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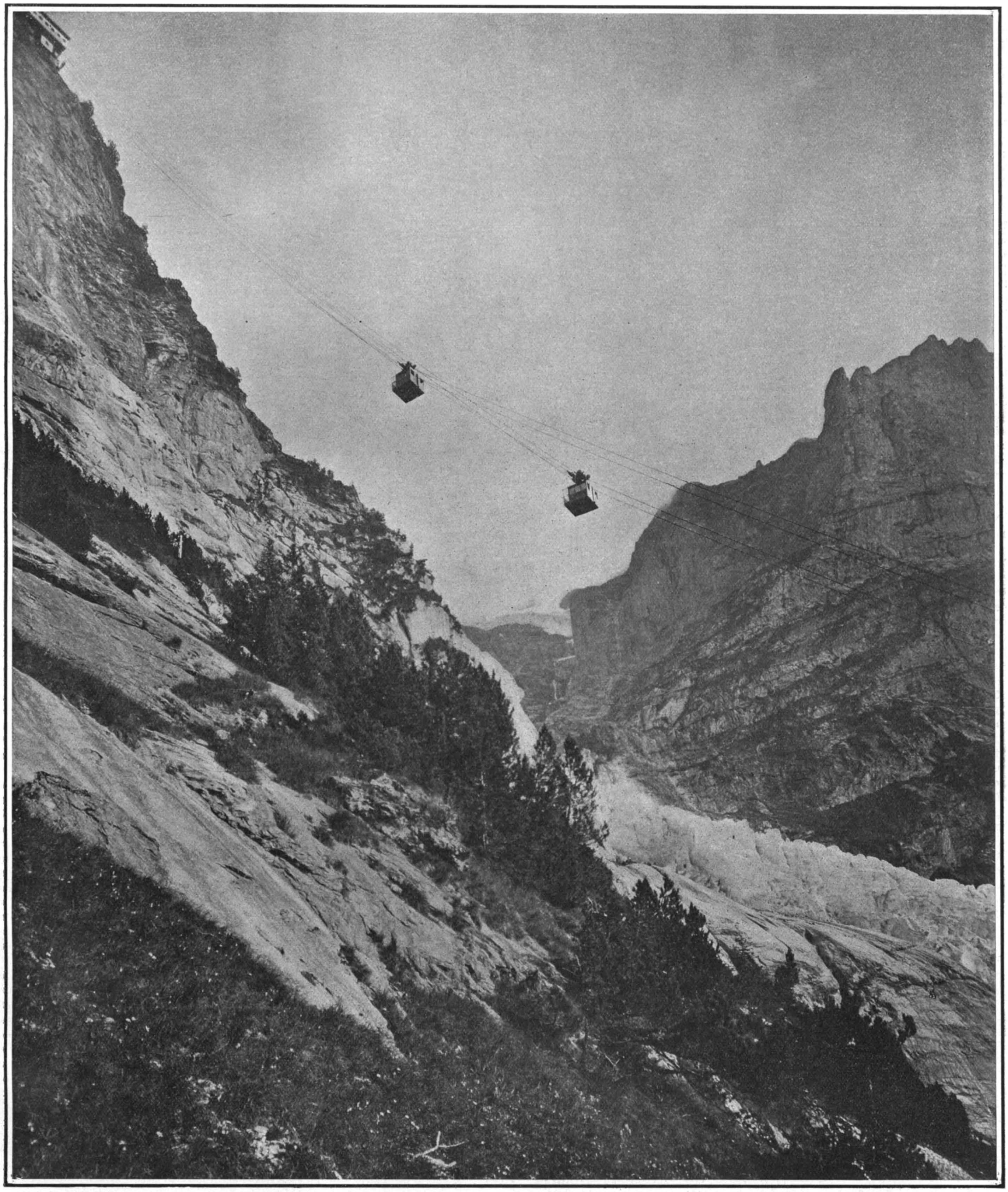

The two cars—one ascending, the other descending—in mid-air. Showing the glaciers below.

THE ELECTRIC AERIAL MONO-RAIL UP THE WETTERHORN.—[See page 353.]

SCIENTIFIC AMERICAN

ESTABLISHED 1845

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NEW YORK, SATURDAY, MAY 8th, 1909.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

DISTORTED BRIDGE STORIES.

As we have been compelled sometimes to criticise in the public interest the city's bridge construction, we are glad of the opportunity to say a word of commendation or reassurance when honestly we can do so.

Our criticism of the manner in which the details of the Queensborough Bridge were altered, upon the decision to add two elevated tracks to the load for which it was originally planned, appeared to be well founded, and has since been confirmed by independent experts. It would still appear that the thorough investigation which has resulted was very necessary to ascertain, beyond all question, that the strength of the structure will be sufficient before putting upon it all the live load which was intended.

When, however, the adequacy of the Manhattan Bridge begins to be questioned upon entirely false presumptions, we are glad to do what we can to allay alarmist rumors. It is not likely that the city engineers would so soon forget the former lesson; and the evidences offered in the sensational press against the character of the structure now building are too obviously based on amateur ignorance of inevitable conditions.

It has been reported that some eagle-eyed pedestrians, who daily cross the Brooklyn Bridge, detected a noticeable change in the hang of the great cables of the Manhattan Bridge, as the members of the lower deck were suspended from them, farther and farther out from the piers, and that they speculated upon the question whether the strength of the cables, or other parts of the bridge, could be sufficient, if so small a part of their eventual load could so distort them.

It is a little difficult to believe that such distortion of the cables is perceptible to the naked eye, unassisted by surveying instruments, in a full-length elevation of the bridge as observed from the Brooklyn Bridge; but there is no doubt that the distortion takes place. There is no more doubt that the engineers not merely anticipated and provided for it, but knew that it could not possibly fail to take place in the natural course of events.

The cables, as first strung, carrying nothing but their own weight, hang in a curve known to engineers as a catenary. This curve in the case of the Manhattan Bridge is well shown in the large illustrations of our Engineering number of December 5th last. When the roadway comes to be suspended from the cable, the latter assumes a different curve, which, if the load is distributed uniformly along the length of the cable, approximates more or less closely to a parabola. If the roadway serves no other purpose and is flexible, it will undulate with the passage of loads across it, and a corresponding distortion will take place in the supporting cable. There are primitive suspension footbridges in existence in which this effect is most noticeable; but it is obvious that such distortion, if it were permitted to take place, would greatly add to the strains in bridges so heavily loaded as those of New York, and would be entirely impossible in practice.

The main office of the truss, which we conventionally consider principally as a roadway, is to stiffen the cables and prevent change of shape and oscillation due to moving loads. The dead weight of this truss is entirely supported by the cables; in the case of all the East River bridges it is not rectilinear, but forms a very flat arch. The truss, although its purpose is to stiffen the cables, cannot be erected in one piece; and as, during erection, the different members extending outward from the piers are successively suspended from the cables, the latter are distorted, the points from which members are hung being slightly below their final position, while those farther on, from which members are not yet hung, are slightly above. The effect of this is well shown in our illustration of April 10th, in which the whole length of the bridge appears in sharp perspective, the parts of the truss already erected appearing, not as parts of a continuous curve, but as two curves which will not coincide with the completed arch. The reason of this is that the "lower deck" members, first hung, did not form a rigid, but a flexible structure. The unloaded center portion of the cable in the meantime flattened through the loading of the parts nearer the piers, and in the case of an elementary flexible cord would have been drawn into a straight line.

When the lower deck members met and the cable was uniformly loaded, it resumed its position as a regular curve, but then began another curious change. As the top chord and heavy upper floor were added, not from the piers outward, but from the center inward, the cable assumed a position (the truss not yet being rigid) in which its central point was lower than its final position, and points intermediate between it and the top of the tower became higher than their final position, just as an elementary cord would hang in a V shape if loaded only in the middle.

These changes, however, though interesting to watch, are no criterion of the ultimate strength of the structure. Not only have they been anticipated by the engineers, but special provision has been made to allow the cables every facility for deflection during the course of construction, in order that when the dead load is complete and uniform, each individual wire of the cables may be in the best position to carry its equal individual share of the total load.

SIGNALING TO MARS.

Not since those historic flashes from Mars were received, some years ago, which were probably caused by the reflection of sunlight falling on snow-covered surfaces, and which were promptly interpreted by Tesla and some exuberantly imaginative astronomers as attempts on the part of a hypothetical race of Martians to communicate with this earth of ours, has so much excitement been created as Prof. Pickering's proposal to build a system of mirrors, by means of which light can be rhythmically flashed to Mars. According to Prof. Pickering, a system of reflecting surfaces of adequate area could be constructed at a cost of $10,000,000. If Mars is inhabited by a race more highly developed than we, on the theory that their planet is older than ours, it is argued that they will have sufficient intelligence to devise a means of answering. Prof. R. W. Wood of Johns Hopkins University suggests the simpler and cheaper expedient of employing a huge strip of black cloth, which could be wound from one roller to another, and made to appear and disappear at regular intervals. He suggests the alkali deserts of the Southwest as a suitable place for the experiment. In all probability, neither Prof. Wood nor Prof. Pickering seriously believes that Mars is inhabited.

Would it be worth while to carry out the idea? To us it seems that if the experiment proved a failure, and no answering signal were received from Mars in a reasonable time, the matter would not be conclusively settled. Knowing practically nothing of the conditions on Mars, it would naturally be unsafe to conclude from a failure that the planet is uninhabited, for which reason the habitability of Mars would still engross Flammarion, Lowell, and the host of newspapers that accept their utterances as astronomical gospel. On the other hand, if an answering signal should be received, it would be safe to say that the event would transcend in human interest and importance the most stirring occurrence in the history of the earth, and would inaugurate a new era in the progress of the human race.

Even in the face of this tremendously alluring but exceedingly remote possibility, it seems to us that the $10,000,000 stipulated by Prof. Pickering, and the smaller indeterminate sum required by Prof. Wood, could be more worthily expended, particularly so when we examine the evidence on which the theory of Martian habitability is based.

To the indefatigable studies of Prof. Lowell we owe whatever facts have been gathered that bear at all on the question. But Prof. Lowell's arguments have been riddled by the inexorable logic of geologists, astronomers, and physicists. He is wedded to the Laplacean theory of planetary evolution, although that theory is considered inadequate by many astronomers in the light of recent celestial observations. He assumes that the history of the earth is the history of Mars. He advances the theory that Mars is a planet which has shriveled up during the course of ages; that its surface is one vast parched desert, with the exception of the snow that gathers each winter about the poles; and that the chief concern of the inhabitants, if inhabitants there be, is to conserve this paltry supply of water, and to conduct it, as the snow melts in the spring, to those regions in the equatorial and temperate zones which would still blossom if they were watered. Evidence of this gigantic irrigation system, which dwarfs anything of the kind that we have ever attempted, Lowell finds in that network of lines which Schiaparelli first discovered, and which were called by him "canals" for want of a better name. As spring and summer approach, the lines slowly creep down from the poles toward the equator, and the dull red or orange of the supposed desert region changes to green. With the advent of autumn and winter, the green resumes its dull red or orange hue, and the lines or "canals" gradually disappear. In these chromatic changes Prof. Lowell sees the seasonal growth and decay of vegetation. His argument for the habitability of our planetary neighbor is based on the undeniably remarkable regularity of the "canals." It is pointed out that they are usually the shortest distance between the points that they connect, and that they meet in groups of three, five, seven, and more in well-defined spots, which he terms "oases," like so many spokes converging in a wheel-hub. In other words, there is nothing haphazard in the arrangement of these canals as Prof. Lowell sees them. They are to him so artificial that they are the symbols of an intelligent race, who have sunk all political and international disputes in the one vital problem of postponing the day when their orb must eventually dry up and they themselves perish.

To reinforce his argument, Prof. Lowell points to the earth. He argues that all terrestrial life emerged from the ocean, although no geologist will positively assert how life did originate on this planet; that the earth was once wrapped in a damp, cloudy envelope, although there is much evidence that moisture, even in geologic times, was of local prevalence only; that the earth is gradually drying up, although all geological evidence points to the fact that the proportion of land to sea has always been a fluctuating quantity, with no marked tendency in either direction; and that deserts on the earth are the harbingers of an ultimate dearth of water extending over the entire earth, although geologists maintain that deserts have always existed. Perhaps the most vigorous attack on Lowell's theories has been conducted by Prof. Andrew E. Douglass, who has studied the "canals" by the methods of experimental psychology, and has shown that there are fundamental defects in the human eye which produce faint canal illusions, and that these have worked serious injury to our observations in the past. It must be confessed, however, that Prof. Douglass has not explained away the seasonal appearance and disappearance of the "canals" and "oases."

Ingenious as Prof. Lowell's explanation of Martian phenomena undoubtedly is, so much of it is based on unsound geological reasoning, and so much on sheer conjecture, that it seems almost futile to make any attempt at signaling in the hope of obtaining something like experimental evidence that Mars is really a living world peopled by intelligent beings.

DIRECT-CURRENT VERSUS SINGLE-PHASE TRACTION.

At the annual electrical night of the New York Railroad Club, there was an active discussion of the problems of railway electrification, which in some respects was in marked contrast to preceding discussions of the same subject. Hitherto, we have been accustomed to listen to rather heated discussion of the merits of the two leading systems of electrification as put forward by the advocates of the high-tension overhead and the low-tension third-rail methods of propulsion, in which each side has claimed a practical monopoly of advantages for its own particular system. During the last year or two, however, there has been afforded an excellent opportunity to test theory by practice; notably, on the two important electrical installations which have been in operation on the New York Central and New Haven systems. Also in various parts of Europe and America, the single-phase and the direct systems have been in operation under varying conditions of traffic. As the outcome of this experience, there has grown the conviction that each system is suited to certain special conditions; and that in the electrification of steam railroads, it is probable that both the high-tension and low-tension methods of propulsion will be employed, even on the same stretch of road.

In future changes from steam to electricity, it is probable that the direct-current, third-rail system, using from 600 to 1,200 volts, will be employed in terminal stations, yards, and the zone of suburban service. Beyond this zone, if in the future it should be found desirable to electrify the trunk lines for long distances between important centers, it is almost certain that the alternating-current single-phase system will be adopted, using a voltage of 10,000 to 12,000 or even more.

It is significant that the Pennsylvania Railroad Company, in spite of the fact that most of the electrical work at New York is being done by the Westinghouse Company, who are the sponsors for the single-phase system in America, have decided to equip their vast system of tunnels and terminals in New York city with the third-rail direct current, leaving themselves free to adopt the single-phase system for any further extensions beyond Harrison into New Jersey and Pennsylvania.

AERONAUTICS.

The Opel firm of Russelheim, Germany, has recently offered a prize of $4,000 for a cross-country aeroplane flight from Frankfort to a point about 15 miles distant. This flight must be made during the coming summer, while the Frankfort Aeronautical Exposition is open. The machine must be constructed in Germany, and the aviator must be of that nationality.

The first German military airship, "Zeppelin I," recently made a night flight, and remained in the air 13 hours and 20 minutes. It was intended to make a 24-hour trip, but the weather conditions were not favorable. The airship started out at 10 P. M. on April 6th, and returned the next morning at 11, after making an excellent flight. The flight was 11 minutes longer than that made by the Gross airship in Germany September 12th last.

