near the top of the Laurel Cañon road in a suburb of Los Angeles. At the same time the light strongly outlined gutter, sidewalk, and fence without blinding motorists coming in the opposite direction.

Flood of Light Cast, by a Single Reflector of a New Type for Automobiles, on a Treacherous Stretch of Winding Trail near the Top of the Laurel Cañon Road in a Suburb of Los Angeles
WRAPPING THE WORLD IN FURS

BY T. WINFIELD THACKERY

WITH a last surging effort he shot his 2,000 pounds of body up out of the sea and onto the bowlder-strewn shore of the bleak, treeless, moss-covered islet lying mysterious and silent in the watery wastes miles off the coast of Alaska. It was toward the after part of May, and a heavy mist hung over the landscape, blending into the gray of the ocean in the direction he had come and hanging close to the tundra that covered the slight rocky rise toward the center of the bit of land.

But he wasted no time studying the somber beauties of nature. As he shuffled up the beach over the rocks, with a movement that suggested the lope of a bear, he reared up his nightmare of a head, with its great, quill-like whiskeys, its starring eyes, its utter lack of forehead, and gave breath to a roar that again reminded of a bear's coughing grunt. He had caught sight of others of his kind, old bull fur seals, who had also reached this tiny isle—one of four making up the Pribiloff group—a few days or hours before him.

They were all huge animals, their hides covered with coarse grayish-brown hair, beneath which might be found the soft fur from which they obtained their name. They were scarred with the marks of countless battles for mates. On the ends of each of their front flippers were huge claws, five in number, looking like bear's claws. And indeed these fur seals were bears—bears living in water. Ages ago their ancestors had either been forced or had naturally chosen to spend more and more of their time in water until at last they had become sea animals. Unlike the hair seals, those intelligent beasts seen in circuses and elsewhere, the fur seal is not a true seal but, as a study of his skeleton shows clearly, a bear. The five claws are of no use to him; they are simply remains—like man's appendix—from a former mode of living.

The old bull we have seen come from the sea—where he had been for the past nine months, living no white man knows where, but sometimes seen as far south as the coast of Mexico—soon picked out a spot his instinct told him would serve his purpose. There he sat down (if that is the way to express it, since he did not lay down nor yet stand at his full height), and there he waited.

Some two or three weeks later, early the following June, the older cow seals began to arrive on St. Paul Island, as they appeared on the other main bit of land, St. George Island, of the group. For it is only on these two islands that the finest of the fur seals have their yearly "rookeries," as their gatherings are called. Nowhere else in the world do they congregate in any number. The other two

[This is the first of a series of three articles by Mr. Thackery, dealing with the absorbing subject of furs—where they come from, curious and interesting facts about the animals that bear them, and how the skins are prepared for the market. Mr. Thackery is a Chicagoan and director of the fur division of the largest retail store in the world. His articles, therefore, bear the stamp of unquestionable authority.—Editor.]
islets of the group are used only by birds that nest so thickly there that one cannot walk without stepping on eggs.

As more and more of the cows arrived, the noise and apparent confusion grew greater. Each cow tried by some mysterious method to find the old bull who had guarded her in his harem the year before. Most of the cows succeeded, but some were caught by the neck in the big teeth of another bull and thrown in with his harem, each bull trying to get as many cows as he could, some having but one or two, others having as many as 200. The bulls fought terribly. Four times the size of the cows, these latter did not resist them and stayed where they were thrown, or laid down by the bull of their choice, and even slept in the midst of the fighting and roaring, which sounded at a little distance like the noise of regiments of soldiers firing their guns and light artillery.

Within a few days the younger bull seals and more cows arrived. They would be coming all through the season, which lasts about three months. All the time the old bulls and some of those just come to big size—those six years and over—fought and were on the move constantly, guarding their charges.

Yet not once, since the time some weeks before when these bulls had taken up their first positions, had any of them eaten or had a drop to drink, or slept for even an instant. Nor would they do so until the three months were up. They lived entirely off the great masses of blubber and fat they had stored up within their bodies during the earlier part of the year.

About a month after the first cows had arrived, thousands of “pups,” as the new-born seals are called, added their cries to the chorus of noise. For a few days each mother cared for her one child, then suddenly she dived into the sea and was gone, leaving the little ones to care for themselves, which they seemed able to do. The cows were hunting food and drink, and contrary to what might be thought, they did not simply hunt down the several kinds of fish in the waters around the islands, but swam sometimes as far as 100 miles hunting their favorite diet—cuttlefish, the “octopuses’ brother.”

While the cows were gone, there was no let-up in the fighting and noise ashore. Other cows and other bulls were arriving constantly, but now they were almost all younger seals, although all two years or more old, since no one has ever seen a one-year-old seal, for these youngsters do not come to the Pribiloffs, although they are thought to swim up into the near-by waters, never coming into sight of land.

As the season wears on, there gather, about the closely packed rookeries (seals prefer to gather in batches of as many as 75,000, packing themselves so closely together as to look like moving patches on the otherwise empty shore, the big bulls looming up like black mountains amid and surrounded by the harem, yet never losing sight of the cows belonging to them), numbers of “bachelor” bulls—those not strong enough to capture or hold any cows. Other and younger bachelors enjoy themselves on a near-by beach, thousands of them in a herd.

It is of these bachelors, this surplus male life, that the U. S. government permits a limited number to be killed each year, to provide that most lovely of furs, Alaska seal, for the woman of civilization.

These animals are separated from the main herd and driven inland. They must be driven carefully, for they get overheated easily and then die, and once dead from this cause, their skins are worthless. As they are driven in—by the Aleut natives maintained on the island by Uncle Sam—they bunch together, the
bigger bulls in the center. The younger ones begin to run around the outskirts of the little band, faster and faster. They must be stopped, else they run themselves to death by the overheating route.

The men rounding them up carry clubs about 9 feet long. With these they finally kill the seals they select with a sharp blow on the skull. The men are trained and know just how to deliver the deathblow, and the method is humane. Following the clubmen come the "stickers," who make certain of the seal's death by stabbing it in the heart. The "splitters" next cut the pelt from head to tail, around the flippers and the tail, and in a certain way about the head. The actual taking off of the skin is then done by the "skinner," who leave as much blubber as possible adhering to the skin.

After removal, the skins are laid flat so that the animal heat will be lost by contact with cool air as soon as possible. The skins are then salted and taken to the salt house, where they are thoroughly cured. When this is done, the skins are salted again and each one rolled up snuggly and tied. They are then packed as tightly as possible in barrels, the spaces between skins being filled with salt to exclude, as far as possible, all air. Finally, they are shipped to the United States where, at St. Louis, they are made ready for the furrier, who makes them into wraps.

The seals chosen to be killed are those of from three to four or five years of age. The two-year-olds are not yet ready for the market and the six-year-olds are usually allowed to live for breeding purposes. The older bulls are also spared, both for this purpose and because their hides are usually scar-marked from battling with their kind, and so are useless for the trade. How many are killed depends on the government.

First, just about half of all the seals born in any one year are males. The pups are counted each year by the government, and about 160,000 are born annually. The natural enemies of the seal—of which the worst is the killer whale, one of the few denizens of the sea that can swim faster than the seal—kill about half of the animals yearly. This leaves, following the 160,000 figure, 80,000 which can reasonably be expected to live. Of these 80,000, 40,000 are females, and the government does not allow any cows to be killed at any time. Thus, there remain 40,000 male seals. Since the seals have the harem ideal, it is not necessary to preserve one male for every female seal, so the government permits—as it did in 1922—about 30,000 male seals, the bachelors before described, to be killed, the remaining 10,000 being allowed to live in order to replace the old bulls who die off. These figures are, of course, not exact, but are within a few hundred of the precise numbers.

To conclude the story of the big bull we first saw come out of the sea: As he continues, month after month, to go without food, water, and sleep, he gradually becomes weaker and weaker, as might be expected in view of his continual activity. Nature led him to store up just about enough fat and blubber to stand the three months' trial. He didn't think of it, for of all animals the fur seal is about the most brainless. He apparently cannot think at all. Finally there comes a day when the last of his harem is about to leave. The weather is showing signs of coming cold. Suddenly he and the hundreds of his brothers either fall down in a heap or crawl off a little way and lie down, and there they at once fall into a deep sleep, from which they do not awaken for as long as three weeks.

When they wake up, they are shadows of their former 2,000-pound vigorous selves. They can barely manage to drag themselves down to the sea, and as they disappear beneath the friendly waves, they are gone into a mystery, for no one, except perhaps some unknown tribe of wild men in the South Seas, ever sees them again until the following May, when they return to the Pribiloffs for their strange mating.

Contrary to the popular idea, the fur seal is not an arctic animal. He cannot stand the intense cold of the regions he visits every summer, and at the first touch of approaching winter he goes south. Perhaps other of the animals man hunts in the northland will become seal-like creatures in time. The polar bear, once seen in relatively large numbers on land, is more and more taking to the water, the older natives of Alaska and near-by lands assert. It is really seldom now that a polar bear is met with on land, although he spends a great deal of his time on icebergs and on frozen reaches of the ice-locked arctic oceans. His pelt, once the pride of the home when made up into huge rugs, is now less in demand for that purpose, and, being very coarse, not of much use to civilized peoples, though worn by natives of the Far North.

Another arctic animal whose fur is perhaps the rarest and the most expensive of any kind, and who is changing from
a land to a water animal, is the sea otter, now nearly extinct. This beast, which Uncle Sam will not permit anyone to kill, formerly frequented stretches of the Alaskan coast. Now it never leaves the water, as far as can be learned, bearing its young and living its days in the sea. Its rich, almost black, fur is occasionally seen as collars and front-lining strips on men's coats. A small skin—only two of which among millions of other kinds changed hands on the St. Louis market in 1922—may bring as much as $600 at auction.

Before leaving this land of the aurora borealis, it remains to note another curious animal—curious, at least, in his way of life—the blue fox.

When the earliest explorers reached the Pribiloff Islands they found this rare animal already inhabiting it and sharing life there with the seals. How the animals got there is, of course, unknown, but it is assumed that they crossed over the ice from either Asia or North America during the winters, when the Arctic Ocean is frozen over for practically the entire distance, the winter ice sheet reaching just about to, and little farther than, the Pribiloffs.

In common with the seals, the blue foxes lived for many years the life of all wild things hunted by men who give no thought to the morrow and care not if they kill them all and wipe out the species. Then, in 1911, when the United States acquired control of the Pribiloffs and began to save and increase the seals, which then numbered a scant 100,000, the blue foxes were studied and the remnants of the once large bands cared for and protected. The seals now number more than 700,000 and the foxes, which cannot be counted since they are not penned up, are much more numerous than formerly.

The foxes are allowed to run wild over the islands, being provided with food by the carcasses of the skinned seals in the summer, and by Uncle Sam's bounty in the winter months, when the millions of sea birds, that also visit the Pribiloffs, and the seals are gone. When the cubs are about to be born, the mothers are enticed into pens by tempting food, and there guarded against excitement and other foxes. When the young ones are born they are taken from the mother, for if she becomes excited she kills them; whether knowingly or not, is a question. The habit is also noticed in the silver foxes, that other rare and costly animal. It is thought by some that the mother, frightened by the noise, whatever it may be caused by, grabs her babies by the scruff of the neck and, being penned in, carries them from place to place seeking a safe retreat, thus gradually choking them to death. Silverfox mothers have been known frequently thus to carry their young about for an entire day, at the end of which the hardship and choking has killed the cub. Frequently the mother does not notice her cub's death.
ISLANDS OVERPOPULATED WITH INDIANS

Centuries ago the San Blas Indians, in eastern Panama near Colombia, were forced by war-like neighbors to emigrate to a few small islands in the Caribbean Sea. Here, in spite of heavy infant mortality, the tribe has lived and multiplied until now every house and all the ground is overcrowded. A serious problem is lack of room for playgrounds for the children. The dead are not buried, but weighted with stones and dropped into the sea. Although the surrounding waters abound with fish and tortoises, and fruit is obtained from the mainland, there is a serious shortage of food.

CLOUDY DAYS THE BEST FOR SURVEYS

Cloudy days are best for the making of accurate surveys. This is because there is no sun glare, and no excessive adjustments of the steel tape line, for temperature, are necessary. All sources of possible error must be eliminated, and this would be difficult, for example, if part of the tape were in the shade and the rest in sunlight. The tapes are adjusted for a definite temperature, and corrections applied according to the prevailing temperature. A scale is built into the tape, so that a constant pull can be exerted. When measuring angles, as many as six readings may be taken on the same angle, often by different observers to distribute the personal error, and then all the readings are averaged. In precise surveys the limit of error does not exceed 1 in 500,000; that is, .0002 of 1 per cent.

GENERAL CUSTER'S STATUE DAMAGED BY TRAINS

Excessive vibration, caused by passing trains, is believed to be responsible for cracks which have appeared in the base of a monument erected to General Custer at Monroe, Mich., his home town. The statue was authorized by the state legislature to honor the memory of the famous warrior against the Sioux Indians, and was erected only a few years ago. An appropriation has now been made to move the statue from its present site, and set it up again at a safe distance from the railroad tracks.

AIR LIFT RAISES AND DUMPS DUMPLESS TRUCKS

When trucks or wagons are not self-dumping, unloading by hand requires money outlay. A lift platform has been devised which quickly raises and dumps such vehicles. The lift is air-operated, and when not in use, is flush with the street level. Dumping is accomplished by driving the front wheels onto the platform. When the air is turned on, a steel guard rises; first about 6 inches, then both guard and platform rise together. The guard prevents the vehicle from slipping backward.
FREAK STAMPS BRING HIGH PRICES AT AUCTION

Freak United States stamps brought the highest prices of all the offerings at a recent auction sale of a portion of a famous New York collection. One 24-cent air-mail stamp, with center inverted, sold for $610. The stamp was one of a sheet of 100, which got into circulation. An unused book of four of the 90-cent issue of 1890 brought $199, and an unused four-cent Columbian issue, of 1893, printed in blue, the wrong color, was sold for $130. A feature of the sale was the payment of $171 for a repaired two-cent of the 1901 issue, with center inverted.

SMASHED 86-YEAR-OLD VIOLIN SUCCESSFULLY RESTORED

Unusually adventurous is the story of an old violin which was fashioned in 1842, at Prague, Czechoslovakia. While

their boots before they enter an office, a unique boot washer has been patented to replace the doormat so familiar in other countries. The device contains a stand to fit both feet and is attached to a tank of water. When the feet are placed on the stand, the water is automatically turned on, washing away any mud or dust. The water continues to run as long as the feet are on the stand.

RADIO HELPS FIND BREAKS IN ELECTRIC LINES

One of the greatest difficulties encountered in modern long-distance electric-power transmission is to promptly find and repair the breaks that occur during windstorms which blow down poles and wires. As telephone and telegraph wires often suffer from the same cause, making communication between different points for checking up the trouble impossible, it has sometimes proved difficult to locate the break. At Minneapolis, during a recent storm that paralyzed all communication, this difficulty was overcome by using the radiophone, by means of which the break was promptly located.
A View of San Francisco from the Bay, Taken from an Old Print, as It Looked in Mark Twain's Days, About 65 Years Ago

Note the Contrast in Skyline between This View of San Francisco Today, and That Above. The Tower is the Ferry Building.
HISTORIC "PONY EXPRESS" PAGEANT TO BE GIVEN

Much interest in the romantic "Pony Express" of western pioneer days in the '60's is being revived by the announcement that a great pageant will be staged on this historic route, beginning August 28.

Celebrations are being prepared in the states which will take part in this pageant—Missouri, Kansas, Colorado, Wyoming, Nevada, and California, and possibly Utah. Descendants of the first Pony Express riders, dressed in early-pioneer costumes, with mail bags, rifles, and pistols, are to ride once more the famous old trail which crosses more than half the continent, from St. Joseph, Mo., to Sacramento, Calif. Two of these riders will be John K. Baker, of Denver, Colo., adopted son of William F. ("Buffalo Bill") Cody, and William Frederick Cody, nephew of Buffalo Bill. United States Army men and cowboys will also ride.

By way of contrast, the riders will be followed by light and heavy motor trucks, passenger automobiles, motorcycles, a special railroad train which will have a clear right of way through to San Francisco, and lastly, several government airplanes. These riders and vehicles will make all the stations of the old trail to Sacramento, and thence will proceed to San Francisco for the California admission-day celebration, September 9 and 10.

One important feature will be the unveiling of a 20-foot bronze statue of Mark Twain on the top of Comstock Lode, in Nevada. This statue, which was designed by Roger Noble Burnham, of Berkeley, Calif., is said to be an excellent likeness of the world-famous humorist. It shows him in miner's garb, notebook in one hand and pencil in the other, as he looked in the days when he wrote his first sketches and edited a newspaper in a Nevada mining camp.

SHARKS MAY FURNISH CURE FOR DIABETES

Promising results have been obtained in the treatment of diabetes by the use of an extract to which the name "insulin" has been given. Physicians of the University of Toronto have been attacking various phases of the problem for the last two years. The substance is an extract that requires the greatest care in the preparation, and is derived from an animal gland. One of the problems that gave concern to the investigators was the assurance of a sufficient source at a reasonable price. The entire animal kingdom has been studied for this purpose, particular attention being paid to various kinds of fish. These could be bred in enormous quantities if necessary, and encouragement of their growth would assure a sufficiency of "raw material." Some attention has been paid to sharks, and experiments along this line are still continuing, but it is not yet definitely known whether fish will constitute an important source of the product. In the treatments to date, which were administered to numerous animals and patients under close observation, it has been definitely established that the extract does exert a marked beneficial effect on diabetes. The most important uses of the product, in the opinion of the investigators, lie in the treatment of youthful sufferers, among whom the death rate has heretofore been nearly 100 per cent; in the treatment of patients who have additional serious infections; and in the treatment of those sufferers who are not relieved by diet. The actual manner of action of the remedy is not known, nor the "how and why" as yet understood. Medical researchers believe that the answer is to be found in the baffling reactions of the chemistry of the blood—a domain which still remains largely unexplored.
AUTOMOBILE RACES WOLF TO ITS DEATH

One of the most exciting pursuits ever staged in South Dakota took place recently when an automobile was used to run a wolf to its death. The animal, of unusually large size, had been raiding many of the farms in that vicinity, and was credited with having killed some 70 hogs on a single farm. A pack of dogs participated in the chase, and the wolf took to the prairie, traveling about 30 miles an hour, with the car close behind. When the machine had almost caught up with its prey, the dogs were loosed, and quickly accomplished a kill. So closely did the car maintain its position behind the wolf that the latter did not even have the opportunity to dodge. It was the largest animal ever seen on the prairie section of the state, and measured 5½ feet from tip to tip.

GERMANS CAST HUGE BELL FOR RHINE CATHEDRAL

Cologne Cathedral, on the Rhine in Germany, is to have what is declared to be the largest serviceable bell in the world. The new bell, to be known as the "St. Peter," will replace the 30-ton "Kaiser Bell," melted down for munitions in the war. It weighs more than 27 tons, is 11 feet high and the same distance in width. The upper half bears religious figures and inscriptions. The original Kaiser Bell was made from guns captured in the Franco-Prussian war of 1870-71.

greatly reduced. In the new attempt the weight would be considerably less, and it is expected that this would greatly increase the average speed. Only a small supply of fuel would be carried, the plane landing every few hundred miles for fresh supplies. In this way it is hoped that a sustained speed much in excess of a hundred miles an hour could be maintained. So great was the weight of supplies with which the nonstop plane was burdened on the start of its journey that it was nearly wrecked at the Hempstead flying field, because its powerful motor was barely able to lift the weight above the roofs of the surrounding hangars. But despite this heavy handicap, the plane covered the distance in the short time mentioned, or, to be exact, 26 hours 50 minutes 45½ seconds.
OIL INDUSTRY TO BREAK RECORD THIS YEAR

The oil industry is expected to shatter all previous records this year with a total output of approximately 700,000,000 barrels of crude oil as against a total of crude-oil production for the year is $1,000,000,000, and that of gasoline, $1,250,000,000. The capital investment in the industry is reported to be approximately $8,000,000,000. While more than 300 different products are manufactured from crude oil, gasoline, because of its relation

551,000,000 barrels in 1922. This year's gasoline needs are estimated at 7,000,000,000 gallons. The estimated value of the to the automobile, represents the biggest source of profit. Kerosene this year is valued at 250,000,000 dollars.

HELCIOPETERS BETTER RECORDS

Rising vertically and flying horizontally was recently accomplished by two helicopters in France. One machine invented by the Frenchman Oehmichen, completed a circle 360 feet in diameter at Valentigney. The other, invented and piloted by Pescara, the Argentinian, made a 120-foot flight near Paris.

NAVAL GUNS SIMULATE HUGE PILE DRIVERS

The pride of the United States Navy is the efficiency of the American gunner. To develop this efficiency constant practice is necessary. Obviously, however, the firing of a sufficient number of 14 or 16-inch shells to give the men proper training would be too costly, and so a system has been devised to train turret men and gunners by using dummy shells.

The dummy shell is loaded into the gun in the same manner as a real shell. Dummy powder bags are placed behind it and the breech is closed, the gun pointed on the target and "fired." In this kind of practice, of course, the dummy shell does not leave the muzzle of the gun. The shell cannot be pulled from the breech so that the practice may be repeated, but must be forced out.

For this purpose, the breech is opened and a wooden block weighing about 150 pounds is dropped down the muzzle of the gun. The weight acts like the "monkey" of a pile driver and forces the dummy shell out of the breech.

UNCLE SAM IS KEEPING TAB ON 4,000 CHICKENS

Besides all his other activities, Uncle Sam also finds time to keep a faithful record of some 4,000 chickens from the time they burst from their shells until life is extinct.

At least six separate forms, involving more than a hundred different entries, are required for every chick in the government flock at the experimental farm conducted by the poultry-husbandry division of the Bureau of Animal Industry, at Beltsville, Md. Obviously, neither the farmer who markets his eggs in a basket at the crossroads store nor the housewife who obtains her pin money from the sale of eggs and fowls, can apply the system of keeping records in force on this 60-acre farm, but both profit from the knowledge acquired at it.

So when this government bureau recommends to poultry raisers a certain ration because of its virtue for increasing the egg yield, or when it announces that hen No. 514 is a champion egg producer, farmers may know that the information is not mere guesswork, but is the result of actual experience and exhaustive tests.

Information as complete as that required by an income-tax schedule is kept of every fowl on the farm, representing fourteen different breeds of poultry. Every egg is numbered as it is taken from the trapnest, and even its weight is recorded. No egg is used for breeding purposes that weighs less than 50 grams (about 1 3/4 ounces), and it has also been determined that a dozen eggs should weigh 24 ounces.

During the incubation period, every egg is tested several times, and the results are described in terms of "infertile egg," "dead germ," "broken egg," "dead in shell," "pipped," and "hatched." Infertile eggs are boiled, cut into fragments and used in feeds. Eggs containing a dead germ are burned. Experiments have determined that in the incubation season the percentage of fertile eggs is approximately 80 out of 100. As the hens wander about the fields and obtain more forage later in the season, the fertility of the eggs is said to reach as high as 90 per cent.

All of the chicks hatched on the experimental farm are identified by means of numbers attached to their legs with bands. The day on which they are hatched, the number of eggs produced daily, and every fact relating to their lives, are then carefully recorded and studied for the benefit of poultry raisers throughout the country.
The effects of various feeds, temperature, and fresh air on the health of the fowl, and their output of eggs, are kept, together with the date of their death and the causes. In addition there is a “poultry-pedigree card” giving the ancestry of each chicken and its breed and sex. All of the results are tabulated, filing thousands of cards, books, and indexes, from which the government draws the information sent to poultry raisers all over the country.

RESERVE VAULT VESTIBULE WEIGHS OVER 100 TONS

What is declared to be the largest vault vestibule in the world, has recently been installed in the Federal Reserve Bank at Cleveland, Ohio, where it will

COLOR SCHEME OF WORK SPACE AFFECTS OUTPUT

...Eyestrain among modern workers has been discovered to be so common as to prompt serious investigations by experts in an effort to relieve that condition.

A View of the Special Steel-Wheeled Truck, Showing the Manner in Which the Huge 200,000-Pound Safe was Mounted and Transported through the City Streets

form the entrance to the gold-storage apartment. The vestibule, which is 4 feet thick, 15 feet wide, and 16 feet high, weighs over 100 tons, and the door that fits it weighs 90 tons. Both are constructed of hard and soft steel, so arranged that it is almost impossible to drill into them. Special steel-wheeled trucks and a fleet of power-winch motor trucks were used to haul them over the city streets, which were laid with steel plates on top of 3-inch oak planks to protect the water mains below.

One of the queer cities of central India is Ujjain, located in the state of Gwalior, on the right bank of the Sipra River. It is one of the seven sacred cities of the Hindus, and according to their reckoning it marks the first meridian of longitude. A great religious festival is held there every 12 years.

Some recent experiments along those lines have been productive of interesting results. It was found that if the workbench on which an operation is being carried out approximates the color of the material used, then eye fatigue is reduced, and the rate of production of the worker rises. It was also found that a girl operating a white typewriter does more work and makes fewer mistakes, with less eyestrain, than if using the standard black pattern. With a black machine, the typist, glancing from her “copy” to the keyboard and vice versa, must make an adjustment of her sight muscles with each change of focus; and when this occurs frequently, the muscles controlling it become exhausted. In both the cases cited the similarity in color between the work unit and the work made these adjustments easier and produced good results, with less eye fatigue to the worker.
FIVE "HAIRPIN" BENDS IN SINGLE BLOCK

One of the queerest-looking streets in the country is to be found in Burlington, Ia. Here, Sixth Street, although its side-walk length is only 241 feet, rises about 60 feet in that short distance, with a grade of over 25 per cent. Between walks the roadway winds first toward one side, then toward the other, like a huge snake, and contains five "hairpin" turns between the foot and the top of the slope. This con-

STRUCTION was resorted to in order to reduce the grade for vehicles. The street now is a constantly used thoroughfare in spite of its considerably increased length.

WEATHER FORECASTING FROM SHIPS AT SEA

Returning from a test cruise on the French training ship "Jacques Cartier," E. H. Bowie, chief forecaster of the U.S. Weather Bureau, expressed the conviction that forecasting wind, weather, and storm conditions at sea is entirely practicable. During the voyage to and from France, the vessel received radio advices as to weather twice a day, not only from Europe and America, but from other vessels within range. Weather charts were then constructed, and broadcast twice each day. Forecasting at sea is a simpler matter than on land, because there is no ruggedness and variation of surface that might influence climatic changes. This uniformity results in greater regularity of wind motion.

SIGN ON DOOR PANEL LIGHTS AS KNOB IS TURNED

Users of signs have long attached them to door panels to attract the attention of customers. It remained for a Chicago merchant to invent a similar sign which lights up automatically when the door knob is turned. This store-keeper found that an ordinary sign "Pull" failed to be noticed by his customers, in spite of the fact that he used the largest one he could find. The new device is the result of his experiments. Placed at about the height of the eyes of the person entering, its brilliant flash coming as the knob is turned, instantly attracts attention. The sign is regulated by a switch so that it can be lighted constantly if desired. All wires are in the door casing, and so cannot easily be disturbed. The sign is so constructed as to be burglar-proof.

At Loughborough, Eng., a 140-foot tower is being erected as a war memorial, which will house 50 bells. The tower will cost about $75,000, and will contain perhaps the finest chime outfit in Europe. The largest bell will weigh four tons.
METAL COMPOUNDS INCREASE GASOLINE EFFICIENCY

Doubling the mileage of an automobile on a gallon of gasoline is regarded as possible in the light of recent experiments where compounds of the metals selenium and tellurium were added to the mixture. The tellurium compound is said to be the more attractive because it lessens the "knock" that is liable to appear in the motor when it is pulling a heavy load.

MOTOR BUSSSES HAUL CHILDREN TO CONSOLIDATED SCHOOLS

Consolidation of public-school districts, which has become common lately, has brought with it the problem of transportation for the children, many of whom travel from the farthest edges of the new districts every morning. This is rapidly being solved by carrying them in motor busses, large autos, or even wagons and hacks.

One of the best illustrations of consolidated-school transportation systems is found in Kansas. There are now almost 150 such schools in this state, and over half have busses equipped with specially made bodies that accommodate from 15 to 35 children. These are driven and kept in repair by school mechanics and housed in school garages. The teachers sometimes are also drivers, and where there is a rural high school, its students serve in that capacity. The busses are fairly fast, and give good service.

There are, of course, occasional days when a "mud holiday" or a "snow holiday" must be called, on account of bad roads, but these are rare.

STAINED-GLASS MEDALLIONS WORK OF STUDENTS

Eleven stained-glass medallions, each the work of individual undergraduates, will be placed in a new arts-and-crafts building at the University of Oregon. The 11 students have each selected a particular craft to portray, designed an appropriate window, originated a legend for the border, and then completely fashioned the work without aid from anyone. One of the legends reads: "Ye Printer—Ye Printer Dothe His Papers Fille with News Which Is Both Goode and Ille." Another: "Ye Potter—Ye Potter Mouldes in Fynest Clays His Present Thoughte for Future Days." As a permanent exhibit of student work, it is claimed the medallions will be unique in American colleges. Antique English pot-metal glass is used to fashion them.
MILLIONS BOUND FOR INDIA IN KEGS AND BRICKS

Just kegs and bricks on the chute of this boat docked at Liverpool, but—as

they are kegs of gold coin, and bricks of silver—worth millions of dollars. The precious cargo is from America and en route to Bombay, India, where the silver bars, 250 in all, will probably be coined, or turned into jewelry.

RATCHET DEVICE ATTACHES TO SCREWDRIVER

Screws can be set or removed by means of a simple screwdriver with a ratchet attachment that fits on the shank. By op-

erating a button on the device the screwdriver handle may be turned either to the right or the left.

TRANSFER COIN-COLLECTION TO WASHINGTON MUSEUM

The Philadelphia mint’s collection of 1,688 coins, tokens, and medals, representing this and more than 40 other countries, is to be transferred to the National Museum at Washington. Among others, the collection contains shillings of 1651, Franklin pennies of 1787, and a rare old “five-eagle,” or $50 gold piece. Most of them are foreign coins, however, from Great Britain, France, Greece, Belgium, Norway, and Sweden, old free cities such as Augsburg and Bremen, and even coins minted by bishoprics in Germany.

BAKED ICE-CREAM EGGS A NEW CONFECTION

Ice-cream eggs with centers of real ice cream, which are baked after filling, are the latest novelty in confectionery. The plates containing the molds, which are egg-shaped, are heated by electricity. Egg-shaped scoops place the ice cream in the batter after it has been poured into the molds, the latter are closed, and the baking is so quickly done that very little of the ice cream melts. The eggs are then taken out of the molds and placed in a refrigerator, where the centers freeze hard.

WASHINGTON STATE PROHIBITS CHRISTMAS-TREE CUTTING

Reforested areas in the state of Washington have been depleted to such an extent by private and commercial Christmas-tree hunters as to prompt the enactment of a law aimed at those offenders. A fine of $1 per tree is named as the punishment for cutting down, topping, or otherwise destroying any tree without the permission of the owner. It is believed that this fine will take all the profit out of the trade.
CAST-IRON BORINGS MOLDED INTO BRIQUETTES

Coal briquettes, molded under high pressure, are a matter of common knowledge, but it is not so well known that cast-iron borings are similarly molded for foundry work. When fed into the cupola as scrap, or as fine borings, there is a considerable loss in the melting process, running as high as 50 per cent, which escapes as iron oxide in the slag. This loss has been reduced to as low as 4 per cent when the borings have been previously compressed into briquettes. A high-speed vertical steam hydraulic press is used in the process, making 30 strokes per minute, and exerting the enormous pressure of 120,000 pounds per square inch on the borings to form the briquette. The borings are unloaded directly from cars to a conveying machine, which carries them through a screening and blowing system, to sift out the dirt and clean them. The clean borings are then conveyed to the hoppers that feed the presses, or to storage piles.