Wilbur Wright, after making a considerable number of excellent exhibition flights at Rome, has gone with his brother to England, where the brothers will be presented with the gold medal of the Aero Club of Great Britain before they return to America to finish the government aeroplane contract. Wilbur Wright, during his Italian flights, is said to have started his machine by sliding it on its runners over the grass under its own power, thus dispensing with the dropping weight and starting rail. If he actually accomplished this feat, he has made a big stride in advance in making his machine thoroughly practical.

The West Hudson Aero Club, Arlington, N. J., will give a grand aeronautic demonstration during the week from May 26th to 31st. Capt. Baldwin has been engaged to make flights with his new 90-foot dirigible, and Mr. Perkins will conduct kite-flying contests for amateurs, besides flying a large number of kites himself. The chief attraction for aviators will be a prize of $1,000, offered for a flight of a mile, and $500 for the aeroplane having the best points, although it may not fly. The contest will be conducted under the auspices of the Aero Club of America.

The Aeronautic Society expects to have its first exhibition on the 22d instant at Morris Park. Besides a large number of cups and small prizes for gliders and model aeroplanes, a prize of $2,000 is offered for one circuit of the race track, a distance of about 1¾ miles; for a 1,500-foot flight, $1,000 will be given, or $500 for a flight of 1,000 feet by any new machine which has not been flown publicly heretofore. It is also hoped to have a flight by some competent aviator, such as Mr. Curtiss or Mr. McCurdy, either of whom is probably capable of making a 25-mile flight. The SCIENTIFIC AMERICAN trophy can be competed for upon both occasions.

The Douai section of the National Aerial League of France will hold an aviation meeting from June 28th to July 18th. $8,000 in prizes are available. One-half of this amount was donated by the municipality. Three contests have been arranged for: (1) A speed contest around a 2½-kilometer (1½-mile) circuit. (2) A distance race to be known as the Grand Prix of Douai, to take place between July 4th and 18th. (3) A cross-country flight from Arras to Douai, 25 kilometers (15 miles).

The London Daily Mail has recently offered a prize of $5,000 for the first aeroplane flight of one mile in a closed circuit, by an English-built machine flown by an Englishman. The flight must be made in Great Britain, within a year from April 7th last, but the machine can be constructed in any part of the British empire. This newspaper, it will be remembered, offered a prize of $50,000 two years ago for a flight of 180 miles from London to Manchester. Only recently, the same paper put up $5,000 for a flight across the English Channel. This latest prize has been offered for the purpose of stimulating British industry, and there is little doubt that it will be won within a year. Mr. J. Norton Griffiths has lately offered a trophy for the longest flight in any one year, in England.

The Technical Committee of the Automobile Club of France has undertaken tests of the leading lightweight French aeronautic motors. The R. E. P. (Robert Esnault-Pelterie), Gnome revolving-cylinder, Farcot, and Renault motors are to be given thorough tests this month, so that the public will soon know just what these various motors are capable of doing. All but the Renault are of the air-cooled type, and this latter is furnished either air or water cooled. They have all been described recently in the SCIENTIFIC AMERICAN SUPPLEMENT.

The new German Aerial Fleet Company expects to open at Friedrichshafen about October 1st a school for aeronauts in which a three years' course will be followed for the practical and scientific instruction of aerial pilots. After having graduated from the primary upper school and studied mechanics for a year, a young man can begin at Friedrichshafen, where he will spend a year in studying the theoretical side of the subject. The second year he may enter the workshops; and finally, the third year, he can undertake to make ascensions in dirigibles and aeroplanes.

ELECTRICITY.

The Burlington Railroad has decided to light its suburban trains running out of Chicago with electricity. The current will be generated by turbo-generators mounted on the locomotive boiler and driven by steam taken from the boiler. The generators will also supply current for the searchlights of the engines.

Heretofore direct-current generators have been designed for operation by high-speed engines, but recently a French company has designed a dynamo generating direct current at 2,500 kilowatts, which is driven by a slow-speed prime motor. The armature of this dynamo is 17 feet in diameter, and serves as a fly wheel. The dynamo runs at 85 revolutions per minute, and generates current at a tension of 250 volts.

The city of Los Angeles has solved the pole nuisance to a large extent by providing a joint pole committee, whose object is to eliminate unnecessary poles and cause the various companies to run their lines on the same poles. The committee has been at work for two years, and 10,000 poles are now being used jointly by the different companies, thus doing away with a like or even larger number that would otherwise be necessary.

A report from Consul General A. M. Thackara of Berlin describes a trackless trolley line in the suburbs of Vienna which is a little over a mile in length. The cars pass through narrow streets with many sharp turns and steep grades. In several places the grade is 1 to 10. A double line is provided so that cars can pass each other without interruption. The line cost $44,153 and the running expenses are under $10,000 per annum.

An interesting example of the value of a small stream for light and power purposes may be found near Sacramento, Cal. A trout stream has been dammed up and the power in the form of electricity has been used for doing such light work as washing and ironing, also for cooking and lighting in the home of the owner. As the stream is very small during the dry months, an old miner's ditch has been dammed to form a reservoir of 100,000 cubic feet capacity. The plant cost $1,500 and in a single year has done $700 worth of work.

A new method of transmitting photographs to a distance has recently been devised. A gelatine negative is used, in which the picture is formed in relief. A style travels over the uneven surface of the negative and operates a rheostat in the main line. At the receiving station a luminous ray plays over a sensitized plate, and the intensity of its light is varied by the rheostat. The reliefs and hollows of the original are thus reproduced in light and shadow on the sensitized medium, and form the picture. This method of transmitting pictures was recently tried with success on the line between Paris and Lyons.

In a discussion of the American and Canadian transmission systems, recently published in Cassier's Magazine, it was pointed out that the largest transmission line in the world is that of the Niagara-Syracuse-Auburn line, which transmits 30,000 horse-power over a distance of 163 miles. The line in parts is designed to carry 60,000 horse-power. The Colgate plant, Yuba River, Cal., connects *via* Oakland and Mission San José to a line 222 miles in length. This plant has a capacity of 11,250 kilowatts and there are over 100 sub-stations on 1,375 miles of circuit on the system.

The use of candles in dining rooms of hotels and restaurants makes a very pleasing decoration. However, the ordinary paraffine candle is entirely unsuited for the purpose, owing to its unsteady light and the drip of the paraffine wax. The ideal candle would be an electric one, but the objection to the use of electricity heretofore has been that it required connecting wires running to the source of power. Recently an electric table lamp has been devised which carries its own storage battery. This little lighting device is rather more ambitious than a candle, being set in a vase in which cut flowers may be placed. The light passing through the flowers and water contained in the vase gives a very soft, pleasing effect.

The intensity of light is measured in candles, both here and abroad, but there is considerable difference in the value of the standard candle in the different countries. Germany uses the Hefner candle—an amyl-acetate flame; in France the standard is the Carcel—a colza-oil flame; while in England the original sperm candle flame has given way to a flame of pentane gas. In this country we use the pentane flame for the gas industry, but for electric lighting incandescent lamps are used which are only approximately equal to the value of the pentane flame. An effort is now being made to adopt an international candle, which will be 1.6 per cent below the candle we use now. This international candle would be equivalent to the English candle and to a French candle known as the *bougie decimile* and to 10/9 of a Hefner candle.

SCIENCE.

A curious defect in color sense is recorded by Mr. C. R. Gibson in the Transactions of the Royal Philosophical Society of Glasgow. The case in question is that of Mr. Gibson himself. His color vision is perfectly normal, with the exception that at times his sensitivity to red is suppressed. As soon as his attention is called to a red object, his eye immediately responds and he sees the object as it really is. In other words, the temporary "red blindness" disappears immediately when he is informed that red rays are present in the light which strikes his eye.

The United States Weather Bureau has established snow gaging stations in the Rocky Mountains. The amount of snowfall in the Rocky Mountains determines the amount of water in many of the principal rivers of the West, and therefore bears a direct relation on the floods that devastate the Middle West at times. Moreover, many vast irrigation enterprises depend for their success upon the amount of snowfall in the mountains. In order to keep accurate and dependable records of the amount of snowfall, and therefore to forecast in a measure the amount of water that may be expected from the mountains, these stations have been established.

From experiments made in France in the employment of artificial refrigeration in wine making, the following conclusions have been drawn: Grapes may be kept at a temperature of 29 deg. F. for a year, but it is not advisable to keep them longer than a few months because of the inevitable softening of the seeds. In the clarification of liqueurs and their preparation for exportation to cold climates, very good results are obtained by cooling to 29 deg. F. for 72 hours. Cold affects wine by precipitating excess of tartar and, with this, the oxy-tannins, albuminoids, pectates and certain alumina and iron compounds which the wine holds in suspension. Pathogenic microbes are rendered inert and carried down with the lees. Applied to sparkling wines, cold increases the quantity of carbonic acid dissolved, without injuring the quality.

A chemist has analyzed fatty matter extracted from Coptic mummies dating from 500 B. C., and found it to consist chiefly of oleic acid, with some other higher fatty acids, but without a trace of any volatile acid. From Egyptian mummies of the 21st dynasty, dating from 1500 B. C., the same chemist obtained large quantities of volatile acids of the fatty series, in the form of soda salts, which were found chiefly among the "natron" which filled the internal cavities of the mummies. Natron is a mineral which is found native in Egypt and which consists of sodium carbonate, mixed with sodium sulphate, sodium chloride, and calcium carbonate. The volatile acids could not have been derived from the butter and other grease used by the embalmers, but must have been produced by the decomposition of the tissues of the body, and then fixed by combination with the natron.

The comparatively high temperature produced within a greenhouse covered with glass and exposed to solar radiation is usually held to result from a transformation of wave-length; that is, that the heat waves from the sun, which are able to penetrate the glass, fall upon the walls of the inclosure and raise its temperature; the heat energy is re-emitted by the walls in the form of much longer waves, which are unable to penetrate the glass, the greenhouse acting as a radiation trap. Prof. R. W. Wood of Johns Hopkins University thinks it more probable that the part played by the glass is the prevention of the escape of the warm air heated by the ground within the inclosure. In some experiments which he conducted it was found that the loss of temperature of the ground by radiation is very small in comparison with the loss by convection, so that little is gained from the trapped radiation. From this it seems doubtful if the atmosphere is warmed to any great extent by absorbing the radiation from the ground.

The unpleasant discovery that telegraph poles impregnated with copper sulphate by the Boucherie process are so readily attacked by fungi that in some districts they last only eight or ten years has led the Austrian government telegraph bureau to institute experiments in the preservative action of fluorides. In the preliminary experiments air-dried poles were saturated with solutions of acid zinc fluoride containing a little free hydrofluoric acid. After two years' service from 80 to 100 per cent of these poles showed a surface absolutely intact, while of the poles treated with copper sulphate, after two years' service, only 50 per cent remained free from fungi and 10 per cent were badly rotted. In subsequent experiments on a larger scale the poles were impregnated with acid zinc fluoride both by steeping and by hydrostatic pressure. Analysis of the water which drained from the poles showed that all of the free acid and a large part of the loosely combined acid had been absorbed by the wood. The durability of this second set of poles has not yet been made known.

A TOOL FOR BORING SQUARE HOLES.

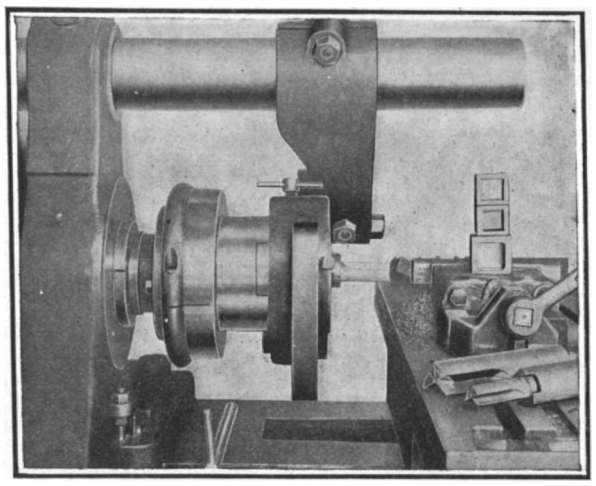
Bits for boring square holes have been on the market for years, but they are adapted for use only in cutting into wood. The tool bores a round hole, while at the same time it cuts out the corners with a cutter, which is fed into the hole without turning. Obviously, such a tool will not work in metals, and yet square holes have a wide use in machinery for keys, wrenches, hand wheels, etc. The present method of making square holes in metals is either to punch them in or cast them, or to drill a round hole and then work it up into the right form with a slotter or shaper.

A tool for boring square holes in metals as easily and almost as quickly as a round hole can be bored has recently been devised by Mr. Carl Philgus, a German inventor. The body of the drill has the form, in cross section, of a spherical triangle. The triangle is made up of equal arcs, each struck from the intersection of the other two arcs as a center. Such a triangle will always touch the four sides of a circumscribed square; and as the triangle is turned, the corners of the triangle will move in a rectangular path, following the sides of the square.

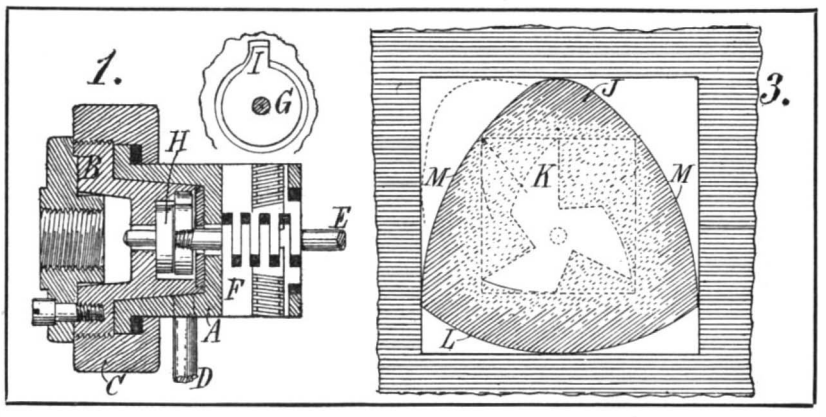
This principle is not a new one. It was discussed in the SCIENTIFIC AMERICAN of April 17th, page 300, under the title "Rotagons." It has been used to a limited extent as a cam movement for the purpose of converting rotary motion into rectangular motion.

The tool, which we illustrate in the accompanying engravings, consists of a drill of the form just described and a guide which imparts the rectangular motion to the drill, the two being fitted in a chuck, which may be secured to the spindle of a lathe. As shown in Fig. 1, which is a section taken longitudinally through the chuck, the device consists of a stationary part *A* and a revolving member *B*, the two being connected by a collar *C*. To hold the member *A* stationary, a pin *D* is provided, which projects from member *A*, and is adapted to engage the bed of the lathe, while the part *B* is secured to the spindle of the lathe. The drill is indicated at *E*, and the guide at *F*. Fig. 2 shows the guide in perspective, and also in plan. It will be observed that it is made of two intermeshing members, which may be adjusted toward or from each other to diminish or increase the size of the square opening, so as to serve for different sizes of drills. As the drill is revolved in the opening, it is evident that there will be a bodily displacement of the drill, and for this reason it will be impossible to couple it directly to the revolving member *B*. Instead, it is screwed into a plate *G*, which bears against a wear plate *H*, adapted to take the thrust of the tool. The plate *G* is formed with a projection *I* at one side, as shown in detail in Fig. 1, and this projection is adapted to enter a recess in the revolving member *B*. Owing to this engagement between the plate *G* and the member *B*, the tool will be revolved, and yet will be free to move bodily in any direction demanded by its engagement with the guide *F*. The cutting part of the tool is like that of an end mill, and its action is similar except for the rectangular displacement. The two members of the guide are adjusted with respect to each other by means of a right and left handed screw, which engages a threaded recess in each member. The use of a pin such as that shown at *B* to keep the part *A* stationary, is not recommended for heavy work. In such cases it is better to clamp the part to the lathe bed. The tool is very well adapted for use on a milling machine, the part *B* being screwed to the spindle, while the stationary part *A* is clamped to the supporting arm of the machine.