PEDALLESS TRICYCLE EMPLOYS UNUSUAL RUNNING GEAR

Exercise for the whole body is the chief merit claimed for a new tricycle without pedals. The saddle is mounted on a "walking beam" pivoted to the frame, and alternate pressure of the feet against the footrest and of the body against the seat, drives the cycle forward.
GIANT REDUCTION GEAR USED ON U. S. NAVY TENDERS

The construction of the U. S. S. "Dobbin," now being rushed to completion, embodies various new departures in naval construction. With a sister ship, the "Whitney," the vessels will be the first to be constructed by the navy for the express usage of destroyer tenders. When commissioned, each tender will carry 216 torpedoes, stored in such a way that six bulkheads will stand between the skin of the ship and the deadly machines. Behind these bulkheads will be stowage compartments for oil, gasoline, and alcohol. An immense reduction gear, 146 1/2 inches in diameter and weighing 72,000 pounds, will be fitted to the propeller shaft of each ship for "tuning down" the speed of its mating pinion. It will transmit 7,000 horsepower at 105 revolutions per minute. This enormous gear, having what is known as herringbone teeth, measures a full 61 inches across its face, and is one of the largest ever constructed in the United States. When harnessed into service and meshing with its pinion, it will make only one revolution to every 15 of the driving pinion delivering power.
AUTOMOBILE WORK STAND TILTS CAR AT ANGLE

Seeking to eliminate the inefficiency resulting from mechanics having to lie on their backs or descend into a dark pit in order to work on the underside of an automobile, an enterprising inventor has recently patented a work stand which tilts the disabled car to any desired angle, up to 90°, thus exposing the bottom of the vehicle. In this position the mechanic can sit naturally, or even stand, at his work, and an abundance of natural light will fall on the machinery. The car is run onto the stand under its own power and locked in position, and the tilting operation is quite easily executed by means of a simple mechanism.

FISH-PROPAGATION BOAT CIRCULATES FRESH WATER

An unusual method of carrying live fish long distances for propagation purposes without bruising or injuring them has been adopted by the Ohio Fish and Game Commission. Instead of tanks or barrels, a boat is used for this purpose, which has two built-in tanks running lengthwise of the vessel, for the most part below the water line. Each of the tanks is provided with an intake at the bow; below the water level, and with an outlet at the stern, above it. This arrangement assures the fish a continuously fresh supply of water. An additional advantage claimed is that no injury results from rolling of the vessels, as with tanks.
ENGLISH RAILROADS COMBINE INTO FOUR SYSTEMS

Practically all the numerous large and small railroads of England and Scotland have been combined, forming four large consolidated systems. These are the London, Midland and Scottish Railway, with a mileage of 7,790; the London and Northeastern Railway, with a mileage of 6,500; the Great Western Railway, with a mileage of 3,800; and the Southern Railway, having a mileage of 2,200. All these roads have terminals in London, and own a total of 24,540 locomotives, 67,900 passenger cars, and 739,500 freight cars, exclusive of about 50,000 company cars and 148 steamships.

HARNESSING WAVES TO BUILD BEACH LAND

The commission of public works at Santa Monica, Calif., noting how the ocean currents built up the shore line by sweeping the sand between amusement piers, proposes to use this action of the waves to extend the shore line by building at regular intervals concrete jetties or quays, 200 feet into the water. This will add land valued at more than $1,000,000. The quays will be ornamental and topped by promenades, to be illuminated at night. A second series of quays will be built after these, and it is likely other coast towns will build similar quays.

AUTOMATIC BOBBIN STOP FOR COTTON SPINNERS

Cotton mills are displaying interest in an automatic stop device which halts the bobbin when a predetermined quantity of yarn has been spun on it. The device is applied to the spinning frame without material structural change, and prevents the bobbin from getting too full and running over. This has been a source of considerable waste in the past.

TIRE GAUGE ON EACH WHEEL SAVES TIME AND WORK

Much trouble and the mussy work of frequent tire examination are avoided by the use of a gauge which shows the air pressure of a tire at all times, on each wheel. It safeguards against the jolting strain on cars caused by hard tires, and the wear on tires by underinflation.
THE "bus" has always been the typical means of passenger transportation in Greater London, and still is, despite "tuppenny tubes" and all other means of travel—the only difference being that the modern chauffeur replaces the picturesque bus driver and the gas engine substitutes for the horse.

How important a rôle the motor bus plays in the Londoner's life may be judged by the facts that, in 1921, the biggest operating company carried a billion passengers, and its 3,000, or more, cars traveled over 100 million miles.

Until recently between 30 and 40 garages in different parts of London handled the repairs and rebuilding necessary for the maintenance of this huge fleet of buses. This was soon found to be impractical in many ways, and wasteful of time, and now a factory has been erected at Chiswick—claimed to be the most modern and best planned in Europe, if not in the world—where all repairs will be done. The buildings occupy an area of some 300,000 square feet, and a complete overhaul of a bus will take only four days as against 16 in one of the formerly used garages.

The works are laid out to accommodate a total of 100 units a week, but the system is elastic enough to enable the handling of 120 vehicles in that time.

When a vehicle is to be overhauled it is driven to the plant under its own power. The first operation is the removal of the bolts holding the coach to the chassis. A hydraulic jack is swung into position and the body is lifted clear of the chassis. During this operation the engine remains running. After leaving the demounting shop, the chassis is driven to another department for attention.

Eventually the reconditioned body leaves the overhauling department and arrives at the mounting department at the same time the completely overhauled chassis leaves the works for its road test. This dovetailing of the two operations is necessary, for overlapping or delay in any department would result in a con-
follows: When the engine is stopped the gasoline tank is emptied and the fuel drained by an underground pipe into a storage tank. As each chassis part is taken out, it is moved by a conveyor and completely dismantled. Each part is tested and inspected before it journeys down the line of workers and benches.

One of the most difficult operations is the cleaning. A special washing machine takes the form of a large tunnel carrying on its inner surface coiled piping perforated with small holes. A hot caustic solution is forced through the perforations by means of a pump, so that every part as it passes through the tunnel on an automatic conveyor, is thoroughly cleaned.

As the chassis passes along the shop, it is gradually stripped of engine, clutch, gear box, brakes, rear and front axles, steering gear, and all other fittings down to the bare frame. The wheels go into a special shop for re-tiring. The springs are reheated in a double-ended furnace, with a capacity of 120 springs a day. After
tempering each spring is tested to a 50-per-cent overload.

After the frames have been passed as fit for further service the process of re-assembling begins. The total length of the main assembling platform is 220 feet.

The rebuilding of the engines is as particular in every way.

By the time the chassis is overhauled and reassembled, it passes into position over a machine which, operating through the rear wheels, starts the engine, and the unit leaves the shop under its own power for the first test run. Then follows the remounting of the body as previously described.

**COMBINATION GAUGE TOOL FOR MACHINISTS**

Making accurate layouts, for centering purposes, is often a difficult job for machinists and tool makers, and takes considerable time in some cases. To speed this operation, an ingenious tool has been devised, in which two slideways, one vertical and the other horizontal, are contained in a cast-iron frame. Each has a slidable scale running in its groove, which can be locked in place. The frame also contains two triangular scales, whose longest sides meet at right angles.

This intersection serves as a reference point when laying out the work, and facilitates accurate scribing of the stock.

While on a world tour in 1921 a resident of St. Louis dropped a corked bottle overboard between Auckland, New Zealand, and Honolulu, containing an offer of a reward for its return to him. Thirteen months later, after traveling about 1200 miles, the bottle was found by a native of the island of Ulawa and delivered to a missionary in Siola in the British Solomon Isles, who reported the find to the sender.

**REGULATOR FOR AUTOMOBILE WINDOWS USES GEARS**

By the use of a recently invented type of regulator for automobile windows, the annoyance caused by imperfectly adjusted, rusty, or broken mechanisms, is eliminated. The new type uses a train of inclosed gears, the entire outfit being self-contained, nothing being visible to the car's occupants save the crank handle. The device can be easily installed in five minutes, and locks the window positively at any stage of the operation of raising or lowering the glass.

**HOSPITAL IN PARIS TO SERVE SICK AMERICANS**

In 1913 the Congress of the United States granted a Federal charter to the American Hospital of Paris, which was organized to provide medical attention for Americans sick abroad. It is now erecting, at Neuilly-sur-Seine, near Paris, a larger and more modern hospital, to be known as the "American Memorial Building," funds for which are being received through voluntary donations and contributions made in the United States. Aside from its work of service, the structure will memorialize the lives of fallen soldiers, as well as those who fell while in the various American hospital services during the war. Many of these were organized by the original parent hospital at the outbreak of the war. In addition to the ward rooms, the new building will contain memorial rooms, beds, equipment, and other features which are being subscribed by American individuals, organizations, and communities. These will bear engraved plates, expressing the purpose of the gift.
WORLD'S LARGEST GENERATOR

There is now being installed at one of the hydroelectric plants at Niagara Falls, the largest power generator ever built. It will deliver 87,000 horsepower, and when in operation will furnish enough current to light more than 2,500,000 electric lamps of the size commonly used for house lighting. The machine will be 35 feet in diameter, 26 feet high, and will weigh 700 tons. Each generator—there will be two—would supply the electrical needs of a large modern city.

TRACKLESS TROLLEY TO RUN ON CITY STREETS

Embodying many new features, a trackless trolley car with a seating capacity of 30, is to be introduced on certain streets in Philadelphia. A car has been designed with great care as to the comfort of the passengers and the operation of the vehicle, which can be driven around or between obstacles with an ease that is surprising. It is, in fact, possible to operate it 16 feet on either side of the feed wires. It is equipped with two 25-horsepower 550-volt motors, mounted in tandem and driving the rear axle through a propeller shaft fitted with universal joints. The master controller may be either automatic or manually operated; the service brake is operated by a pedal, and the emergency brake by a hand lever, both brakes being of the internal expanding type and mounted on drums on the rear wheels. A modified standard trolley base, mounted on the arch roof, carries two poles, which are necessary to complete the circuit with the overhead wires.

The car is built on a specially designed chassis with a wheel base of 137 inches, and has cushion tires on all four wheels.

The Largest Generator in the World, in the Process of Erection at Niagara Falls: Note the Size of the Man as Compared with Its Height

The Trackless Trolley in Perspective: It can Travel a Maximum of 16 Feet Each Side of the Overhead Wire

Passengers Boarding One of Philadelphia's Trackless Trolleys, Which Has Stopped at the Curb to Receive Them
IMPROVED TELEGRAPH CODE AID S RADIOTELEPHONING

As every radio enthusiast knows, one of the greatest difficulties in telephone reception is that of "tuning out" wireless-telegraph signals. This difficulty Maj. Gen. George O. Squire, chief signal officer of the U.S. Army, proposes to abolish by using an unbroken alternating current instead of the interrupted direct current, the sudden breaks in which, between dots and dashes, are the worst possible source of disturbance.

In the new code, there are no such breaks, although short spaces are used between the letters and longer ones between the words, as heretofore, the message delivered on the receiver tape having the appearance of vertical projections of varying height from a horizontal base line. Of these the lower ones represent dots and the higher ones dashes.

CHECKS RISING SAP TO SAVE TREES FROM LATE FROST

Injury to fruit and other trees and vines by late frosts, can be guarded against by a method which retards the rising of the sap in the tree until danger from that source is passed. This prevents premature blossoming due to spells of unseasonably warm weather. It is accomplished by surrounding the trunk of the tree with an elastic rubber container through which is circulated ice-cold water supplied from a tank in which is a refrigerating coil. This cold-water bag is insulated with sawdust packed in a wooden casing which surrounds it and the adjacent portion of the tree trunk.

"Choking" a Tree to Prevent the Sap from Rising Prematurely and Becoming Frozen. Insert: Rubber "Choker"

Pipes may be run to various trees through the orchard and all cooled from the one cold-water tank. In one test the method was successful in holding back development of a prune tree for three weeks after other trees in the orchard were in bloom.

SIMPLE POSTAGE-STAMP AFFIXING MACHINE

There is said to be no danger of stamps sticking together in a new postage-stamp affixer, that automatically places one drop of water, of any size desired, on the envelope. The stamp is then pasted on the envelope by pressure on the handle. The water container is in the handle, and does not come in contact with the stamps; hence no moisture can get into the mechanism. The machine also counts the stamps. It has few parts and is of simple construction.
AIRSHIP HANGAR COULD HOUSE LARGE OFFICE BUILDING

At Scott Field, Ill., the Army Air Service has erected, at a cost of more than $2,000,000, a large airship hangar. The huge structure could contain a 10-story office building with a 50-foot tower on the roof. The hangar, which is built of steel, concrete, and glass, is 825 feet long and 225 feet high. At the end are large steel doors opened and closed by electric motors that travel on railroad rails.

STEEL VAN BODY PROTECTS SILKS IN TRANSIT

Safe and speedy delivery of silks from some eastern mills to the distributing houses in New York City, is assured by the use of a special van with an all-steel body. The cab is entirely covered with bullet-proof steel and the door so constructed that it may be locked from the inside as well as from without. The windshield and the windows contain bullet-proof glass and cannot be opened.

RUSTIC ARCH LENDS BEAUTY TO FACTORY GROUNDS

Manufacturing plants are usually conspicuous for the lack of attractive surroundings, and it is of interest to note the attention given to beautifying the grounds of a factory for fine watches. The company bought and tore down several dilapidated structures along a road which was 150 feet from its line and 75 feet below the factory site. A rustic arch of stone was erected as the entrance to a footpath winding up the hill and leading to the plant. In the natural rock along the front of the plant, grow many varieties of evergreens.
FALSE ROCK BOTTOM CAUSES BRIDGE TO SAG LIKE ROPE

Disaster was averted in the nick of time recently at Hilo, Hawaii, when a loaded passenger train was flagged just as it was about to cross a collapsed bridge. A series of heavy rainfalls preceded the collapse of the structure, which spans the Waikiki River. Immediately after a passenger train had passed over it, a rumbling roar was heard; ten concrete supports crumpled like so many matchsticks, and the floor sagged down almost to the level of the water. More than 100 feet of track was left hanging in this dangerous condition. Insecure footing for the bridge supports is believed to be responsible for the collapse, in that they rested on rock underlaid by a shallow stratum formed by volcanic and earthquake disturbances. This layer, it is assumed, had been dislodged by further volcanic disturbances, causing the entire foundation to give way.

MAMMOTH GIRDER SHIPPED ON FOUR CARS EACH

Unusual measures were resorted to recently when it became necessary to ship, from Milwaukee to northern Michigan, a pair of extremely long, heavy girders. Each covered a length of four flat cars, and needed a special pivot under each end to permit the cars to take the curves. It was also necessary to route the shipment very carefully, to insure that no limiting clearances of bridges, tunnels, or curves would interfere with safe passage.
FURNITURE DEALER MOVES GOODS BY MOTORCYCLE

Moving household goods with a motorcycle is an interesting use to which this type of vehicle has been put by a London furniture dealer. Into the sidecar of his motorcycle he loads such articles as a couch, a table or two, and several chairs, which he delivers to his customers quicker than with the ordinary moving van.

LONDON AND CHICAGO MAY BE LINKED BY AIR LINERS

Plans now under way in England have for their object the linking up of the entire British Empire by airship lines. Independent of these plans, but governed by their success, the same interests are laying the groundwork for a similar service that will link England and the United States in regular scheduled flights, with Chicago as the American terminus of the line. The practicability of the scheme is soon to be demonstrated on the Indian route, which will be established between London and Bombay. Six motored airships will be constructed for this service, each capable of carrying 200 passengers in addition to a cargo of mail. They will be 700 to 800 feet long, have a diameter of 112 feet, a capacity of 5,000,000 cubic feet of gas, and a speed of 80 miles per hour. The ships will carry two classes of passengers; first-class in cabins, and second-class in bunks. That Chicago has been selected as the American terminal point depends on its more central location than New York. The running time, or rather, flying time, between London and Chicago has been set to about 40 hours, which will require an average speed of about 100 miles an hour. It is expected that this speed will be realized after the airships have been modified in the light of experience acquired on the London-Bombay route.

SANDBLAST CUTS SHIP'S PORTHOLE LENSES

Considerable time and money were saved at a large eastern shipbuilding plant recently by the method adopted for cutting special-size porthole lenses. A sandblast was used, the glass being first protected with metallic disks, cut to the desired size, and bearing upon pasteboard cushions. When cut halfway through, the lenses were reversed, and finished from the opposite side. This prevented concaving the edge of the glass. Although the lenses were 1 inch thick and 6 1/4 inches in diameter, only 10 minutes were needed to assemble and cut down each one.

Putting a Motorcycle to a New Use: The Miniature "Moving Van" Makes Better Time than a Truck
PORTABLE ELECTRIC-LIGHT GUARD EASY TO ATTACH

Adjustable to any extension cord, a new lamp guard can be attached in a moment to any electric light without removing the socket. A hole running lengthwise through the split handle admits a large-size cord, and the guard locks with a key, preventing theft. It covers any standard brass or weatherproof socket up to 1 1/4 inches in diameter, and fits lamps that have straight as well as those that have curved sides.

ROOTS OF TREE-SEEDLINGS GROWN IN "SPLINTS"

Artificial root distortion which causes disease and loss of young tree plants, is practically impossible in an improved method of raising trees and shrubs from seeds. Each little tree begins its growth in earth inclosed in a tube made from a piece of building paper, about 5 inches wide and 2 feet long, to which lath strips are cemented lengthwise. The roots are thus forced to grow straight downward. After the seedlings have been transplanted, the lath and paper rot away, thereby helping to supply nutriment to the roots.

PHOTOGRAPHS WAVE LENGTHS

Photographic exposures of one one-millionth of a second are used in a new instrument for measuring sound and light wave lengths. The instrument was developed for astronomical work and, in connection with a method of measuring the velocity of sound in metallic vapors, is a great aid, particularly in studying radiations from the sun.

PAINTING ROAD CENTER LINE WITH A WOODEN WHEEL

In order to speed up the work of painting a white mark down the center of its concrete highways, Wayne County, Michigan, has mounted a 4-inch wooden painting wheel, covered with felt, behind a motor truck. A compressed-air painting machine sprays paint onto the felt tire, and this is at once transferred to the road as the wheel rolls along. From 6 to 7 miles a day can be painted by two men with this method, as against 1 mile with the old four-man penciling outfit.
CLouDBURST' SWEEPS TONS OF MUD ON MINING CAMP

Excitement is never lacking in a gold-mining camp, particularly if it is located in the Colorado Rockies. Snow slides are of common occurrence in the winter, and mud slides take their place in the summertime. A recent cloudburst there let loose a wall of mud, 12 feet high, on the unsuspecting camp. Rocks, mud, and boulders flowed through the small town, covering the streets. The dining room of the leading hotel became filled to the ceiling with this oozy mass, which covered up 22 dwellings. Fortunately, only one person was killed outright, and one fatally injured, owing probably to the fact that the slide occurred at noon time.

When you want anything and do not know where to get it, write Bureau of Information, Popular Mechanics, Chicago.

A Graphic Picture of the Havoc Done in a Colorado Mining Town, When a 12-Foot Wall of Mud Avalanchéd Down upon It: A Cloud burst Loosened the Slide, Which Completely Covered 22 Houses

One of the Houses Which a Colorado Mud Slide Swept from Its Foundations, and Crushed Like an Egg Shell

Queen Building Dollhouse

Leading architects of England have been working for two years on a miniature house for Queen Mary, to be 7 feet high and 8 feet long, which will be complete and perfect in every detail. There will be silk Persian rugs, electric elevators, a piano, a complete kitchen outfit, a midget auto before the door, a library filled with hundreds of books, each written by a famous author for the collection, flawless plumbing, and portraits of the royal family by noted painters. Another year will be required to complete the house, which may lay just claim to being the most elaborate plaything in the world.

Mechanical starters for airplane engines are coming into increasing use, particu-
HOW DEALERS IN CAST-OFF HATS MAKE A PROFIT

That a surprisingly large market for old hats exists is evidenced by the wide activities of junk dealers in retrieving old headgear from ash cans, city dumps, and from hat stores. The better grades of second-hand hats—those obtained from stores where they are left by purchasers of new hats—are renovated, graded, and sold back to hat manufacturers who reblock and resell them. Those badly battered and worn, are baled, and sent to mills where, after suitable chemical treatment, they are made into rugs.

UNUSUAL DUMPING SCHEME

Gravity will be one of the forces used to advantage at the new coal pier of the Virginian Railways Company in Norfolk. The loaded cars will be hauled up an incline, where the huge car dumpers will empty them into mammoth pans. As the empty cars are returned, the loaded pans, acting as counterweights for the cars, will be elevated still higher to the top of the pier for transfer to boats. The scheme eliminates heavy and expensive construction, which would be necessary if the loaded cars had to be raised clear to the top.

CHILD'S BRAIN PHOTOGRAPHED

Photographing the brain of a living person was recently accomplished in a manner that produced no ill effects upon the patient. While working at a clinic in a New York hospital, physicians made several flashlight pictures of the inside of the brain of a 10-month-old baby. It is expected that photographs made in this manner may prove of great value in the treatment of brain diseases.

"AERIAL" ADAPTATION OF GOLF MAKES DÉBUT IN CHICAGO

Golf of an "aerial" variety, in which the ball is hit from a suspended sling to a small net hung on a pole some distance away, is being demonstrated in Chicago. The outfit necessary to play the game consists of two poles, one supporting the sling, the other the net, and a special spoon-faced club or hammer. The distance between the "tee" and the "hole" may be varied from a few feet to 50 or 75 yards, as the player acquires greater skill.
JUMPERS COVER BATHING SUIT WHILE WALKING TO BEACH

Wearing bathing suits through city streets or in beach restaurants is prohibited in many localities, and yet heavy outer clothing—especially after a swim—is quite bothersome and annoying. As a comfortable outfit meeting all requirements, there is being introduced a suit of light waterproof jumpers. These cover the entire body, from the hood to the straps fastening about the ankle.

HERRING SPLIT AND DRESSED IN RAPID MACHINE

A herring-dressing machine, which is claimed to have a capacity of 3,000 fish an hour, has recently been imported. The herring are placed on sliding plates on a star-shaped revolving table supported on an arm from the base of the machine, and the heads cut off. They are then drawn by the tail through a series of mechanical devices by which they are slit open, cleaned, and the backbone removed. Just before being discharged from the machine, the fish are washed by a rotary brush against which a stream of water is directed. A nonrusting alloy is used in the building of the machine.

ALL-PURPOSE GAS MASK LETS WEARER TALK

Investigations carried on since the great war have resulted in the development of a gas mask that permits the wearer to carry on conversation with about 80 per cent of the efficiency of the average speaking voice. This is accomplished by means of a diaphragm of water and gas-proof cloth held in an aluminum casting opposite the mouth. Improvements in the canister render the mask effective against ammonia fumes and carbon monoxide as well as the ordinary war gases. The equipment, which weighs only 5 pounds and is arranged to be carried under the left arm, is simplified by the elimination of the nose and mouth pieces.

JAPANESE SUBMARINES MAKE WARM-WATER VOYAGE

Five thousand miles will be covered by a Japanese flotilla of seven submarines in an effort to determine the practicability of traveling in warm waters. Compartment temperatures in submarines have always been too high, from a health standpoint, and the present journey, undertaken in the warm waters of the South Sea, will test the resistance of the crews to capacity. The test trip is said to be the first of its kind ever made by any navy in the world.
DITCHING WITH DYNAMITE

What Appears to Be the Edge of a Dense Woods in the Background of This Picture Is Mud, Water, and Debris Plung High by a Single Explosion of Dynamite Which Opened a Quarter Mile of Irrigation Ditch.

By JOE ALEXANDER

The development of a new kind of dynamite which lends itself to a simplified method of blasting, has so reduced the difficulties of ditch making in wet ground, as to make feasible the draining of thousands of acres of marsh land. On many farms there are small areas of swampy land, that are usually susceptible to drainage if ditches could be made, but the latter is a problem. Hand labor is expensive, the work very difficult, and the use of a ditching machine not often warranted.

A solution of these difficulties is seen in the new low-freezing explosive, which is rated as a 50-per-cent straight nitroglycerin dynamite and is capable of being exploded according to the principle of "propagated blasting." By means of a crowbar, or other similar tool, a row of 20 holes, about 18 inches apart and each 18 inches deep, is made on the line of the proposed ditch, and each hole is loaded with approximately a half pound of dynamite, the difference from the common procedure of blasting being that the only hole to be fitted with fuse and cap, is the one in the middle of the row. The uncapped charges are exploded by the concussion transmitted through the wet ground from the centrally located detonating charge which is ignited. This method, which is only applicable in wet ground, makes for a considerable saving in blasting caps and fuse material as well as in labor in connecting up the charges. A reasonably clean-sided ditch, free from standing brush and roots and requiring little shoveling, and about 3½ feet deep and 4½ feet wide, will be formed. About 30 pounds of dynamite is required for each 100 lineal feet of ditch.
A new hand hoist of clever design employs no drum but a sheave over which a chain is passed, the slack end of the chain hanging loose from the winder. A novel feature of the invention is the winding head which consists of a crank-operated eccentric shaft carrying a bevel gear engaging another gear attached to the housing. The eccentric gear has one more tooth than the gear in the housing, and as it is also integral with the chain-wheel sheave, each turn produces an advance equivalent to one tooth.

TWENTY-FIVE MANUFACTURERS JOIN TO MAKE ONE PIANO

An unusually interesting and valuable piano is the one belonging to the Piano Club of New York City. The many manufacturers of nationally famous pianos who are members of the Piano Club each wished to give to the club an instrument of his own make, but which of the many was to be accepted could not be decided. The idea was finally adopted of making a composite piano, each of 25 manufacturers doing a part of the work or contributing part of the materials. The result, an expensive and high-grade instrument called “everybody’s baby,” is now installed in the club rooms.

AUTOMATIC NEST TRAPS HEN AND EGG

Unusual interest attaches to a trap nest invented by a Norwegian because of the simple way in which a nonproductive hen separates itself from the layers. The nest is divided into two sections with an upper and lower level. The hen enters through an opening at the upper level, walks across a trapdoor, and climbs onto the nest. When an egg is laid it drops into a cup mounted on the end of a pivoted lever which swings down and rolls the egg into a separate compartment, at the same time unlatching the trapdoor, which swings upward. The hen then leaves by a platform on the lower level, which action resets the trapdoor.
THE silver-tipped, one of the most terrible fighting animals in the memory of man, has been extinct these many years; the grizzly, smaller brother of the silver-tipped, remains in small numbers in only two or three states; the bison persists in small and protected herds where he once roamed by millions; the elk is nearly gone, and the mountain lion is being hunted to extinction in order to save the few remaining deer. The most interesting fauna indigenous to any of the continents virtually has passed from the mountains and the valleys, the forests and the prairies of North America. The same is true of the Indian.

To see these animals one must go to museums, where, at large cost, habitat groups of nearly all our four-footed and winged life have been recreated by taxidermists. Now, however, the complaint comes from the museums that these bison, deer, bear, mountain lions, and other "stuffed" animals will not last long; that, within the next half century, they will be nothing but dust and hair, piles of rubbish ready for the janitor's broom. Then all that will remain will be the pictures of these animals, and of the native races of men of this continent.

In view of this, a proposal has been made which, supported as it is by museum authorities, national and state-park officials, ethnologists, zoologists, and conservation experts, will repeople the plains and the mountains, the river valleys and the deserts, with humans and animals, destined to remain there forever. The transcontinental traveler, whether by train or by automobile, will see at the edge of the forest an Indian, his bow drawn to the arrow's head, with a deer, an antelope, or an elk, just within range. Rounding a curve, he will come upon a life-size silver-tipped and her cubs, half hidden and half revealed by the brush of the mountain wall. On a ledge of rock, above his head, he will be startled by a tawny mountain lion, or a pair of them, basking in the sun, or playing.

The motorist, following any one of the highways westward, will find his road through the various states marked with the animals of that state. In California, he will find bears along the trail, from the ton-and-a-half silver-tipped to the little 300-pound brown bear; in Washington, he will see the mountain lion and the puma along the highway; in Oregon, the elk will greet him in the valleys, the mountain lion in the lower hills, and while from lofty pine trees, golden and bald-headed eagles will look down upon
him. Through Arizona and New Mexico, he will meet the cliff dweller and the Pueblo Indian face to face along the highway, while in the desert and in the low hills he will see again the antelope, the coyote, and the occasional gray puma, as the soldiers of Anza and Coronado saw them. The Indians, the bears, and the elk, and the northern and darker mountain lions, will be of bronze; the deer and the antelope, the coyotes, and the southern mountain lions, will be of concrete, accurately colored to represent the natural fur of the animal. Each figure will be exact as to size, form, expression, and color. The weapons and the implements of the Indians will be reproduced in bronze also. The whole plan is one of permanency—to present to all future generations the wild life of western America as it was when white men first set foot in the New World, and to insure the preservation of these primitive men and the native animals through all the years. Some of the larger birds, such as the California condor, now practically extinct; the golden eagle, the bald eagle, and even some of the lesser forms of winged life, will be similarly cast in bronze or concrete.

Along the seashore will be set up statues of individuals and groups of the rapidly disappearing sea otter, and of some of the seals which are threatened with extinction, as well as the sea elephant, now found only near one small island off the coast of Mexico.

The idea originated in the mind of Charles Keeler, poet, essayist, and dramatist, president of the Writers' Club of California, and managing director of the Chamber of Commerce of Berkeley. He first presented it to Paul J. Fair, constructor of educational exhibits for the U. S. Forest Service, himself a wild-animal sculptor of ability. The matter was later presented to museum and park officials, state officials, highway organizations, and others throughout California. It met with the immediate approval of these men, and of many chambers of commerce in the state.

Later, when life-sized figures of both Indians and animals have been placed in position in some of the California mountains, the project will be laid before the Smithsonian Institution, the director of national parks, and the Department of the Interior. Sculptors are to be invited to submit small figures of individuals of the various Indian tribes which once inhabited the western states, as well as of the larger animals of that territory. Figures, such as the various poses of the mountain lion made by Arthur Putnam, the silvertips, grizzlies, and brown bears of Douglas Tilden, and the coyotes and bears done by Mr. Fair, will be used as models for the bronzes and the concrete statues. Indian models are expected from Roger Noble Burnham, of Berkeley.

The bronzes are to be cast in the usual manner, and then securely anchored on the natural rocks.

As an example of the type of statuary contemplated may be mentioned "The Last Grizzly," an already executed magnificent life-size bronze, representing a battle between a
mother grizzly and two Indians who have attempted to steal her twin cubs. The contest between men and beast is realistically pictured and the fighting instinct of this species of bear emphasized by the two snarling cubs, who are trying to aid the mother by biting at the red men.

A new and interesting method of handling the concrete for animal figures that must be painted, has been devised by Mr. Fair, who, with Mr. Keele and Mr. Burnham, has been working on this problem for some time. The concrete can be colored before being cast, or painted with waterproof paint after casting, which would require repainting every four or five years.

Figures made of the colored material will not be "poured." The concrete will be made thicker and then modeled into the figure of the animal by the artists, just as clay is used in making the original small figure for the statue. Thus, differently colored concretes can be used for modeling different parts of the animal, and the delicate shading of the antelope or of the mountain lion developed to a point of accuracy which could not be attained were they cast in any metal, or poured from ordinary concrete.

The financial plans are as yet not quite worked out, but no difficulties are anticipated.

"The Last Grizzly": Statue Representing Conflict between Red Men and Mother Bear

"The Killer": Young Deer Fallen Prey to a Mountain Lion of the American Rockies, a Mounted Group Now in the Oakland Museum
MODERN JOVE JUGGLES MILLION VOLTS

At an electrical show held at a western university not long ago, one of the students mystified the crowd with a display rivaling the mythical feats of Jove, who was believed by the ancients to be the wielder of the thunderbolt. Seated in a chair separated from a table by seven-plies of insulators, the youth grasped a zigzag rod in one hand and in the other a wand with which he made contact with a ball from which the lightning effect was emitted. The impurity with which he handled the 1,000,000 volts is explained by the low amperage value of the current passing through his body and the insulators under the chair legs, which prevented the electricity from going to the ground and thereby establishing a flow of current that would have been disastrous to the daring young experimenter.

THIRST FOR KNOWLEDGE MAKES JAPS WAIT IN LINE

Libraries are very popular in Japan, particularly with students, who apply themselves zealously to their studies. As the date for the entrance examinations to higher schools approaches, this popularity increases, and the students begin to “cram” in earnest. Long lines form at the library entrance, and the students patiently wait their turn to be admitted. This congestion is most apparent in the large cities, as Tokyo, Osaka, Kobe, or Kyoto, where the student body is considerable.

BULGING HULLS FOR SHIPS

Freedom from rolling is the advantage claimed for vessels fitted with corrugated hulls, so shaped as to form two bulges on each side. In addition, this design is claimed to give additional cargo space and to lower the fuel consumption. On a recent voyage from Bangkok, India, to Hull, Eng., the vessel “Rio Azul,” so fitted, consumed only a moderate quantity of fuel. The owners attribute this good showing to the freedom from rolling, which, in the ordinary steamer, causes the propeller to “race” out of the water, losing its propulsive power.

Producing a Lightninglike Display with the 1,000,000 Volts Which He Permitted to Pass through His Body, the Young Man Seated in the Chair Mystified the Crowd at an Electrical Show Held Not Long Ago at a Western University.
IMPROVED MAST GIVES MORE ROOM ON DECK

Departure from the usual mast construction made available more handling space for hoselines on a Pacific-coast tanker vessel, at the same time doing away with many guys and stays that would otherwise be necessary. Two steel channels, placed back to back so as to form an "H," constitute the mast, which is slightly higher than its two channel-shaped steel supports. Steel diagonals connect the inclined supports with the vertical mast. To cap the mast, a 4-foot wedge was cut out at the top, the flanges sprung toward each other, and welded together.

WORLD'S STOCK OF DIAMONDS

Not counting those that are as yet unmined, there exists in the world 42.5 tons of diamonds, which is equivalent to 192,500,000 carats—the unit by which diamonds are usually weighed. Based on the average market value of diamonds today, the total represents approximately $100,000,000,000. India, the sole source before the 18th century, has produced 4,400 pounds; Brazil, in the 18th and 19th centuries, 5,500 pounds; and Africa, in the last 40 years, 75,000 pounds.

ENVELOPE SEALER IS SELF-ADJUSTING

Mail is easily sealed by merely pulling it through a new device that adjusts itself to irregularities in the thickness of the contents of the envelope. The flap of the envelope is first passed over rollers that run in water, to moisten the glue, and then pulled through a slot that folds the flap, which is sealed by means of a fingered closing spring.

FLAME-PROOF LOCOMOTIVE BUILT FOR MINE USE

Guided by the exacting requirements of electrical equipment for use in gaseous mines, a builder of storage-battery locomotives has designed one that is assembled from a number of units, each of which is of flame-proof construction. The motor is inclosed in an air-tight case provided with handholes through which ordinary repairs can be easily made, and a special housing guards against danger from the controller. An air-tight shell also incloses the headlight lamps which are controlled by a revolving switch mounted in an explosion-proof compartment. Ample ventilation is provided for the battery compartment, which is so arranged that no tools or loose wires can come in contact with the cell terminals. All wiring is heavily insulated and protected, and leads enter the casings through special stuffing boxes. Locks prevent unauthorized persons from tampering with the apparatus.
LOAD GROUND WITH PIG IRON TO SALVAGE BUILDINGS

While the Panama Canal was being dug, quantities of earth were dumped into swampy ground to form the site on which the city of Balboa was later built. Recently the error of having erected many costly buildings on this filled ground has been revealed by the sinking of the foundations. In some instances the settling has been so alarming as to make the evacuation of the buildings advisable. Instead of trying to counteract this sinking, the government engineers decided to help it along until no more settling would occur. Trenches were dug around the buildings and filled with water, and tons of pig iron were piled on the floors and on the ground. Gradually the buildings are being leveled, and it is believed the ground will become firm enough before very long to support them in a plumb condition.

WRITE our Bureau of Information, if you wish to know who makes or sells any article described in this magazine. Send no postage; the service is free.

MAROONED AUTO TAKES LAKE RIDE ON ICE CAKE

Having been carried 20 miles out into Lake Superior, and drifted about on an ice floe for two days, a small automobile was at last dragged to safety across a temporary ice "joint" with cables and driven back to dry land uninjured. This series of adventures happened after the owner had driven out on the ice to fish. Though apparently stable, the ice field began to crack, and left the car marooned on a floating cake which drifted farther and farther from shore. Some peculiarity of the massive ice floes—a glancing collision, perhaps—caused the drifting cake to return toward the main sheet from which it had broken, and a lucky cold spell "cemented" the joint, making the recovery possible. A track had, literally, to be chopped through the rough edges of the floe, an iron stake driven into the solid ice, and the car dragged to safety with cables. Its lucky owner, who had labored alone for two whole days and a night to effect the rescue, brought in a load of 300 pounds of lake trout which he had caught on his fishing trip.

COMBUSTION PROCESS FILMED WITH MOVIE CAMERA

Filming the combustion processes that actually occur in the burning of coal under a large modern boiler, is one of the movie camera's most recent uses. The boiler was fitted with a moving-grate type of furnace, carrying a thick bed of burning coal, the glowing surface of which radiated heat direct to the boiler tubes. By protecting the lens of the camera, it was possible to obtain a satisfactory picture of combustion at a furnace temperature of 3,000° F. Grate travel, too slow for ordinary observation, was clearly shown in two minutes by the film which was made by snapping pictures at intervals during four hours of actual furnace operation.

PAPER FROM PINE STUMPS

After many extensive experiments a chemical engineer in Louisiana has developed a method of extracting the turpentine, resin, and other elements from long-leaf yellow-pine stumps to such an extent that a good grade of paper can be made from them. Heretofore the large content of resin, the many knots, and the charcoal surfaces caused by forest fires, have prevented this use of the material. Now, in addition to 20 tons of pulp per day, a plant which is being built at Elizabeth, La., will produce about 500 gallons of turpentine and 20,000 pounds of resin.

SAFETY-MATCH LIGHTER PREVENTS ACCIDENTS

A novel match lighter which guards against accidents has been invented. When the match is inserted in the opening, a sawtooth blade which works automatically scratches and lights the sulphur head. All danger of heads flying off and the flames burning the fingers is prevented. The box is in convenient pocket size.

BEAUTIFYING A CITY STREET WITH AN ITALIAN CASCADE

The problem of ugly, abandoned streets has been solved by Oakland, Calif., which

Oakland's Cascaded Street, Which Beautifies the Hillside over Which It Runs in Small Rivulets

has converted a hill street into an attractive Italian cascade, over which water flows continuously. At night each of the series of bowls in the cascade is illuminated from beneath by varicolored electric lights. This presents an attractive spectacle to the city's business district across Lake Merritt.

PAIL WITH FLOAT PREVENTS Calf DRINKING TOO FAST

Fast drinking is a habit which careful stock raisers are anxious to correct in young calves, for if allowed to continue, it is likely to cause digestive disorders that affect the animal in after life. An effectual check against this is believed to have been found in a simple metal float that fits into a straight-sided pail in which it slowly drops as the calf feeds. A hole in the center of the float, the upper surface of which forms an inverted cone, regulates the flow of milk, and prevents its being drunk too fast.
A Forest Fire Staged for the Movies: Portable Searchlights were Used to Light Up the Blaze for the Cameramen, Who Worked in Pairs.
Specially designed hoods, gauntlets, and garments for the cameramen, and sheet-iron blinds to protect their instruments, were used recently in filming a forest fire set ablaze over a 20-acre tract as material for a motion-picture scenario. Twenty cameras were used, stationed in pairs at various points around the tract of pines. In spite of the precautions taken, five of the cameramen were so severely burned as to require medical attention, and two of the cameras were put out of commission by the terrific heat of the flames which raged too closely.

SHALLOW FREIGHT BOATS HAVE FOUR PONTOON RUDDERS

With the development of inland waterways varied types of freighters have been designed to meet changing conditions. The latest to appear is a long, shallow craft, 272 feet in length and 42 feet wide, designed for service on the Erie Barge Canal. Its steering facilities are unusual, consisting of four pontoon-like rudders, two at each end, to permit turning rapidly. The propellers run in a “tunneled” hull, partly out of the water, but the depth of immersion may be adjusted to suit varying conditions of draft. Forty air-tight compartments, with bulkheads, render the vessel practically unsinkable. Being of shallow draft, the boat will carry all its freight on the upper and lower decks. It will be electric-driven, power being generated by oil engines of the Diesel type.

After suffering from sleeping sickness for 12 days, a nine-year-old boy was completely cured by three injections of a new serum.
UPWARD CURRENTS OF AIR HELP GLIDERS

One of the mysteries of soaring flight with gliders and low-powered planes is the upward currents of air that usually exist in a hilly country, but frequently are found also over the sea and desert. If a sailplane is launched from an elevation, it will, unaided, glide through the air and gradually approach the earth at an angle dependent upon the skill of the pilot and the design of the plane. It is due to the air sailor taking advantage of the uprends of air that the remarkable records with motorless and low-powered planes have been made in recent months. An engine of low horsepower assists in driving the plane from one favorable air current to the next.

A recent example is the flight of a plane with 13-horsepower motor, across the English Channel and back, a total of 80 miles.

FARM POPULATION DECREASING

Department of Agriculture figures show that in 1922 there was a net loss of 460,000 persons in the agricultural population, a decrease of about 1.5 per cent from the 1920 census, which gave the rural population as 31,359,000 persons. The greatest movement away from the farms was in the Pacific states, while in the south central and New England states the loss was greater than the average for the entire country. Italy, it is expected, will offer to supply the shortage with "hand-picked" farmers.
WATER PRESSURE OPENS GARAGE DOORS

An ingenious owner of an automobile has devised an interesting method of operating his garage doors, merely tapping an ordinary service pipe of his household water supply for the purpose. As he drives up toward the garage, he stops at a post to which an extension from the kitchen water pipes has been led, and by means of a key faucet, turns on the water. This fills a small underground tank, and then the water begins to back up in the extension pipe. The pressure of the water upon the entrapped air operates a small piston, which is located in the pipe line at a point within the garage and under its roof. As the piston is forced outward, two lever arms, connecting the garage doors with the piston rod, are also forced out, causing the doors to swing open. When the key is turned off in the faucet at the post, a valve opens, draining off the tank water and relieving the pressure in the pipe. Door weights then pull the doors shut.

STREET-CAR TROUBLE REPORTS BY RADIO AND TROLLEY WIRE

Telephoning trouble reports over the trolley wires is an interesting use that an eastern street railway has shown to be possible with radio. Considerable experimenting has been done in this line and the recent tests between the dispatchers' offices and moving trolley cars, gave very satisfactory results. The transmitters and receivers used were similar in many respects to those employed in ordinary radio broadcasting. The wires form a network which provides ready means of contact at all important points along the system and acts as a guide for the long-wave currents used. There is no interference, it is said, to the receiver of messages from short-wave broadcasting stations. Both at the point of origin of the message and at the receiving point facilities may be provided for two-way conversation; that is, each operator may talk as well as listen. This is possible without the use of switches alternately connecting transmitter and receiver to trolley wire.

NEAT BRONZE TREE MARKER ADOPTED BY COLORADO

Some 40 trees of rare varieties on the capitol grounds at Denver, Colo., are designated by neat bronze markers set into the ground. The title plate is 12 inches long, 4 inches high, and besides the name of the tree, bears the words "Colorado State House Grounds" and the seal of the state at the top. A 32-inch iron rod, painted white, supports the marker, which also gives the Latin name of the tree.
Looking into the Concrete-Brick Plant, Where a Force of Only 10 Laborers will Eventually Turn Out 35,000 Bricks a Day

WESTERN STOCKYARDS FOLLOW CHICAGO'S AS MODEL

Following the example of Chicago, where a so-called central manufacturing district is used to house the stockyards and other industries, Los Angeles is utilizing a 250-acre tract for establishing a similar manufacturing zone. Stockyards were rushed to completion in the

sand from the Los Angeles River, filled depressions in the tract, and were later used to pump sand for concrete. A concrete-brick plant was also built, with a capacity of 11,000 brick per day. The river sand was so fine that much of it was unsuitable for concrete, but after a screening and grading plant had been established, enough usable sand was salvaged for all operations. Considerable ingenuity was shown in dovetailing all operations, so that maximum progress resulted in spite of all difficulties.

CROSSBREEDING OF PLANTS

The crossbreeding of plants is as interesting to a botanist as the crossbreeding of races to a biologist, says a Swedish botanist, who has specialized in the study of willows. Crossbreeding occurs when willows go north, the female willow being a hardier and more aggressive pioneer than the male, and mother of more than 70 varieties of sallows and crossbreeds of willows. The male finds migration hard and gives up.

How a Six-Inch Hose and Nozzle were Slung from a Boom to Facilitate the Pumping of the Sand

as yet undeveloped area, and were built in the short time of 90 days. Numerous short cuts were devised during the course of construction to hasten progress. Six and 12-inch centrifugal pumps, sucking
MOVIE FILM GAUGES ACCURACY OF OBSERVATION

Interesting experiments have been carried out in Germany recently for the purpose of gauging the value of the average individual's powers of observation. A specially prepared test film was used for that purpose, which showed a bit of dramatic action that could not fail to impress itself on the observer's mind. An unrelated incident, following on the heels of the major action, was interposed as a check upon the observer's deductive powers. Some 20 questions were later prepared, which the special audience had to answer. In no case were the answers more than 74-per-cent correct, ranging down to 52 per cent. The best answers came from those who, to be extremely cautious, concentrated on only five questions. Questions as to actual, observed happenings produced only 53 per cent of correct answers.

SUGGEST PARKS REPLACE CITY ALLEYWAYS

Unsightly alleys in the rear of homes in Wichita, Kan., will be replaced by parks if the suggestion of a real-estate agent of that city is carried out. It is proposed that some of the present alleys, as well as all future ones, be made into parks with tennis courts, a golf-practice course, a large sand pile for children, stone benches, and other conveniences. To further improve the appearance, shade trees would be planted at appropriate spots, and a high inclosing hedge grown. City employees, tradesmen, and others would reach the houses from the street by way of a sidewalk running around to the rear. A fund would be established to provide for the upkeep.

How the Converted Alleyways in Wichita, Kansas, would Appear under the Plan of a Real-Estate Agent of That City: Among Other Features, Note, toward the Left, a Golf-Practice Course.

EARL HUTCH, REALTOR, WICHITA.
Some Novel and Little-Known Accessories

This is the latest style in French handbags. The bags are made to match the gowns worn, and can be detached from the frame, so that another bag may be substituted.

The latest in ironing boards has its own switches, and saves a good many steps in an ironing day.

Canning fruit is easy with this jar holder. It is readily attached to a table, and holds the jar firmly in a cushioned grip, so that there is no danger of breakage and resulting cuts.

Right: Ten feet of wire are reeled up in this electric plug. So that a lamp or other fixture may be plugged in and placed in any convenient position.

In a small dining room, this cabinet is very handy. Ordinarily it conceals an extension table and ironing board, which are hidden behind a swinging door that looks like drawer fronts. Several leaves may be added to the table.

This improved doughnut cutter has a trigger for ejecting the central portion after the doughnut has been cut.

Anyone wishing further information on devices described in the editorial pages can...
INTENDED FOR THE HOME AND ITS MEMBERS

A Bracket Arm Which is Easily Attached to Any Dresser: It is Fitted to Receive a Lamp. Below is Shown How This is Done

Below is Shown a Glass Pad That is Placed under the Stove Legs, to Make Cleaning Easier

A Tiny Electric Bulb, Fitted to a Magnifying Mirror, Which can Easily be Attached to the Dresser

The Cooker, Standing beside the Kitchen Cabinet, is Electrically Heated at Its Top and Bottom, Making the Heat Practically Uniform throughout the Interior. It can Also be Used at Picnics, by Plugging In with the Automobile's Batteries

Flour can be Mixed, Dough Kneaded, and Fruits Strained with This Machine. It is Equipped with Two Troughs, One of Which is Perforated for Straining

No Ice is Needed in This Refrigerator, Which is Fitted with a Bracket for Swinging Out from the Window Ledge. It will Not Rust, as It is Made of Galvanized Metal

obtain it by addressing Bureau of Information, Popular Mechanics Magazine, Chicago.
ILLUMINATED CROSS REVOLVES ON CHURCH TOWER

A large cross, 12 feet high with a cross-arm 8 feet wide, was erected recently on the top of a Cincinnati church tower, and presents a striking appearance, as it is strongly illuminated and caused to revolve at night. The cross is made of copper, and weighs 500 pounds. It is supported by a heavy wooden platform built in the church tower. A small motor, geared to the vertical branch of the cross, imparts motion to it. The “Queen City” is situated on the northern bank of the Ohio River, and the flashing cross is clearly visible in many of the Kentucky hills and towns across the river as well as in all parts of the city.

SAFETY AND PRIVACY ASSURED BY NEW MAIL BOX

A mail box, opening at any convenient place near the front door, extending down between the inner and outer walls of the building and then projecting inside, has been made for private homes. A pivoted deflector plate inside the chute automatically locks the box as the lid is opened. Other advantages are that it is a more convenient receptacle, and that it will hold large packages which would not fit in an ordinary box.

TYPEWRITER WORD COUNTER UTILIZES SPACE BAR

A detachable typewriter device for registering the number of words written, which can be put in place on any machine, is sold in England. The attachment is composed of a T-flap that rests on the space bar and the counting mechanism, the whole hooking on to the front of the typewriter. The operator strikes the T-bar at the end of each word, thus registering the word and moving the space bar at one time. If space is desired without counting, the operator strikes the space bar to one side of the T-piece.

BASKET LINERS PROTECT DELICATE FRUIT

Fruits with thin skins or those easily bruised, such as peaches, or early apples, are afforded protection against injury by the use of a new basket liner just placed on the market. The liner is made of nonporous white Manila board, with locking ends, which, when brought together, form a lining conforming to the tapered inside of the basket. Fruit shippers are thus saved the considerable loss due to spoilage which results from protruding staples or the clinched ends of wire handles.
ACTION OF METALS ON MILK STUDIED IN TESTS

That milk absorbs some of the metal from the container in which it is placed has been shown in recent experiments. The amount absorbed varies with the metal and the condition of the milk, being highest for milk in iron vessels and lowest for sweet milk at normal temperatures and for vessels made of German silver and other nickel alloys. Ordinarily the effect is not important, but under certain conditions a metallic flavor will be given to butter that is made from ripe cream.

AUTO-CAMPING TENT MADE WITHOUT RIDGEPOLE

For the convenience of the automobile camper, a khaki wall tent which may be set up without a ridgepole and with telescoping end poles, has been designed. The ridgepole is done away with by means of a strip of heavy flexible webbing which is stretched by levers to keep the peak of the tent from sagging. Pieces of enameled-steel tubing which telescope to a length of 28 inches serve for end poles. The outfit goes into a bag 10 by 28 inches.

REVOLVING RUG RACK SAVES MUCH FLOOR SPACE

A rug rack, the supporting frame of which is circular, and can be swung completely around, is being introduced. It is designed to save floor space. The support can be adjusted up or down to take any-size rugs up to 9 feet in width.

ELECTRIC HEATER SUSPENDED FROM LIGHT SOCKET

Features of a pendant electric heater now available are its ornamental design and simple operation, in addition to which the hot elements are always out of children's reach. The appliance is tubular in shape, 11 inches in length, weighs only 1 pound, consumes 620 watts at either 110 or 220 volts, and is suspended from a light socket by a 1-foot cord. Thus it is a useful and easily carried article when traveling, or for placing in a garage to keep the car radiator from freezing, as well as being entirely safe for use in the home. Deflecting chambers above the luminous unit prevent the heat from rising.
OLD CHINESE WEavers USED HUMAN AND GOATS' HAIR

Human and goats' hair were used in weaving an old Chinese Moachang piece now treasured in the collection of a Detroit connoisseur. The 200-year-old bit of oriental art bears woven designs and painted figures and may be used for either wall or floor covering.

PUNCHED DISK SHOWS WATER WASTE FROM TINY LEAKS

As a means of showing the great quantity of water that will pass through a small leak, a water-supply company gives its customers a metal disk punched with three tiny holes, beneath each of which is marked the number of gallons of water, at 40 pounds' pressure, that would run through it in 24 hours. The smallest puncture, hardly as large as a pinhead, would allow 180 gallons to escape in the period mentioned.

Our Bureau of Information is for your benefit. Use it as often as you please.

IDAHO RATTLESNAKES SHIPPED TO AMSTERDAM, HOLLAND

Forty-seven full-grown rattlesnakes are resting in the window of a taxidermist of Boise, Ida., awaiting a trip to Amsterdam, Holland. There they will be sacrificed by scientists developing a serum for snakebites to be used in India. A small party of men searching a near-by creek with forked sticks captured the reptiles. When more are caught they will all be boxed and shipped.

TROUBLE LAMP WORN ON CAP GIVES STRONG LIGHT

An interesting trouble light for the use of mechanics, which, like some others of its kind, can be easily carried about and used without hindering either hand, is featured by a small reflector case and two six-candle bulbs. The reflector is padded and held in place on the head by means of an adjustable band. The cord attachment plugs into any lamp socket.

USE MOST ACCURATE BALANCE TO TEST NEW THEORY

In the most accurate weighing that science has yet successfully attempted, a balance so delicate that it will weigh three pounds with an error of not more than one part in a billion, is being used to test the Einstein theory of gravitation at the Bureau of Standards. The method involves the weighing of large crystals in different positions, and it was found that a change of less than one-half inch in the level of the center of gravity would be detected by the balance. Another refinement is the use of weights equal in volume to the crystal and its supporting frame. The balance is incased by cork walls in a closed room and is operated from the outside.
HEAVY COLUMNSHandled by
ROLLING SKID ON TRAILER

The safe and expeditious handling of
six 23-ton granite columns was the prob-
lem confronting a San Fran-
cisco contractor in the erec-
tion of a large bank building
in that city. A low-bed truck
trailer was used to trans-
port the heavy shafts through
the streets, one end resting on
a roller-mounted skid,
or platform, on the trailer
floor. The support proper
consisted of a heavy wooden
bolster on top of the skid,
which was banked with sand bags to
prevent injury to the column. When the
column was suitably rigged for unloading,
the skid moved forward on its rollers,
bearing the column with it, as the oppo-
site end was raised. Block and tackle
were used to draw the tackle shears toward
the building as the column swung free.
This method proved so efficient that some
of the columns were in position 30 minutes
after arrival at the building site. On ac-
count of lack of space, shear legs were used
for only two of the columns, the others be-
ing handled with a 55-foot gin pole, which
slowed up the placing of the columns.

SWARMS OF GOLDFISH NETTED
BY LAKE ERIE FISHERMEN

Lake Erie fishermen each year are
troubled more and more with a kind of
fish they do not care to catch, and this
is the species one would think the last
to be found in this northern lake—gold-
fish. The origin of the trouble is 18 years
old. That long ago a Toledo, Ohio, fish
raiser conceived the idea of making an
outdoor hatchery for goldfish. He leased
the right to dam Ten Mile Creek, a small
stream near Sylvania, Ohio. He placed
50,000 small fish and about 4,000 big ones
in the pond thus created. All went well
until a heavy flood hit the territory, and
dam, fish, and all were swept into Lake
Erie. Now hundreds of them are netted
each year. Having little food value, they
are thrown back into the lake.

GLASS CUT ON BOTH SIDES
IN ACCURATE MACHINE

Quick, accurate work and a saving in
breakage are the advantages claimed for
a glass-cutting machine, the feature of
which is a pair of cutting wheels mounted
above and below the glass. The only
place where pressure is applied is at the
cutting wheels, and this pressure is equal-
ized, due to the fact that one cutter is di-
rectly above the other. Scales and guides
on the machine make for speed and ac-
curacy. There is also an attachment that
facilitates the cutting of circles. Curved
glass may be cut as readily as flat.
COLLAPSIBLE WINDOW GUARD IS LOCKED IN PLACE

An interesting feature of a window safety guard invented recently is the fact that it can be locked across the window opening so as to protect against attempts from the outside to open it. It is made of crisscrossed steel strips, forming a network which can be pulled out or collapsed at will. This adaptation of the window guards commonly used in jewelry stores as protection at night, also prevents children from accidentally falling through the window.

CAP SPRING KEEPS VACUUM BOTTLE TIGHT

Those who have experienced the annoyance of a leaky vacuum bottle, caused by the cork working loose under the cap, will appreciate a simple and effective preventive recently invented. Only a small coil of spring is used, just strong enough to keep the cork in place. This is inserted in the cap, being soldered to the top, so that it cannot work loose.

MAKE BALLOON RADIO AERIALS TO REPLACE USUAL POLES

Balloon radio aerials to replace the usual poles and other supports, are being manufactured. They are gas-filled and—to present surface enough to enable them to rise to great heights and to withstand the buffeting of the wind at these altitudes—are designed somewhat in the shape of a cigar. Carrying one-strand antenna wire, the balloons will rise to an altitude of from 300 to 1,000 feet. Several sizes are contemplated, but all will be made of the same material: silk. This will be treated so as to insure resistance to atmospheric pressure. One of the incidental advantages claimed for the scheme is that it will be possible for all occupants of apartment buildings to tune in on distant stations, whereas now, because of the limited space available on the roofs, only a few aerials can be erected on any one building.

POLICE OF PARIS ADOPT BULLET-PROOF ARMOR

New styles in armor, declared to be bullet-proof and therefore protection against any lesser attack, have been adopted by the police of Paris for use in rounding up French criminals who often prefer to be killed rather than arrested. The cuirass, as the main part of the armor is called, covers the breast and lower part of the body with a series of overlapping plates. In addition, a shield to be used to safeguard his neck and head is provided for the policeman.
FOOD CHARTS DETERMINE HOW MUCH TO COOK

Tedious calculations by stewards and chefs are no longer necessary to determine just what quantity of each ingredient must be prepared to satisfy a given number of patrons. A circular chart has been devised for the purpose, with rows of figures like the spokes in a wheel, which indicate total quantities for any number of persons. The figures are calculated in basic units of consumption for each person. The chart is also available in booklet form.

IMPROVED BROACHING TOOL AIDS PRODUCTION

A broaching tool has recently become commercially available with which it is claimed 75 to 300 per cent more operations are possible than with the ordinary broaching tool, and which has the ability to withstand 45 to 50 per cent greater strain than usual. Another quality is that it will hold a keen cutting edge with less frequent grinding than the common broach. The tool is furnished in round, square, and various other shapes.

DEVICE GIVES AUTOIST DATA ON GASOLINE SYSTEM

On the dial of a device for attachment to the instrument board of an automobile, are four windows that show the amount of gasoline in the tank; the amount of gasoline consumed on a trip; the total of gasoline used, and the condition of the gasoline-feeding system. It gives warning before trouble becomes serious.

WIND-DYNAMO MAST ALSO USED FOR WIRELESS SUPPORT

Of interest to farmers using wind dynamos, of which there are great numbers in rural United States, is news from Scotland of the use of the tower as a support for wireless aerials. Two mills have recently been introduced, one with wheels 8 feet and the other 18 feet in diameter, the latter storing a surprising amount of power. It will operate 400 15-watt lamps when the wheel is making 30 to 60 revolutions a minute. Scottish improvements in design include ball-bearing shafts and extra-size carbon brushes.

NEAT WINDOW CARD USEFUL IN AN EMERGENCY

To enable the police or firemen to notify absent owners of buildings or offices in an emergency, there has been invented a small card holder which is swung into position at a conspicuous place in the window. The device is a square metal frame held by an arm which pivots on a small screw in the woodwork of the casing.
BOY SCOUTS ROUND UP 10,000 GOATS

Driven to the Sea over Hawaiian Lava Beds—Long Trek Proves Grit of Lads Who Worked on Short Rations

BY EVERETT W. MARQUART

On the Island of Hawaii there are 100,000 wild goats scattered through the mountains, which have become a veritable pest. On the western part of the island about 150 miles from Honolulu, the goats were recently forced from their mountain homes by an exceptionally dry season.

They migrated to the lower lava stretches in search of food and found the sparse grass of these lava beds excellent pasture. This land is used by the ranchers along the coast as grazing ground for their cattle, and the horde of goats threatened to deprive the cattle of their food.

One of the ranchers whose land the goats had invaded conceived the idea of using boy scouts to round up the goats and drive them down onto a peninsula where they could easily be imprisoned. This idea appealed to the Hawaii boyscout commissioner as an outing for his boys as well as a means for saving the herds of the rancher, and 200 boy scouts were enrolled. A dozen Pearl Harbor marines, armed with rifles, and the nearby ranchers completed the band.

The plan was to drive the goats down the lava slope to the peninsula, and once there, the ranchers were to prevent their return. The first day's drive was to be 10 miles, but the boys were "green" at the work and could not keep the living line intact. The left wing of the line was composed of boys from 10 to 12 years of age, and it was through this that the goats escaped and returned to the slopes of Mauna Kea and Mauna Loa.

The second day's drive began at 6:00 in the morning with each boy stationed 75 yards from his neighbors, thus forming a living line 10 miles in length. Each boy carried a quart of water and an extra pair of shoes, but no food was taken, as plans had been made to lunch at Kiholo at 2:00 in the afternoon. For boys unused to walking over the jagged lava the play became tedious work and then torture. The lava somewhat resembles a waste of huge pieces of glass, splintered and lying in confusion. To add to the discomfort the sun beat down unmercifully. At two o'clock they were not in sight of Kiholo, yet they labored on, the weaker lads falling hopelessly behind. On through the heat of the afternoon they went, and just as the sun was setting in a wonderful Kona sunset the goats were pushed out onto the neck of land that was to be their prison. The Kanaka ranchmen estimated the full-grown goats in the flock at 10,000, not to mention the kids.

Fifteen of the scouts who had fallen behind were forced to spend the night alone on the lava beds without food.
water, or blankets. It was a successful drive for the rancher, but the scouts were forced to undergo hardships which would have deterred many men.

The goats were killed later by the ranchmen and the skins sold, while the carcasses were cast away, to be later used for bone meal. A windlass was invented to pull off the skins at the rate of two a minute.

Thus the Kona coast and the ranchers' cattle were saved from some of the 100,000 wild goats on the Island of Hawaii.

NAVAL AIRMEN USE DEAD WHALE AS TARGET

When a dead whale nearly 100 feet in length recently drifted inside the breakwater at Cristobal, the Atlantic terminus of the Panama Canal, the community found itself with a "white elephant" on its hands. In the tropical climate the huge carcass quickly became an intolerable nuisance. An attempt was made to hoist the carcass onto the shore, there to dispose of it. This idea was abandoned, however, when it was discovered that no crane or derrick could be found able to hoist the mass.