The drill so far described will cut square holes with rounded corners. For most purposes a hole of this sort is just as good as one in which the corners are sharp. However, there are certain conditions in which a hole with square corners is necessary, and to provide for this a special form of drill is required, which is shown in one of the photographs. The tool is formed in two parts, one being a shank adapted to engage the guide, while the other forms the cutting portion. The shank of the tool is much larger than the cutting part, as shown by the cross sectional view, Fig. 3. Furthermore, it is found that one of the corners of the shank must be rounded, as shown at *J*, so as to permit the adjacent cutting edge *K* of the drill to cut into the corner of the square hole when the part *J* enters the corner of the guide (see dotted position), and yet carry the edge *K* in a straight line while the part *J* is moving along the side of the guide. The other two cutting edges of the tool serve merely to rough out the hole, while the finishing cut is made by the point which lies adjacent to the rounded edge of the shank. The arc *J* and the opposite arc *L* are both struck from a center at the point *K*. The other two arcs *M* are flatter than the arc *L*. The form of shank is worked out empirically, and a complete set of templets has been made for different sizes of tools.

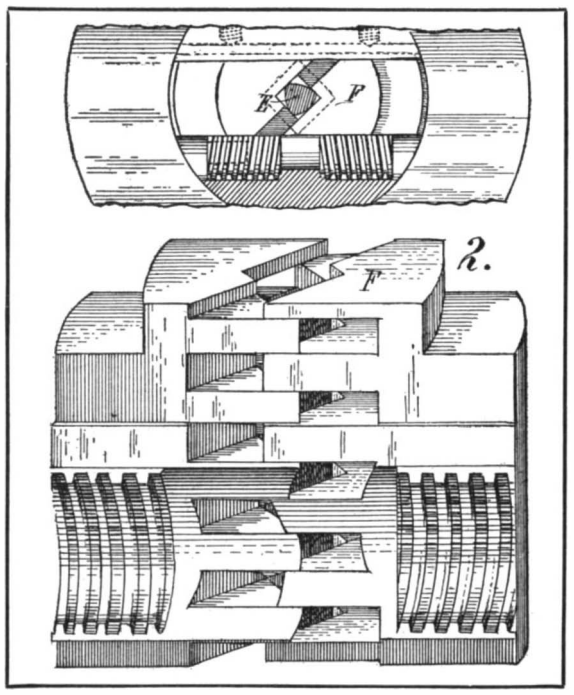


The tool for boring square holes mounted on a milling machine.

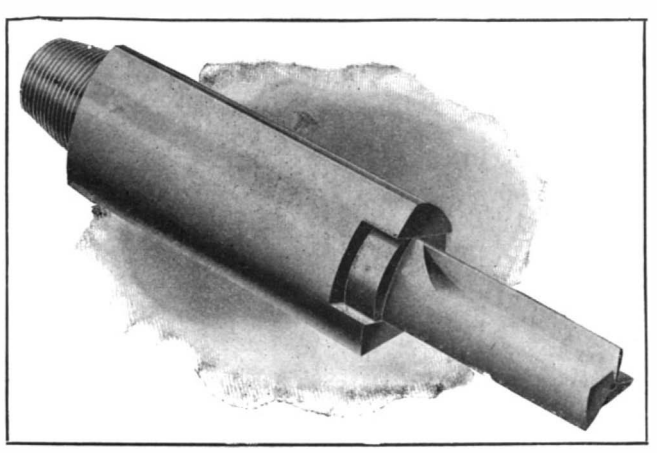


Section through chuck.

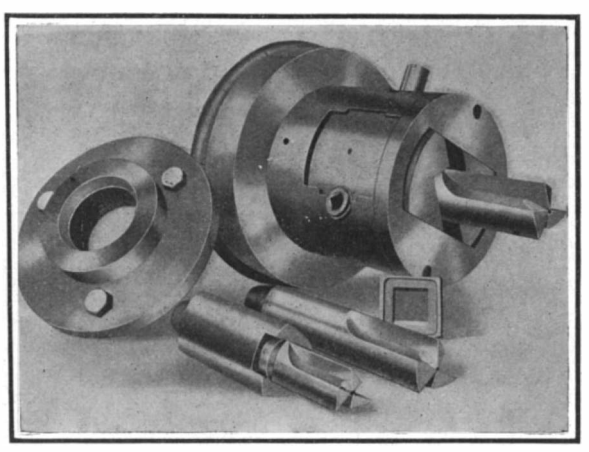
Diagram showing drill for cutting hole with sharp corners.



Details of the guide members.



Drill for cutting square holes with sharp corners.



Chuck holding the guide and drill.

A TOOL FOR BORING SQUARE HOLES.

Sun Spots and Animals.

H. Simroth has attempted to explain successive glacial periods and climatic alternations by changes of latitude caused by a very slow oscillation of the earth, to the extent of 30 or 40 degrees in each direction around its longest axis, which meets the surface in Ecuador and Sumatra. The cause assumed by Simroth for the pendulation is the oblique impact of a former satellite, coming from the west-southwest, upon the earth in the region of the Soudan. With this "pendulation theory" is associated the hypothesis that all animal life originated near the 10 degree meridian (the equator of the pendulation axis), which passes through Central Europe and the Soudan, and one of its consequences is an intricate connection between sun spots and the geographical distribution of animals. Such a connection has long been assumed to exist (in regard to visitations of locusts, for example) but the assumption has found favor with few zoologists. According to the theory the period of fluctuation in animal life should be the mean sun spot period of 11 years, although the interval which actually intervenes between successive sun spot maxima varies from 6 to 17 years. In 1907, in accordance with the theory, many species of animals appeared in unaccustomed places or in unusually large numbers. The following examples, with many others, are mentioned by Simroth in a recent article. Siberian pine jays flocked into Germany in great numbers in 1907, as they had done in 1896. The cause commonly assumed for the migration of these birds is a failure of the Siberian crop of pine nuts, which are their principal food. Simroth, on the contrary, attributes the migration to increase in the number of birds, resulting from an unusually abundant crop of pine nuts in the preceding year. In support of this view he cites the very heavy crop of seed produced by German conifers in 1906, and the remarkably large numbers of squirrels seen in 1907.

Asiatic prairie hens also appeared in Europe in 1907. Their last previous appearance was in 1888, approximately two sun spot periods earlier. In 1907 the woodwork of the National Museum in Washington was seriously injured by termites. A similar attack had been made 11 or 12 years before. In the spring of 1908 about 15,000 pounds of shad were taken from a Prussian lake which had yielded an equally surprising harvest in 1897. In 1907 huge swarms of wasps, thistle moths, and dragon flies appeared in Germany and locusts in Hungary. Simroth attributes to sun spots even the unusual numbers of the white variety of the common great slug (*Luriax maximus*). Without regard to the pendulation theory, the occurrence of so many phenomena of this nature in 1907 is very remarkable, but in the same year many species were unusually scarce. The numbers of every species vary from year to year, owing, doubtless, to climatic influences. Simroth draws from the phenomena a number of conclusions, of which the following are the most interesting:

In the equatorial phase of pendulation, through which Europe is now passing, various organisms return both from the east (e. g., Siberian jays and prairie hens) and from the west (e. g., some American mollusks and plants) to the 10th east meridian. Both the migration and the multiplication of species are connected with the 11-year sun spot period.

The warm period, through which Europe is now passing, occasions a great increase of animal life.—Umschau.

By a German patented process, soluble starch is produced by acting upon a mixture of starch and acetic acid with small quantities of mineral acids at a low temperature. The methods hitherto employed for producing soluble starch do not yield a perfect product and, furthermore, necessitate the employment of heat, because the dilute mineral acids which are used act imperfectly and very slowly on starch in the cold. In the new process the mineral acids appear to act only as conveyers or catalyzers. The product, which apparently is an acetyle derivative of starch, dissolves completely in hot water and the solution does not coagulate, even after long standing. The soluble starch may be used in adhesive pastes, for thickening colors and in many other ways.

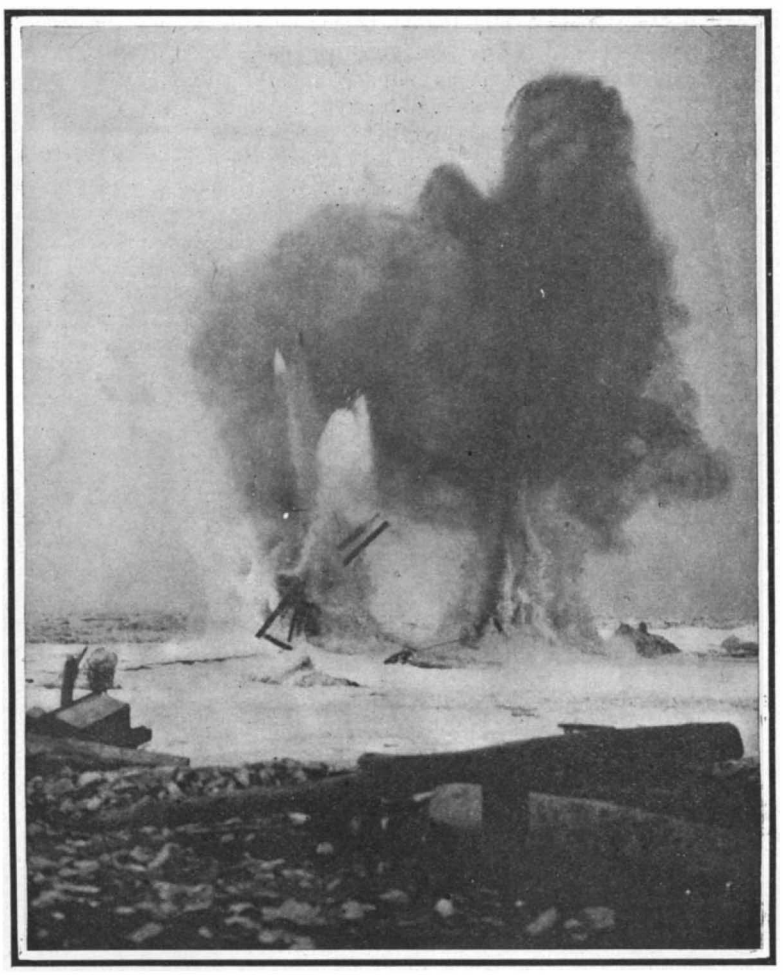
DYNAMITING THE NIAGARA ICE JAM.

BY ORRIN E. DUNLAP.

Scientists tell us that centuries ago the entire Niagara section was in the grasp of a mighty glacier, this ice formation of the past being responsible for the interesting features we now view there. The information dug up by geologists as to the ice period of the past, the Ice Age, as it is termed, is most interesting and forms a chapter that is fascinating. No less interesting is the story of the latest glacial formation that captured Niagara and turned the great gorge and the banks beyond it between the Lewiston escarpment and Lake Ontario into a mighty reservoir, jammed by ice, raised to such an extent that lives and property were endangered to a more pronounced extent than at any time, so far as known, since the whites settled on the banks of the river now accepted as the boundary line between the countries.

Engineers and others have been astonished by conditions that developed at Niagara during the last month. It required the engineering talent of the State Department of Public Works to relieve the situation caused by a remarkable ice jam. On Wednesday, April 7th, a hurricane swept the Lake Erie and Niagara River region. This wind was terrific in its velocity and force. It broke up the ice in Lake Erie and also drove it into the Niagara River channel. Quickly, the river began its work as a transportation agent, and after the first of the ice floe reached the Falls of Niagara hundreds of tons were delivered into the gorge every second. Over both the American and the Horseshoe Falls the ice plunged. Day and night the delivery from the higher to the lower level was continuous. Water, too, was sent into the gorge in great quantities, the effect being that the level of the lower river was rapidly raised from its normal level to a height never before recorded. Normally the river is 343 feet above sea level, but on the night of Friday, April 9th, it attained a height of 382 to 383 feet, and burst in through the windows of the power house of the Ontario Power Company, at the water's edge, on the Canadian side, flooding the station and depositing hundreds of tons of ice on the floor. All the machines were wet and had to be shut down. Despite the fact that the company's electrical engineers and other experts worked hard, the station had not resumed operation the fore part of the last week in April, the work of drying out the big generators of 10,000 horse-power having been found to be a task of no small magnitude. The damage to the company was estimated by it at $100,000, exclusive of the high-grade lubricating oil used to the extent of about 100 barrels, under normal conditions, in lubricating the bearings. While this great power house was shut down, the Electrical Development Company of Ontario and the Canadian Niagara Power Company took on part of the current load. As the transmission lines of the Ontario Power Company's service extend very many miles, the industries were temporarily embarrassed by the disaster.

On the morning of April 10th it was found that the river was jammed with ice for nearly every foot of the distance between the mouth and the Falls of Niagara. There was an open spot at the Whirlpool Rapids, but up and down stream from this tumultuous point, the water was hidden under a mass of ice of great thickness, which finally attained a thickness of between 40 and 50 feet.



Copyright 1909 by O. E. Dunlap.

The blast that broke the Niagara ice jam.

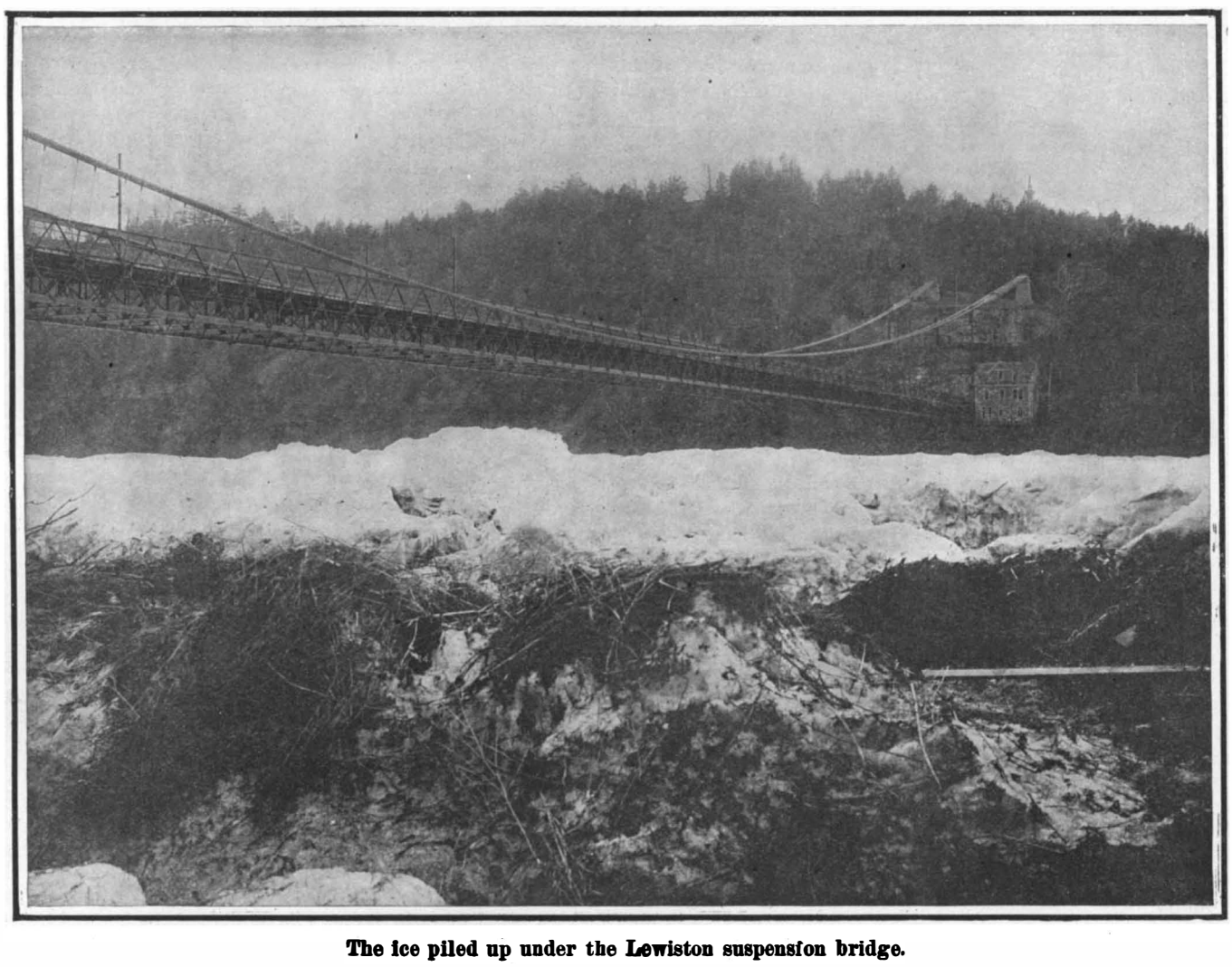
As the water rose to an abnormal height, the ice was carried over the tracks and roadbed of the Niagara Gorge electric railway for miles of its length. As the water receded it left the road buried under from 10 to 20 feet of ice for these miles.

At first the jam was accepted as an unusual, entertaining spectacle, but within a few days it was observed that the ice was rising higher and higher. There was no water in sight, but it was evident that the river was the agent that was sending the ice up, up, up, until it had risen to 50 feet from the normal level of the stream. The flow of the river on the higher level above the falls did not indicate that Lake Erie was discharging an unusual quantity of water at that time. Then the conclusion quickly came that the ice jam had settled to the bottom of the river at the mouth between Fort Niagara and Niagara-on-the-Lake, where sandbars are known to exist to retard the passage of ice and water to the lower lake. This decision made it clear that the Niagara gorge and the river banks beyond were being transformed into a vast storage reservoir, on the surface of which a giant glacier was being elevated day and night as the Falls of Niagara continued to pour their millions of gallons of water into the gorge every minute.

At Lewiston the ice was now attacking a hotel veranda, while up stream boat houses, fish traps, docks, etc., had been swept away, and down stream private pumping stations and docks had been buried or wrecked. The ice was jammed against the abutments of the great upper steel arch bridge at Niagara Falls, and down at Lewiston the top of the glacier was within about 15 feet of the deck of the lower suspension bridge, which originally was erected 65 feet above the normal level of the river. The shed of the inclined railway, Canadian side, near the Falls, was a broken mass of timbers, and the steamers "Maid of the Mist," the little boats that carry people up near the Falls to Rainbow Land in the summer time, were shocked at the persistency of the ice in butting against them, as they nestled high on the slope of the bank.

It was evident that unless action was promptly taken to relieve the situation still greater damage would be done. John A. Merritt, collector of customs of the port of Niagara Falls, asked the United States War Department to instruct the United States Engineers in Buffalo to investigate and suggest a remedy, but nothing was effected. Sanford White, president of the village of Lewiston, wired Governor Hughes, who was quick to hurry the engineers of the State Department of Public Works to the scene. Assistant State Engineer Kunzie made an investigation. He realized that the great river had all or partially ceased to find its way into Lake Ontario. Under his orders, tons of dynamite were hurried to Fort Niagara by wagon that night. On the morning of Thursday, April 22nd, it was being placed in a hole in the ice at the mouth of the river, the purpose being to shatter the ice and open a channel to the lake. The blasting continued throughout that afternoon, and by Friday it was evident that the jam had been broken, the water receding rapidly. On Friday more blasting was done to break up the field, and Saturday added to its destruction. By Sunday the river itself had resumed its work with great vigor and continued breaking up the ice field and opening a channel until all danger was past. Mass after mass would break away and start down the river like a great white ship. The spectacle of the breaking up of the ice was impressive. The ice was seen to be many feet thick above the water line, its depth below being unknown.

The Ontario Power Company was damaged by a backing up of the water close to the Horseshoe. Three miles down stream from the power house two of the power transmission towers supporting the aluminium transmission line were upset by the ice jam, though they had been placed at a point estimated far above the



The ice piled up under the Lewiston suspension bridge.

The ice is here shown within 15 feet of the bridge, the floor of which is 65 feet above the water.

DYNAMITING THE NIAGARA ICE JAM.

danger line. For miles the poles of the Gorge road were swept away and the wires torn down. The damage to the roadbed is unknown at this writing, but the company is hopeful that it will not be too severe. Hundreds of men have been set to work clearing the ice and debris away, and every effort will be directed to a resumption of travel over the line at the earliest possible moment. It is hoped that the road will be ready for the usual summer traffic.

Old residents below the Lewiston mountain agree that the winter of 1844-45 brought a mammoth jam, but as industry was not then so active along the river as it is now, and as there were no great bridges and power stations endangered, the record made was not so notable as that of the big jam of 1909, which will long be remembered as a warning to engineers that all the freaks and possibilities of the mysterious Niagara are not yet known.

The Budde Hydrogen-Peroxide Process for Sterilizing Milk.

The problems confronting a public pure milk supply are only too well known. The greatest difficulties arise from the fact that trade milk is drawn from so many quarters and such a varied assortment of sources, and then promiscuously mixed, that even if the supply from one set of cows should be pure, it is immediately contaminated by its admixture with the product from other doubtful cattle. Sterile milk in the generally accepted sense of the word is practically impossible to obtain. Numerous methods have been evolved for treating milk so as to render it perfectly innocuous. Scalding and boiling are the most commonly favored means for destroying germs, but heat destroys the character of the article, and in artificially fed children is invariably productive of rickets and other serious infantile maladies. In pasteurizing milk no two dairymen adopt the same degree of temperature.

Within recent years the tendency has been toward the use of a powerful antiseptic, such as hydrogen peroxide. Although highly successful in its results, the use of an antiseptic requires care, since otherwise the requisite effect is not achieved or the taste of the milk is quite changed. A Danish chemical engineer, C. Budde, D.Sc., of Copenhagen, has for some time been prosecuting his investigation along these lines, and after prolonged experiment has succeeded in evolving a process which has received the indorsement of such eminent bacteriologists as Prof. Von Behring, Dr. Rideal, Prof. Tanner Hewlett, and other well-known luminaries at the leading institutions of Europe. So effective is it in its application, that Buddeized milk, as it is generically termed, is becoming extensively consumed not only in Denmark, but other European countries and Great Britain.

Although it appears somewhat elaborate in comparison with the popular dairy methods the process is so inexpensive as to enable the purified milk to be sold at the customary price. The milk upon collection from the various farms is brought to a central depot, where it is raised to a temperature of 122 deg. F. In this heated condition it passes through a centrifugal cleaning machine similar in design to a separator, but having only one outlet, the cream not being separated from the milk. This operation not only removes all particles of dirt suspended in the milk more effectively than ordinary filtering, but also serves to arrest any bacteria that may be adhering to the foreign articles and to the minute motes of the tissues of the cow which are always present in milk. It may be mentioned in passing that such cleaning the inventor maintains to be necessary in any milk treatment, since experiments have proved that the bacilli adhering to these different particles are the most resistant. Striking illustration of the extent to which dirt is present in milk is afforded by the amount of residue that is found in the bowl of the centrifugal cleaner after the raw milk has passed through.

From the cleanser the milk passes into a water-jacketed glazed earthenware vat, in which it receives the predetermined quantity of hydrogen peroxide (H_2O_2). The temperature of the water jacket can be raised to the requisite degree and maintained thereat merely by the admission of steam. The vat is fitted with a mechanical stirrer, which is actuated from time to time to create and maintain a homogeneous mixture. The peroxide is perfectly harmless when taken in small quantities. The amount used by Dr. Budde is very minute. The chemical is added to the fluid when heated to the temperature of 122 deg. F.

The effect produced upon the milk by the hydrogen peroxide is that the enzyme catalase, first isolated by Loewe at Washington in 1901, attacks the hydrogen peroxide, and immediately decomposes it into water and oxygen. The result is that the one volume of oxygen thus released—hydrogen peroxide consists of two equal parts of hydrogen and oxygen—immediately seizes upon another atom of oxygen. Consequently, for a very short moment the oxygen is in the form of unic atoms, and exercises a far greater inclination than ordinary oxygen to combine with the oxidizable substances present, which fact explains the well-known powerful oxidizing qualities of the hydrogen peroxide. It is imperative that the H_2O_2 be chemically pure.

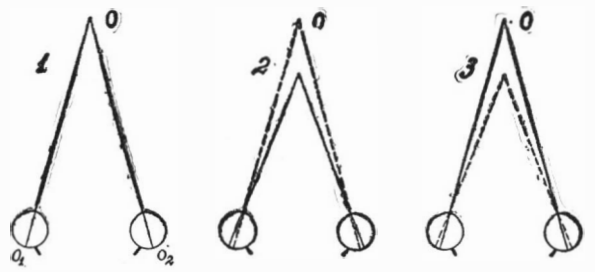
The product has been subjected to prolonged searching tests by eminent Swedish, Danish, Austrian, and German scientists and bacteriologists, who have pronounced an eminently favorable verdict thereon. Possibly the most striking of these investigations were those carried out by Dr. Th. Begtrup Hansen at the Silkeborg Tuberculosis Sanatorium in Denmark in comparison with raw and pasteurized milk. The results of these observations were completely satisfactory. It was found that the patients partook of the Buddeized milk readily and found it agreed well with them; it was well absorbed and possessed good nutritive value; and in certain cases of gastric and intestinal disease agreed better with the patients than pasteurized milk, while no ill effects arose from the method of sterilization. Its greatest advantage, however, was its sterility, while the fact that it insured the destruction of tubercle bacilli in mixed milk from several cows, such as ordinarily exist in trade milk, i. e., that generally provided for the public, was especially commented upon.

WHY DRUNKEN MEN ALWAYS SEE DOUBLE.

The first answer to this is properly that they do not; for in order to see double, one must have two good eyes with accompanying sets of nerves and cerebral organs; and as there is nothing to prevent a one-eyed person from getting drunk, all drunkards do not necessarily see double.

Having, however, made this restriction we may consider the causes of seeing double in drunkards or others; and incidentally touch on why it is that we see at all.

The eye resembles in many things a photographic camera. There is a chamber which receives light only through a convex lens, having a diaphragm in front thereof; the interior surface is dark, and there is a receiving surface for the image. Furthermore, within certain limits the distance between the lens and the receiving surface is adjustable to suit the distance of the object depicted, and the opening in the diaphragm in front of the lens is adjustable in diameter. The lens makes on the receiving surface an inverted and diminished image of the object seen. This surface is very complicated; although the layer (itself the innermost of three forming the wall of the camera) composing it is only about 0.4 millimeter equaling say 0.016 inch in thickness, it is made up of no less than ten layers. First comes a layer of pigment; then a



layer composed of alternate rods and cones, or tenpin-shaped bodies, lying radially; then a layer of a sort of skin, then one of grains; then one of fibers; as the eighth coat comes a layer of gangliar cells, then one of nerve fibers, and at last the inner skin; all these within a thickness of about 1/60 of an inch. The compound layer is in communication with a certain portion of the brain by means of a nerve, which starts from a point between the axis of the eye and the nose, and crosses the nerve coming from the other eye, so that the nerve of the right eye goes to that particular portion of the left half of the brain which is devoted to the sense of sight, and that from the left eye goes to the right side. Where the axis of each eye cuts the receiving surface (called the retina) there is a point that is specially sensitive to sight. Where, however, the nerve itself enters the eye and spreads out to form the retina, the eye is perfectly blind.

When we wish to see distinctly, we automatically so adjust the eyes laterally, by converging them more or less (they are always to greater or less extent convergent in the case of normal eyes) that the image formed in each falls upon the sensitive point of the retina. If the object is too far off to enable us to get a distinct image thereof in either eye, we can do one of several things. We can bring it nearer, so as to throw its sharpest image on the retina instead of before it; or we can by contracting the eye muscles bring the retina nearer the lens; or we may use a concave lens to throw the image farther front in the eye; or, last of all, we may do with the eye what we may do with a camera—reduce the convexity of the lens itself.

Both eyes may be moved either upward or downward, or to the right or to the left, in the plane in which they lie. They may also be made more or less convergent; but it is impossible to direct one of them upward and the other downward. If we converge them so that the two images fall on the sensitive point of the corresponding retinas, we get in the brain a sharp image. If, however, from any cause, we are not able to move the eyeballs so as to have this image fall on the respective sensitive points of the retina, we see double. This is shown in the annexed sketches, in which Fig. 1 represents the position of the two eyes as properly fixed on an object O, the images O_1 O_2 coming at the sensitive point of each retina. In Fig. 2, however, the eyes are too much, and in Fig. 3 too little convergent; so that in either case the brain sees two objects instead of one.

This seeing double can be caused by temporary or permanent paralysis of either the inner or the outer lateral muscles of the eyeballs. For permanent paralysis there may be any one of several causes; for temporary paralysis also, among these latter being the excessive use of alcohol or of tobacco, or of both together, or the effect of poison, as for instance lead. Under the influence of strong drink, the controlling muscles of the eye, like others of the body, are not under command; hence, some drunken subjects stammer in their speech, others stagger in their walk, and others see double.

One-third of All Proper Names Derived from Parts of Speech.

The surnames which appeared upon the schedules of the First Census show a very great preponderance of English and Scotch names. A large proportion of all the names are adaptations of nouns, verbs, and other parts of speech, and in general, represent the simplest Anglo-Saxon terms. Inspection of the nomenclature of the surnames of the First Census suggests the preponderance of the distinct Anglo-Saxon element. About 30 per cent of the entire population was represented by names adapted from parts of speech. Upon a classification, according to the meaning of the names, it appears that the origin of practically all was connected with daily life and surroundings. Classified by meaning, most of the proper names derived from parts of speech which appear in the First Census schedules fall under the following topics: Food, eating, drinking, clothing, sewing materials, household utensils, nations, towns, cities, nationality, kinds of men, condition, appearance or state, bathing, ailments and remedies, occupations, parts and conditions of the body, relationship, games, religion, music, literature, kind of house, building material, belongings, surroundings, furniture, tableware, merchandise and commodities, money, color, objects of nature or features of landscapes, trees, plants, and flowers, fruits, nuts, weather, beasts, birds, flying and creeping creatures, the ocean and maritime subjects, war, death, violence, and time.

The Current Supplement.