The solution of the problem was finally given by a group of naval airmen, who were engaged in the maneuvers of the combined Pacific and Atlantic battle fleets then in those waters. They thought the dead whale would make an excellent bombing target, one very closely resembling a submarine. The whale was towed out to sea by a tug. The airmen dropped bombs at it from various altitudes. Some excellent practice was afforded, and a number of direct hits were scored before the huge carcass was broken up, when it was attacked by myriads of seagulls, sharks, and other ocean scavengers, and the nuisance which had threatened the public health of the city was averted.

STAINLESS SILVER INVENTED

Silver articles not susceptible to atmospheric conditions, and able to retain their polish for long periods of time, are being manufactured in Sheffield, Eng. The new composition is 92½-per-cent silver and is considered an important discovery in this field.
SPECIAL NET-HOLDING DEVICES
USED IN LARGE LAUNDRIES

Devices for holding laundry nets that signal when the capacity is reached, are
being introduced. One of the more interesting ones is three-sided, with two moveable arms fastened to a platform on which the bag rests. The arms swing outwardly and automatically raise a warning indicator when the bag is full. Holders of this kind insure that the weight will conform to the standard previously determined as the most suitable for good washing.

GAS-ENGINE PRIMER STARTS ELECTRICALLY

An interesting type of primer for gasoline engines designed to facilitate starting such engines in cold weather, has been placed on the market. The outfit consists of a primer bowl which is screwed into the intake manifold, and contains a coil of tubing through which gasoline is forced by a pump located on the dash. This coil is electrically heated by means of current from the batteries, furnishing hot gas promptly. A switch on the dash controls the current, and a pilot light indicates when the current is flowing; also reminding the driver, by its presence, to shut it off when the engine has warmed up.

BUTTONS ON STEERING WHEEL
CONTROL AUTO SIGNALS

The natural position of the driver's hands on the steering wheel is utilized to advantage in an improved type of automobile-signal device which is being received with favor by some car owners. In the ordinary position on the wheel, a neutral button is close to the right hand, while the "stop" button is close to the left. In turning to the right, however, 

SPRING-PLUNGER VISE GRIPS

Irregularly-shaped objects can be securely gripped in a new vise of Swiss design which features jaws formed of a series of steel plungers, each actuated by a pair of springs. After conforming to the outlines of the object, each set of jaws is locked by a bolt, and tightened against the object by means of the vise screw.
A Convenient Welding and Cutting Table

BY A. S. JAMIESON

A GREAT many pieces sent to the welding shop for repair are very awkward to set up or clamp while being welded. The illustration shows a table, in use in a shop doing much repairing, that will clamp and hold almost any piece in any desired position, and that has saved a great deal of time and money.

There is very little machining to be done on the table, beyond drilling and tapping. The top, which is 4 ft. square, and the legs, 24 in. high, are made of 2-in. angle iron. The top is cut and assembled on the floor, and all joints "tacked"; the legs are clamped on and tacked also, whereupon all joints are securely welded. A 3-in. length of the same angle iron is welded to the inside of each leg, to support the table top, as shown in the detail, Fig. 1; no other bracing is necessary.

The work support is made by welding a disk, of $\frac{1\frac{1}{2}}{\text{in.}}$ plate, on one end of an old pillow block, and bolting the block
to one side of the table; a 3-ft. length of 1\(\frac{3}{16}\)-in. shafting fits in the block. Two old pulley hubs, 1\(\frac{1}{16}\)-in. shaft size, are ground smooth and welded together, at right angles, drilled and tapped for clamp screws, and slipped on the upright, as shown. A second 3-ft. length of 1\(\frac{1}{16}\)-in. shafting, forged or cut flat on one end, and fitted with a heavy C-clamp, as shown in Fig. 2, is then slipped into the horizontal hub, and the clamp fixture is complete. To attach the clamp to the shaft, an ear is welded onto it and drilled, the shaft being drilled and tapped for a clamp screw. The ends of the clamp screws are casehardened.

The top of the table is provided with a number of ribs, made of T-iron, as shown in Figs. 1 and 3, to support standard firebrick. Considerable cutting is done in this shop, and, when this is done, several of the bricks are removed, and the work is placed over the hole in the table. The slag goes through the top and does not affect the table, nor does it fly all over the operator.

The attachment shown in Fig. 4 is simply a 1\(\frac{1}{2}\) by 6 by 10-in. plate, welded to a length of the 1\(\frac{3}{16}\)-in. shafting. This is used, as shown in Fig. 5, for offset pieces, or for lining up work of uneven thickness, and is exceedingly useful.

The vise attachment, shown in Fig. 6, also adds considerably to the effectiveness of the table. The piece of 1\(\frac{1}{2}\)-in. boiler plate used to support the vise is welded to the shaft at an angle, so that there will be no interference with the vise bolts.

**Small Ammonia-Carrying Drum**

The small ammonia-carrying drum described in this article was designed and built for the purpose of eliminating the necessity for handling large and heavy drums, when only small quantities of ammonia were needed, as in repair work or for charging, in small household plants, which need only from 2 to 5 lb. of refrigerant.

The drum is made of extra-heavy pipe, to the ends of which heavy boiler-plate disks are welded. The ends are dished after cutting, as shown, for strength. The angle between the edges of pipe and disks is just right for the reception of the welding metal. A steel socket, tapped for 3\(\frac{1}{8}\)-in. pipe, is welded in the side of the drum, and into it a 3\(\frac{1}{8}\)-in. nipple is fitted; on the nipple, in turn, is screwed a tee, and 3\(\frac{1}{8}\)-in. nipples connect the tee to a gauge and to an angle valve. The combination gauge is an essential part of the device; it should read to at least 15 in. vacuum, and up to 300 lb. pressure. The angle valve is of standard construction, and should seat tightly, in order to hold the high pressure of the ammonia. On the outlet side of the angle valve is mounted a 3\(\frac{1}{8}\)-in. companion flange that is used to connect the valve to a large drum, when charging. All fittings must be extra-heavy.

To fill the drum with ammonia, it is first exhausted by means of a vacuum pump, until the gauge shows a vacuum of 15 in. Connection is then made to a large ammonia drum, through a short nipple and a companion flange, and the two valves opened, until the pressure in the two drums is equalized, when the valves are closed, and the drum disconnected. To ascertain the weight of the charge, the drum should be weighed before and after filling. The nipple between the two valves should be short, as the amount of liquid between the two valves is lost when the flanges are separated.

Before using the drum it should be tested under high pressure for leaks. An all-steel or iron drum is necessary, as ammonia corrodes other metals suitable for valves.—J. V. Romig, Allentown, Pa.

**Beeswax makes a better lubricant for tail centers than the usual white lead, oil, or grease.**
An Advertising Novelty

One of the leading clothing houses in Denver has, in addition to a well-arranged window display, a small electric push-button switch on the outside of the building, so wired that any passer-by can illuminate the interior of the store at night, in order to obtain a good view of the elaborate clothing display inside, on models and in glass showcases. A small brass plate, reading "Press Button to See Interior of Store Lighted," calls attention to the arrangement. The lights remain on only as long as the button is pressed down, so that no current is consumed needlessly.—Edward H. Flaharty, Denver, Colo.

Interchangeable Chuck for Woodturning

In pattern shops equipped with only a few lathes, but employing many pattern-makers, it frequently happens that one has to wait his turn to use the lathe. As the setting up of a job in the lathe often consumes just as much time as the turning operation itself, it has been found, in one shop, that the provision of interchangeable chucks and plates enables the workmen to set up many of the jobs at their benches, and thus eliminates much of the lost time.

The chucks are made in two parts, of cast aluminum, and finished all over. The illustration clearly shows the construction. The chuck A is drilled and countersunk in the center to receive a No. 14 or 16 chucking screw, for use on small jobs. For large jobs, a flat faceplate, B, is used. This is drilled and tapped to receive the clamp bolts C, and is recessed at the back to make a snug fit on the chuck. All chucks are made of the same diameter, and the bolt holes are all spaced alike, so that one plate will fit a chuck on any lathe. When another job is to be turned in a hurry, and work is already on the chuck, all that is necessary is to remove the faceplate from the chuck and substitute another plate. Also, when it is desired to change from one lathe to another, to facilitate the work, the plate is simply changed from one chuck to another.

Detachable Letter Shelf for Desk

The desk worker will find the detachable shelf shown in the illustration serviceable for carrying reference books, correspondence, or the telephone, when the desk top is so covered with material that additional space is necessary. The shelf consists of a piece of 1-in. wood, hung from the side of the desk as indicated, the long hook bolts attached to one end of the board engaging with screweyes driven into the side of the desk. More than one shelf of this kind can be used, and, of course, the size of each may be varied to suit the user.

Fixture Holds Horn for Adjustment

Anyone who has occasion to test and adjust automobile horns will find the fixture illustrated a great convenience and timesaver. It consists of two uprights mounted on a wooden base, one having a V-shaped cut, as shown, and the other a series of small holes, drilled in a vertical line to accommodate a pin. The horn is laid in the "V," and the end hooked under the pin, the weight of the mechanism at one end holding the horn securely in the fixture. Such a horn support not only leaves both hands free, but also eliminates the time-consuming adjustments that are necessary when clamps are used.—Emil J. Bachmann, Keene, New Hampshire.
A Homemade Drill Press

A small vertical drill press is at times a necessary tool in the home workshop, though there may not be sufficient use for it to justify the purchase of one. However, a drill press that will give satisfactory service can readily be made of material that is available in almost any shop.

An ordinary breast drill, mounted in the manner illustrated, is used. A machine bolt, pushed through a hole in a wooden slide, and also through a metal sleeve made of pipe, as shown, is substituted for the stationary handle. The head of the bolt is counterbored flush with the back of the slide. The upper end of the drill is held in place by a sheet-metal bracket, screwed to the slide and drilled to fit the breast-drill shank.

The slide fits neatly behind wooden guide strips, that hold it to a heavy wooden back so that it can be moved up or down. The table is securely attached to the lower end of the back with wooden braces and wood screws, and must be made strong enough to withstand considerable pressure.

A number of holes are drilled in the center of the back, as shown, about 1 in. apart and large enough to accommodate a wooden lever; a broomstick will serve for this. The lever is notched on one end at several points, as indicated, placed over the breastplate of the drill, and the end inserted into one of the holes in the back. By suspending a weight from the lever, as indicated, pressure is applied to the drill. The pressure can be varied by moving the weight, the notches serving to keep the latter from slipping out of position.

If it is desired to run such an improvised drill press with an electric motor or from a shaft, the hand crank is removed and a suitable pulley is bolted to the large gear. Care must be taken, of course, to use a pulley of such size that the drill will be run at a suitable speed.—J. H. Garety, Charleston, S. C.

Making Up Shipping Cartons

The homemade bench shown in the photo, which is used to make up corrugated-cardboard shipping cartons, is well adapted to the purpose, and the method employed for obtaining the greatest possible adhesion between the flaps, to which adhesive is applied, is rather novel. The boxes are mounted on wooden forms, fitting the inside closely, as shown, and hollow, hinged wooden lids, filled with bricks to make them weigh about 50 lb. each, are let down on the flaps after these have been given a liberal application of adhesive. The adhesive used is silicate of soda, which sets very quickly.

By using a double bench, having six sealing forms on each side, it is possible for one man to keep busy working around the forms without pause; by the time he has sealed the twelfth box, the first may be removed. The boxes can be sealed at a rate of approximately 100 per hour.

Keep the spark plugs adjusted to the gap specified for the car. Do not guess at the distance, but use a gauge to test the gap.
Part I—Gateposts, Pump Base, Ranges, Seats, and Tables

AMERICA is rapidly getting acquainted with itself. The motorist who does any touring at all meets numerous transcontinental and interstate tourists on the roads around his city, and auto campers almost without number. Many people of means choose an extended tour, camping along the way, as the most interesting and restful vacation possible, while, to many a family of modest circumstances, camp are numerous. In the first place, it keeps the camper from “squatting” where he is not wanted, and in the second, just as good roads have often trebled traffic in any section, so good camp facilities quickly increase the number of the better class of campers visiting a community, to the increased prosperity of local business. The equipment described and illustrated in this article is very simple to construct.

“camping out,” via auto, offers the only opportunity of enjoying an inexpensive rest period.

Until quite recently, public-camp sites have been scarce, and, where they did exist, cooking and toilet facilities were primitive, and, in many cases, the camps were dirty, badly drained, and altogether uninviting.

Now, however, many communities are studying the question of how to make the automobile tourist comfortable, and are making provision for clean, attractive camp sites. The advantages of a public Any man who can handle hammer and saw can quickly make the forms necessary. If a number of men in each community will give a few hours’ time to the project, the only expense involved will be that of the lumber for the forms, and the materials for the concrete. This would even be a fine project for the local troop of boy scouts, and, under competent supervision, would not be at all beyond its powers.

These are merely suggestions; in many communities it may be preferable to turn the work over to the local contractor,
who, with the accompanying illustrations to guide him, can, in a very short time, transform the bare site into a splendid camp.

The layout shown in the first illustration is suggestive only, since the actual layout will depend entirely upon the size and shape of the plot of ground available, and upon the number of tourists expected. All the equipment shown, however, should be included at the start, and additional units erected if those shown are not sufficient to care for the campers.

When selecting a site, one that is level, well wooded, and well drained should be chosen, if possible. The last-named feature is one that is too often neglected, and while it may not always be possible to obtain a naturally drained site, it is a very easy matter to drain one, using concrete tile. Where drainage is necessary, the accompanying table will be found very useful, as it will insure that the proper size of tile, installed to suit conditions, will be used.

The table shows the area that may be drained with various-size tile mains, and indicates the effect of the slope at which the tile is laid. The table is based on a run-off of \( \frac{3}{4} \) in. in 24 hours; in sections where rainfall is extremely heavy, or is of the nature of downpours, a run-off of \( \frac{3}{8} \) in. or even \( \frac{1}{2} \) in. is used as a basis for calculation. For a \( \frac{3}{8} \)-in. run-off, just two-thirds as many acres will be drained by a certain size of tile as the figure shown in the table, while, if \( \frac{1}{2} \) in. of water must be carried off in 24 hours, the tile will serve only half the acreage shown. For example, a 4-in. tile, laid with a 1\(\frac{1}{2} \)-in. slope per 100 ft., will drain 3 acres, carrying off \( \frac{1}{4} \) in. of water every 24 hours. If it must carry off \( \frac{3}{8} \) in., it will drain only 2 acres, and if \( \frac{1}{2} \) in., only \( \frac{1}{2} \) acres.

The amount of tile used, therefore, and the spacing of the mains, depend on local conditions of rainfall.

The entrance to the camp should be designated by one or two large and attractive signposts; the design shown in Fig. 1 is an excellent one, as it carries a light so that it may easily be read at night, and is sufficiently heavy and rigid to resist chance knocks and sideswipes, such as tourists often heedlessly inflict.

The post is made long enough to allow at least 6\(\frac{1}{2} \)-ft. clearance under the sign, and should be imbedded in the ground for at least 3, and preferably, 4 ft. The post tapers from 8 in. square at the bottom to 6 in. square at the top, and carries a 12-in. globe. The signboard is 3 in. thick and is cast integral with the post; it is made from 24 to 40 in. high in order to accommodate the desired lettering.

The form for making this post is shown in Fig. 2, and is decidedly simple. It is so made that the flat side of the signboard is uppermost, and the 3-in. rib forming the continuation of the post, on the bottom. The beveled edges on post and signboard are formed by triangular molding, as shown. The 1-in. conduit for the electric-light wires is laid in place after the concrete has been filled in to half the thickness of the post, and the reinforcing bars for post and signboard placed in like manner. The conduit and bars may be made up and held in position in the form by means of wire ties, if desired, and laid in place in the form before any concrete is placed, but, in this case, special care must be taken to work the concrete completely into the corners and between the bars and conduit, by means of small iron rods.

The lettering may easily be cast integral with the signboard by means of a form top, a part of which is shown in Fig. 3. The outlines of the letters are laid out on the top, the letters sawed out, as indicated, and the interior portions of letters such as O and A fastened in place by means of short sheet-metal straps. As soon as the form is filled, this top is nailed or screwed over the signboard portion, and the letter spaces filled in. The letter openings should be beveled slightly, so that the top may be removed easily when the concrete has set.

The concrete used should be a 1:2:3 mix, that is, mixed in the proportion of 1 part Portland cement to 2 parts sand, and 3 parts clean pebbles. The lettering form may be filled in with a mixture of 1 part cement to 2 parts marble dust; this
Figures 1 to 3, Signpost for Entrance of Camp, Detail of Main Form, and Form for Casting Letters; Figure 4, Well Curbing, Pump Base, and Gutter; Figure 5, Form for Pump Base, Showing Method of Making Manhole; Figure 6, Cooking Ranges and Chimney in Use, and Figure 7, Full Details of Individual Range.
will make the letters stand out sharply against the background. The materials required for this post are 1 1/2 sacks of cement, 3 cu. ft. of sand, and 1 1/2 cu. ft. of pebbles.

A good water supply is essential within the camp, and unless city water mains are available, one or more good wells must be provided. The well curbing is generally built as shown in Fig. 4, and a 5 or 6-in. slab top, cast in the simple form shown in Fig. 5, placed over it, as indicated. The manhole form is simply made of galvanized iron, conical in shape, and provided with two ears, nailed to a cleat, which, in turn, is nailed in position on top of the form. The form for the pump stock is a tapered block of wood, oiled, and placed in position in the center of the bolts that are to hold the pump; these are wired in position. The gutter may be formed as indicated, or made by means of a trowel while the concrete is still green, and should be carried out a short distance from the well, by means of separate gutter units, to prevent puddles around the well.

The manhole cover may be cast, using the inside of the galvanized-iron form, at the same time as the rest of the slab. It should be reinforced with short lengths of iron rod, laid crisscross, and be provided with a lifting ring, made from half of an old bridle bit, or from a hitching-post ring, the end of which is provided with a large washer and nut. The iron form must be well oiled before pouring.

The slab top is reinforced with 3/8-in. rods, spaced 6 in. apart, and placed as indicated. A 1:2:3 mix is used for this job also, and approximately 1 1/2 sacks cement, 9 cu. ft. sand, and 3 1/2 cu. ft. pebbles will be required for the cover; for each 10-ft. length of gutter, 1 1/2 sacks cement, 3 1/2 cu. ft. sand, and 5 1/2 cu. ft. pebbles will be required, and for the curbing, for each foot of depth, 1 1/2 sacks cement, 3 cu. ft. sand, and 4 1/2 cu. ft. pebbles.

Stoves are necessary for the preparation of meals, and those shown in Fig. 6 will be found very satisfactory. They may be used singly, located back to back on each side of the chimney, or on all four sides, as necessary. The dimensions of the ranges are shown clearly in Fig. 7, and the form in Fig. 8. The top is made of No. 12 sheet iron, flanged as shown, and the grate of 3/4-in. square bars, cemented onto the ledge that supports the fire-brick lining. The doors are made of sheet iron, with ears formed on the top for hinges, and swing on iron rods held in eyebolts cast in the concrete.

It is best to use commercial 16-in. concrete blocks for the chimney, but where these are not easily obtained, the blocks may be cast in the form shown in Fig. 8. Concrete tile, 6 in. in diameter, may be used to connect the ranges to the chimney, or where several stoves connect with one stack, common stovepipe may be used instead; the stovepipe allows considerable independent movement of stoves and chimney, without causing cracks. For each range, 3 1/4 sacks cement, 7 1/2 cu. ft. sand, and 11 1/4 cu. ft. pebbles will be needed, together with one 6-in. concrete tile, thirteen 16 by 16 by 8-in. chimney blocks, one 16 by 16 by 4-in. cap, 1 sheet-iron top, 2 iron stove doors, 4 eyebolts, about 3 ft. of 3/8-in. rod for hinges, and 1 cast-iron clean-out door.

The lunch tables and benches shown in Figs. 9 and 10 will prove very popular. They resist upsetting, do not rot or warp, and can be scrubbed easily.

Two forms are necessary for the bench, one for the pedestals and the other for the top slab. The pedestals are cast vertically, as indicated in the detail. The top slab is cast horizontally, and is reinforced with 3/8-in. bars, placed 4 in. apart lengthwise, and 24 in. apart crosswise. The pedestals are set up on bases cast into the ground, the proper distance apart, as indicated by the dotted lines, Fig. 9, and may be joined to the bases by a cement-mortar joint as indicated in one of the details showing the pedestal-and-slab joint. Pedestals and bases may also be cast together, if desired, and set into holes dug in the ground. The top may be joined to the pedestal in two ways: by bolts, in which case the latter are cast into the pedestal, and holes for their reception cast into the top, as shown in the illustration of the table-top form; or by means of a cement-mortar joint, the upper edges of the pedestals being slightly beveled, and recesses formed in the slab to receive them. The tops and pedestals may be cast in one piece, reinforced as indicated in one of the details, but this method is not recommended.

The table, Fig. 10, is made in exactly the same manner as the benches, and the three units set up as shown in the plan lying on the table.

For each bench, the materials required are: cement, 1 1/2 sacks; sand, 3 cu. ft., and pebbles, 4 1/2 cu. ft.; for the tables: cement, 3 sacks; sand, 6 cu. ft., and pebbles, 9 cu. ft. For the complete assembly of two benches and table, 6 sacks cement, 12 cu. ft. sand, and 18 cu. ft. pebbles will be required.
Figure 8. Forms for Stove and Chimney Blocks; Figure 9, Lunch Bench, Showing Method of Making Pedestals; Figure 10, Table, Showing Part of Form for Top, Methods of Joining Top to Pedestal, and End Elevation of Assembly of Benches and Table. Forms for Tables and Benches Are Alike, Except in Size.
The forms for all these pieces are very simple; all there is to remember is that the interior of the form must be an exact duplicate of the piece to be made, and that the forms must be well enough braced to resist sagging or spreading under the weight of the concrete. Forms must always be oiled or greased before placing the concrete, and all blocks forming holes, recesses, or panels given plenty of taper, to permit easy withdrawal. The lumber used should preferably be green; if seasoned lumber is used, it should be thoroughly wetted. Forms that are to be used for only one piece need not be elaborate, and may be nailed together, but those used for duplicate pieces, such as the bench and table pedestals, must be made to be taken apart without damage, and must be fastened by means of clamp bolts, as shown, or by similar fastenings.

Additional equipment, suitable for larger and more pretentious camps, will be described in the August issue.

### Tripod Drill Used as Hand Drill

The engineer supervising the development of the Skagit River for power pur-

poses, finding that the excavation for the power house would necessitate an un-
usual number of drill holes, improvised a drill that proved very speedy and serviceable.

A drill of the Leyner type was removed from its regular mounting, and, after suitable handles, made of round steel, had been attached to it as shown in the photo, was used as an ordinary hand drill. It had almost twice the drilling speed of the latter, but, of course, it was a little more difficult to move, owing to its weight. For vertical holes of 6 ft. and over, it was found highly satisfactory.—Aaron Evans, Rockport, Wash.

If the auto fan belt slips, turn it over. The fresh surface will usually cling to the face of the pulley when the oily inner surface will not.

### Scribing Lines on Round Work

I have often tried to mark a true line around the circumference of a cylindrical body, such as a shaft, pipe, or piston, but have always experienced trouble in scribing it exactly, until I hit upon the following scheme: Take a piece of paper having a straight edge and wrap it around the cylinder so that the edges line up where they overlap. Then scribe a line along the edge and it will be found perfectly true.—John A. Blaker, West Auburn, Massachusetts.

### Metal Index Tabs

Brass letters and figures, embossed on the pattern-shop embossing machine, make good index tabs for the shop catalogs, books, or card files. The tabs are cut to shape as shown, a couple of indentations punched in them with a center punch, and the backs then coated with shellac. When this is nearly dry, the tabs are pressed into place on the book pages or cards.

### Sawing and Filling Holes in Slate

When rebuilding a large power-house switchboard, one of the old panels was found to be 6 in. too wide for the new board. It was sawed down, on the job, in the manner shown in the illustration. The panel was placed on two wooden horses, 2 ft. high. A wooden handle was fitted on one end of a 3/4 by 14-in. powerhacksaw blade, and a coil spring fastened to the other end. A length of cord was
attached to the coil spring, passed through a staple driven into the floor, in line with the cut as indicated, and the end fastened to the horse so as to permit adjustment. Considerable pressure was thus placed on the saw, so that it was possible to saw the slate at a rate of 14 in. per hour, which is much faster than usual when sawing slate by hand.

The location of some of the instruments was changed on the panels; this left a number of holes, which were plugged in the following way: Just enough water was added to some Portland cement to enable it to set, making a very dry mixture. A block of wood was clamped over the hole to be plugged, and the cement tamped in until the hole had been filled to within \( \frac{3}{8} \) in. of the surface of the panel. The block of wood was then removed, and the other end of the hole tamped until the cement at this end was also \( \frac{3}{8} \) in. below the face of the panel. The cement was allowed to set for 24 hours. A thick paste, made of slate dust and boiled linseed oil, was then forced into each end of the hole, and allowed to project about \( \frac{1}{8} \) in. above the surface of the panels. When the mixture was dry, the material was dressed down flush with the face of the panel by means of very fine emery cloth, which had been almost worn out in polishing copper busbars. The panels were then polished with oil, and the places where the holes were plugged could not be detected.—Ben Buck, San Francisco, Calif.

**Convenient Tool Tray**

The illustration shows a simple portable tool tray that has been found to be of considerable utility to automobile mechanics. It consists of a 1-in. board, about 12 in. wide and long enough to bridge the distance between the radiator and cowl of an average-size car. A hole, about 3 in. in diameter, is cut at one end to fit over the radiator cap, and small blocks are tacked to the corners, to keep the board from rocking, or slipping over on either side. Strips of wood are nailed on top, at the edges, to prevent screws, small springs, etc., from rolling off, and a number of holes are drilled through the board, as shown, to accommodate engine valves.

The use of this tool tray does away with the habit of laying tools on fenders, which is highly objectionable, as it mars the varnished surface. The tray also saves the mechanic numerous steps, as all the tools needed for a job may be kept on the tray within easy reach.

**Secure Latch for Paddocks**

It is desirable to have the gates of stables and paddocks provided with a latch that cannot be opened by the horses. A good latch, that is absolutely secure, and has been found to be very useful on the stallion paddock at the University of Illinois, is shown in the photo. The gate is made so that it touches the gatepost at the bottom first, and the top must be sprung in in order to hook the latch. There is not a chance for the gate to open when the latch is in position; the harder the stallion rubs or pushes against the gate, the tighter the latch becomes.
Increasing Usefulness of Small Grinders

An ordinary small emery-grinder head can be converted into a most useful and versatile machine tool at slight cost, and with the expenditure of a little time. The tool can be used for disk grinding, sawing and ripping of boards, turning pattern work, and various other purposes.

A worktable, made of sheet steel or hardwood, is mounted on the grinder head. It is held by two round-steel brackets that slide into the usual work-rest holes and are locked by setscrews. In case a metal top is used, it is drilled and countersunk for flat-head screws, and the ends of the two brackets are tapped to receive them. For a wooden top, wood screws are used, the brackets being split and spread, and the ears drilled and countersunk on the underside. A slot is cut near one end of the table for a small circular saw that is attached to one end of the emery-grinder shaft. The other edge of the table should come within 1/8 in. of the disk grinder that is attached to the other end of the shaft. This is a simple faceplate, similar to that used on patternmakers' lathes, with screw holes drilled in it for fastening the work. It is faced with abrasive disks for use as a disk grinder, or may be reversed, as shown by the dotted lines, and used as a faceplate for wood turning, a tool rest being bolted to the bench for this, as indicated.

If the length of the grinder shaft permits, a 4-in. scroll chuck, fitted with a screw flange, is attached as shown in the lower view. This chuck will be found useful for filing, polishing, and drilling, the latter being accomplished by pressing the work against the drill, which is held in the chuck.

An electric motor of 1/2 or 1/4 hp. is used, a snap switch being located on the underside of the workbench, near the edge, as indicated. As it is necessary to have a wide range of speeds, interchangeable pulleys of different sizes must be provided for the motor shaft. The motor should be mounted on a sliding base, so that one size of belt can be used for all pulleys.

Removing Broken Screws

The acetylene torch, which is part of the necessary equipment of most shops and garages, is of considerable assistance in the removal of broken screws in metal. Weld onto the screw a piece of metal that will project above the surrounding surface. When the screw contracts upon cooling, it becomes loose in the threads, and can then readily be removed by gripping the projecting piece with a pair of pliers.

Thumbackes Used as Battery Markers

The owner of a battery-service station uses numbered thumbtacks on storage batteries to identify them while being repaired or recharged. Sets of thumbtacks, numbered from 0 to 9, are provided, the numbers being stenciled on with paint. The use of thumbtacks for marking is much better than using tags, as the latter are likely to be torn off. A record, corresponding with the number shown by the tacks, is made in the books, and the tacks remain in place until the job is complete and the battery called for, when they are removed and used again.
Bathtubs for Cooking Vessels

A canning plant that is remarkable for its many cost-saving features, employs ordinary enameled bathtubs as cooking vessels, in which certain foods are given their preliminary heating. In this way the purchase of several expensive pieces of equipment has been avoided.

The tubs are mounted on trucks so that they can easily be moved from place to place about the factory. In use, a tub is filled with the food to be processed, and is then placed where a steam pipe carrying live steam, can be dropped into it. After the preliminary cooking is finished the truck is wheeled to the point where the cans are filled. An advantage of this method is that the tubs are easily cleaned and sterilized, and, besides, no discoloration is imparted to products heated in them. Furthermore, as they can be moved, they are more convenient than the ordinary stationary kettles. The tubs are also used for mixing sirups, and even brine.—Orin Crooker, Wheaton, Ill.

Carbon-Removing Tool

Many uses can be found for discarded hacksaw blades fitted in a holder similar to the one shown in the illustration. The method of construction makes this tool particularly handy for breaking up the carbon that accumulates in automobile piston-ring grooves, as any number of blades necessary to fit in the grooves can be used while the others are folded back into the holder. The latter is made of % in. sheet steel, bent over as shown, and drilled near the end—the same size as the holes in the blades—to take the screw and nut that hold the blades in place. Blades broken in the center are long enough for the purpose. The set of blades should be ground down on the end to make them all of the same length, which gives a better appearance to the tool and makes it more handy to use.

Draining Oil Trucks

Large factories using oil for fuel usually have an underground concrete storage tank to conform to the requirements of fire-insurance companies. These storage tanks are filled from large oil trucks that drive over the top of the tank and discharge the oil by gravity. Difficulty has been found in completely draining the oil trucks, owing to the fact that the tank on the truck has a slight pitch forward.

The illustration shows a very practical method of draining the trucks. The top of the tank is formed, as shown, with an 8-in. drop, and a ramp to enable the trucks to be driven on and off easily. When the truck is in position over the tank, the rear wheels are thus 8 in. below the front wheels, which allows all the oil to drain out of the tank. The truck will stand in position without the use of the brakes.—G. L. Munroe, Fall River, Mass.