"The Making of a Cold-Drawn Steel Tube" is the title of an article which opens the current SUPPLEMENT, No. 1740, and which shows how it is possible to produce homogeneous ductile steel tubing in large quantities. "Wireless Telegraphy in Navigation" is discussed from the standpoint of the recent process invented by Lieut. Lair of the French navy. Sir Oliver Lodge writes illuminatingly on "Chemical Affinity." The Bottomley seed and soil nitrogen bacteria for leguminous crops is explained by our English correspondent. F. W. Henkel discusses the question as to whether or not there is a trans-Neptunian planet. Prof. E. Rutherford's brilliant paper on "Some Cosmical Aspects of Radioactivity" is concluded. The name of F. W. Lanchester is known to everyone interested in the coming science of aeronautics. It was Mr. Lanchester's studies of bird flight that first interested the late Samuel P. Langley in the matter of solving the problem of artificial flight. In the current SUPPLEMENT appears the first installment of an excellent paper by Mr. Lanchester on "The Fight of Birds," in which he sets forth with rare skill and clearness the mechanics of natural flight. Dr. M. Dorset contributes a good paper on "Some Common Disinfectants." Lovers of musical instruments will read with interest Juseppe Marangoni's history of the double bass violin. This is the first time any attempt has been made to trace the history of the largest of orchestral string instruments. Some illustrations of old-time double basses accompany Mr. Marangoni's paper.

One of the electric railway systems of Washington, which runs through a fruit district, is carrying on a campaign of instruction to the owners of the orchards. A special train runs over the line to carry experts who lecture on the best method of raising and handling fruit. The schedule of this train is published in all the stations along the line so that the lecturers will have a good audience at every stop. On a recent trip of this special train, professors from the University of Idaho and Washington State Agricultural College lectured to large audiences along the line and gave practical demonstrations of spraying, pruning, and planting fruit trees.

Correspondence.

THE ACTION OF A CUTTING EDGE.

To the Editor of the SCIENTIFIC AMERICAN:

The true action of a cutting tool or edge is not fully understood by the common machinist, I have noticed. It is not realized that it does not cut as the word is usually understood, but tears the material apart. No matter how fine the edge, the tool tears the fibers, but the finer the edge the fewer fibers it tears. To divide the material without tearing a cutting edge of absolutely no thickness would be required, but this is an impossibility. On microscopic examination the edge of the finest razor is shown to be composed of irregular saw teeth, while the edge of an ordinary lathe tool is very rough and blunt.

Springfield, Mass. GEORGE CLARK-RAYMOND, JR.

THE DISCOVERERS OF THE HUDSON.

To the Editor of the SCIENTIFIC AMERICAN:

The following dates and facts may be interesting to your readers:

1524—Verrazano saw Sandy Hook, which he called Cape of St. Mary. He entered New York Bay and explored it. He noted the difference between high and low tide to be eight feet in the bay. He sent a boat ashore at Rockaway Beach and again at Quogue.

1525—Gomez entered New York Bay. He called it St. Christobel. He called the cape that Verrazano had christened Cape of St. Mary, Sandy Cape, which was afterward transformed into Sandy Hook. But on a map made in 1527 we find Sandy Hook called by the name that Verrazano gave it, Cape of St. Mary.

1541—On Mercator's globe, made this year, the Hudson is called the Grande River.

1542—Allefonsce sailed through Long Island Sound, described Hell Gate and the Palisades. He noticed that the waters of the great river were salty for eighty-eight miles. He sailed its whole length, as far as it was navigable. But was he the first white man to sail up the Hudson? Did not some of the French traders on Manhattan Island precede him?

1609—Henry Hudson, eighty-five years after Verazzano, entered New York Bay, and sixty-seven years after Allefonsce sailed up the river, now called by his name.

Mr. William Harper Bennett, in the first chapter of "Catholic Footsteps in Old New York" gives these and other facts, and in an extensive bibliography shows us where to look for further information; but it is a pity that he or some one else has not gathered together all the facts concerning the pre-Hudson trips up the Hudson. J. F. SHEAHAN.

Poughkeepsie, N. Y.

WELLS AND DARWIN, AND THE DOCTRINE OF EVOLUTION.

To the Editor of the SCIENTIFIC AMERICAN:

The pioneer work in evolution of William Charles Wells, M. D., of Charleston, S. C., is written up in the following scientific journals: Medical Record, February 15th, 1908, February 13th, 1909, and The Journal of the American Medical Association, March 15th, 1909.

It appears to the writer that European scientists have overlooked some points which may entitle America to a large share in the honor of the discovery of the principle of natural selection and the law of the survival of the fittest. Possibly Darwin's statements have been underestimated, while his opinions have been overrated. In the historical sketch of the later editions of "The Origin of Species," Darwin furnishes the following facts: Dr. Wells "distinctly recognizes the principle of natural selection, and this is the first recognition which has been indicated; but he applies it only to the races of man, and to certain characters alone." "As far as the mere enunciation of the principle of natural selection is concerned, it is quite immaterial whether or not Prof. Owen preceded me, for both of us, as shown in this historical sketch, were long ago preceded by Dr. Wells and Mr. Matthews."

Study of the historical sketch seems to invite the belief that Wells's distinct recognition, application, and precedent enunciation do not raise Wells's work, in Darwin's estimation, above that of some who appear to have done little more than imperfectly copy what Wells had already discovered, clearly applied and enunciated.

The discovery of the principle of natural selection seems to be claimed by several scientists, and only some writers have given Wells's work the credit of its important influence upon evolutionary thought; but all writers seem to consider both the claims of Darwin and of Dr. Alfred Russel Wallace, who, independently and almost coincidentally, discovered the principle of natural selection.

NORBURNE BARNARD JENKINS, M. D.

New York, N. Y.

A Novel Rudder Indicator.

A rudder indicator is now made which indicates the position of a rudder at night without the use of any light in the wheel house. The device is made entirely of bronze and is attached to the steering wheel. An arrow traveling over a dial indicates the exact position of the rudder, swinging as it does with the rudder so that the position of the rudder may be seen instantly in daylight. At night, the scale remains dark if the rudder is amidship. If the rudder is to port, a red light illuminates a translucent shield, thus notifying the helmsman immediately of the general position of the rudder, while the arrow gives the exact angular deflection. If the rudder is to starboard, the shield glows green. In no instance is any bright light shown to interfere with or obscure the wheelman's vision, which is the case wherever a light is turned on in the wheel house.

Common Ignition Troubles.

BY E. Q. WILLIAMS.

If we were to judge by some of the things we read, all ignition troubles are common enough, but if one takes into consideration the number of outfits that are in unskilled hands and the treatment they frequently receive, the wonder grows, not that there are some troubles, but that there are not a great many more.

One of the commonest troubles is weak batteries. When starting out everything runs all right and perhaps continues until the car is so far away that a new battery is not to be had, when skipping or misfires begin, and continue to grow worse until perhaps the engine stops.

In cases of this kind an ounce of prevention is worth several pounds of cure, but when the ounce is not used, it is necessary to do the next best thing. If in a boat or auto, there are frequently some used-up dry cells lying around in the odd corners, and among them may be one or two that still have some life in them. Adding these to the others in series may help one to limp along to where new batteries may be secured, even though 8 or 10 cells are used in series. If all cells are in about the same condition, putting two, or even more sets if you have them, in parallel will help amazingly. If you are near a drug store or where you can get some sal ammoniac, try drilling three or more holes deep into the cell—clear to the bottom won't hurt anything—and pouring in a strong solution of sal ammoniac in water. Let it soak in well; then put in some more. Keep doing this for 10 or 15 minutes and it will help out, though it takes some time for it to soak through and get thoroughly at work. Dilute sulphuric acid is also recommended for this purpose, though the writer has never tried it and cannot say how well it will work. If one were near a source of direct current, putting the cells in series with a bank of lamps—with the positive pole of the line to the carbon of the cells—and running the current through for a time, will rejuvenate them, though as one can nearly always get new cells where current can be had, this scheme doesn't amount to much.

Broken wires and bad connections are also responsible for their share of troubles. Broken wires can usually be located easily if one goes at it right.

When your engine stops, turn it over once or twice and if nothing happens, or if you have a spark jump and you do not hear anything buzz, some main connection has gone; if one or two cylinders work and the rest do not, then the individual wires to the dead cylinders are the ones to investigate.

The first place to look is at the wires that move; for instance, the timer wires; these frequently break at the binding post on the timer. Next look at any loose places where the wire may jar up and down; it may be broken inside of the insulation. If you have an extra piece of wire handy—and it is an excellent plan to have some of what is called "annunciator wire" coiled up in your kit—run it across in the place of the suspected wire, connecting it in. Then try your motor again, proceeding in this way until you find the trouble.

An excellent plan is to leave the motor on contact so that, in the case where it has jump spark ignition, the vibrator of the coil will begin to buzz as soon as the trouble is found; or if the engine has make-and-break igniters, touching the wire which has been taken off the electrode to the frame will tell the story.

Sometimes the jarring of the motor will break the ground wire or make its connection work loose; sometimes a wire will break with apparently no reason and in places where apparently it is absolutely certain that there is no possible way for it to break, so that in hunting trouble, never take it for granted that anything is right, but consider that it is liable to be wrong until it is proved right.

Sometimes the battery connectors break off, or the binding posts jar loose and the current passing through a poor connection turns it black, so that it does not carry the current as it should; this is sometimes difficult to find, but when it is suspected, the best thing to do is to go over the connectors, giving each a strong pull on each end; then go over each of the binding nuts with a pair of pliers and tighten them up so that they are solid. If a battery tester is at hand, try testing the battery clear across from the first cell to the last. This will show whether all connections are carrying current or not, though even if this test shows all right, the jarring from running may make loose connections show trouble.

One of the worst things to ferret out is a trouble that comes and goes. Perhaps everything will work all right for a few minutes or hours, and then the trouble breaks out, and after a few minutes' hunt it is gone only to reappear later.

Such troubles are usually caused by a poor connection, a wire broken inside of the insulation, etc. Perhaps the timer pulls so far around that it grounds a contact; sometimes a lever in a certain position will crowd a wire so that the insulation wears off. But in any event, when trouble of this kind comes, careful study and thought about all the conditions will do wonders in locating it. Above all things, don't get rattled and begin to pull things to pieces, but go at it slowly and carefully, thinking over all the circumstances that might cause it, and your trouble will soon be found.

Bacterial Fertilizers.

Plants assimilate nitrogen only in the form of nitrates, and it is now known that the nitrogen of organic manures is converted into nitric acid in the soil, by the agency of certain bacteria. This discovery led to the manufacture of fertilizers which contained, in addition to organic nitrogen and lime, strong cultures of selected nitrifying bacteria, but the results expected were not fully obtained. There are two reasons for the failure. In the first place, bacteria bred in the laboratory become less prolific when they are suddenly placed in the soil, a medium to which they are not accustomed. In the second place, the few millions of bacteria thus introduced into the field are utterly inadequate to the task imposed upon them, unless they multiply very rapidly.

Stoklasa, director of the Prague experiment station, has devised a method of accustoming laboratory cultures to the soil by cultivating them, for a time, in a mass of earth. This earth was then employed as a fertilizer and was found to increase the crop by one-third. Stoklasa recommends the following method: 2,500 parts of earth are mixed with 50 parts of dephosphoration slag and sprinkled with a mixture of 100 parts of molasses and 1,000 parts of water. A culture liquid is prepared by adding 2 parts of glucose, 1/5 part of carbonate of lime, and 1/20 part of potassium phosphate to 100 parts of water. To this liquid are added a few drops of pure cultures of two very active nitrifying bacteria, *Radiobacter* and *Azotobacter*. When the liquid has become filled with bacteria it is sprinkled over the heap of prepared earth. A few days later this earth is applied to the land in liberal doses, about four tons to the acre. This novel fertilizer can be made very cheaply. It will be observed that the bacteria, in their transition from the laboratory culture medium to the soil of the field, pass through two media of intermediate composition and thus become acclimated by easy stages.

Preserving Wood with Insoluble Fluorides.

The impregnation of wood with solutions of fluorides exerts an excellent preservative action, but insoluble fluorides would be still more effective, as they could not be washed out. Their insolubility prevents their application in the usual way and they can be introduced only by forming them within the wood. For example, the insoluble fluoride of lead, which is instantly precipitated when solutions of a lead salt and of an alkaline fluoride are mixed, could be deposited in the fiber of the wood by impregnating it successively with those solutions. But a similar result can be produced with a single liquid. When a dilute solution of an alkaline fluoride is mixed with a dilute solution of a salt of zinc, copper, iron or chronium, no precipitate falls at once, but an almost insoluble fluoride is precipitated when the liquid is heated to from 140 to 212 deg. F. This precipitate may be a normal, basic or double fluoride, or an oxyfluoride, according to the salts employed and their proportion. Hence it is only necessary to impregnate the wood with the cold mixed solutions and then to heat it to the temperature of precipitation. The minimum quantity of alkaline fluoride used is that required for the formation of the neutral fluoride, but in view of the possible formation of a basic salt, it is preferable to use an excess of alkaline fluoride.

The Death of John D. Hall.

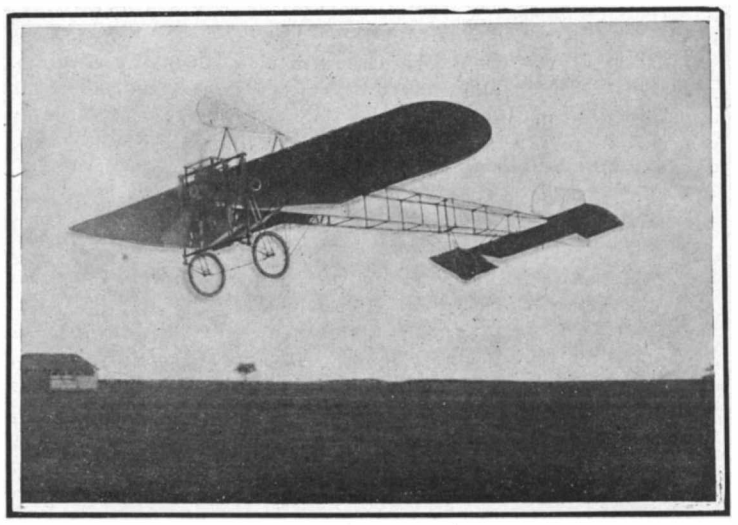
John D. Hall, one of the most prolific of American inventors, died in New York on April 20th at the age of eighty years. Mr. Hall was both a mechanical and a civil engineer. He received his early education in a country school and later matriculated at Union College, from which he was graduated in 1854. It was in California during the gold fever that he first patented an invention, a contrivance for separating gold from ores. When he returned East he became chief engineer for a Philadelphia manufacturer of thermometers. In that capacity, his mechanical genius was displayed in his invention of improved processes of manufacture. His inventions brought him a large fortune in royalties.

Glass containing a large amount of manganese acquires a violet tint after a month's exposure to sunlight. Glass containing only traces of manganese becomes discolored in less than a year, and the tint deepens with time. The color, however, is not necessarily produced by the presence of manganese, for Jena glass contains manganese but is not discolored by sunlight. A violet background appears to accelerate, and a brown or black background to retard, the effect of sunlight on glass discolored by it.

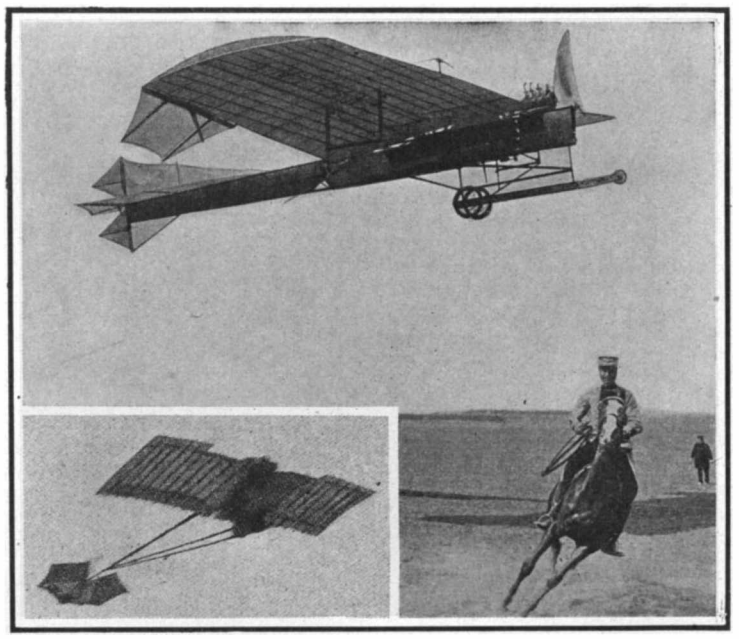
RECENT SUCCESSFUL FRENCH MONOPLANES.

Three of our illustrations depict the three latest monoplanes that have recently made successful flights in France. The largest and most impressive of these is the "Antoinette V," which is the fifth machine built by the company of that name in Paris. The first of these, known as the "Gastambide-Mangin," was experimented with about a year ago. Since then four others have been built. M. René Demanest has been making excellent flights above the parade ground at Chalons, and the photograph depicts him in one of these. On April 9th, after a series of brilliant trial flights of not more than five in number, he won the last of the "250-meter" prizes of the Aero Club of France. He has also made other flights of about a mile, including several turns. His machine is fitted with movable wing tips on the rear edges of the plane. These are used to maintain the transverse stability, and are operated by a vertical wheel beside the aviator's seat and convenient to his right hand. The horizontal rudder at the rear end of the triangular body frame is worked by another wheel in front of the aviator. The latter's seat is in this frame, just back of the rear edge of the plane. A condenser of fine copper tubes extends forward on each side of the body frame from the aviator's seat to the front end for condensing steam formed from the cooling water. The plane is guyed to a central mast above and to the running gear below. The latter consists of a pair of pneumatic-tired wheels, running forward from between which is a beam with a roller on its front end. A telescopic tube with a shock absorber supports this beam near its front end, and takes the initial blow when the monoplane alights. The 8-cylinder, 50-horse-power Antoinette motor is mounted on top of the triangular body frame at its front end, and carries a single 2-bladed propeller on its crankshaft. For an excellent idea of the arrangement of the motor and condenser, as well as for a description of the former, see SUPPLEMENT No. 1728; while a general view of an Antoinette monoplane as exhibited in the first Paris Aeronautical Salon appears in SUPPLEMENT No. 1725. The machine has a spread of 12 meters (39.36 feet), a surface of 40 square meters (430.5 square feet), and a weight of 500 kilogrammes (1,102 pounds). The weight lifted per square foot is therefore 2.9 pounds. The speed of the machine is over 40 miles an hour. Such a monoplane can be imported into the United States for $6,500, and the purchaser will be taught to fly it, if he cares to go to Paris for that purpose.

The "No. XI" Bleriot monoplane, which is shown in another of our illustrations, is the latest machine of that indomitable aviator, M. Louis Bleriot. By lightening the construction, and making his machine as small as possible, M. Bleriot has succeeded in reducing the weight with aviator to 230 kilogrammes (507 pounds). The spread of the monoplane is but 7 meters (22.97 feet), and the length over all is the same. The surface is 15 square meters (161.46 square feet), so that the weight carried per square foot is 3.13 pounds. The "Bleriot IX" carried 4¼ pounds to the square foot, so that although the present machine is much smaller and lighter than the former one, the weight lifted per square foot is less. The wing tips on the ends of the plane have been dispensed with, and the wings themselves are warped instead. The horizontal rudder consists of movable wing tips on each end of a fixed surface placed at the rear beneath the body framework. The motor used is a 30-horse-power R. E. P. 7-cylinder air-cooled engine. It is mounted at the front end of the body framework, and is direct-connected to a 4-bladed propeller having aluminium blades of nearly rectangular shape. The machine as first constructed had only 12 square meters (129.2 square feet) of supporting surface, but this has been increased since the first successful 200-meter (656-foot) flights were made at Issy last January. The speed is about 46½ miles per hour. M. Bleriot has been experimenting of late at Buc, where M. Pelterie has a private aerodrome. In February he made several splendid flights of 1 to 1½ minutes with his "No. IX," in which he made turns with great ease. On March 9th he made a flight of nearly a mile (1,500 meters) with turns with the "No. XI" machine shown herewith; while on March 15th, after executing several flights of 500 to 700 meters (1,640 to 2,297 feet), he made a splendid one of 2,500 meters (1.55 miles) in two minutes with several turns. On April 5th he experienced a slight accident, owing to a wind gust. The machine came to the ground suddenly, but was not seriously damaged, nor was the aviator hurt. We have published descriptions of Bleriot's aeroplanes and of the R. E. P. motor in previous issues.



The Bleriot "No. XI" monoplane in flight.



The huge "Antoinette" and tiny "Santos Dumont" monoplanes in full flight.

The small monoplane shown in one of the illustrations is that of Santos Dumont. This machine is so tiny that it can be transported on an automobile, as was shown in the December 12th, 1908, issue of the SCIENTIFIC AMERICAN. An excellent illustration of the motor as he now has it arranged will also be found in SUPPLEMENT No. 1730. This machine has a spread of 5 meters (16.4 feet) and is 6 meters (19.7 feet) long. Its weight complete with aviator is variously given as 120 and 140 kilogrammes (264.6 and 308.6 pounds). Taking the latter figure, the weight per square foot of supporting surface is 2.48 pounds. The machine has a double-opposed-cylinder air-cooled motor with water-cooled heads located on the front edge of the plane. A large wood propeller is carried upon the motor crankshaft. A suitably braced bamboo pole runs back and carries the tail, and water tubes are run along this pole for the purpose of cooling the water of the motor heads. In this way, the extra air resistance of the radiator is dispensed with. Several excellent flights have been made lately, the best of these being at St. Cyr on April 8th, when M. Dumont flew 1½ miles in a straight line, passing over telegraph wires, fences, etc. The machine has made other flights, and has shown its capability of turning and of being readily controlled. It is the smallest and one of the most successful monoplanes that have ever been produced.

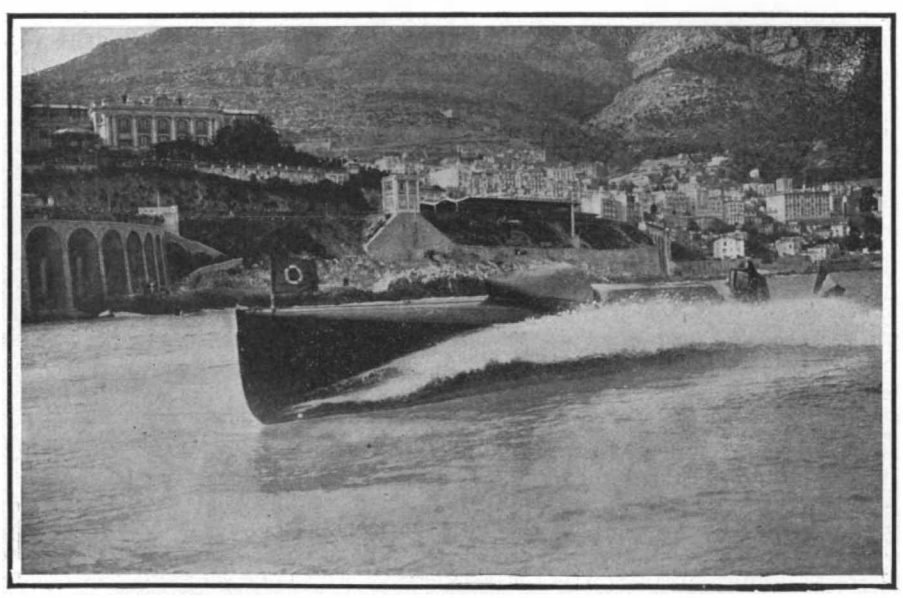
THE WINNING MOTOR BOATS AT MONACO.

Two of the photographs reproduced on this page show the British and French champions that made new world's records last month at the Monaco races. The former is a new 15-meter (49.2-foot) racer fitted with twin screws and two 12-cylinder Wolseley-Siddeley gasoline engines of 300 horse-power each, while the latter is the same Tellier hull that was used last year but which was fitted this time with four 4-cylinder 120-horse-power motors connected in pairs, driving twin screws also.

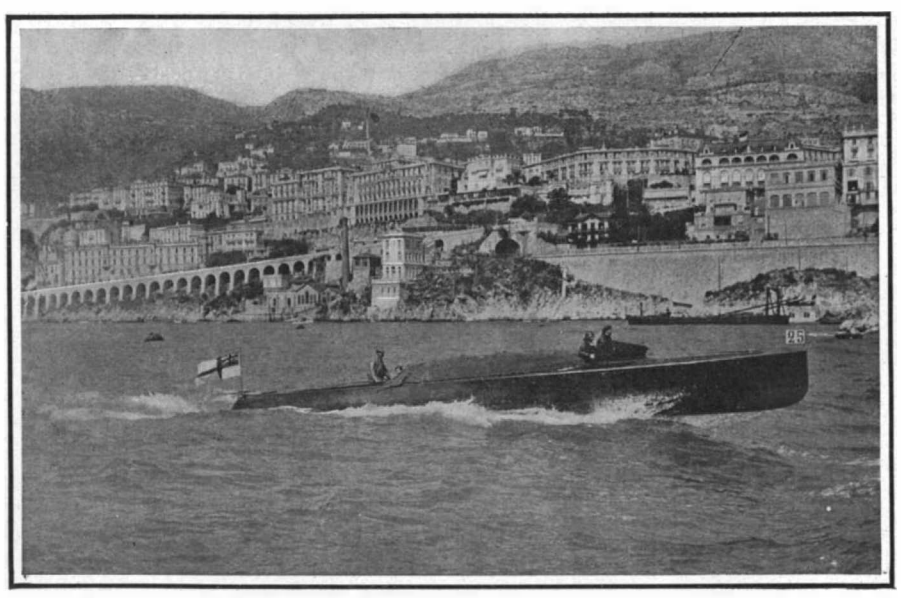
The results of most of the races were given in the April 17th issue of this journal, but it will perhaps be well to recapitulate here. The two boats illustrated and the American "Standard" were the only 15-meter craft. Our other boat, "Dixie II," was only 12 meters (40 feet) in length and about one-third as powerful. The "Standard" was practically rebuilt at Monaco, and she did not race, while the "Dixie II" could do nothing in the Mediterranean.

The first race in which the American, French, and English racers met was that for the Prize of Monte Carlo, held on April 4th. The distance was 50 kilometers (31.07 miles), and the winner was the "Wolseley-Siddeley II" in 49 minutes and 4/5 second, or at an average speed of 38.03 miles an hour. The "Panhard-Levassor" finished but 13 4/5 seconds behind the "Wolseley-Siddeley II," while the "Dixie II" averaged only 21.16 miles an hour.

The "Coupe des Nations" 100-kilometer (62.1-mile) race was won by the "Wolseley-Siddeley" in 1:35: 9 3/5 at an average speed of 39.15 miles an hour. The best lap of the 16 was covered in 5:44 at a speed of 40.6 miles an hour. The "Panhard" dropped out with a broken connecting rod in the 13th round, and the "Dixie II" with a leaking water pump in the 14th. The English champion made a flying kilometer in 56 1/5 seconds, or at the rate of 39.77 miles an hour. The hydroplane "Duc" covered the same distance at a speed of 41.09 miles an hour.



The "Panhard-Levassor" racing at Monaco.



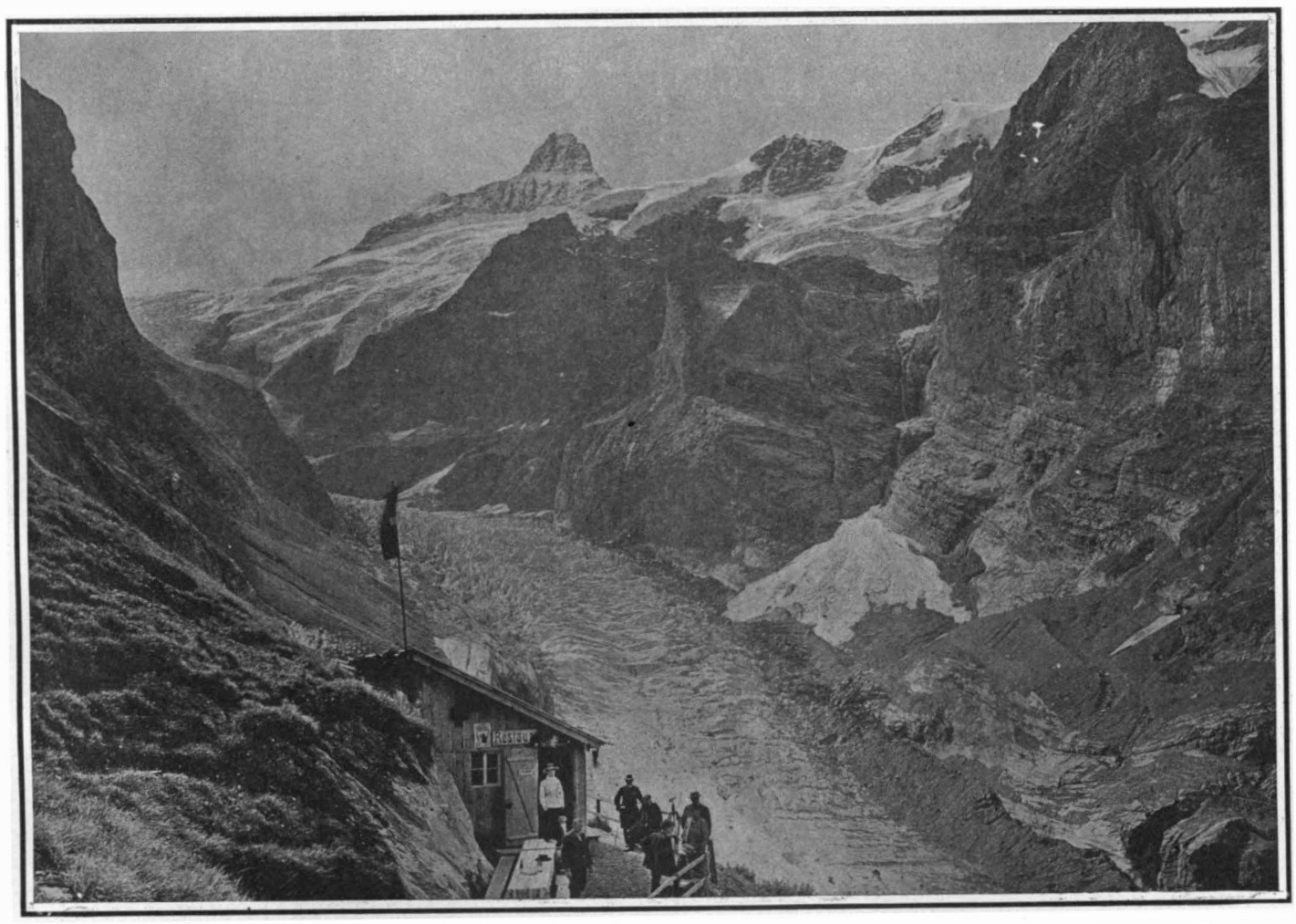
The "Wolseley-Siddeley II" at full speed.