Making Tight Joints with Undersize Threads

When laying some 6-in. water pipe in a small town, all the pipes having been cut at the shop, it was found that the threads on two of the pipes had been cut so small that the pipe could be screwed into the fitting up to the last thread, with the result that the joints were not water-tight. To make them fit properly, the threads were first thoroughly cleaned, then tinned with solder, using a paste flux and wiping the surplus solder off with a cloth. The joints were then screwed up, and found to be perfectly water-tight.
Cheap and Serviceable Water Cooler

The water cooler shown in the illustration will be found serviceable in shops and factories where a large supply of cool drinking water is required. It consists of two sections of vitrified-clay pipe; one section is 24 by 36 in., and the other 12 by 36 in. in dimensions. A cement base is made by setting the larger pipe on a flat surface, and pouring cement into it, then pressing the smaller pipe into the concrete as shown. The surface of the base between the pipes is slanted to the drain pipe, and the surface inside the smaller pipe is sloped to an outlet pipe, which, together with the drain pipe, is placed in position before the concrete is poured. The outlet pipe is provided with a faucet on the outside. As it is rather difficult to drill the hole through the outside clay pipe, this should be done at the yard where it is purchased.

The whole can be conveniently mounted on a sturdy wooden table or bench, and a drip pail provided underneath. Double-thickness wooden covers, with a piece of sheet zinc between the layers, are provided on both pipes as shown, that for the outer pipe being made in two sections. The space in the smaller pipe is used for the water, its capacity being about 13 gallons, and the space between the two pipes is packed with crushed ice. The entire cost of the water cooler is approximately $9.—Louis Davis, Nashville, Tennessee.

A Self-Closing Oil Container

In a shop that builds small meters, all shafts, before assembling, are inspected by being revolved by hand on bench centers, the centers being touched, before the shaft is mounted between them, by a fine wire carrying a drop of light oil. It is essential that the oil be kept perfectly clean, as a speck of dirt on either center might result in a false test, so the automatically closing oil container shown in the drawing is used.

The container is made of wood and brass tubing; the wood is used for the base and the two uprights, and the tubing for the oil container and cover. Before fastening the uprights to the base, a slot, about 3/8 in. wide and 2 in. long, is cut in the tube that is to hold the oil, and the ends of the tube are serrated, or "nicked" with a file, so that the tube will not turn in the upright. Leather washers are fitted tightly into the ends of the tube, and the ends pressed into the uprights. The cover is also made of brass tubing, and slips over the first piece. It is cut a little shorter than the first piece, for clearance, sawed lengthwise, and one edge of the cut bent outward. To one end of this edge is fastened a wire spring, as indicated; the curved edge also serves as a handle.

The photograph shows the container closed, and the other illustrations show the details of construction. When the operator desires to dip the wire in the oil, he turns the cover around until the open-

A Self-Closing Oil Container: Upper Left, the Container Closed; Right and Center, Details of Construction

The entire cost of the water cooler is approximately $9.—Louis Davis, Nashville, Tennessee.

As soon as the cover is released, it is snapped back to the closed position by the wire spring.—Harry Moore, Montreal, Can.
An Upright Tool Cabinet

The tool cabinet shown in the illustration is made almost entirely of 1 by 12-in. finished lumber. It is divided into two parts: the cabinet proper and a drawer section. The cabinet section provides space for the larger tools, and the drawers contain nails, screws, small tools, and miscellaneous material.

Tools such as chisels, screwdrivers, pliers, etc., are conveniently supported on the wall of the upper section by means of strips of leather, attached to the wall with small round-head screws. Hammers and similar tools are held in place by long screws partly driven into the wood, while saws are slipped into the slotted shelf shown in the compartment at the left. Tools are also hung on the inside of the doors. A few shelves, arranged near the bottom of the larger compartment, provide space for small boxes of tools, such as taps and dies, or for books and catalogs relating to tools.

The drawers in the lower section may be subdivided in any suitable manner, and one or both of the drawers provided with sliding trays for holding screws or nails of various sizes. All the major dimensions of the cabinet are given in the drawing, and the construction is quite obvious. The details may, however, vary to suit the builder of the cabinet.—C. N. Schuette, San Francisco, Calif.

An Upright Tool Cabinet of Excellent Design: Left, Photo of Cabinet; Right, Perspective Drawing; Showing All Important Dimensions

Reboring a Turret-Lathe Bed

The drawing shows a simple method of reboring a turret-lathe bed, when it is not convenient to move the part to a machine shop for reboring. A angle plate, with a hole drilled through one side, is used as one bearing for the boring bar, and is clamped to the lathe bed as indicated. A bushing in the hole in the opposite side of the lathe bed serves as the other bearing. The bar itself has a fine thread on one end, and a nut is used to feed it.

Cutting a Belt for Cone Pulleys

When cutting a belt to length for cone pulleys, the “cut-and-try” method occasionally gives good results, but more often does not. The following method, however, always gives correct results: Place the belt on the pulleys as shown in the drawing at the left; stretch the belt; mark and cut it, and make the joint in the customary way. When the joint has been made, place the belt on the proper steps, as shown on the right. This method also saves time.
Marking Wooden Boxes

The methods described in this article were used, with satisfactory results, for marking a large number of fruit boxes and trays with the owner's name and address, and will prove equally useful wherever quantities of wood surfaces are to be marked or lettered permanently. At first, a bronze burning die was used, and while the results were fairly satisfactory, depressed blackened lettering, formed with the same die under pressure, was found to be neater and could be made more quickly. For rough work, the burned lettering answers very well, and this method has the advantage of requiring no vise or press, and of ease of application, as the hot die can be applied while the surface is in any position.

For either method, the first operation is the making of the pattern for the die; this requires nothing more than skill with a pocketknife, although a set of small chisels or regular woodcarving tools will expedite matters. The letters should be made at least 3/4 in. high, and be as plain as possible, as this will help in producing a good casting. The wood used is cherry or mahogany, about 1/2 in. thick, and the letters should stand up from the surface from 3/8 to 1/2 in., the outlines should be as sharp and clean as possible, and, of course, the letters must be cut reversed, as shown in the drawing. If more than one line of lettering is required, it is best to make separate dies for each line, as it may be desirable, at times, to use but one line—the owner's name, for instance.

The die should have a boss cast on the back, to be drilled and tapped for a handle, if the die is to be used for burning. A casting can be obtained at any brass foundry; if the pattern is supplied to the foundry, the die should cost about $1 each. Bronze is better than brass, as a rule, especially for a burning die; either of the two is preferable to cast iron, as a smoother casting is obtained, and one that is easily touched up with file and chisel. If a good casting is obtained, all that is necessary is to smooth up the faces and edges with a file, taking care to keep the surfaces true.

To use as a burning die, a long 3/4-in. steel-rod handle is screwed into the boss, and fastened by a locknut. A sliding handle, made from a piece of pipe, is then slipped on, and a wooden cross handle fastened on the end by means of nuts and washers, as shown in Fig. 4. The die is heated nearly red-hot, in any convenient manner, pressed firmly on the surface to be marked, and removed as soon as the lettering is burned deeply enough.

If a large vise is at hand, a better job can be done by coating the faces of the letters with paint, and pressing the die into the wood, between the vise jaws. A large vise will take a single line of letters, but a double line, or a single line used in a smaller vise, demands the use of shoes or pads to take the pressure.

Two heavy iron or steel plates may be used, with the dies pinned to one of them, but a better method is to make a pattern and have two shoes, as shown in Fig. 2, made of cast iron. No machine work will be required on the shoes; if
the die extends beyond the vise jaws, the shoes should extend the full length, as shown, and have lugs at top and bottom, to fit over the vise jaws. Holes drilled in the face of one shoe will accommodate the bosses on the dies, and dies and shoe should be drilled, and dowels fitted, to hold the dies in position. One shoe can be drilled for two dies, and the other for one, in case it is desirable, at some time, to use but one die.

A felt pad, tacked to a board, as shown in Fig. 3, is saturated with black paint, and applied to the die, being careful to get just enough paint on the die to cover the letter surfaces. The box is then placed in position, and the vise closed; considerable pressure must be applied, and the die should be sunk into the wood about ¼ in.; of course, this applies to soft wood, as so deep an impression cannot be made in hardwood.

Sometimes the use of a compound- lever press is preferable to using the vise, and Fig. 5 shows clearly how such a press may be made from ½ by 1¼-in. cold- rolled steel. The dies and shoes are used as before; by pressing the handles together, the die will be forced into the wood.

**Stand for Welding Hose**

In most shops the welding hose is allowed to drag on the floor when the torch is in use. This not only wears the hose rapidly, but, where much cutting is done, the hose is constantly being burnt. To eliminate this trouble, one shop uses the hose stand shown in the illustration.

It consists of a ⅜-in. pipe, 4 ft. long, threaded on both ends, one end being fitted with a reducing coupling, and the other with a tee. A ¾ to ½-in. coupling is used, a hole being drilled through the ½-in. end and tapped for a thumb- screw. Short nipples are screwed into the run of the tee, and this end of the fixture is anchored in a circular concrete base, a barrel hoop being used as a form. A length of ⅝-in. iron rod is bent to the shape shown, and the straight end inserted into the coupling, where it can be locked at any desired height by means of the thumbscrew.

The hose hanger consists of part of an old motorcycle rim, fitted with a hook, and a spring clip to keep the hose in place. In use, the standard is moved close to the work, and the part of the hose not in use is coiled on the hanger and clipped. This fixture not only saves the hose, but, if the hose is adjusted on the hanger properly, helps to balance the heavier torches.

**Novel Transom Control**

The writer recently saw, in an old mill, an odd homemade control arrangement with which window transoms could be adjusted quickly and held securely.

The transom is pivoted at its center, and a length of strap iron, bent to the shape of a bow, is attached to the frame as indicated. Holes are drilled near the ends of the bow to permit a length of sash cord to be attached to it by passing the ends through the holes, and knotting them. The sash cord passes from one end of the bow over a V-pulley screwed into the ceiling, then through a cam lock attached to the lower window sill, and back again to the other end of the bow. The purpose of the cam is to hold the transom securely in any desired position. The operation of the device is apparent from the drawing.—W. Burr Bennett, Scranton, Pa.
Wire-Gate Tightener

The device illustrated, which is used to tighten wire-fence gates, is of considerable utility, as it can be tightened or loosened in a moment, and eliminates entirely the unsightly sagging of the gate.

A loop of wire or iron rod, fastened to the gatepost, and into which the end pole of the gate is set, is used at the bottom, as no trouble is experienced in keeping the gate tight here. The tightener is attached to the top of the gatepost; it consists of a thick hardwood cam or lever, cut to the shape shown, and fastened loosely to the post with a large spike so that it can swing freely, a washer being slipped on the spike on either side of the lever. A heavy-wire or iron-rod loop is attached to the lever, as shown, so that the wire will be drawn back a few inches when the lever is swung around and locked. A spike should be driven into the post at the point indicated, and bent so as to hold the lever in the closed position. On long gates, it is sometimes advisable to use a tightener at both top and bottom, but on smaller gates the one at the top is usually sufficient. To tighten the gate, put the gate pole in the lower loop, then, with the lever in the position shown by the dotted lines, slip the upper loop over the top of the pole, and draw the lever back.—Jonas Byberg, Silverton, Oregon.

A Lathe Kink

It is usually found convenient to keep the compound rest of a lathe set at an angle of 30° to the cross slide. In reducing the length of a piece being turned, advantage may be taken of this practice, as it affords a simple means of accurately gauging the cut. At the 30° setting, feeding in the compound rest a certain dis-

Hinge Stops for Casement Windows

Casement windows sometimes fold back against lighting fixtures, with the result that the window panes or fixture globes may accidentally be broken. To avoid this, a simple and inconspicuous hinge stop can be provided, consisting merely of a small machine screw, tapped into the hinge as shown.

Open the sash as far as possible, and make a scratch on each hinge, at the point where the half of the sash comes over that on the jamb. Close the sash, and make a prick-punch mark in the center of the middle portion of the hinge, ¾ in. outside of the scratch. Drill and tap for a ¼-in. machine screw, and cut the screw to such a length that the head will project about ¼ in. If something more ornamental is desired, special screws with fancy heads may be used.

Emergency Thumbtacks

Emergency thumbtacks can readily be made from small pieces of thin sheet brass, slit on the edge and bent at right angles, as indicated. An old pair of ordinary paper shears can be used for cutting the slit. The cut is made at a slight angle from the edge to make a sharp and thin point that can easily be pushed into the wood.—Ben Frantzreb, Indianapolis, Ind.
How to Build Attic Aerials

BY F. L. BRITTIN

Attic aerials are easy to construct, and when properly made, the results obtained with them are nearly as good as those obtained with outdoor aerials. Attic aerials should not be confused with loop aerials, as they have no directional effects. They also have an advantage over outdoor aerials in that they do not need a lightning switch.

The end-to-end type of this aerial consists of a number of lengths of No. 14 stranded copper wire, strung parallel to each other, and attached to the uprights at each end of the attic by means of ordinary aerial insulators. The total length of the wire used should not be less than 150, nor more than 200 ft., and the wires should be spaced about 1½ ft. apart. One end is left dead; the wires are then connected in series, as shown, and the other end is soldered to the lead-in wire, which is brought down to the instrument through a length of flexible loom.

In attics where less space is available, such as those with hip roofs, the aerial can be strung along the rafters, as shown in the upper right-hand drawing. One length of No. 14 wire, 150 to 200 ft. long, is strung in four parallel rows as indicated, the wire being attached to the rafters by means of round porcelain insulators, which can be purchased at any electrical-supply store. One end is left dead, and the other is connected to the lead-in wire, as before.

The flat-loop aerial, shown in the lower
drawing, is designed for small attics. Two lengths of rope are strung across the attic from corner to corner, and are tied together at the point where they cross. The aerial wire is attached to the ropes, as shown in the drawing, being tied firmly at every point where it touches the ropes. The inner end is the dead one, and the outer end is connected to the lead-in wire. The turns should be spaced about 1 ft. apart.

In apartments where there are no attics, an inside aerial that gives good results with a tube set can readily be made by running several turns of annunciator wire behind the picture molding, leaving one end of the wire dead, and bringing the other down to the receiving set.

With such an aerial the writer has received stations 1,000 miles distant, using a two-step spider-coil receiving set, made as described in the February issue of this magazine.

To obtain the best results with any receiving set, just as much pains must be taken to secure a good ground as to construct the aerial. Number 14 wire should be used, and one end soldered to a water or radiator pipe. A clamp can also be used, the pipe, of course, being scraped where the clamp is attached. Gas pipes are not so good for grounding purposes, as they are often insulated from the ground by the meter. However, this can be remedied by shunting a wire around the latter.

Built-In Poultry Feeders

Poultry feeders of the type shown in the illustration, built against the wall between two frame uprights, have been found very convenient, and save considerable floor space. A dry-mash feeder is illustrated on the left, and shown in section at the right. The front side is slanted, to allow the feed to slide down freely, and the top is also built at an angle, to prevent the fowls from perching on it. Small strips of wood are nailed over the lower end, or mouth, of the feeder, as indicated, so that the feed cannot be scratched out. Open feeders, of the V-shaped type shown at the right, are also used. These are fastened to cleats nailed to the uprights.—Harry R. Shiffer, Brownstown, Pa.

Using Stale Photograph Paper

Stale developing paper will give foggy, gray images in ordinary developing solutions. By exposing three times longer in printing, and using about four times as much bromide of potassium in the developer, the prints may be made clear and “contrasty.” The exact amount of bromide to be used is easily ascertained by experiment.

Increasing Capacity of Scales

The standard family scale usually has a weighing capacity of 25 lb., but it often happens that heavier articles must be weighed. To increase the capacity of such a scale, a coil spring may be placed on the stem of the platform, as indicated in the drawing. The coil spring should be made of No. 12 or 14 steel or brass spring wire, and can be wound so as to increase the capacity of the scale several times.

When the spring is in place, a body of known weight is placed on the platform, and the scale indication noted. The actual weight, divided by that indicated, gives a factor that is used to multiply the scale readings shown when weighing other articles. For example: if, as shown in the drawing, a 10-lb. weight is placed on the platform,
and the scale reading is 5, for all articles weighed subsequently the scale reading is multiplied by 2, to obtain the correct weight.

The results obtained with this method, while not absolutely correct, are close enough for practical purposes.—E. W. Kemp, Lexington, Ky.

Counterweight Holds Lid Open

A counterweight, attached to the lid of a chest or bin, as shown, holds the lid either open or closed, and eliminates the need of a catch. Any heavy piece of metal can be used; it is screwed or bolted to the back edge of the lid so it will not overbalance the lid when closed, but exert sufficient force to draw the lid straight up when the latter is raised halfway. If desired, the weight may also be adjusted to hold the lid in an intermediate position.—H. F. Grinstead, Columbus, Mo.

Why Aster Seedlings Die

Florists are sometimes perplexed concerning the cause of asters wilting and turning black at the stem, near the ground, which usually happens just at the time when the flower is beginning to bud. As a general rule, more trouble of this kind is experienced with plants grown in a greenhouse than with those grown outdoors.

The grower usually attributes the loss to some kind of stalk borer, aphis, or fungus. The real cause is, however, excessive rainfall or heavy watering, which causes much trouble, especially among asters planted in rich soil. Low land, on which water has a tendency to remain long after heavy rains, is a very poor place for seedlings, although it is ideal in dry weather. The same indications of stem rot are found among asters allowed to remain too long in the greenhouse, and also among those that have slender stems, because they have been planted too thickly, and therefore have to be partly buried in soil to steady them.—A. C. Cole, Chicago, Ill.

Shallow-Water Rod Anchor

The hunter, fisherman, or trapper who uses a light, flat-bottomed boat can im-

![Handy Anchor for the Flat-Bottomed Fishing Boat: The Rod is Pushed into the River Bottom](image)

prove his craft considerably by fitting it with an anchor of the type illustrated. It consists of a cast-iron floor flange and a short length of 1-in. pipe to fit, the flange being screwed securely over a 1-in. hole cut in the floor. The top end of the pipe must be above the water line of the boat. The remainder of the equipment consists of a 9/4-in. iron rod with a ring formed at one end. This rod is dropped into the pipe and pushed into the bottom of the stream or lake. If desired, an anchor of this kind may be installed in each end of the boat, to insure stability.

Gasoline Flatiron Used as Camp Stove

A convenient camp stove can readily be made from a gasoline flatiron. The handle is removed and two flat-iron legs are substituted for it, so that the flatiron may be inverted, the bottom serving as the top of the stove. The fuel tank is turned to the position shown, care being taken that the feed pipe is not twisted off while turning. A support of flat iron is provided to brace the fuel tank, and is attached to the iron by the screws that hold the nearest leg. The fuel is lighted in the usual way.
Bottle Window for Log Henhouse

A northern farmer who did not have much time to spare or cash to spend, when erecting a log henhouse, used empty bottles instead of regular windows. Ordinary round bottles were used, as they are stronger than flat ones. Notches were cut in adjacent logs with an adz, and the bottles fitted and cemented in place, care being taken to keep the glass clean. Owing to the small diameter of the bottle in comparison with that of the logs, it was necessary to bevel the notches deeply on the inside, to admit as much light as possible. Any number of these bottles can be arranged in a log wall without weakening it. The bottles admit as much light as ordinary windows, and prevent drafts. They have the additional advantage of keeping the henhouse warmer than ordinary windows during cold weather, as the dead-air space in each bottle prevents, to a great extent, the dissipation of the heat inside.—H. Webster, Spear Hill, Man.

Oiling Washing-Machine Motors

Many small electric motors, used on washing machines, are made with dustproof bearings, the oil hole in the top of each bearing being fitted with a hollow screw cover that is set with a screwdriver. In cramped quarters this cap is very unhandy, as a very short screwdriver must be used to turn it, and for this reason refilling is often neglected. The simple improvement illustrated will help considerably to remove this trouble. A small piece of sheet brass is soldered in the slot of the screw cap, as shown, thus making a thumbnut out of the screw cap. A hole, just large enough to receive the end of the oil can spout, is drilled through the threaded side of the cap. With this improvement no screwdriver is needed, nor need the cap be removed entirely to oil the bearing.

Keeping Out the Rain

The drawing shows a good method of keeping rain out of the open window of a sleeping room, where it is essential to have fresh air at all times, even during rainy weather. A wooden box is made to fit between the window jambs and rest on the sill. It is held in place by means of thumb-screws on the sides, and also by the weight of the window on top. The opening is made on the underside of the box, so that rain cannot enter.—H. A. Palmer, Toledo, Ohio.

Lazy-Tongs Row Marker

The garden-row marker shown in the illustration is of special convenience as it can be adjusted to any desired spacing. The center "diamond" of the tongs is pivoted to the end of the handle, and a bolt on the opposite corner of the diamond fits in a slot cut in the handle, as indicated; a wingnut being fitted on the bolt to clamp it at any point in the slot. Heavy nails, driven through the lower strips, at the points of the diamonds, are used as markers; ¾ by 1-in. strips are used for the lazy tongs, and are fastened together by snug-fitting rivets and washers.
BUILDING A CAMP CAR
By Ray F. Kuns
PRINCIPAL AUTOMOTIVE TRADE SCHOOL,
CINCINNATI, OHIO

Part I
Chassis and Body Construction

THE Camp Car, or land cruiser, described in this article was evolved after a number of years' experience in summer touring, and is the fruit of much thought and preliminary investigation.

Many plans were made, designs drawn up, checked over thoroughly, and then discarded, and much experimenting was done before the car was finally built; the car has, since being constructed, been driven over 5,000 miles, and has given every satisfaction.

Some of the considerations involved in the construction of a car of this type are the following: It must be of lightweight construction; everything must be contained under one roof—that is, there must be no sections extending beyond the protection of the roof, whether traveling or in camp; it must allow the driver good vision in every direction; it must afford comfort to all passengers when riding, and good beds when camping; it must have provision for carrying a supply of safe drinking water, and for the preparation of meals; it should have an ice box, and as many cupboards and lockers as possible. These provisions are only necessary, and were not at all hard to embody in the final design.

In designing the car, the body width was determined by the space necessary for the berths and seats, as it was desired, when carrying four passengers, that the seats should afford each a good view.

The seats were accordingly to be individual, and were located in the car as shown in the floor plan; they are held in this position by cleats, but may be removed and used in any part of the car, as desired.

The length was the next consideration. After some figuring, it was decided to allow the body to overhang the rear axle by 5 ft., and the body was so built; after one season's use, however, the wheelbase was lengthened, and the overhang reduced to 3 ft. It was found possible to make the floor 12 ft. long. The headroom was determined by the writer's height, and this left only one main dimension to be determined — the length of the "snout," or overhanging part of the roof, needed to house the berth that is swung over the hood in front of the steering wheel.

The bed or berth was made 4 ft. wide, so as to take a regular mattress, and this, then, fixed the amount of overhang.

The first tour taught much about chassis design and construction. The 5-ft. overhang was found to impose too much weight on the rear axle, and while this was all right as far as steering and traction for hard pulls were concerned, it did not make for a steady-riding car or tire economy. The original wheelbase was 123 in.; by moving the rear axle back
24 in., a much better balance was obtained, and the body design was unaltered, except as to floor arrangement. The present wheelbase is 147 in., and the weight on each wheel, with full load, is about 1,500 pounds.

The first touring-car frame being too light, it was discarded, and two lengths of 4-in. channel iron were used instead. A short connecting length of the same-size channel was welded across the front, to form a bumper and brace the frame, and another length across the frame, to carry the front end of the torque arm. The remaining cross members are either 11/2-in. pipe or sections cut from the old frame. The frame was made narrow enough to allow the springs to be mounted on the outside.

The front springs are 40 in. long, and are mounted under the frame in the usual manner; each has nine leaves, 2 in. wide. The rear springs are 56 in. long, and have fourteen 2-in. leaves each; the rear ends of the springs are fitted with sliding contacts instead of shackles.

The first season, the rear springs were underslung, with long shackles at the rear; this, however, allowed the springs to twist and the car to sway badly. With the present construction there is no sideways, and riding comfort is all that can be desired. Four heavy snubbers are used to check rebound.

The rear axle was taken from a heavy touring car. It is of the full-floating type, having adjustable taper-roller bearings throughout. The gear ratio is 4 1/2 to 1, but 5 to 1 would be better. The front axle is of the usual I-beam type, designed for touring-car service.

The 6-cylinder engine is of the standard L-head type, 3 1/2-in. bore by 5-in. stroke, with a rating of 29 1/2 hp. It is an engine designed for service in a passenger car weighing about 2,700 lb. The transmission is standard. The engine is powerful enough to keep the car moving even in very bad going, although, in hard pulls, the 5-to-1 gear ratio in the rear axle would help considerably.

The speed in high gear ranges from about 5 to over 45 miles per hour, although, of course, the average touring speed is around 30 miles.

The tires and rims are worthy of more consideration than they usually receive. Nothing less than a 4 1/2-in. truck cord, or a 5-in. passenger-car cord tire, should be used for a car of this weight. The rims should be one of the several types that make contact with the felloe all the way around.

The foregoing information is given, not so much with the idea that others will assemble a special chassis, as the writer did, but rather that the main points of this design may be remembered when selecting a chassis. There are a number of fast, light trucks on the market, among which a suitable chassis may be found. If a touring-car chassis is used, it should be one with a very rigid frame, an engine of the specifications outlined above, and good springs. A suitable chassis will be more commonly found among the higher-priced cars than among the low and medium-priced ones.

The chassis being ready, the framing of the body may proceed. The job will probably have to be modified to fit the chassis, but the dimensions given will be of material help, and, in many cases, can be followed without change. When assembling, the road clearance must be watched; this should not be less than 10 or 12 in. If the body is to be framed on the chassis, it is well to set the latter in such a position that it will not be disturbed while work is in progress, and to block it level. If this is not done, every deflection of the springs, or change in tire pressure, will throw the job out of level, and result in delay.

The sills used for the frame are 2 by 4-in. oak, although any good hardwood will answer. The manner of attaching the sills to the frame will vary; in a touring-car chassis with a hump in it to run over the rear axle, the sills may be set on edge, in such a manner that the front ends rest on the top of the side members.
Figure 1. Plan, and Figure 2, Side Elevation of Assembled Chassis for Camp Car; Figure 3, Floor Plan, Showing Location of Chairs While Driving, Stove, Ice Box, and Other Equipment; Figure 4, Details of the Body Frame, Showing Window Frames in Place, and Connection of Front Posts and Rafter to Truss Member.
of the frame. If the frame is straight on top, the sills may be laid flat, as shown in Fig. 4. Another method is to bolt the sills to the side of the frame. A point to keep in mind is that every inch that the sills project above the frame means an inch added to the height of the body, and this means much, not only in looks, but in sidesway, and in clearance under bridges, etc. In laying the sills, also, care must be taken to see that they will clear other parts of the car as they move up and down with the spring action.

Having bolted the sills to the frame as seems best, the floor, of No. 1 common pine, is laid. Two boards are cut to the necessary length, one being fastened to the front end of the sills, the other to the rear, at right angles, determining the four corners of the lower part of the body. The rear board may have the groove sides planed down, and the edge laid even with the ends of the sills, and must be squared carefully with the front board and sills before being nailed down. The flooring comes next.

Wherever possible, the floorboards are laid full length; that is, clear across the width of the body. There are no cross sills, for two reasons: They raise the floor from 2 to 4 in., and they tend to make the frame more rigid, and more subject to racking on rough roads.

The position of the engine, transmission, and wheels will determine the location of the parts that must be cut out of the floor. The old floorboards may be used, but it will usually be found necessary to use new lumber.

As cross sills are eliminated, other members must be used to take their place. The floor helps, but cannot be depended on to do the work alone. At the front, any wood sill or truss would prove too bulky and insecure. Accordingly, the truss member, Fig. 5, was evolved. This is made from 1¼-in. angle and T-iron. All joints are welded, and the rabbets formed are set to the front, in order that the windshield may have a proper seat when closed. The two short center posts are bolted to the front ends of the sills, and rest on a steel plate, fitted onto the top edges of the car frame. Two pieces of ½ by 1-in. steel are welded into the outer panels, as shown, for braces; these prevent sagging of the outer edges of the body. The space between the long posts is filled by the windshield, while traveling, and by the forward berths, while camping.

The side sills are pine or poplar, 2 by 2 in. in size, nailed under the edges of the floorboards, when the latter are cut to length. Pieces of the same material are used to bind the edges of the floor cut-outs. The rear edge of the floor is strengthened with a 2 by 2, or 1 by 4-in. sill, depending on the method of attaching the main sills to the car frame.

Having the truss member erected and all edges of the floor bound and strengthened, the next step is to lay out the studs or posts.

The approximate position of the posts may be gathered from Figs. 3 and 4; good, sound oak or ash, 1½ in. square, is used for these. The posts are half-lapped, at the bottom, to the floor and 2-in. sills, and the joints fastened with screws, after coating the surfaces with white lead or paint, to prevent penetration of moisture. As the posts are set, they are plumbed, laths being used to brace them in position. The front posts are fastened to the truss angles with screws.

It will be noted, in Fig. 4, that there is a 12-in. board bolted to the bottom and top of the posts on each side. These are poplar, known as panel stock by lumber dealers; the bottom boards are ¾ in. thick, and the top ones ½ in. thick. These boards take the place of heavy cross and longitudinal sills, and are fastened to the posts with 9⁄16-in. bolts. This construction insures sufficient rigidity to prevent racking of the body, while permitting considerable twisting without damage; no corner or diagonal braces are used.

The rafters are of 1¾-in. oak or ash; they are 2 in. wide at the ends, and 4 in. at the center. If additional headroom is desired, they may be cut out to a curve on the underside, starting the curve at a point 16 in. from each end, and making the height of the chord 1½ in.; that is, the width at the center would be 2½ in. A rafter is set at each post, which results in uneven spacing, but is best for strength. One 9⁄16-in. bolt is used to fasten the rafter, at each end, to the posts, which are notched ¾ in. to take the ends of the rafters. In the overhanging end of the top, short posts are fastened, to support the rafters.

Short pieces of the post material are used in the corners of the top as bolting pieces for the panel boards, and similar pieces along the edges as nailing cleats for the roof sheathing.

The two rear side windows, and the rear window, are arranged to slide up, for ventilation. When traveling at touring speed, however, there is a great amount
Figure 5, Truss for Front of Body; Figure 6, Details of Roof Covering and Locker Framing; Figure 7, Method of Applying Duck Covering to Sides and Rear; Figure 8, Details of Windows; Figure 9, One-Half of Windshield, Showing Ventilating Frame; and Figure 10, Door Construction, Showing Sliding Window.
of suction at the rear of the car, and the
dust whipped up sifts in at every crevice.
As it is hard to make a sliding joint snug
enough to exclude this dust, it may be
best to make only the side windows slide.
The posts are used as the side frames.
The window sills are 1/2-in. stuff, set at
a slight angle to insure drainage. The
window cap is merely a piece of quarter-
round molding, nailed over the lattice
strip that holds on the duck covering.
The window frames cannot be finished
until the body has been covered.

The roof may be covered with the
regular roof sheathing used by body
makers, or, as in the present case, with
5/8-in. oak flooring.

The smooth side is laid to the rafters,
as this forms the ceiling, and is stained
and varnished. The sheathing is fas-
tened with 1-in. flat-head nails, well
punched down. With the framing fin-
ished, as in Fig. 4, and the roof sheathing
on, the duck roof covering is applied.

This may be obtained from a body-
trimmer's supply house, in a width suf-
cient to cover the roof without a seam.
The corners of the sheathing should be
rounded, to prevent cutting the covering.
Each edge of the covering is drawn down
to a line on the panel board 3 in. from
the top of the sheathing, and tacked fast.
The edges are then trimmed, if necessary,
and covered with a 3/8 by 2-in. lattice
strip. These details are clearly shown in
Fig. 6.