RECENT FLYING MONOPLANES AND RACING MOTOR BOATS IN FRANCE.

THE ELECTRIC AERIAL MONO-RAIL UP THE WETTERHORN.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

An entirely new departure in railroad engineering, in its relation to the ascent of mountains, has recently been inaugurated by the opening of the new line for ascending the steep precipices of the Wetterhorn in Switzerland. The topographical features were such that the construction of a surface railroad was out of the question except at enormous expense, while the route would have been tortuous and lengthy, winding up the mountain face and entailing the heavy cutting of galleries and tunnels for the laying of the track.

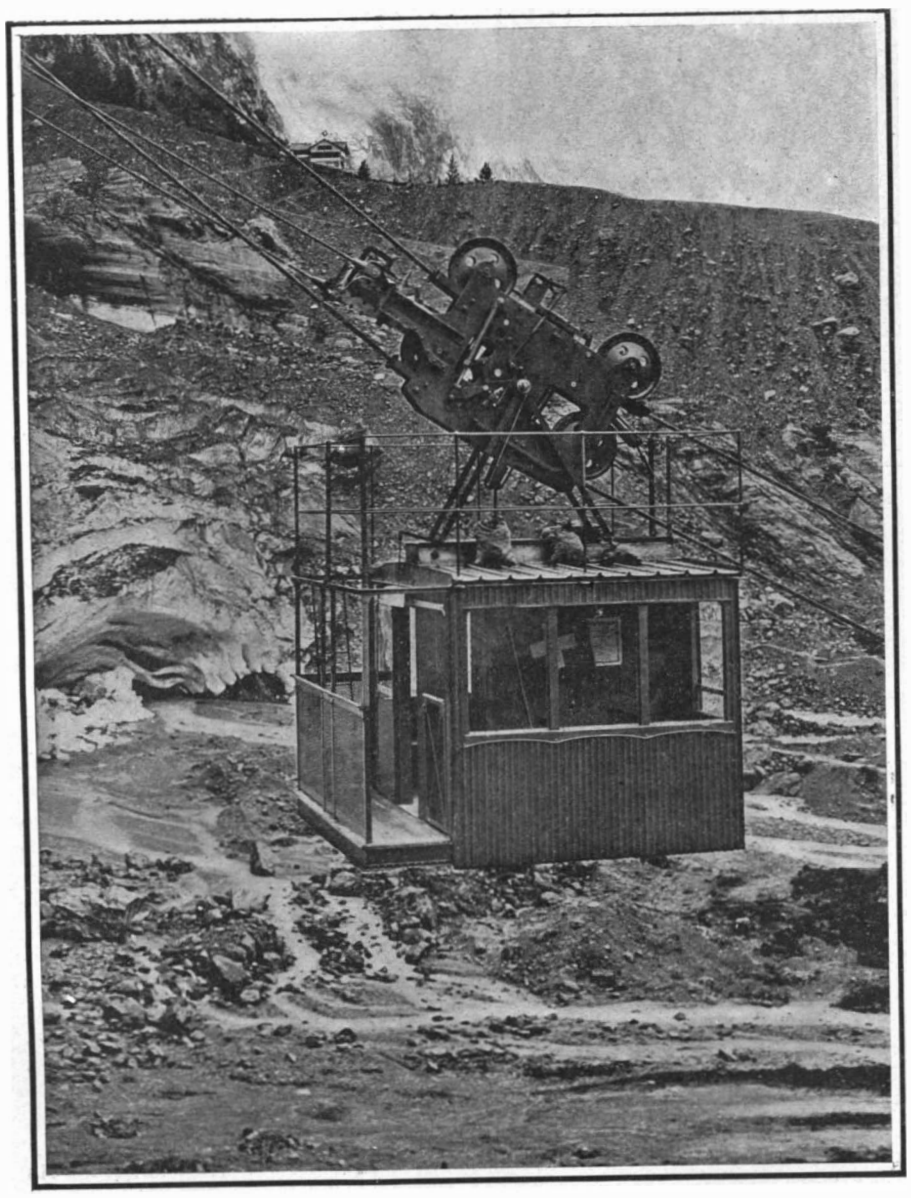


The restaurant near the upper station. View from the Grindelwald glacier.

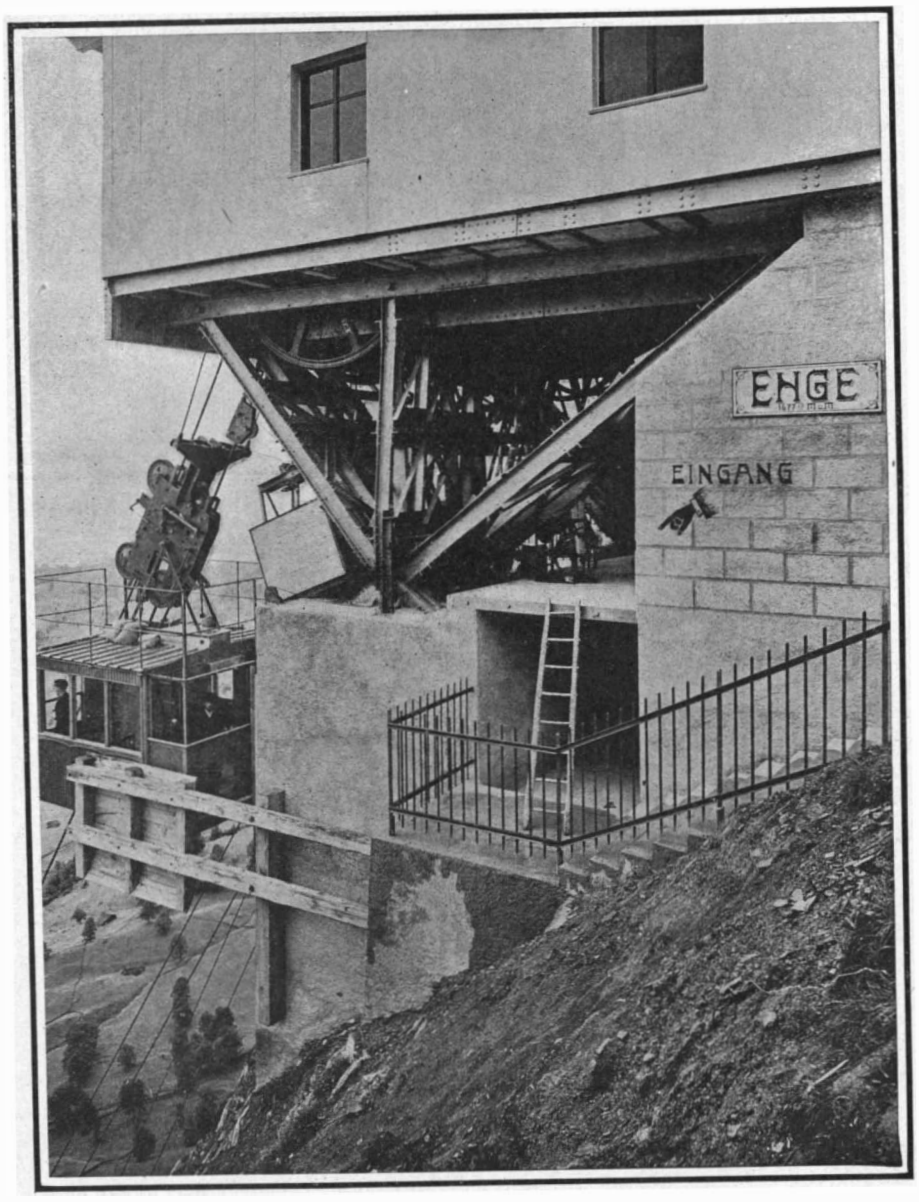
Under these circumstances the promoters of this enterprise decided to adopt an aerial system comprising two sets of cables each carrying a car and so disposed as to work in alternate directions simultaneously so as to secure a counterbalancing system. In evolving the system best adapted to the project, it was decided to combine the broad principles of the ordinary aerial cable system generally practised with those of the suspended railroad invented by the late Herr Eugen Langen and which is now in successful operation between Barmen and Elberfeld in Germany. It will be recollected that in this last-named idea the car is suspended from the running truck, which is mounted on wheels disposed in a single longitudinal line and running on *A* or inverted U-shaped supports according as the line is negotiating streets or passing over the river.

In the Wetterhorn railway the rigid rail of the Langen system upon which the trolley runs is represented by two stout cables placed one above the other. Upon these is mounted the trolley comprising two pairs of wheels disposed exactly one above the other in the vertical plane and a trolley body occupying the space between the two cables, thus forming a compact, almost rectangular truck of narrow width.

The car itself is supported from the trolley, being hung from a transverse axle passing through the center of the trolley body, and in such a manner that it is quite free, so that the car can always maintain an absolutely perpendicular position irrespective of the gradient. The suspension system, as may be seen, comprises an inverted V-frame on either side of the trolley, with the apex mounted on the carrying transverse axle, and the opposite extremities anchored to the roof members of the frame of the car beneath. At the prow of the trolley is secured a suitable transverse framing to the outer extremities of which are attached the ends of two hoisting ropes by means of which the carriage is hauled up the cableway. The track wheels are equipped with guide channels for



The car near the lower station, showing double cable track and method of suspending car.



Upper station, showing carriage at landing stage, the ironwork of the engine house, and method of attaching hauling cables to car trolley.

THE ELECTRIC AERIAL MONO-RAIL UP THE WETTERHORN.

directing the track ropes through the grooves of the upper and lower running wheels respectively, so that the two are kept the requisite distance apart and the wheels secure the maximum amount of adhesion and at the same time prevent derailment.

By means of this railway the traveler is hoisted through the air to a height of some 5,250 feet above sea level to Enge station, a halting point perched on a ledge on the face of the mountain. The lower or departure station is at the foot of the mountain some 4,000 feet above sea-level at the snout of the Grindelwald Upper Glacier and about an hour's walk from the terminus of the surface railroad at Grindelwald, and in close proximity to the Wetterhorn hotel, which is the center for mountaineering and other expeditions throughout the district. The situation of the lower station is such that the line to the upper terminus passes through an angle of 45 deg.

The higher station at Enge is situated on the goat path that climbs round the face of the mountain and is carried on a convenient ledge 5,250 feet above sea-level or 1,250 feet above the lower station. A substantial pier-like structure of masonry has been built at this point, projecting from the contour of the mountain, to serve as a convenient stage for the traveling carriage to enter to land and embark passengers. Above the station is situated the power installation. The power house at its outward end is carried upon a substantial heavy steel-work foundation, the side trusses being built diagonally and crossing and locking with the central vertical section at angles of about 45 deg., thereby giving the foundation ironwork the form of the letter V, as may be seen from the illustration. This plan was adopted not only on account of the great factor of strength rendered possible, but because it offered the most convenient arrangements in the disposition and operation of the hauling cables and drums. So precipitous is the ascent that on looking out from the landing stage of the Enge station, it appears to be a precipitous drop down the mountain side to the lower terminus below.

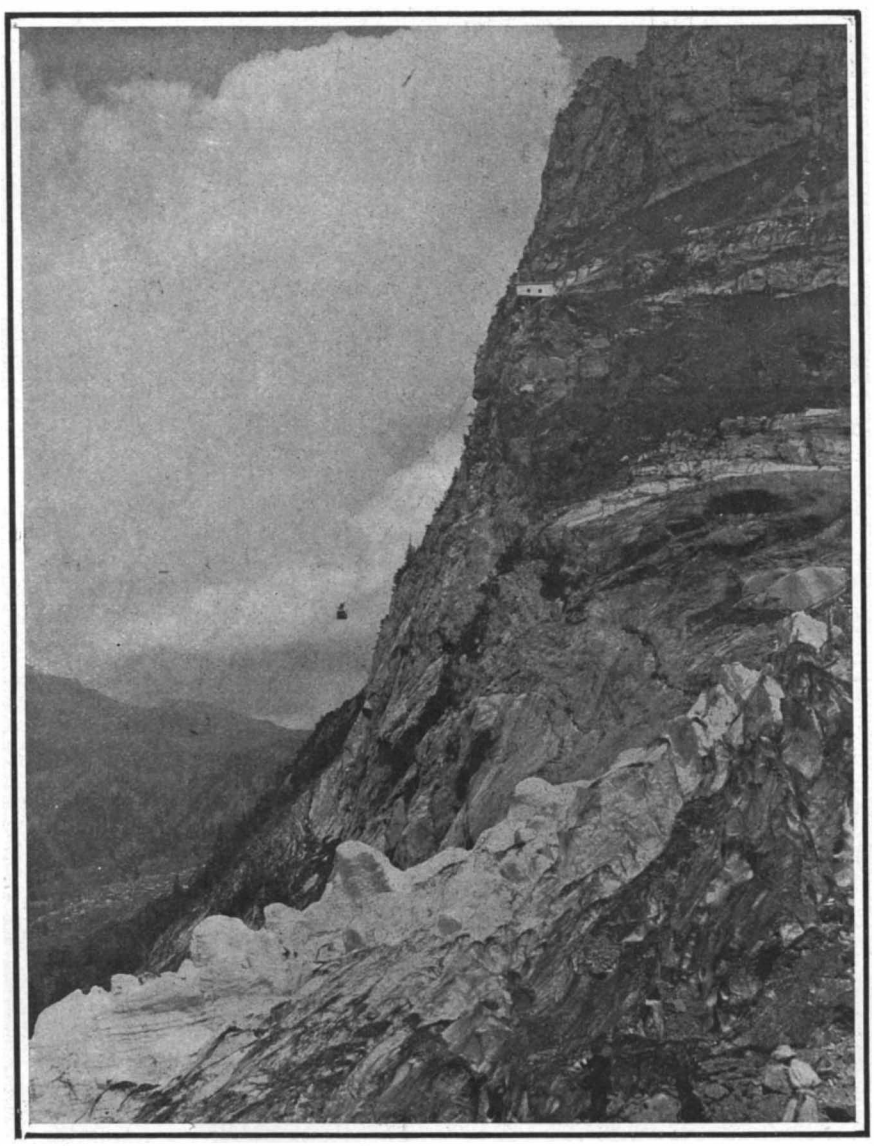
The winding station at Enge comprises two main horizontal winding drums driven by electric motors. The ropes from the drum pulleys pass through the station and over vertically placed grooved pulleys to the prow attachment of the car truck, to which they are attached as already described. These latter pulleys project partially through the power house flooring as shown in the illustration, so that a perfectly clear passage is afforded to the ropes between the car-trolley and the winding mechanism. Track cables are anchored at either end to a depth of 30 feet into the solid ground and are covered with cement piles and masonry. For the purpose of carrying out the work of construction, which was undertaken by the Fonderie de Berne, to whom we are indebted for the courteous permission to reproduce the accompanying photographs, a temporary aerial railway was erected between the departure and Enge stations for the transport of the requisite building material for the latter point, while the heavy track cables were hauled up from the lower point by means of a powerful windlass installed at Enge.