Before covering the sides, the posts are
braced, on the inside, by means of lattice
strips tacked to the centers, to prevent
them from being pulled out of line as
the material is stretched. One edge of
the side covering is tacked to the rear
door post, and the duck run back to the
rear edge, making no allowance for the
window opening. It is best to cut the
material at the rear corner, putting on
only one side at a time, and not to at-
tempt to run around the rear and up the
other side without cutting. Note, in Fig.
7, that the duck is fastened between panel
board and posts, at top and bottom, the
nuts being slacked, the material tucked
in, and the bolts drawn tight again; this
avoids cutting the material. With the
top and bottom tacked in place, the lat-
tice strips are applied. These are 3/8 by
2-in. molding strips. A strip is nailed,
on the outside of the duck, so that it
will just touch the bottom of the window
sills when these are in place. A second
strip is nailed 23 in. above this, to form
part of the window cap. These strips
run from the rear door post to the rear
corner post, on each side, and across the
rear, in like manner. The strips do not
meet at the corners, but are cut short
to allow room for the vertical strips that
cover the tacks fastening the duck to the
corner posts. When fastening the ver-
tical lattice strips at the window posts,
they are allowed to project over the posts
about 3/8 in., to form shoulders against
which the windows rest and slide.

The temporary lattice strips tacked on
the inside are now removed, and strips,
long enough to reach between the posts,
fastened on the inside of the duck by
nailing to the outside strips. A helper,
holding a heavy sledge or dolly against
the strips, is necessary for this part of the
job. Flat-head nails, 3/4 in. long, are used
for this, heads inside, where they do not
spoil the appearance of the job. No in-
side strips are placed above the windows,
as they would interfere with raising the
latter.

After the sides are finished, the win-
dow openings are cut out, and the body
forward of the doors covered and paneled
to conform to the rear. The front side-
window frames are fastened to the posts,
and the duck tacked to them.

The windows, shown in Fig. 8, have
frames of poplar or pine, rabbed 1/4 in.
wide and 1/2 in. deep, to receive the glass.
The glass is retained in the rabbets by
1/4-in. square molding. All joints are
mortise-and-tenon, and the panes may be
arranged in any manner desired.

The windshield, the left half of which
is shown in Fig. 9, is set in the upper part
of the truss member. Each side is framed
to fill half of the opening in the truss, the
full width being 6 ft. 4 in. The halves are
joined at the center by a 3/8-in. rabinet.
Aside from filling the opening properly,
when used as a windshield, these parts
also form the sides of the housing for the
upper berth, when lowered, and carry
part of the weight of the bed when raised.
Therefore, the frame is made of hard-
wood.

When opened, the top edges overlap
the panel boards 1 in., which prevents
them from opening too far, and makes
them weatherproof. Mortise-and-tenon
joints are used throughout, and the glass
panes are fastened in the same manner as
in the side windows. The lower panels
are filled in with light oak frames, carry-
ing two panes of glass each; the frames
are hinged at the bottom, and may be
dropped for ventilation. When up, they
are held in position by metal thumb
buttons.

The halves are hinged to the truss
posts, and clear the web of the T-iron top rail by ¼ in. Three hinges are used on each side. In framing, it must be borne in mind that the frames are right and left-hand, or they will not mate when hung.

The door frames, Fig. 10, are made of hardwood. Each door is provided with a sliding window that drops into a pocket—much like a sedan window. Double-strength glass is used, in a light wood frame. Duck is used to cover the top and bottom of the door; this is tacked, on the inside, in the rabbet provided for the window frame, and, where this does not run, strips of quarter-round molding are used. Edges where molding is not used are rounded with a rasp, so that all exposed edges are round. Corner joints are half-lapped and screwed, and cross rails tenoned into mortises in the sidepieces. The window frame is held in by means of a 20-gauge sheet-metal pocket, and by lattice strips screwed to the frame.

Three carriage hinges are used on each door, and deck locks, with a permanent handle, fitted. The sheet metal forming the pocket should be painted body steel or galvanized. It is so formed that any water blowing in at the window joint will run out over the flange at the bottom of the door. The edges of the doors are made snug by trimming them with aluminum T-molding, purchased from a bodybuilder’s supply house. The windows are raised or lowered by straps attached to the frame, and are held closed by small “triggers” which swing under the frame.

Full details of the interior fittings, etc., will be given in the August issue.

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**Tool Holder for Small Model-Making Lathes**

The difficulty of forging tools for small lathes, and of keeping such tools in proper condition, is obviated by the use of the tool holder shown in the illustration.

The holder is made of cold-rolled steel, and the shank is easily bent in a vise by means of a large wrench. The square hole for the bit is made by drilling a ½-in. hole through the end of the two parts of the holder, as shown, while the parts are clamped together, and then filing each half with a small square file. A length of 3¼ by ¾-in. high-speed steel is used for a bit, this size being the smallest that is usually carried by dealers. It is furnished annealed, and can be cut to length with a cold chisel or hacksaw, then ground and hardened. The hacksaw must be used with light strokes, or the steel, being air-hardening, will harden under the saw and ruin the blade.

The advantages of this type of lathe tool for the amateur are the ease of hardening the high-speed steel, of grinding the bits for a new edge, and the elimination of reforging.

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**Increasing Volume of Tone of Phonograph**

The vibrations of the diaphragm of an ordinary phonograph reproducer are conducted to the amplifying chamber from one side only, although it is obvious that both sides of the diaphragm vibrate equally. Advantage can be taken of this fact by providing an additional horn to amplify the volume of the tone. The horn can be made of fiber board, and the small end must be just large enough to fit over the outside of the reproducer, a notch being cut in it to fit over the needle arm. The horn is held in place on the reproducer by means of a rubber band. The sound is given out from both sides of the diaphragm, which not only results in increased volume, but also in a slightly different quality of tone.—Charles I. Reid, New York City.

Porch boxes for flowers and plants should be wider at the bottom than at the top, to afford additional growing space for the roots.
A Novel Seesaw

The seesaw shown in the illustration is novel in that it combines a swinging motion with the usual tilting one, providing the sensations of both a swing and a seesaw.

It is supported on two upright posts, spaced approximately 14 in. apart. Posts, 8 in. in diameter or 8 in. square, are large enough. The pivot on which the plank swings is a length of pipe or steel rod, running in holes bored in the posts, as indicated, about 3½ ft. above the ground. Both ends of the pivot are fitted with washers and cotter pins. The plank is underslung on the pivot by means of two old automobile connecting rods. The plank should be a strong one, of 2 by 12-in. stock, and about 14 ft. long. The “big-end” caps of the connecting rods are removed, and holes are drilled through the plank for the connecting-rod bolts; the plank is then bolted to the rods, and the rods to the pivot. The plank must, of course, be perfectly balanced when suspended from the pivot.—Lowell R. Butcher, Des Moines, Ia.

Yardstick for Fishing Boat

Fish laws are becoming more stringent every year, and the fisherman is kept busy with his ruler to avoid arrest for keeping fish that are under legal length. To simplify matters, some fishermen mark off the lengths of various kinds of fish on their rods. However, a simpler method of measuring the fish is to tack a yardstick along the inside of the boat, near the bottom, marking the length limit of each variety of fish on it. When a fish is caught, it is placed against the measure and it can be seen at a glance whether or not the fish may be kept.—Robert Page Lincoln, Minneapolis, Minn.

Combined Trouble and Tonneau Light

The owner of a light sedan car that was not equipped with a tonneau light, found the arrangement illustrated a most convenient one, as it provided a lamp for interior illumination, and one that could be used outside the car as a trouble lamp.

An ordinary portable hand lamp, such as may be purchased at any auto-supply house, and about 10 or 12 ft. of flexible cord, of a color to match the upholstery of the car, are obtained, and connected to a plug and socket fastened on the side wall, near the floor, and close to the rear seat of the car. The surplus cord is tucked away between the seat end and the side of the car, so that it is concealed, except for a short length running from the top of the back cushion to the clip that holds the lamp, near the ceiling. The clip is made from a piece of spring brass, bent as shown, so that the handle of the lamp may be pushed between its ends, and is secured to the wall with a round-head screw. Wires, concealed under the upholstery braid, may be run to a switch placed near the door. The wiring is, of course, connected to the storage battery. In case of trouble, the lamp is easily accessible, and the cord is long enough to reach any part of the car.—George R. Brown, Bridgeport, Connecticut.
Simple Clothes Washer

A simple but efficient clothes washer of the type shown in the drawing has been used successfully for a number of years for cleaning clothes that will stand boiling.

It consists of a wash boiler, fitted with a 1-in. pine board that is perforated with 3/4-in. holes and mounted on wooden legs. A larger hole at each end permits the insertion of two lengths of 1-in. pipe, 14 in. long, which are fitted at the upper end with an elbow, nipple, and cap, the cap being perforated with numerous small holes. The pipe should fit snugly in the holes in the board, and the lower ends, which are open, must be only a slight distance above the bottom of the boiler.

In use, the arrangement is fitted in the boiler as indicated, the clothes are packed in, and water is poured in to a depth not quite sufficient to cover the clothes. As soon as the water boils, the steam confined beneath the clothes forces the water up through the pipes and over the clothes. The water will then seep through the clothes, and in this way there is a continuous circulation, which cleans the clothes in a short time.—G. E. Hendrickson, Argyle, Wis.

An Improvised Smokehouse

When it is necessary to smoke small quantities of meat, and no smokehouse is available, one can readily be improvised from a laundry stove, a barrel, and a support such as a sawhorse or wooden box.

One head of the barrel is removed, and a hole, 8 in. in diameter, is cut in the other head near the side, as shown. This hole is fitted over the short length of pipe projecting above the stove, the barrel being supported by the sawhorse and by a brick placed on the stove. The meat is hung, by means of small wire hooks, from an iron rod placed across the top of the barrel. The whole arrangement is placed outdoors in a place sheltered from the wind. Wood or corn cobs is used for fuel.—Harold Jackson, Kankakee, Ill.

Repairing a Fishing Rod

Many a broken fishing rod is laid aside because the owner does not know how to repair it properly. The ordinary method of repair is to cut the two ends at an angle, and, after applying glue to the surfaces, to join them and wind silk around the joint.

This method can be greatly improved upon by reinforcing the splice with a medium-size darning needle. The sharp end is driven into one piece and the other end is then ground to a point and pushed into the other piece. It may be necessary to drill a small hole in the second piece with a fine drill, in order to force the ground point into it without pushing the needle down farther in the first one. The joint, of course, is glued and wound with silk in the usual way. A splice thus made will be the strongest part of the whole rod.
Fastening Full-Length Window Screens

The drawing shows an excellent method of mounting full-length window screens. The frames are made of oak and must fit exactly in the window opening. The screen is tacked to the frame in the usual way, light wooden strips being nailed over the edges. If additional strength is necessary, for protection against entrance, a double-screen construction is used: the fly screen and a heavy galvanized-wire screen. The frames are fastened at the top by means of screwhooks on the window casing and screweyes in the screen frame, and at the bottom by means of screweyes and eyebolts, the frames being drawn tight against the casing by means of the eyebolts.

A Gauge for Clipping Hedges

A little time spent in making the hedge-clipping gauge shown in the drawing will go far to improve the appearance of hedge fences by making it possible to clip the hedge uniformly, and without giving it the appearance of careless work.

The perpendicular member of the gauge is made from a piece of 2 by 4-in. material, but the horizontal parts may be of lighter stuff, the dimensions to which such a gauge is made depending upon individual requirements. In use, the trimming is begun at one end of the hedge, the gauge being held in an upright position by standing upon the bottom member. Clip as much of the hedge as projects above the top of the gauge, moving it along as the work proceeds.

Simple Farm Derrick

A handy and efficient derrick can be built in a short time from material found on nearly every farm. It consists of a discarded wagon tongue, pivoted on a fence post so as to revolve freely, and fitted with a simple winch for raising the load.

An iron pivot yoke is forged to the shape shown, or one may be built up of flat and round iron. A hole is drilled in the post top to accommodate the shank, an iron disk and a steel ball, taken from an old ball bearing, being set in the hole as shown, to make an easy-running bearing. The yoke straddles the tongue at its balancing point, a bolt being passed through a hole drilled in each. The winch consists of 3/4-in. pipe and fittings, and is arranged as indicated, the winch shaft passing through holes drilled through the ends of the “hounds.” One end of a stout cable is securely fastened to the winch shaft, and the other end to an iron collar that is an easy fit around the bottom of the post. This collar is held in position by half collars above and below it, screwed to the post. Hooks or clamps to suit the load are suspended from the
outer end of the tongue. A rod, sliding through the ends of the hounds, near the winch shaft, as indicated, is pulled out to keep the crank from revolving when it is desired to swing the load. With this arrangement it is possible for one man to operate the derrick unassisted.

Clamp Bolts for Pump

The clamp bolts shown in the illustration have been found very useful for bolting pumps to concrete foundations, as the pump can be easily attached or detached without damage to the bolt threads. In setting the bolts in the concrete, they are placed outside of the area covered by the pump base, but close to the holes through which they would ordinarily have been inserted. When the concrete has set, the pump is placed in position, and small steel clamps, bent as indicated, are fastened down by the nuts, so that the ends of the clamps project over the pump base. Setscrews in the ends of the clamps are screwed down against the pump base to hold it in place. To remove the pump, the nuts and setscrews are loosened, and the clamps are turned out of the way.

Attachment on Spade Saves Shoes

The illustration shows a simple attachment for a spade, to save the shoes while digging. The attachment consists of a short length of ¾ or ½-in. pipe, about 4 in. long, with a hacksaw slot cut through it lengthwise as shown, to permit it to be pushed onto the spade. The slot should, of course, be of such a width that the spade will be gripped firmly. The use of this attachment not only saves the shoes of the workman, but since it is much wider than the narrow edge of the spade, it is not so tiring on the foot.—R. A. Danby, Dannevirke, New Zealand.

A "Live" Scarecrow

Most scarecrows are inefficient because they show no signs of "life." The scarecrow shown in the drawing, however, which is made to swing on a post, and is actuated by the wind, has been found very effective.

It is constructed as follows: Sink a flat piece of timber into the ground, allowing it to project about 3 ft. Then pivot a similar piece to it with a loose-fitting bolt, as shown. Saw a slot across the top end of the second piece, at an angle, as shown in the detail, fasten to it a horizontal piece for the arms, and nail shingles, cut to represent hands, in slots on the ends of the arms. Nail a piece of lead or other metal to the bottom end of the pivoted piece, for a counterweight. After the frame is finished, dress the scarecrow up in the desired manner, allowing plenty of play at the pivot.

If the arms are not at a considerable angle from the direction of swing, and the gusts of wind strong enough, the upper half of the scarecrow will move backward and forward, causing a bobbing motion that is a sure fright for most feathered garden pests. The intermittent gusts of wind keep the figure in constant motion. The counterweight must be heavy enough to bring the figure upright when the breeze abates, but must not, of course, be heavy enough to prevent the figure from swinging.—L. B. Robbins, Harwich, Mass.
MAKING FINE SCRAPBOOKS

By R. S. ANDREWS

Awarded Third Prize—$25.00—in Contest on Occupations for Shut-Ins

HERE is a genuine need of a scrapbook that will serve the general purposes of such a volume and not fall to pieces inside of a year. Many of those commonly seen on the market are poorly constructed, in fact, they present all the appearance of having been made to sell instead of to use. A scrapbook, made of good materials, and called to the attention of those interested through the proper mediums, will find a ready sale.

The materials needed to make a book such as will please the purchaser are as follows:

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 sheets craft paper, 15 by 18 in.</td>
<td></td>
<td>$0.40</td>
</tr>
<tr>
<td>50 strips craft paper, 2 by 18 in.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 pieces bookbinders' board, 14¾ in.</td>
<td></td>
<td>$0.25</td>
</tr>
<tr>
<td>1 piece light canvas, 12 by 18½ in.</td>
<td></td>
<td>$0.10</td>
</tr>
<tr>
<td>1 piece heavy linen thread</td>
<td></td>
<td>$0.30</td>
</tr>
<tr>
<td>1 can best liquid glue, ½ pt.</td>
<td></td>
<td>$0.25</td>
</tr>
</tbody>
</table>

Total cost: $1.00

A much lower price can be secured by purchasing materials in lots sufficient for a dozen or more books at a time.

The tools needed are:

<table>
<thead>
<tr>
<th>Tool</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 5-in. malleable-iron clamps</td>
<td>$0.70</td>
</tr>
<tr>
<td>1 breast drill</td>
<td>$3.85</td>
</tr>
<tr>
<td>1 ¼-in. drill bit</td>
<td>$0.10</td>
</tr>
<tr>
<td>1 ½-in. drill bit</td>
<td>$0.20</td>
</tr>
<tr>
<td>1 packet 3-inch darning needles</td>
<td>$0.10</td>
</tr>
</tbody>
</table>

Total cost: $4.95

Two true and smooth 2 by 18½-in. pine boards are also needed.

Craft paper is tough, very durable, and well suited to this purpose. It can be bought from any paper-supply company, cut to the proper sizes. The binders' board must be bought from the bookbinders' supply houses. The other materials, as well as the tools, can be purchased at any department store. The canvas should be dyed, preferably bright red, although any other color will serve the purpose. While one can dye enough cloth for several books at home, better results can be obtained on larger quantities, taking the work to a professional.

The paper is always even on the edges when received, and in order to keep it so, the work should be done on a smooth bench or table.

The first step in making the book is to clamp one of the boards on each side of the paper, lengthwise, and flush with the edge, as in Fig. 2. Care should be taken that the boards and paper are even, and the clamps must be tightened until the paper forms a solid mass. A line should then be drawn, ⅛ in. from the outer edge, the full length of one of the boards. Marks are made on this line at points 3, 4, and 8½ in. from each end. The breast drill is now brought into play, and holes are drilled with the ⅛-in. bit at these six points, right through the paper, care being exercised, while drilling, to keep the drill perpendicular. The spacing of the holes is shown in Fig. 1.

When the six holes have been drilled through the boards and the paper, the clamps and boards can be removed and applied to the narrow paper strips, which should be drilled through the same holes in the board, the finished strips appearing as in Fig. 3. The drilling is now finished, and the book is ready to be assembled.

In order to keep the pages and strips even, a wooden pin, about 6 in. long, and slightly smaller than the drill, is set in each end hole in one of the boards. These two pins are to string the leaves on, and to keep the holes in alignment. Four pages of the large sheets are strung on the pins, followed by four of the strips. These strips form stubs used for the purpose of gluing in extra pages, and are to be found in all first-class scrapbooks. The alternate placing of four full pages and four stubs is continued, as shown in Fig. 4, until the entire lot is strung on the pins. The other board is now put in place, and the clamps once more adjusted and tightened. The pins can then be removed and all the holes swabbed and filled with glue, as in Fig. 5. The back edge of the book is also given an application of glue, and the work is left on a level surface for a day or more, to allow the glue to set. After it has dried.
Figure 1, Clamp Board, after Drilling; Figure 2, Sheets Clamped for Drilling; Figure 3, Stub Strips Ready for Assembly; Figure 4, Assembling the Sheets and Strips; Figure 5, Gluing Sheets; Figures 6 and 7, Applying and Sewing Hinges; Figure 8, Placing Binders' Board in Position, and Figure 9, Completed Scrapbook.
sufficiently, the holes are again drilled with the \( \frac{1}{4} \)-in. drill, which will clean the holes without removing all the glue.

When this second drilling is done, the clamps and boards can be removed, preparatory to sewing the volume together. Now is the time to use the small strip of cloth. It is folded down the center, then cut along the crease, making two pieces, each 6 by \( 18\frac{1}{2} \) in., and one piece left on top of the other. The back edge of the book is again given a coat of glue and then set down lengthwise, as nearly as possible in the center of the two pieces of cloth. The volume is then laid flat on the bench or table, and the two pieces of cloth are carefully adjusted so that they extend around the back of the book and approximately 2 in. on each side, the work then appearing as in Fig. 6. The two pieces of cloth are known to bookbinders as “hinges.”

The volume is now ready to be sewed together. The darning needle should be threaded with a piece of the linen thread, 16 ft. long, which has been doubled twice; this makes a four-ply thread, 4 ft. long. This should be threaded through the cloth hinges and the book, in the three sets of two holes, as shown in Fig. 7, until the holes are full of thread and the needle will no longer go through. The ends of the thread are then tied securely.

The hinges being sewed in place, one piece of binders’ board is put in position on each side, between the two edges of the hinges. If the measurements have been fairly accurate, the boards will extend \( \frac{1}{4} \) in. over each end and the front of the book. The boards are pushed back as far as possible against the thread, and marked on each side at the edge of the cloth. Lines are then drawn, the full length of the boards on both sides, at these marks, which will be about \( 1\frac{1}{2} \) in. from the edge of the board. An even layer of hot glue is brushed on both sides of the boards in this \( 1\frac{1}{2} \)-in. space, and the backs are immediately replaced between the flaps of the hinges, as in Fig. 8. It is well to place some waxed paper between the backs and the book, when the hinges are glued, to prevent any glue that might soak through the cloth from sticking the boards and the first page together. The hinges should be smoothed down on the backs, a smooth board weighted down on them, and the whole left a day or two to dry.

The back is now complete, and the book ready for the cover. The piece of 34 by \( 20\frac{1}{2} \)-in. cloth is spread out on the table, and the book laid on it so that one-half of the cloth extends about 1 in. beyond the front edge and each end. The other half of the cloth should be folded over the top and the book moved carefully, if necessary, to divide the cloth equally between the two sides. When properly placed, the cloth will extend about 1 in. past the front edge of the book boards.

When the cover cloth is found to be properly fitted, the top cloth is laid back carefully so as not to move the book, and an even coat of hot glue is applied to the back edge, the top hinge, and the topmost board or back. The cloth is once more carefully put in place and brushed down smoothly with the hands. The book is then turned over, and the opposite side has the cover glued on just as the first one. The overlapping 1 in. of cloth is folded inside after an application of hot glue has been brushed on the board to receive it. The corners can be given a neat appearance by snipping them off diagonally with the scissors, and folding the sidepiece over the two ends, inside the cover.

The entire cover is then carefully inspected to see that the cloth is down smooth on the boards. If the canvas is all properly glued in place, the cover is complete except for a paper lining. This lining should be glued to the inside of each back, and must be of such a size that it will overlap the edges of the cover cloth, but not quite reach the edges of the board. Waxed paper should then be placed between the back and the leaves, and the volume weighted down on a level surface to dry for two days or longer.

When the book is thoroughly dry, its appearance will be greatly improved and its sale stimulated if the word “Scrapbook” is stamped on the front cover in bronze. The lettering can be done with ordinary liquid bronze and a large rubber stamp. Since quality is the principal selling point, care must be exercised to make the book neat and attractive.

Correct and careful work, however, will come to naught unless the books are properly marketed. They should be offered for sale in book and stationery stores, and also advertised in the household and authors’ magazines. The names of these publications can be procured from any newsdealer.

Do not forget to lubricate the auto fan. The fan is an important part of the cooling system, and failure to look after it properly may cause it to get out of order when it is most needed.
Rigid Homemade Ironing Board

A laundress in a northern Michigan resort town, who employs a number of helpers, has found ironing boards of the type shown in the illustration exceptionally rigid and convenient, and, as they may be taken apart in a few minutes, they do not take up much space when not in use.

The fixture consists of three main parts: the ironing board proper, made of 1 or 1\(\frac{1}{4}\) in. stock, the upright, and the base. The base is made by nailing two pieces of 2 by 3\(\frac{1}{2}\) in. stuff, 42 in. long, to a heavy block, 5 in. high, as shown. The upright is made by nailing another 5-in. block to the bottom of a \(\frac{3}{4}\) by 12 by 36-in. board, and then nailing a three-sided box, as shown, to the plank. A space of 2\(\frac{1}{4}\) in. is left between the bottom of the box and the block, and the ends of the base-boards are put in position, and marked for the cleat, which should fit snugly against the inner side of the box.

A cleat, with a beveled face, is then nailed on the top of the upright, leaving enough space between box and cleat for the ironing board. Two cleats are nailed to the latter, the top one is beveled to fit under the cleat on the upright, and the bottom usually narrow smaller end is an additional advantage.—Herma N. Clark, Chicago, Ill.

Preventing Vibration of License Plates

The attachment of the auto-license plate to the front of the radiator by means of a bracket clamped around the filling tube makes it conspicuous, but the vibration of the engine soon causes the plate to loosen and rattle.

To overcome this, and at the same time prevent the vibrating bracket from breaking the seam of the filler tube, one motorist has fastened the lower part of the plate to the radiator, as shown. The bolts pass through the lower holes in the license plate and between the tubes to the inner side of the radiator. A cork, drilled through the center, is slipped on each bolt, between plate and radiator, to absorb the vibration, and tin washers are used between nut and radiator, to prevent damage to the latter.

If desired, the corks may be painted black to correspond with the radiator, and they will then be scarcely noticeable.

Using Cut Films in Plate Holder

The cut films that have been placed on the market will probably supersede the glass plate entirely, owing to their freedom from "halation" and their unbreakable qualities. They can be loaded into an ordinary plate holder by the use of a stiff paper card, cut to the exact size of the film, and placed behind each film when loading the holders. The cards should be painted a dead-black color to prevent halation.
Railroad Lantern Used as Stove

An ordinary railroad lantern can be used as a small stove on which the trainman can make his coffee. In converting the lantern to a stove, a 1-gal. tin pail, or similar can of suitable diameter, is substituted for the regular glass globe, nail holes being punched in the side near the bottom and the top as shown, and a hole cut in the bottom. The can is then placed, upside down, over the wick, and the stove is complete. If a pail is used for a coffee can, as shown in the drawing, small holes are punched in the cover or top to permit the steam to escape.—A. LaMont Burst, Washington, District of Columbia.

Strong Turnbuckle Made of Pipe and Fittings

The illustration shows a homemade turnbuckle consisting of pipe and fittings. A piece of ½-in. pipe, about 6 in., or so, long, is drilled through the center for a "tommy." One end of the pipe is threaded for a cap, and the other end is tapped for a plug. A ½-in. hole is drilled through the center of the cap, and a swivel, made of ½-in. iron rod and bent to the shape shown, is pushed through this hole, the end being spread over on the inside of the cap. After screwing the cap into place tightly, both cap and pipe are pinned together to prevent unscrewing. A plug, screwed in the other end of the pipe, is drilled and tapped for a ½-in. threaded rod, which is also bent at the end to form a ring.

A Darning Kink

By enameling one half of a darning "egg" black and the other half white, it will be found that the strain on the eyes incident to darning will be relieved considerably. When dark-colored stockings are mended the white part of the egg is turned upward, contrasting with the material, and in the case of light-colored stockings, the black part is used. The fatigue of the work is thus decidedly lessened.—C. L. Meller, Fargo, S. D.

Grooving File for Golf Clubs

It does not take long for the face of a golf driver or brassie to wear down, but it can be quickly restored to its former condition by the use of the tool illustrated. This tool consists of eight hacksaw blades, bolted together at both ends with stove bolts, the cutting edge of every other blade being reversed as shown in the end view. The method of use is obvious.—F. S. Roots, Fall River, Mass.

Spring for Hand-Brake Pawl

The pawl spring used on the hand brake of a light car frequently breaks, and this should be remedied immediately, as, otherwise, the car may run forward when the engine is cranked. A good repair can be effected in a few moments in the manner shown. Instead of replacing the usual spring, which consumes considerable time, one of the coil springs used in a rear brake shoe is hooked over the brake rod and the ratchet-pawl pin, as indicated. It is not necessary to drill any holes.
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What Men Use To Get Those Glistening Teeth

Note how many men and women show white teeth nowadays. They are proud to show them when they smile—because they are attractive.

There is a new way of teeth cleaning which millions now employ. It means whiter, safer, cleaner teeth.

It removes film

You can feel on your teeth a viscus film. It clings to teeth, gets between the teeth and stays. Food stains, etc., discolor it. Then it forms dingy coats. Tartar is based on film. That's why teeth look cloudy.

Film also holds food substance which ferments and forms acids. It holds the acids in contact with the teeth to cause decay. Germs breed by millions in it, and they cause many troubles.

That's how teeth are ruined.

You must do this

Old ways of brushing do not end that film. Some always remains to threaten serious damage night and day.

So dental science sought a film combatant and two methods were discovered. One acts to curdle film, one to remove it. Experts proved those ways effective. Then dentists everywhere began to advise their use.

A new-type tooth paste was created, based on modern research. The name is Pepsodent. Those two great film combatants were embodied in it, for daily application.

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Pepsodent also multiplies the alkalinity of the saliva. That is there to neutralize mouth acids, the cause of tooth decay.

Pepsodent multiplies the starch digestant in the saliva. That is there to digest starch deposits on teeth which may otherwise ferment and form acids.

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THE L. S. STARRETT CO.
The World’s Greatest Toolmakers
Manufacturers of Hack saws Unexcelled
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The Micrometer Head illustrated above is part of our Inside Micrometer Set No. 124. A splendid “mike” which is furnished in four size combinations ranging from Set A (2 to 8 inches) to set D (1 to 32 inches). Turn to page 180 of the Starrett Catalog No. 22 A for illustrations and complete description. Write for free copy if dealer can’t supply you.
16" x 8" — Price $512.00
Quick Change Gear Lathe

South Bend Lathes

for the MACHINE SHOP for MANUFACTURING for the TOOL ROOM

Over 30,000 Satisfied Users

<table>
<thead>
<tr>
<th>SIZE</th>
<th>Standard Change Gear</th>
<th>Quick Change Gear</th>
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<tr>
<td>9&quot; x 3&quot; Lathe</td>
<td>$211.00</td>
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<td>24&quot; x 16&quot; Lathe</td>
<td>$1,254.00</td>
<td>$1,423.00</td>
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Established 1906
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Only 10½ inches long
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Right-hand Ratchet
DOUBLE Ratchet
Gears Locked

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Spiral Screw-drivers
Plain Screw-drivers
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Ratchet Bench Drills
Ratchet Chain Drills
Vises, Removable Base

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drill points.

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muscles and doing "impossible"
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Sharpen and sharpens ordinary razors, sharpenes razor blades, scissors, etc. Complete outfit for only $75

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"HOW I BEAT THE GAME" - The Inspiring Story of how one poorly paid garage mechanic won success, his own business and a big income. Tells how you can increase your salary from 100 to 500%.

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Tool Cases Excel

Machinists, Tool Makers and Carpenters find them most satisfactory in construction, appearance, service and price. Immediate shipment. Booklet describing 20 styles on request.

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$600 to $5,000 PROFIT
FROM WASTE STORE SPACE

Business man! Send for amazing story of Butter-Kist Popcorn and Peanut Machine profits. Pay for in three, six, nine months, cash, other terms. Write

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AGENTS: $6 PER DAY AND UP

Selling concentrated, non-alcoholic food flavors. Always fresh. Put up in collapsible tins. Ten times the strength of bottled flavors. Guaranteed under U.S. pure food laws. All flavors. Sold in every house, used every day. Not sold in store. Big demand. Big repeat. 100% profit.

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can make big money. Earned over $300 in one month. New ideas. Get this a big, easy seller and a sure repeater. Must satisfy customers or money back. Write for terms, trade copy and sample outfit. Get a big sale today. Customer. Get repeat orders every month and have a steady income.

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Read this new schedule of prices; and then act! And, Remember—you are getting these Bargain Prices on the FAMOUS

OTAWA

—the most dependable engine on the market. Easier to start. Pulls more than its rated HP.

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A real bargain, 7 blue-white Diamonds set to look like a brilliant $700.00 solitaire. Dainty 18 kt. White Gold, hand made mounting. Gentleman's ring, same price.

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Merey send $2.00. Shipment made without "red tape." Examine at will. It costs nothing. If not convinced it is the Greatest Bargain in America, please return. And keep it to tell your friends. Good only to capable person. A few cents a day prevents a $5,000.00 mistake. Write for our gift catalog. Protecting Guarantee. You get $2.00 per cent profit divided on the purchase and a 10-day money back.

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J. M. LYON & CO., INC.
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What Boys Say the Best Proof of All

George Sanders has used one set of Vitalic bicycle tires nearly five years. His letter is typical of all who say they ride on Vitalics. And it's the kind of proof that counts most with buyers of tires.

Vitalics can be depended on. They have been the choice of boys and men for over ten years. For real endurance, freedom from punctures, no tires equal Vitalics.

Big bicycle makers like Excelsior, Iver Johnson and others put nothing except Vitalic tires on their finest wheels.

"Tougher than Elephant Hide" is a slogan that describes Vitalic qualities exactly.

Continental Rubber Works
1946 Liberty Street  Erie, Pa.

VITALIC Bicycle Tires

"TOUGHER THAN ELEPHANT HIDE"

Boys: Tell your father or big brother that he can now get Vitalic Cords for his automobile with the same "Tougher than Elephant Hide" quality.
"Oh Mary, we won't be shut-ins anymore."

"I've bought an INDIAN Motocycle and side car—and the open road is ours."

"Just think—we'll have all the joy of travel, the zest that comes from new scenes, the health of life out of doors."

"What wonderful times are ahead of us. You in the big, comfortable side car, with me to pilot you to mountains, shore, the length of the gypsy trail."

"It's sport we can afford, too. The price is so low, and the upkeep so little, that it costs no more than carfare."

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"It won't cramp us to pay for it, either. Just a little each week, and we have the fun of riding while we're paying."

INDIAN Scout, the most popular middle weight, $250; electrically equipped, $285, F. O. B.

INDIAN Big Chief, 74, ideal for heavy duty side car work, $345, F. O. B.

Ask your dealer—or write us, Dept. N7—for free booklet and easy, ride as you pay plan.

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Please Mention Popular Mechanics
**For This Genuine Self-Starting REMINGTON No. 10**

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30 Days Free Trial

5 Year Guarantee

Greatest Value Ever Offered!

Biggest Value Ever Offered!

**Guaranteed Equal to New**

As regards character of work and speed. Compare it with a new machine, and if you are not convinced beyond all doubt—if you do not feel it is all we claim after a 30-day trial, you'll not be out one cent!

Send Today

A postal will do—send details of our $3.65 down-payment job in selling also. Learn why you can sell a genuine Remington No. 10 at such a tremendous saving to you! Or send $3.65 now and if not convinced in the biggest value ever offered, your money returned promptly without question. Our references: Any Mercantile Agency or your bank. Address LINCOLN TYPEWRITER CO.

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NEW YORK

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**Sell coal to your trade in carload lots**

Earn week's pay in an hour. Sideline salesmen wanted.

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Knowing how to buy is merely knowing WHERE.

This is Chicago's Great House of UTILITIES AND AUTOMOBILE PARTS.

WHOLESALE ONLY

Dealers send today for the best money-saving list.

KETTLE AUTO SUPPLIES COMPANY

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**Amazing Hand-Made Tools**

Make $20 Every Day!

That is a fact. Salesmen are making amazing incomes selling direct to mechanics, garage, stores, etc. These tools, put up in kits, are made for our famous Cornell saving formula. Every tool increased the Income in the world. Salesmen make sensational demonstrations. Wrenches, punches, bearing scrapers, etc.

You Take No Money Risk!

We take all the money risk. You make instant sales and big cash profits. Take the new features shown. Best order now. Don't delay! Territories closing fast.

Write TODAY—Get Sample Outfit

Write or wire for complete sales plan, describing these remarkable tools, territories and offering sample outfit. Don't delay! Territories closing fast.

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**EASY FOR YOU TO OWN A FINE INSTRUMENT!**

YEARS ago the famous King Brass Instruments were sold only for cash to famous musicians. But now due to our easy payment plan anyone can own one of these wonderful instruments.

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Simply order direct from the factory. You save middleman's profits—and you get a fine, new, sounded, laryngotest & accurately made King Instrument. With it goes our guarantee plus free factory-service.

**IT'S EASY TO OWN A KING**

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Better them are demanded everywhere. American "Universal" electric machine, done work of six men, saves big PROFITS in this new uncharted field. Every town—old or new—in town or city, is your prospect. Work easy to see—Profits more than unlimited. Positive guarantee and 25c-a-day trial offer you. Write today for complete details.

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Electric Motor driven; 6 or 12 volts. Fully guaranteed. For all cars. Mention voltage wanted... $4.50

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Fits most cars. Extends throttle 2 in. Nickel plated... $1.00

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Handy road and garage outfit. $1.00

Big loads are easy for the Auto-Wheel

Two, three, four happy boys are an easy load for the sturdy Auto-Wheel Coaster Wagon. Auto-Wheel Coasters are built for hard play. See how the body is put together. Not just nailed, but mortised. Auto-Wheel Coasters are so strong that we use them in our factory for carrying loads up to a 1000 pounds (half a ton).

Auto-Wheel Coasters and Auto-Carts

The mortised joints are only one of the features which make Auto-Wheel Coasters sturdy and substantial. Other features are: rubber-tired disc wheels, steel-tired disc or wood spoke wheels—all wheels interchangeable—hand brake, special hub cap and locking pin, special hound brace, self contained roller bearings.

Write for catalog which shows all models of the Auto-Wheel Coaster and the Auto-Cart, the Auto-Wheel’s junior companion for little brother and sister. Send the names and addresses of three local coater wagon dealers, and we will give you a year’s subscription Free to the “Auto-Wheel Spokesman,” a dandy magazine for boys.

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Tells how we help you plan and install. From rough sketch or description we supply working plans and clear instructions. We loan the tools needed. Any handy man can install. This is the place to buy on money-back guarantee. Plumbing Outfits and Supplies. Water Systems: Hot-Air, Water or Steam Heating Plants; Radiators, Pipes, Bollers or Septic Disposal Tanks.

Save $25c For Yours Today
We have spared no effort or expense to complete this remarkable and instructural book. To keep from sending it broadcast to disconnected persons, we request a deposit of 25c, which will be refunded on your first order— or send for our FREE Bulletin. Write today and save half.

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50 Years at 4547-57 Cottage Grove Ave., Chicago

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BY THE FIRESIDE

Sport Fenders Underslung
Sport Fenders for Ford

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A BETTER Engine
For Less Money

Only Engine Sold on a Lifetime Guarantee

THE NEW WITTE

Throttling Governor
Easy to install—Easy to handle—Gives more power than rating—Increase or decrease speed at will—Run on cheap fuel, Gasoline, Kerosene, or Methanol or Alcohol—Steady speed on variable load—Starts without cranking—So simple a boy can understand it. Adaptable to any power job anywhere

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Send No Money—For a sufficient quantity of the Flapao-Pad firmly to the body, keeping the Flapao-Pad continually applied and the pad from slipping. No straps, buckles or springs attached. Soft as velvet—easy to apply.

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Tobacco Habit Banished
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Quick Results

Trying to quit the tobacco habit unaided is often a losing fight against heavy odds, and may mean a serious shock to your nervous system. So don't try it! Make the tobacco habit quit you. It will quit you if you will just take Tobacco Redeemer according to directions.

It doesn't make a particle of difference whether you've been a user of tobacco for a single month or 50 years, or how much you use, or in what form you use it. Whether you smoke cigars, cigarettes, pipe, chew plug or fine cut or use snuff—Tobacco Redeemer will positively remove all craving for tobacco in any form in a few days. Your tobacco craving will usually begin to decrease after the very first dose—there's no long waiting for results.

Tobacco Redeemer contains no habit-forming drugs of any kind and is marvelously quick, scientific and thoroughly reliable.

Not a Substitute

Tobacco Redeemer is in no sense a substitute for tobacco, but is a radical, efficient treatment. After finishing the treatment you have absolutely no desire to use tobacco again or to continue the use of the remedy. It helps to quiet the nerves, and will make you feel better in every way. If you really want to quit the tobacco habit—get rid of it so completely that when you see others using it, it will not awaken the slightest desire in you—you should at once begin a course of Tobacco Redeemer treatment for the habit.

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A single trial will convince the most skeptical. Our legal, binding, money-back guarantee goes with each full treatment. If Tobacco Redeemer fails to banish the tobacco habit when taken according to the plain and easy directions, your money will be cheerfully refunded upon demand.

Let Us Send You
Convincing Proof

If you are a slave of the tobacco habit and want to find a sure, quick way of quitting "for keeps" you owe it to yourself and to your family to mail the coupon below or send your name and address on a postal and receive our free booklet on the deadly effect of tobacco on the human system, and positive proof that Tobacco Redeemer will quickly free you from the habit.

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Free Book Coupon

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Every Mechanic whose tool kit is complete with Brown & Sharpe Tools is well prepared to do the close limit jobs that come up every day—he has a precision tool kit.

Brown & Sharpe Tools help him do the difficult jobs well—they have helped mechanics do accurate work for over 70 years.

Write for a No. 28 Small Tool Catalog and select the tools that will build up your kit for greater precision.

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Select from the 44 Styles, colors and sizes of Ranger Dresses, Ride and exhibit sample Ranger and make money. Delivered free, express prepaid, on Approval. Factory-to-Rider. Prices as low as 115c to $2.50. Pay out to any Ranger if desired. Lines and payments. Parents often advance first payment. Send your name and address for descriptive bulletin. Discounts allowed to dealers.

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SEND ONLY $1

Be distinctive—have your own stationery. Send cash or money order for 200 sheets, 100 envelopes, postpaid, printed in blue ink with your name and address, not over 3 lines for 50 characters, on good white bond, sheets 6 x 7.

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For Photoplay Ideas

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FOR nearly ten years a Carnes Artificial Arm has kept Mr. Palhe Yazzie of Lawrence, Kan., on the payroll as a draftsman and machinist at a good salary. Thousands of other mechanics, artisans, office workers, farmers and laborers owe their independence to this improved arm.

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The Carnes Arm cannot be detected from the natural except by close inspection. Its wearer can dress himself, use knife, fork, pen, pencil and keys; pick up large or small objects, carry grips—in fact, do virtually everything that was possible before. He can bend the elbow of the Carnes Arm, turn and throw the wrist and work and close the fingers, even if the amputation is at the shoulder.

192-PAGE BOOK FREE. A book of 192 pages, profusely illustrated with photographs showing what can be done with a Carnes Arm if desired, will be sent free to any person interested. Send for it now.

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Send us only $5.00 a month until the low total price of $66.20 is paid, and the machine is yours.

This is the famous L.C. Smith typewriter which has set the world's standard for quality and service for over twenty years. Every machine is guaranteed. Standard size, Keyboard of Standard Universal arrangement, 42 keys, writing 84 characters—universally used in teaching the touch system. The entire line of writing completely visible at all times, has the decimal tabulator, the two color ribbon, automatic reverse, the back spacer, bell-bearing type bars, bell-bearing carriage action, bell-bearing shift action, in fact every late modern feature and modern operating convenience. Comes to you with everything complete: tools,revolving operating book and instructions—nothing extra to buy. You cannot imagine the perfection of this handsome rebuilt typewriter until you have seen it. We have sold thousands of these perfect late style machines at this bargain price and every one of them has paid the money back to the manufacturer. The supply of satisfied customers has been such that a beautiful, strictly up-to-date machine on five days' free trial before deciding to buy it. We will send it to you F.O.B. Chicago for five days' free trial. It will sell itself, but if you are not satisfied that this is the greatest typewriter you ever saw, you can return it at our expense. You won't want to return it after you try it, for you cannot equal this wonderful value anywhere.

SEND NO MONEY Order Now—Before They're Gone

When the typewriter arrives deposit with the express agent $6.20 and take the machine for five days' trial. If you are convinced that it is the best typewriter you have ever seen, you may pay the balance of $59.90 a month until our bargain price of $66.20 is paid. If you don't return it, we return the express agent, receive your $6.20 deposit and keep the typewriter. We will pay the return express charges. This machine is guaranteed just as if you paid $66.20 for it. It is standard. Over half a million people own and use these typewriters and think them the best ever manufactured. The supply at this price is limited, the price will probably be raised when next advertisement appears, don't delay. Fill in the coupon today—the typewriter will be shipped promptly. There is no red tape. We employ no solicitors—no rollers—no chatted mortgages. It is simply understood that we retain title to the machine until full $66.20 is paid. You cannot lose. It is the greatest typewriter opportunity you will ever have. Do not send us one cent. Get the coupon in the mails today—sure.

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Street Address...................................
City........................................State...
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Easy to Play
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TRUE-TONE
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Easiest of all wind instruments to play and one of the most beautiful. You can learn the scale in an hour's practice and play popular tunes in a few weeks. You can take your place in a band within 90 days if you so desire. Unrivalled for home entertainment, church, lodge or school. In demand for orchestra, band, or dance music. The portrait above is of Donald Clark, Soloist with the famous Paul Whiteman's Orchestra.

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2588 Buescher Block
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Gentlemen: I am interested in the instrument checked below:

Saxophone
Coronet
Trombone
Trumpet

(Mention any other instrument interested in.)

Name:
Street Address:
Town:
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These beautiful RAJAH diamonds have all the living fire and dazzling beauty of the genuine blue white diamond and are the result of years of scientific and chemical research. They stand the test of direct comparison. YOU CAN BE THE JUDGE. Wear one of these rings on the same finger with a genuine diamond seven days. If you or your friends can tell the difference, send it back and we will refund your money. YOU TAKE NO CHANCES.

SPECIAL INTRODUCTORY OFFER for Short Time Only
No.
Ladies' band, Tiffany mounting—white gold—$3.35
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No. 28—Ladies' band, White gold—$4.65

SEND NO MONEY
Just state your ring size when ordering. No cost to you. A firm mailing address number is important. When in doubt either return ring or send for information.

R. ROTHCHILD CO., 609 S. 14th St., Omaha, Neb.

Popcorn Poppers and Peanut Roasters
put you on the road to profit

Start in business for yourself without much investment, without stock to carry, without much effort. Profits are BIG—3½ cents on every 5-cent sale or 15 cents on every dime. Here's a wonderful opportunity which will pay profit-dividends every day.

You can do what others are doing. No experience is necessary—start today, grow with the idea. KINGER MACHINES are complete in every detail. Use them to turn out the popped corn and roasted peanuts with little attention on your part.

SEE WHAT ONE MAN DID
JAMES KIPWISS, P. O. Box 56, Waynesburg, Pa., writes: "Since I got your machine, in 15 days I have made $227.50."

Kinger Popcorn Poppers and Peanut Roasters
fit in very little space. And the entire population is your market—young or old, everybody likes and buys popcorn and peanuts.

New Illustrated Catalog Free
Write for it TODAY. It shows all the new models and tells how easily you can buy a KINGER on terms.

Dept. P. M.

KINGERY MFG. CO.
Cincinnati, Ohio

SOMETHING NEW!
A real LOUD TALKING DETECTOR
made of B-Metal. 100% superior to any crystal. Puts new life into your RADIO set. Guaranteed for ONE YEAR. CHEAPEST in the lower run. If your dealer is unable to supply it, we will.

B-Metal Refining Co., DETROIT, MICH.

"BOW LEGS and KNOCK-KNEES" UNSIGHTLY
SEND FOR BOOKLET SHOWING PHOTOS OF MEN WITH AND WITHOUT THE PERFECT LEG FORMS

PERFECT SALES CO.
140 N. Mayfield Ave., Dept. 5, Chicago, Ill.

RELIABLE WATCHES AT LOW PRICES
Ingersoll

To 0% OFF

Tobacco
Special Bargain Introductory offer on Kentucky's Finest Good Ole Melon Sweet Green River valley Smoking Tobacco, Twin Pack (1-lb. each), 50-cents value for only $1.00 postpaid. Satisfaction guaranteed or money back.

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EQUIP YOUR SHOP NOW
FOR BETTER SERVICE AND BIGGER PROFITS
Small cash payment brings you HB Automatic Air Outfit and HB 8-Hour Battery Charging. Both big money-makers for you. HB 8-Hour Battery Charging increases profits, reduces labor and current cost, saves half on rental batteries, wins trade from competitors. Pays for itself on easy $30 monthly terms. Dependent on HB service wins business, helps you sell tires, accessories, etc. Easy terms on all HB outfits. Money-back guarantee. Free Write for information.

HOBART BROS. CO., Box M-7, TROY, OIOH.

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Stop pedaling

Motorize your bicycle with a Merkel Motor Wheel and ride in ease, go as you please, 400 miles for a dollar

It makes your bicycle a long distance, low cost motor vehicle.

Easy to install. It slips right into the rear forks of any standard bicycle.

Simple to operate. Positive and sturdy throttle, clutch and rear wheel brake controls. All handy by the handle bar grips. And the gear drive and free engine clutch—allowing the motor to run during traffic stops—make it the most attractive proposition on the market to own—and ride!

Put a MERKEL MOTOR, mounted in its own specially constructed rear wheel, in the rear fork of your bike, and tour the country this summer. Special low price now in effect that makes it the cheapest motor transportation in the world.

Fill in the coupon and mail at once.

MERKEL WHEEL Dept. 7, Hanlee Mfg. Co. SPRINGFIELD, MASS.

Send me the MERKEL MESSAGE, giving full description of the MERKEL MOTOR WHEEL, with special low price offer. I have a bicycle I want to motorize.

Name: ____________________________

Town: ____________________________ State: ________________

The Merkel Motor Wheel

Please Mention Popular Mechanics
Build a Business for Yourself

SHARPEN SAFETY RAZOR BLADES

At last an opportunity for you to step out of the "Wage Earning Class" and into a "Money Making" business of your own. You Need No Experience; Very Little Money Required. Begin right at home, or small room anywhere. You will make money right from the start. Nearly everyone now uses Safety Razors. There are Big Profits for you in the Safety Razor blade re-sharpening business. The New Velvet Edger is a mechanically perfect machine. It leaves nothing to Guess Work. It is the only device now on the market "With a Genuine Carbonutum Home" which hones and sharpens the blades, step by step, until the nearest edge that steel will take is obtained. No Guessing or fluffing of the blades, but an "Even Pressure" on both sides of the blade at the same time, inserting a Straight, True, Hollow Ground and Keen Cutting Edge which gives the shaver all the delights, and none of the bitterness of imperfectly sharpened blades. No Other Machine has the accurate, direct action, of the Velvet Edger. Machines are made in three sizes, Twelve, Eighteen and Twenty-four blades. Many have bought these machines and are now making from Ten to Twenty dollars daily. You have the same opportunity. "If You Hurry." Don't let "The Other Fellow" beat you to it.

Send Now for Free Booklet giving full information. Don't Delay.
Address THE F. W. COCHRANE MFG. CO., 1316 W. Slussen Ave., Los Angeles, Calif.

CAR OWNERS SAVE MONEY

Cut your own tire bills — and make good money selling National Tirefiller to others. A proven success for 12 years. Eliminates tubes, punctures and blowouts. Increases tire mileage 30 to 50% and still outwears several casings. Easily inserted; easy riding. Over 300,000 enthusiastic users. Big sales possibilities. Some good territory still open. Driver agents make good profits. Mail coupon today for proposition.

National Rubber Filler Co.
222 College St., Midlothian, Texas.

Please send me your agent's proposition and full information on National Tirefiller.

Name: ____________________________
Address: ____________________________

MAIL THIS NOW
You'll Smile, Too!

Hop into the saddle of a Harley-Davidson—give 'er gas—and smile at miles as you whiz down the straight-away like a zooming 'plane, or loaf along the road's edge till you see a speeding car you want to leave behind.

Wonderful Sunday outings with "the bunch"—week-end trips to seldom-fished lakes that automobiles never reach—cool rides into the quiet country when your day's work is done! All this, and more, at a travel-cost of only two cents a mile—why, it's cheaper than going to "movies"; and a thousand times more sport.

Pay-as-you-ride! Ask your dealer about his Easy Payment Plan and reduced prices. Take a free demonstration ride. Write us for illustrated literature.

Harley-Davidson Motor Co.
Milwaukee, Wisconsin

Harley-Davidson
The Motorcycle
Money-making sales opportunities in open territory. Write Desk A-2.

FREE-
Actual Reports of Secret Service Operator 38

Here is something money can't buy. More fascinating than detective stories. Confidential reports of a real operator—No. 38—is the famous detective in America. Absolutely free. No cost. No obligation. Don't fail to send for them. They may point the way to Big Money for you. See how the modern detective works! Read these inside stories of the solution of great mysteries. See what possibilities this most fascinating and eventful of all professions offers to you—and how you may fit yourself for it.

Be a Finger Print Expert
To command the highest fees, the Secret Service man must also be a Finger Print Expert. These reports show why. This profession may be easily learned at home, in your spare time. Wonderful opportunity in this UNCROWDED, PROFITABLE field.

Make $5,000 to $10,000 a Year
The unlimited demand for trained Finger Print men is increasing daily. Opportunity is waiting for you. No time to lose. Send today for these reports, also our big Free book on Finger Prints. Give us particulars and addresses of our graduates! Brilliant future ahead if you act now.

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Also FREE
Send the Coupon
UNIVERSITY OF APPLIED SCIENCE
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T. G. COOKE, Pres. University of Applied Science
1920 Sunnyside Ave., Dept.B135 Chicago, Ill.

Dear Mr. Cooke: Please send me FREE and prepaid, Reports of Operator 38, your new illustrated book on Crime and Crime Detection and your Special Outfit Offer. It is fully understood I assume no obligation.

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"ELECTRAHOT"

Electric Soldering Iron

Guaranteed for One Year

Smallest, lightest, speediest practical soldering iron we know of. Gets into odd corners that others cannot reach. Easy to hold; does not tire. 13½ in. long, weighs 12½ oz. with cord and plug.

Ideal for Radio and Other Electrical Work

Every radio fan needs it. Every motorist or repair man appreciates the quick, clean, efficient work it does. Electricians swear by it — would use no other. Ideal also for household soldering jobs, jewelers, dentists, tinsmiths, home-tinkers — everybody needs it and can make it pay big dividends.

SEND NO MONEY!

Just fill out C. O. D. coupon order and pay postman on delivery.

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647 No. Clark St., CHICAGO, ILL.

FASTEN IT WITH AN AJAX EYEBEAT FASTENER

Blinds Paper, Cardboard, Leather, Cloth
It Saves Time by Punching the Hole, Feeding the Eyelet and Clipping in One Operation. Order from your Stationer

Machine Appliance Corp.
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SINGLE shot hunting rifle of finest grade; case hardened steel; modelled after famous Springfield rifle. Bolt action; take-down model 36 inches over-all. Shoots 22-calibre long or short cartridges. Satin finish.

$6.95

PAY POSTMAN ON DELIVERY plus postage. Money back if Not Satis\'fied.

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INSTRUCTIVE AND ENTERTAINING BOOKS

Just pick out the ring you prefer, give finger size, and send it along with your money. It will be returne, with your money. If satisfied, pay only a few dollars monthly.

GUARANTEED $75.00 VALUES

The $47.00 ring is 18-karat solid white gold, set with beautiful, blue-white, perfectly cut, sparkling, brilliant GENUINE DIAMOND WORTH 100% MORE. The $40.00 ring is 18-karat solid white gold, enameled with orange, blooming design, and set with seven perfectly cut, blue-white, dazzling, genuine diamonds. CLUSTERED TOGETHER IN SOLID PLATINUM, looking like a $600.00 solitaire 1½-carat size.

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It brings a large jewelry store right into your home.

STERLING DIAMOND & WATCH CO.
63 PARK ROW, Dept. 677 NEW YORK (Est. 1879)
Oh You Skinny!

Why stay thin as a rail? You don’t have to. And you don’t have to go through life with a chest that the tailor gives you; with legs you can hardly stand on. And what about that stomach that flinches every time you try a square meal? Are you a pill-feeder?

Do you expect Health and Strength in the form of pills, potions, and other exploited pills? You can’t do it; it can’t be done.

The only way to be well is to build up your body—of all of it, through Nature’s methods—not by pampering the stomach. It is not fate that is making you a failure; it’s that poor emaciated body of yours; your half sickness shows plain in your face and the world has healthy people. So he HEALTH—STRONG—VITAL. That’s living. Mark the ailments on this to get your consultation coupon upon which you wish special confidential information and send with a 10¢ piece (one dime) to help pay postage on my Special Letter to Thinner. Write for Full Promotion and Conservation of Health, Strength and Mental Energy.” Don’t put it off—send for your free book and right now today.

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Physical and Health Specialist

Mr. Lionel Strongford, Dept. 455, Newark, N. J.—Please send me your book, “PROMOTION AND CONSERVATION OF HEALTH, STRENGTH AND MENTAL ENERGY.” For postage on which I enclose a 10¢ piece (one dime). Send me special information on subjects marked ( ) below, with obli-gation, also on those I may write on extra line below:

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Catarrh
Asthma
Hay Fever
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Headache
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Diabetes
Debility
Insomnia
Nervousness
Stomach
Disorders
Calcification
Biliousness
Indigestion

Weaknesses (Specify)
Poor Memory
Rheumatism
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Weak Eyes
Gastritis
Heart Weakness
Pleurisy
Circulation
Skin Disorders
Dependancy
Round Shoulders
Long Troubles
Steeple Shoulders

Mall Coupon—Send No Money

VI-REX ELECTRIC COMPANY
326 West Madison St., Dept. 27, Chicago

Please send me without cost or obligation your free book describing your VI-REX Violet Ray outfit, and details of your $1.00 offer.

Name__________________________________________
Address_______________________________________
City_______State______________________________

Please Mention Popular Mechanics
Special Bargains—While They Last
500 FAMOUS SEABROOK RADIO CABINETS
At Less Than Half Price

A large jobber, pinched for cash, sold us 500 beautiful high grade Seabrook Radio Cabinets, without regard to cost, enabling us to offer you:

<table>
<thead>
<tr>
<th>Size</th>
<th>Regular Price</th>
<th>Our Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>$85.00</td>
<td>$37.50</td>
</tr>
<tr>
<td>Large</td>
<td>$125.00</td>
<td>$47.50</td>
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Radio Chamber: 13½" wide, 10½" high, 10" deep.

100 LOUDSPEAKING HORN CABINETS

Handsome Mahogany Piano Finish
Come fully equipped with famous Seabrook Horn and Genuine Baldwin Loudspeaking Unit, cord and plug, selling most everywhere at $35.00. Our Price while lot lasts... $19.25

Heller-Loeb Company
143 West Kinzie Street
Chicago

Big 3-Ft. Telescope

Useful and Entertaining (In Five Sections)

See people and objects miles away, on land or sea, as if they were close. Wonder Telescope gives new pleasures to home, farm, camp, travel, sport. See moon and stars as never before. Opera out over 3 feet long; measures 12 inches closed. Brass bound; has powerful lenses. Thousands pleased—"Could tell color of airplane 4 miles away."—Mrs. Yarbrough. "Saw Provincetown Light, 20 miles away, as clear as if in front of me."—D. H. Serlin.

Send No Money

"If I have been watching submarine 5 miles off the coast,"—P. G. Grinnell—"I can see children playing in school yard 6 miles away."—P. H. Bennington.

"Read the numbers on house, see everything on farm"—R. O. Feltner.

Custom-Made Tops Less Than Half Price

ASK US TO PROVE IT

You can attach them easily. Full instructions sent. Complete tops with beveled plate miles. For all cases, special prices on materials, finish, and costs.

S-C Products Co., 758 Nicholas Bldg., Toledo, O.

Earn $20 to $60 a Week

Household necessities, Summer drinks, Jewelry, Perfumes, Soaps, Extracts, Foods, Spices, Toilet Goods, Alumina Ware, bath towels, fancy boxes toilet soaps selling like hot cakes. Big Profits. Write today for catalogues.

Western Products Co., 639 North Oakley Ave., Chicago

Make $1500 to $3000 a Year Charging Batteries!

New HB Constant Potential Outfit charges all sizes of batteries perfectly in 6 to 8 hours. You can clear $150 to $350 every month. No experience needed. Small cash monthly let your profits pay balance with nice surplus besides. Long free trial on money-back guarantee lets you try any HB outfit at our risk. Don't delay and let some competitor get ahead of you with 8-Hour Battery Charging. Take the lead yourself. Order your HB Outfit NOW on free trial.

Write today for full information and our easy payment plan.

Hobart Bros. Co. Box M-77 Troy, Ohio

WANTED

Railway Postal Clerks

$1600 to $2300 Year

Men—Boys, 18 to 35

Write Immediately

Steady work. No layoffs. Paid Vacations. Travel—See the Country

Common education sufficient. Send coupon today—SURE

Name...

Address...

FRANKLIN INSTITUTE, Dept. T80, Rochester, N. Y.

Sir: Send me without charge, (1) Complete Railway Postal Clerk Examination questions; (2) List of government jobs obtainable; (3) Send sample coaching lessons and send list of examination places.
"Detroit" Belt Lacing Outfit

Costs only an inch, outsells the belt for strength, ease and flexibility—easily and quickly applied. Same method used by 10,000 big factories.

Complete outfit lacing tool and big box of belt postpaid... $5.00

ASSORTED BOX

GUARANTEED

"Detroit" Belt Lacing is the only machine closed wire lacing that takes a perfect wrapped grip on your belt. Each box has a pulling strength of over 350 lbs. Comes put up with colored paper side strip in 12 inch sections cut to any length without waste. Three sections in box, holds 364 inches of belt.

Tool made to last a lifetime. Lacing always costs little. Sold on money back guarantee.

DETROIT BELT LACING CO., DETROIT, MICH.

NEW CORDS

1000 MILES OF 1000 MILES SERVICE

Sensational New Cord Tire Sale!

Our big volume business enables us to sell brand new Cord tires at lowest prices. Don’t miss this sale. Every Cord guaranteed first quality and Cord on son’s supply now and cut your tire cost in two. Thousands of satisfied customers getting full mileage and you, too, can get 10,000 Miles for $5.95

SEND NO MONEY

Just send your name and size of tire wanted. Don’t wait Price soon to go up. Take advantage of this sensational tire sale. Shipment C.O.D. Section unwrapped for inspection. Order now. Dept. 61

SUPREME TIRE CO., 2234 W. Jackson Blvd., Chicago

Join us for Profits

Become one of the big, happy and prosperous group of live-wire hustlers who earn enough to pay for pleasures and luxuries above their everyday needs. If you put in your best efforts, we do the rest for you.

Sell Tailoring

Earn from $75 up per week selling fine Gibson tailored all-wire suits to wearers direct for $31.50, over 100 styles all one price. Sell on credit. We pay you commission profits IN ADVANCE and tend to delivery and collections. Handsome big sample line sent you promptly, write today.

W. Z. Gibson Inc.

"$60 More a Month!"

L_\text{AST} night I came home with great news—a $60 increase in salary! I took the money out of my pocket and asked Mary to count it. You should have seen her face light up when she found the extra $60. I think she was even happier than I was, for it was the third increase in a year.

"Today I am manager of my department—earning more money than I ever thought it would be possible for me to make. I owe it all to the training I received from the International Correspondence Schools. That little coupon was the means of changing my whole life."

How much longer are you going to wait before taking the step that is bound to bring you more money? Isn’t it better to start now than to wait for years and then realize what the delay has cost you?

One hour after supper each night spent with the I. C. S. in your own home will prepare you for the position you want in the work you like best. Don’t let another priceless hour go to waste! Without cost or obligation, let us prove that we can help you. Mark and mail this coupon.

$400.00 ONE DAY!
Ira Shook of Flint Did That Amount of Business in One Day

Making and Selling Popcorn Crispettes with this machine. Profits $289.00. Mullen of East Liberty bought two outfits recently, and is ready for third. Iwaia, Calif., purchased outfit Feb., 1920. Since, has bought 10 more—his profits enormous. J. R. Bert, Ala., writes: "Only thing I ever bought equalled advertisement." J. M. Pat-tilo, Ocala, wrote: "Enclosed find money order to pay all my notes. Getting along fine. Crispette business all you claim and then some." John W. Culp, S. Carolina, writes: "Everything going lovely. The business section of this town covers two blocks. Crispette wrappings everywhere. It's a good old world after all! Kellog $700 ahead end of second week. Mexiner, Baltmore, 250 in one day. Perrin, 380 in one day. Baker, 3,000 packages, one day.

WE START YOU IN BUSINESS
Little capital, no experience. Furnish secret formula.
Build a Business of Your Own

The demand for Crispettes is enormous. A delicious food confection. Write me. Get facts about an honorable business, which will make you independent. You can start right in your own town. Business will grow. You won't be scrambling and crowding for a job. You will have made your own place.

Profits $1,000 a Month Easily Possible
Send post card for illustrated book of facts. Contains enthusiastic letters from others—shows their places of business, tells how to start, when to start, and all other information needed. It's free. Write now.

LONG EAKINS COMPANY
728 High Street
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TAILORING SALESMEN
We Pay You Salary and Commissions
Greatest money-making line in America. Made to measure suits, overcoats, one price, $33.50. Express prepaid, all wool, all wool linings, hand tailored, 350 of our own designs. No charges for style or oversize. Bigger advances commissions, weekly salary besides. Protected territory. Apply at once.

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CHICAGO, ILL.

CAMERAS
Over a Hundred Styles and Sizes
Send for new 1923 illustrated catalog showing newest models and latest reduced prices.
IT'S FREE
10 days' free trial given
Seneca Camera Mfg. Co.
300 Central Ave., Rochester, N.Y.

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"Red Devil" Rapid Boring Auger Bits are 33 1/3% easier boring, have 10% greater clearance, and bore with or against the grain of any wood. Style 2400—10 1/4 in., shown here, 75c.

Red Devil Pliers

Stand the Gaff!

They give you a powerful grip at just the right place—a non-slip hold on that rusty nut, that screw-eye you want to turn, that rod you want to loosen, that wire you want to cut.

"Red Devil" Pliers give long time service and satisfaction—drop forged of steel—will last for years.

Made in 100 styles—one for every purpose.

"Red Devil" Slip Joint Plier

Shown above, the most useful tool of its kind for the home, workshop or car. The handles fit the hand without pinching—the thin nose reaches hard-to-get-at places—the slip joint widens the range of objects that can be gripped.

"Red Devil" No. 1024—6 1/2 in.—at all good hardware dealers, or if not in stock send $1.00 and dealer's name for a sample tool.

Mechanics' tool booklet free
SMITH & HEMENWAY CO., Inc.
Manufacturers of "Red Devil" Tools
260 Broadway, New York, N. Y.

"Red Devil" Glass Cutters—the glaziers' standard tools of the world. "It's all in the wheel." Made in 40 styles. No. 024 shown here, 20c.

Please Mention Popular Mechanics
Here is the New Way
To Fill a Ford and Measure Gasoline

Without Lifting the Seat
Without Guesswork—Without Waste
Without Losing Your Temper

The
Kirstin
Fil-O-Meter

(For Fords and Chevrolets)
A Gasoline Filler and Gauge Combined

Here is the greatest time, trouble and temper saver ever manufactured for Ford and Chevrolet cars (with tank under the seat.) Now it is no longer necessary to get out of the car, raise the seat cushion, and fuss with a tight screw cap in order to fill the tank or measure gasoline. Here is the end of messing with a measuring stick. Say "good-bye" now to taking a chance on the amount of gasoline remaining for a trip. The Fil-O-Meter shows your gasoline at a glance. It saves the long walk you take for gasoline when you run short. Be safe. Attach a Fil-O-Meter.

YOU CAN ATTACH IN 10 MINUTES

Full Directions for Attaching Accompany Each FIL-O-METER

Anyone can attach the Kirstin Fil-O-Meter. The cap is taken off the tank (a slot is made in the seat frame) the Fil-O-Meter is put in place and screwed down with the clamp where it can't shake loose or rattle—all in ten minutes. No mechanic required. With the Fil-O-Meter in place the Ford or Chevrolet fills like a regular car. No lifting cushions—no fuss, muss or inconvenience. The filling-station man simply lifts off snap cap—places hose in the opening—and fills your tank. You see every fraction of gasoline register, too, as it enters the tank. No more guessing about how much you get. No more counting the turns of the filling crank. Once in place the Fil-O-Meter is out of the way—but always where you can see and use it handy. The Fil-O-Meter weighs less than 2 lbs., is strongly made of pure aluminum, and will last a lifetime.

TEN DAY, MONEY BACK TRIAL

Order a Kirstin Fil-O-Meter now. Put it on your car. Use it ten days. At the end of that time if you are not perfectly satisfied with it for any reason, you may return it at our expense and your money will be immediately refunded. Could any proposition be fairer? Especially on an article you absolutely NEED—and at such a LOW PRICE? The Kirstin Fil-O-Meter is absolutely GUARANTEED to satisfy in every respect, and to save its cost many times over in a very short time. Order now and let us prove it.

Our Guarantee Protects You—ORDER NOW

You can order at once with the assurance that you must be satisfied or your money will be refunded. When ordering be sure to give your make, year and model of your car (touring, roadster, sedan, etc.). If you require further information on the Kirstin Fil-O-Meter before ordering, we will give it to you gladly. But why delay your order? We take the risk that you must be perfectly satisfied. Use the coupon and address.

A. J. KIRSTIN CO.
Mfrs., 10 First St.
Escanaba, Michigan

MAIL WITH THIS ORDER

A. J. KIRSTIN CO., 10 First St., Escanaba, Mich.

Gentlemen: Please send me a Kirstin FIL-O-METER for Ford, Chevrolet, year, model, with understanding that I will put it in use on my car and if not perfectly satisfied after ten days' trial I can return it and get my money back.

☐ Money Order enclosed [ ] Check enclosed [ ] Send C. O. D.

NAME: _______________________________ TOWN: ___________________________ STATE: ________

☐ I can sell FIL-O-METER Send me seller's proposition.
AGENTS! Are you making $150 to $250 a Week?

"Co-operative" Agents do—join us!

If you are a good agent you cannot afford to stay out of this organization! Without a penny of cost to you membership in this Association brings you selling opportunities that you cannot find alone. We have only one object: to help every member make more money! We investigate selling opportunities; we find you best money-making products offered for sale in America; we protect you against injustice; we develop your efficiency by telling you the successful methods of our biggest money-makers! If you are making less than $150 to $250 a week, mail the coupon today and change your luck!

100,000 Agents in this big Co-Operative Association!

The Agents Co-Operative Association has nothing to sell. It has been organized to help agents get away from the poor little selling propositions that scarcely pay a living. It is our purpose to assist every member who wears the Co-operative button to turn his time into bigger profits than have ever before been possible.

Wear this Button!

Don't Cost You a Penny!

No dues, no strings or obligations; mail the coupon today. A handsome illustrated booklet will be sent to you at once explaining how we help you to make more money immediately you join. Don't delay, membership limited.

AGENTS CO-OPERATIVE ASSOCIATION
210 East Ohio Street, CHICAGO

Look at the BENEFITS!

1. We find you the most profitable lines on the market.
2. We put you in touch with big concerns offering easiest selling lines at biggest profits.
3. We protect you against injustice on the part of manufacturers.
4. We tell you how our most successful agents get their results. We improve your efficiency and build up your earnings.
5. We are advertising the A.C.A. button, so that wearing it will help you get a hearing and sales everywhere.

AGENTS CO-OPERATIVE ASSOCIATION, 210 E. Ohio St., CHICAGO

Without obligating me, please send me complete information about membership in the Agents Co-Operative Association. It is understood that I am not to pay a penny for membership or dues or anything else. Free booklet on request.

Name _______________________________
Address _______________________________
Territory covered _______________________________
Number of years' experience as Agent _______________________________
Lines handled _______________________________
WE WANT AGENTS

To introduce the Milburn Puncture Proof Inner Tube. Mr. P. H. Milburn, of the Milburn Puncture Proof Tube Company, Chicago, after many years of practical and theoretical experiments, has perfected an inner tube which in actual test suffered the loss of NO AIR after being punctured as many as 500 times. Many users have run over 20,000 miles without removing a tire from the wheel. Milburn Puncture Proof Inner Tubes are made of the best quality live red gum rubber—especially built and air inflated. Milburn Puncture Proof Tubes cost no more than other ordinary tubes.

CAR OWNERS WANTED

To sell and demonstrate this wonder tube. Interests everyone immediately. Automobile owners buy on sight. It makes no difference what car they drive or what tires they use. Our salesmen are coining money on our "DIRECT FROM FACTORY" scheme of selling. Absolutely no competition. We control all basic patents. No capital required to start. Previous selling experience not necessary.

Earn from $5000 to $10,000 a Year

Earn $5000 to $10,000 yearly or more. Get into business for yourself. Sell Milburn Puncture Proof Inner Tubes. Every car owner is a prospect. Your field is unlimited. Now is the season. Get in while it is good. Be independent.

FREE TUBE

SPECIAL FREE TUBE OFFER

Send coupon or write today for special free tube offer and further details. References, Industrial State Bank of Chicago, National Bank of the Republic, Chicago, Baker State Bank of Chicago. Don't hesitate. Fill out the coupon and send it in or write and send name and we will send you all details. This is your opportunity so don't delay. Address

P. H. MILBURN, Pres.
Milburn Puncture Proof Tube Co.
335 West 47th Street
CHICAGO, ILLINOIS

TESTIMONIALS

Convincing Statements from a Few of Our Agents

J. D. Cooper—"I have made 20,000 miles with my Milburn Puncture Proof Tubes and have not as yet removed a rim or casing and my castings are still in excellent condition."

J. C. Jerves—"I sold 50 Milburn Tubes in the first three days."

Chas. Cayton—"I sold twelve tubes yesterday in ten minutes."

L. S. Knapp—"My first few hours out I sold eight tubes, no trouble at all to sell them. The most wonderful tube on the market today. I think, I am hoping you will give me the agency for a big territory."

D. Edleste—"I have driven seventy-five miles in one of the 30x3 tubes and twenty were spike nails. It has gone above the test that you recommended to me it would do."

S. W. Dow—"Your tubes are fine; we have a 30x3 1/2 that has certainly stood the gaff; it has been punctured anywhere from forty to forty-five or fifty times this week, and is standing up in great shape."

Staples Brothers—"Your tube arrived and proved satisfactory in every respect. We think we know a good thing when we see it and would be pleased to represent THE MILBURN PUNCTURE-PROOF TUBE COMPANY."
Have You Seen It?

This wonderful fountain pen with a perfect check protector attached, which enables you to write and protect your checks, no matter where you may happen to be.

THE NAME IS

Security

FOUNTAIN PEN

It enables you to protect your checks just as efficiently as the most expensive check writer on the market. Any time—any place—and in addition to this unique and practical feature, the "SECURITY" has five other new features of equal importance not embodied in any other pen on the market, which place it in a class all by itself.

It has a Screw Pressure Filling Device. It has a 14 karat tempered iridium tipped gold pen. It has an air cushion feed bar, which prevents even the slightest leak in the ink reservoir when the pen is not in use. And it has a rolled gold spring clip. And a rolled gold band on cap, which prevents same from breakage.

A five-year unconditional written guarantee is furnished with each pen. $53,000,000,000 were lost in 1923 on account of raised checks, forgeries, and alterations of negotiable securities, and you are liable to be the next victim.

Your check or money order for $3.00 or $3.50 (if you prefer a small size pen), $4.00 if you prefer a medium size, and $5.00 if you prefer a large size pen, will bring you this marvelous writing tool, which will end forever your pen troubles and give protection on your checks without any extra cost.

Where Can I Get One?

Security Pens are sold by our special representatives direct to the user. They are not sold in stores. If we have not as yet an established representative in your locality, order direct by using the coupon below.

KRITIKSON BROS., Inc.
Dept. P. M.
900 W. Jackson Blvd., Chicago

KRITIKSON BROS., Inc.
900 W. Jackson Blvd., Dept. PM, Chicago, Ill.

Gentlemen: Enclosed check or money order—please send me one Security pen, No., guaranteed for five years.

Style of point preferred

□ Fine □ Medium □ Coarse □ Med. Stub
□ Broad Stub □ Steno □ Posting, in flexible □
□ stub □ action, long □, or short □ model.

Name

Address

Please Mention Popular Mechanics

How to Get the Most Out of One Tube

You will never know the full range and power of a single tube until you have operated Duo-Reflex, the most powerful one-tube circuit ever built.

Under conditions at all favorable, your compact compass of stations is heard on a loud speaker, and headphones extend the range from coast to coast.

Especially designed for Duo-Reflex, and the major essential of its power, is the ERLA radio frequency reflex transformer, one of the greatest improvements in years. Be sure to look for the ERLA trademark when buying!

ERLA

“LYON BODIES” $27.50 AND UP

SEND NOW For Our 1923 “Book of Bargains”

Containing a full line of bodies and accessories at exceptionally low prices. Buy direct from the factory.

AUTO TIRE SALES CO., Dept. P8
1346 S. Michigan Ave.
CHICAGO Division

Small Steam Engines and Boilers

Gas and Gasoline Engines

1/2 H. P. Up

Pumps, gears, model makers’ supplies, Sent postpaid (2 dime preferred) or 20c stamps.

Modern Engine & Supply Co. 334 Monadnock Bldg., Chicago
**Personal Read This!**

Think of yourself, stepping up to a prospect making an installation in five minutes. Do it at the curb. It always creates interest. A second and even a third sale often results—right there on the spot! This means triple commissions. Think of the repeat business which is yours with no work at all. Think of the respect you will command as the representative of a half-million dollar concern backed by men who have already built an international business which is over thirty years old and the largest in the world of its kind. I offer you this—it is yours simply because you already know enough about motors to know how to sell this big money maker.

Why try to sell something you don't know about? When here is something you do know about!

You can sell a whole truck fleet just as quick as you can sell one car. You can sell MOTOR MASTERS to merchants or farmers for every car, truck, or tractor they may have—all with the one sale. Soon you will be selling dealers. That means hundreds of sets at one sale.

Remember we guarantee MOTOR MASTERS to prevent carbon—to prevent plug flooding and fouling—to increase power—to save gasoline or money back. You can demonstrate MOTOR MASTERS on sight. Put them in your customer's car while he waits. Cut down the gas from 10 to 20%. There will be an amazing increase in power—smoother running. No long time for installation, only five minutes for your sale—your profit—and on to the next customer! Send in the coupon and cash in on your own intelligence and knowledge. What others are doing you can do!

**Motor Master Corporation**

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**YOU can sell my product. YOU ALREADY KNOW HOW. And I need your knowledge. You can be a “star” salesman for me, because your knowledge of motors is all I need.**

No “COACHING” necessary, if you know gasoline motors at all. That is why I want you for my agent. You know that gasoline today is “heavy”. It doesn’t evaporate like the old time gas. It gets on the spark plug firing points and “floods” the spark. You have often wished for something to stop this flooding and keep oil off the plugs, too. Something which will keep the plugs clean—give your motor the power it should have.

You have often said to yourself—“How easy it would be to sell a device which overcomes oil pumping, flooded plugs, and carbon. I could sell thousands of them”. Well—here it is—THE MOTOR MASTER. The simplest device that ever was—solid brass, no moving parts—lasts forever.

I wish I could sit down with you and tell you all about the MOTOR MASTER—so simple—yet so wonderful. For it is more than a protection to the spark plug—it is a hot spot, which puts a perfect mixture right at the spark plug points and gives such a hot explosion that carbon is burned out while the motor runs. No lay up to remove carbon. No reboring to stop “oil pumping”. A big increase in power. A big saving in gasoline.

And so easy to install! Just screw a MOTOR MASTER into the spark plug hole and screw your old spark plug into it. That’s all—except that you must cut down your gas from 10 to 20%. NO MORE TOUGHED SPARK PLUGS! NO MORE CARBON! MORE POWER! LESS GAS!

**CAR OWNERS WANTED To Sell and Demonstrate MOTOR MASTERS**

You can do this while you drive. Use your own knowledge to make big money—right now. No instructions necessary—Just tell prospects what you already know—and clean up!

Every man you call on will want a set of MOTOR MASTERS. So answer this advertisement at once. It means big money in your pocket. You can start selling them now. Everybody needs them—everybody has trouble with spark plugs and carbon and oil pumping. MOTOR MASTERS are guaranteed to end all that trouble or money back.

**EARN $200 WEEKLY**

FREE for the asking. Don’t wait. Send in now and get your agent’s stock, and your own FREE set of MOTOR MASTERS. Get them on your car and show them to a prospect. He wants them at once. Nearly a million sold already. Some of that money might just as well have been yours, if you had only been our agent before this. Don’t let such a chance slip by again. Send in this coupon and get started quick selling an established article that is guaranteed or money back.

**Result: More work—more money.**

**DON’T DELAY. MAIL COUPON TODAY.**

646 No. Michigan Ave.
CHICAGO, ILL.

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**Please send me a copy, without obligation, on my part, your literature telling me how I can become your agent and make big money selling MOTOR MASTERS. Also tell me how I can secure my set free.**

Name

Address

City .................................................. State ..........................
High School Course in Two Years!

Lack of High School Training has kept thousands of men and women from attaining business and social position. Without this training you are absolutely barred from a successful business career, from leading professions, from well-paid civil service jobs, from teaching and college entrance. In fact, all preferred positions are closed to you without this vital training. You can’t stand this heavy handicap nor do you have to. The American School can give you the valuable training you missed.

Put Your Idle Hours to Work

You can complete our simplified High School Course within two years by spare-time study. Then you will be mentally equipped to handle a worthwhile position. This course, prepared by some of America’s leading professors, will broaden your mind, give you a wider outlook and make you keen, alert and capable.

Remove Your Handicap

Whether you need High School Training or specialized instruction in your chosen line — NOW is the time to remove your handicap. You must know the short cuts and efficiency methods. You must know the HOW and WHY. Over 50,000 students owe their success to training received from the practical, money-making Courses in the coupon below. Let us tell you about this training — about the Course you are interested in. Check and mail the coupon.

American School
Dept. II, 74, Drexel Ave. and 56th St., Chicago

American School
Dept. II, 74, Drexel Ave. and 56th St., Chicago

Send me full information on the subject checked and how you will help me win success.

Architect
Building Contractor
Automobile Engineer
Automobile Repairman
Civil Engineer
Structural Engineer
Business Manager
Cert. Public Accountant
Accountant and Auditor
Bookkeeper
Draftsman and Designer
Electrical Engineer
Electric Light & Power
General Education
Vocational Guidance
Business Law

Lawyer
Machine Shop Practice
Photoplay Writer
Mechanical Engineer
Shop Superintendent
Employment Manager
Steam Engineer
Foremanship
Sanitary Engineer
Surveyor & Mapping
Telephone Engineer
Telegraph Engineer
High School Graduates
Fire Insurance Expert
Wireless Radio
Undecided

MAIL COUPON NOW!

SHAW MANUFACTURING CO.
Dept. FS, Galesburg, Kansas

☐ Please send me your plan book for building the SHAW Speedster. (Enclose 25c in stamps.)
☐ Full Information on SHAW Speedster.
☐ Full Information on Shaw Bicycle Motor.

Name: _______________________________________
Address: ___________________________________
AGENTS WANTED!

Will you sell PART TIME or FULL TIME for $100 to $200 a Week?

Forrest in Mississippi made a record of $68 profits in one day. Weber in Wisconsin has averaged $900 a month. Scores of part-time men are adding $10 to $20 a day to their income, taking orders for SAAL Heavy-Oil Systems. If you are not making big money now, get our free book—read how men no smarter than you are actually making their fortunes selling “SAALS” to motorists and dealers. Never mind what we claim—judge this big-money-making opportunity by what our Agents tell you themselves!

FREE OUTFIT FOR YOUR OWN CAR

No money to invest, no stock to carry, no delivering or collecting, no experience necessary. A car of your own helps get sales, but not indispensable. We supply the merchandise, the capital, the selling plan and simple instruction which will enable you to get 7 to 9 orders out of 10 calls. We even supply absolutely free a sample outfit for your own car to carry. All you supply is your time, and we pay you more for it than you ever got for it before!

SAAL HEAVY OIL

“Makes cars ride better and last longer” System

No waiting for Pay Day—Get your $17 to $34 Cash in pocket every Day! Whether you have succeeded or failed at selling other things, even if you never sold anything before YOU CAN MAKE BIG MONEY SELLING “SAALS”! We can promise YOU success, because among our successful Agents are a lot of everyday fellows who never made more than $5 a week before. Mark the coupon “Agent’s proposition paying $100 to $200 a week” get the $1.00 STORY from our agents themselves, then decide!

H. G. SAAL COMPANY

Dept. 401
1800 Montrose Ave.
CHICAGO, ILL.

Capital $2,500,000
Established 22 years
One of the World’s Largest Manufacturers with unlimited resources
Builds Cunningham Tubes

For thirty years the carbon filament lamp has been considered the finest development in the electrical art, and for thirty years a great majority of the world’s leading manufacturers have been making them. The important and ever-growing demand resulting in the building and expansion of hundreds of factories, and the improvement of factory methods, until today the production of filament lamps is one of the most significant industries of the world.

The new Cunningham type C-301-A, Amplifier and Detector represents a culmination of the research and efforts of the world’s leading manufacturers in the art of the filament lamp. The filament current of over one-fourth of an ampere is the highest yet produced. A test tube made from this filament tube is shown.

A Speciality Designed Tube

For Every Radio User

Cunningham tubes are covered by patents dated (3-15-21) & (8-15-21), and will be protected by additional patents. Desired for amateur, experimental and entertainment use in radio sets to follow.

Patent Notice: Cunningham tubes are covered by patents dated (3-15-21) & (8-15-21), and will be protected by additional patents. Desired for amateur, experimental and entertainment use in radio sets to follow.


Ford Goes 66 Miles On 1 Gal. Gasoline

With wonderful new vapor humidifier, equals gas at 8 to 12c per gallon. For every make auto. Car Owners wanted in every locality to introduce it. Demonstration model furnished free. Write quick for particulars. Give make of car.

WALTER CRITCHLOW, Suite 320, 716 Madison Street, CHICAGO

THE SHAW MOTOR ATTACHMENT
Makes Your Bike Like a Motorcycle

A high grade 21/2 H.P. Motor attachment quickly clamped to any bike frame. Speed 4 to 90 miles an hour. 90 to 125 miles per gallon of gas. Special Low Price Now! Write today, or call at our offices.

World Battery Co., Dept. 31, 315 So. Western Ave., Chicago, Ill.

THE SECRET of QUICK SALES

There's a way that brings quick and certain sales of our brilliant Combination Handy-Lite. It's building profitable business for our agents in sparest time. This lamp means the demand for a light brighter than gas or electricity but needing no wiring or piping. Lights with match, smokeless, compact, handsomely nickel-plated, durable. Write for supreme selling secret and attractive agency proposition.

Enterprise Tool and Metal Works, Dept. 37,

Burns 97% Air

GREAT 2 IN 1 LAMP
MEN!

BREAK THE SHACKLES THAT BIND HER TO A ROASTING STOVE IN SUMMER

No more sweltering kitchens—no more fires to build or watch—no dirty, heavy coal to lift—no wood to chop—no back-breaking scuttles to empty—no smelly oil stoves to clutter kitchen—no more spoiled roasts, bread or cake—this

Amazing New Invention Makes Your Present Range A GAS STOVE

Does Away with Dirty Coal and Wood

HERE is the amazing new invention that has ended forever woman's slavery to household drudgery. IN ONE MINUTE it turns your present coal and wood range into a real gas stove that turns on and off with a valve.

Wonderful Baking

You can bake in your own good old oven—better and quicker than ever before. No waiting for the oven to heat to the right temperature. No worrying over evenness of heat when you want delicious, light and fluffy cake, perfect biscuits, bread, pies, etc. In a jiffy your oven is at a fine, even temperature—any degree you want. Put on your roast, stew or vegetables. Go away and forget them. Come back when they are done—turn off valve and fire goes out. Leaves your kitchen cool and sweet.

Just Turn Valve—Burns 95% Air—5% Oil

Mr. B. M. Oliver, the inventor, calls this wonderful device the Oliver Oil-Gas Burner because it uses 95% air and only 5% coal oil (ordinary kerosene, the cheapest fuel known)—turns them into real gas with intense, hot, clean, even flame—nowick, smoke or odor. 16 models to fit every kind of cook stove or range. No drilling holes—no change of any kind—simply set in firebox, in one minute. Absolutely safe. Lasts a lifetime.

30 DAYS FREE TRIAL

No Money—Mail Coupon for Free Book and Trial Offer

Oliver Oil-Gas Burner Co.,
2046-8 Oliver Bldg., St. Louis, Mo.

Send your Free Book, "New Kind of Heat," and also your special low price and 30 day Free Trial offer. This does not obligate me in any way.

Name ..........................................................
Address ..................................................
City ..........................................................
State ......................................................

I need more Salesmen, Agents and Managers

Agents—cash in on this nation-wide sweep of Oil. F. W. Bentley of Pa. says, "Ye gods, some seller. I made $215 today." Mrs. Seldor made $100 a month in spare time at home. If you want to make $50 a week in part time or $350 a week in full time; or if you can swing a territory at $5,000 to $15,000 a year, write me quick for Sales Plan and Exclusive Territory Franchise. I give Fords to producers. But you MUST act at once. Address B. M. Oliver, Pres., at address at right.

Free Fords
This Beautiful Book on Wood Finishing FREE

GIVES complete instructions for finishing all wood—hard or soft—old or new. Explains just what materials to use and how to apply them. Tells how inexpensive soft woods may be finished so they are as beautiful and artistic as hard wood. This book is the work of experts—illustrated in color. Includes color card—gives covering capacities, etc.

JOHNSON’S WOOD DYE

Use coupon below for a free copy of "The Proper Treatment for Floors, Woodwork and Furniture." It is full of valuable ideas on Wood Finishing and Home Beautifying.

S. C. JOHNSON & SON, Dept. P. A. 7 Racine, Wis.
Please send me, free and postpaid, your instruction Book on Wood Finishing and Home Beautifying.

NAME ..................................................
ADDRESS .......................................... 
CITY & STATE .....................................
Dealer’s Name .....................................

Johnson’s Wood Dye is very easy to apply—it dries in four hours and does not rub off or smudge. Penetrates deeply, bringing out the beauty of the grain. Made in fourteen popular shades, all of which can be easily lightened or darkened. Color card in book.

S. C. JOHNSON & SON
The Wood Finishing Authorities
Dept. P. A. 7 RACINE, WIS.
Canadian Factory—Brantford
Get your own tires free
and pick up $300. a month
as a Mellinger Tire Agent!

THIS picture shows how easy
and fascinating it is to ride
around in the open air in your
spare time and make ten or fifteen dollars a day showing Mellinger Tires. Notice
the interest everyone shows in the MASTER Salesman Kit which I send you free.
Notice too the magnificent Cord Tire. This powerful cord tire is guaranteed for
mileage half way around the world. YET YOU SELL IT at a price so low that
competition is knocked out to start with. We give our good agents tires for their
own use so they can demonstrate without trouble. We have thousands of agents.
They are prosperous and content. You too can start. No capital or experience is needed.

12,000 miles GUARANTEED

Lowest Wholesale Prices
in America

Mellinger Super Quality Cord Tires, always con-
considered the best cord tires made, are now even
better. The use of Ethyl-cured Rubber gives marvelous tough
tread, wears down so slowly it reminds you of steel, yet so
pliable that it feels like pure gum. Bead reinforced with two
chafing strips; combed Egyptian cord; a double layer of
cushion rubber; cured 2½ hours on air bags. These high-
grade features on the Mellinger Cord cost more, yet you pay
less than for ordinary unguaranteed tires and I give a
Guarantee Bond for 12,000 miles.

Whether you want CASH or guaranteed mile-
age for yourself at LOWER WHOLESALE
PRICES, write me today. Get my inside figures and
discourts. My new low prices amaze everyone. Better
tires for less money makes business roll in. One Billion
Dollars will be spent for Tires in the next few months.
Tires are shipped prepaid on approval.

IF YOU OWN A CAR
WRITE ME QUICK

Be the first from your locality to get the Mellinger
Plan and positive proof that you can make big
money. I say it’s your big opportunity—a big business—
hosts of friends and customers—I don’t ask you to risk one
cent. Send the coupon today. My Big FREE BOOK
explaining everything will be in your hands in a few days.

Mellinger Tire & Rubber Co.
1703 Grand Ave., KANSAS CITY, MO.
$800,000 Capital

References: Any Bank or Trust Company or Any Publication

Tire Agents Wanted—
The Mellinger Plan

is revolutionizing the tire business. A positive proven
success. Different from anything you ever heard of.
You can start a business of your own without any capital—you can
begin part time if you wish. No previous experience needed. Tires
shipped on approval. No risk. Saves car owners money. Just
what millions of tire buyers have been looking for. Piles up profits
for Mellinger Agents.

FREE

For a little of your time in showing and recommending Mellinger
Tires, I will make you a surprising offer
that will give you a set of tires FREE. If you are in earnest
I will send you the Master Salesman Kit, containing everything.
As one Agent says, “It’s like taking a prospect through the Fac-
tory. The Kit sells the prospect and I take the order.”

———send this now———

Mellinger
1703 Grand Ave
Kansas City, Mo.
—Send Me a free book and prices

Name

Address
Men Wanted in Auto and Electric Business

If you like mechanics and want proof that you can make a real success in the auto and electric business look at the sixty thousand Sweeney trained men, many owning their own business, in all parts of the U.S. and foreign countries. These men learned their trade in eight weeks at the greatest trade school in the world, the Million Dollar Sweeney School. No previous experience is necessary. You will learn here by the Sweeney System of Practical Experience, with tools, not books, by doing the actual work with your own hands on all kinds of cars, engines, parts, etc. The cost of training is small. Real jobs, success and independence reward the trained man.

With over TWELVE MILLION automobiles running the demand for mechanics, demonstrators, chauffeurs, truck drivers, garage men, etc., is greater than ever before. Countless opportunities in cities and towns and even remote places. Probably I can give you the names of successful Sweeney men right in your locality.

If you are looking for work at $50 a week and up, if you would like to get into something sure and solid that will give you success and independence, and can put in a few weeks this summer in TRAINING, write me today.

I am making a special THIRTY DAY OFFER. That is why you should not delay. The first step is to send for this big free illustrated catalog and learn of the practical and immediate opportunities for you in this business.

FREE RAILWAY FARE

If you will come now I will help by paying your railway fare from any point in the U.S. to the Sweeney School. I will also tell you about my New Summer Offer—a wonderful opportunity for you! The first step is to send for my Free Catalog. Get all the facts.

FREE

Simply send name today for my big 64-page catalog. Shows hundreds of pictures of men at work in the school. Tells all about wages, profits, opportunities in auto and tractor business. Explains step by step how you learn. Interesting letters from graduates telling how they made good. Shows how men come from all over the world to this big school. Makes you want to join the crowd. Tells everything you want to know. No cost, no obligation. Clip the coupon, or a postcard will do. Get the catalog now—that’s the first step. Don’t put it off one minute, No colored students accepted.

E. J. SWEENEY

LEARN A TRADE—

Sweeney

AUTOMOTIVE & ELECTRICAL SCHOOL

1103 Sweeney Bldg. Kansas City, Mo.