The distance between the two stations is about 1,300 feet and it is carried out in a single span, the alinement of the cable representing a gradient of about 80 deg. The motive power requisite for operating the railway is drawn from the Grindelwald power station supplied from a hydro-electric station on the Black Lütschine River. The power is transmitted to the Enge station by three overhead conductors on wooden poles.

The cars themselves have a carrying capacity of ten persons. They are of light construction and are fitted with every possible mechanism to insure safety in transit. The brakes, of a special type, are particularly powerful and capable of holding the car on the steepest sections of the line. The provision and testing of the brakes constituted one of the most important features of the installations, since it was realized that they would have to be of exceptional strength, in order to control the car upon the higher and steepest stretches of the cables.

In making the ascent the traveler is afforded a magnificent view over the glacier flowing beneath, while the situation of the upper terminus at Enge provides facilities for easily attaining sight-seeing points from which striking panoramas over the surrounding mountain peaks may be gained. The railway for this reason is certain to prove a powerful attraction to visitors, so that its commercial success is practically assured.

Owing to the railway being operated upon the "compensating" system—that is, one car descends while the other ascends—the consumption of electrical energy is very small, and materially contributes to the economics of the system. Wear and tear are also reduced to the minimum, as experience with ordinary cableways has already emphasized. Herr Feldmann, who is responsible for the idea here, shows that by this invention not only is the negotiation of mountains by railroads considerably simplified, and complete stability secured, but the initial cost and maintenance expenses are very materially reduced. Though this is the first instance to which the invention has been applied, the Fonderie de Berne are already completing arrangements for its adoption in other parts of the Swiss Alps where the prevailing conditions render a rack or other system of surface railroad impracticable owing to capital outlay. Even in the case of the Wetterhorn this first stretch is but part of a more complete scheme for reaching the peak of the mountain, which will mean the attainment of an altitude of some 12,150 feet above sea level. The preliminary surveys have proved that the project offers no insuperable difficulties. As experience of working is gained the projectors will become possessed of more reliable data upon which to extend its application, since pioneering is inevitably somewhat slow. The present installation, however, has certainly emphasized in no uncertain manner the celerity with which the system can be carried out, since the construction of this line occupied only about two years, which period in future operations can be considerably decreased. Certainly to the traveler the system possesses many attractive features. Transportation is rapid and comfortable, since the cars travel with remarkable steadiness and smoothness, while owing to the lower cost of installation tariffs can be proportionately reduced. In addition it will serve to bring within the reach of all, many points among the Alps which at present are inaccessible to aught but the daring and those animated by the spirit of mountaineering adventure.



Upper terminus perched on the mountain side. Railroad and car in mid-air.

THE ELECTRIC AERIAL MONO-RAIL UP THE WETTERHORN.

A convenient rule of thumb for ascertaining approximately the size of engine required to drive a direct-current dynamo is to multiply the kilowatts of output by 1.7 for small machines, 1.6 for medium sizes, and 1.5 for 500 kilowatts or over. The result will be about the brake horse-power required.—Power and the Engineer.

Phonograph Appliance for Visible Record.

A large proportion of public singers have a faulty pronunciation, as is well known. This defect is further exaggerated by the phonograph, even in the case of the best instruments, and it often happens that one's pleasure in hearing a record is lessened by not being able to understand the words. M. De Pezzer, a Paris scientist, overcomes the difficulty by using an apparatus which can be adapted to any phonograph and carries a paper strip with the words to accompany the music so that we see the words as the music is heard, and at the proper time. To this end a box is fitted to the phonograph and it has a guide in which the paper band can slide along. The band is unrolled from a roller on one side and it is driven along by perforations in the sides of the band which work with a toothed roller. At the other end, a roller winds up the strip as it is fed along. A groove or window cut in the box makes a part of the band visible. The toothed driving wheel of the strip is connected by gearing with the phonograph mechanism, but it can be thrown out of gear at any moment by a suitable device. An already prepared band is put in place and it is started at the moment the first note is heard. The essential point lies in preparing the paper strip, and this is carried out by obtaining a first graphic diagram which the apparatus furnishes. To this end a strip of white paper is mounted in the above box and there is mounted an electric registering device whose stylus, a lead pencil point, bears upon the paper as it runs along. Contact can be made for the electric device by a telegraph key. A phonograph disk being mounted in place, a skilled person listens to the piece of music and beats time by means of the telegraph key, so as to make a record of intervals or notes upon the paper by means of the stylus, thus giving the structural record of the piece. Each beat represents a note and the intervals between the notes are then shown. Afterward the proper syllable is written opposite each beat and we thus have the record of the musical piece. This first record gives a model from which printed records are easily made, the only essential point being to observe the time divisions of the original.

Visible Vibrations of the Atmosphere.

M. Raymond has communicated to the Astronomical Society of France a method of obtaining ocular evidence of the existence of waves and currents in the atmosphere, by projecting on a screen a magnified image of the sun. The first observation of this kind was made by Ventura. The focusing can be so adjusted as to bring out sharply the vibrations of the air in the form of markings which cross the sun's image. A remarkable regularity and parallelism of the markings, and consequently of the stream lines of the atmosphere, is frequently observed.

Puiseux has called attention to the analogy between these phenomena and the fringes and shadows which are so often seen moving over the ground and along walls during total solar eclipses, especially just before and after totality, when the visible disk of the sun is reduced to a narrow crescent. These fringes have given rise to numerous discussions. Their explanation is undoubtedly to be found in the refraction of the sun's rays by ripples in the upper atmosphere, running parallel to the general direction of the thin solar crescent. When the entire disk of the sun is visible the shadows cast by its various parts overlap and become confused and hence invisible. A parallelism between the course of the fringes and that of very high cirrus clouds crossing the face of the sun has also been observed.

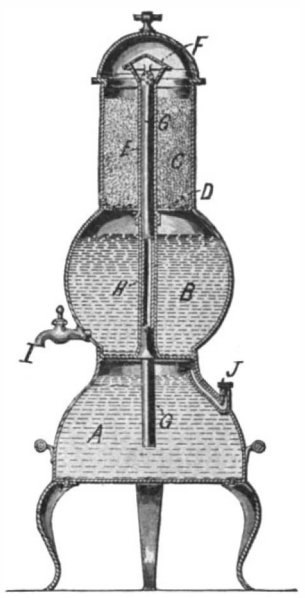
Miss C. O. Stevens has discovered a method of seeing atmospheric waves, not as projections, but directly, and without waiting for an eclipse. If the eyes are protected by a screen of thin fabric it is often possible to see a series of bands, alternately light and dark, moving across the face of the sun. These bands are due to a moving train of air waves, which act as prisms.—Cosmos.

The city of Denver, Col., has recently installed a new bacteriological laboratory at City Hall, which is one of the most complete in the country. The physicians of the city depend absolutely on the bacteriological work of the department for diphtheria, and they are in hopes this season of doing efficient work in typhoid fever.

Patent Department

AN IMPROVED COFFEE URN.

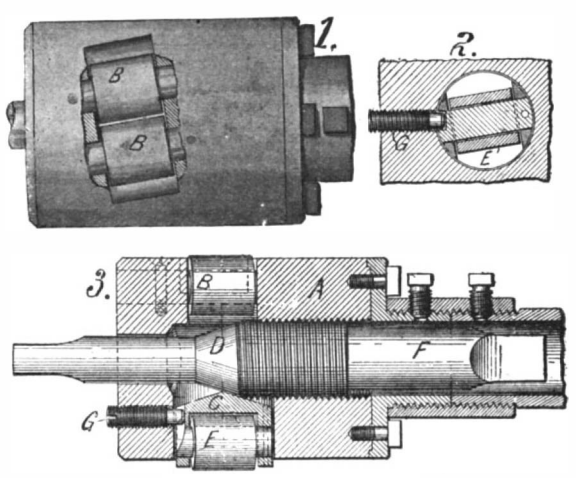
Pictured in the accompanying engraving is a coffee urn arranged to distribute water under steam pressure over the coffee, and permit it to percolate therethrough into the coffee pot, where it is maintained near, but always slightly below, the boiling point. The urn is so arranged that it may be taken apart and thoroughly cleaned. It consists essentially of three receptacles, which are placed one above the other. The lower receptacle *A* is filled with water, the receptacle *B* serves as the coffee pot, while the ground coffee is placed in the container *C*. The container *C* is formed with a perforated bottom *D*, and its upper end is closed by means of a dome-shaped cover. Running up through the center of the receptacle *C* is a tube *E*, which is provided with a hood *F* at the upper end. Fitted in the tube *E* is a second tube *G*, which extends through the coffee pot and into the boiler *A*. A tube *H* in the coffee pot surrounds the tube *G*, and its upper end fits snugly into the expanded lower end of the tube *E*. The coffee pot is provided with a faucet *I*, through which the coffee may be drawn off. In operation an alcohol lamp is placed under the urn, and when the water begins to boil, the steam forces it up through the tube *G* against the hood *F*, and thence into the receptacle *C*. The boiling water percolates through the ground coffee, and falls into the chamber *B*. It will be evident that the temperature of the coffee in the receptacle *B* will always be maintained under the boiling point. The boiler *A* is provided with a vent at one side, which is closed by a plug *J*. Ordinarily, it is advisable to unscrew this plug slightly, so as to permit the steam to escape and prevent the water from being forced through the tube too rapidly. However, to prepare the coffee quickly, the vent may be sealed by screwing the plug in tightly. If it is desired to stop the operation of the coffee urn, the plug *J* is removed, to let the steam flow out freely. The inventor of this coffee urn is Mr. E. C. Dalleine, of 7 East 40th Street, New York city.



IMPROVED COFFEE URN.

BOILER-TUBE CLEANER.

The boiler-tube cleaner which is illustrated herewith is adapted to be expanded within a boiler flue so as to crack off the scale. The device is particularly adapted for use in vertical flues so that the scale will fall to the bottom of the boiler. As shown in the sectional view, the device consists of a head *A* provided with a recess in which are journaled two rollers *B*. The rollers are preferably disposed at an angle to the axis of the head. Directly beneath these rollers is a second recess adapted to receive a block *C*, in which a roller *E* is journaled. The inner surface of the block *C* is conical in form and is adapted to engage a tapered surface *D* on a needle *F*, which projects axially through the head *A*. A portion of the needle is threaded in the head *A*, so that when a wrench is applied to the squared ends of the needle the latter may be fed inward to force the block *C* outward. To prevent the block *C* from turning when the needle is operated a screw *G* is provided, the inner end of which engages a keyway or slot in the block. In operation the device is inserted in a boiler flue just beyond the flue sheet, after which the needle *F* is turned by means of a monkey wrench, thereby forcing the roller *E* outward and virtually expanding the cleaner. The rollers *B* and *E* are disposed at such an angle, with reference to the axis of the head, as to permit of readily moving the cleaner through the boiler flue, as the head is rotated. The rollers will then crack off the scale as the head is fed into the flue. Mr. Willis E. Frazee, of Vergas, Minn., is the inventor of this boiler flue cleaner.



BOILER-TUBE CLEANER.

Restriction in Trade-Mark Registration.

BY PERRY B. TURPIN.

In the exercise of its appellate jurisdiction over the Patent Office, the Court of Appeals of the District of Columbia has recently handed down several important decisions affecting trade-mark registration.

Three of these decisions are especially noteworthy in that the first decides what are goods of the same class from a trade-mark standpoint; the second decision relates to the inclusion in a registration with matter registrable *per se* of non-registrable matter; while the third decision relates to descriptive marks and to what can and cannot be registered.

The first decision referred to above, being that of Walter Baker & Company, Limited, *vs.* Harrison, was decided December 22nd, 1908. In this case Mr. Justice Van Orsdel, after holding that the marks were the same, decided that coffee and cocoa are goods of the same descriptive properties. In the decision the court said:

"Things may be said to possess the same descriptive properties when they can be applied to the same general use."

Again it says:

"A mark should be denied, not only when used upon goods of the same descriptive properties as a similar registered mark, but when used on goods belonging to the same general class."

This case went up to the court on appeal from a decision of the Commissioner sustaining a demurrer to the opposition, and the court reversed the Commissioner's decision and has taken a stand, as to the similarity of goods, far in advance of that heretofore occupied by the Patent Office.

The second decision is in the case of Johnson & Brandan, rendered January 5th, 1909. In this case the applicant presented for registration a mark "having the descriptive word (Asbestos) printed in large letters across, and partly obscuring the figure of the ass. This was also an opposition case, and Mr. Chief Justice Shepard said:

"The word Asbestos is clearly descriptive of the goods manufactured by each party."

In sustaining the demurrer the Patent Office Examiner thought that there was other matter in the mark, as applied for, far more striking than the word Asbestos, and the Commissioner of Patents regarded the word Asbestos "merely as a descriptive and subordinate feature of the applicant's trade mark."

The court, however, said:

"The applicant deliberately selected and carefully designated the trade mark having the descriptive word printed in large letters across and partly obscuring the figure of the ass. He thereby made it an actual and permanent feature of his trade mark."

Thereupon the court expressed the opinion that the Commissioner should have denied registration, as claimed, giving the applicant at the same time an opportunity to amend by omitting the objectionable word.

The third case decided, February 2nd, 1909, by Mr. Justice Van Orsdel, In re Central Consumers Company. This was an appeal from the decision of the Commissioner of Patents refusing to register the word "Nextobeer" as a trade mark for a non-intoxicating malt beverage, and the court affirmed the Commissioner's decision, saying:

"It requires no stretch of the imagination to understand how the public would at once draw the inference it is manifestly intended it should draw from the use of this mark, that the beverage on which it is used is almost the same as beer, or a good substitute for beer, or possesses almost the same ingredients and qualities as beer."

Further on, the court aptly says:

"It was not intended that the mark should lend value to the goods, but that the quality of the goods and the reputation of the owner should ultimately make the mark valuable as a symbol in the connection in which it may be used."

Now these three decisions are of importance to producers operating under trade marks, the enormous value of which is well understood, in that they teach:

First, the necessity of avoiding the adoption of a mark owned by another and used "on goods belonging to the same general class."

Second, that the application for registration should not include a non-registrable word or symbol with one that is registrable in itself; and

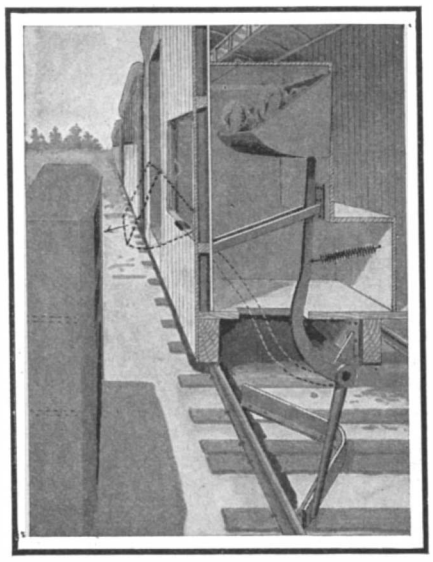
Finally, that the mark should not be descriptive of the character or quality of the goods upon which it is used. If the trade mark be a word, Mr. Justice Van Orsdel says, it should not possess:

"An inherent significance that would of itself enhance the sale or value of the article to which it may be applied."

While it will be seen the action of the court tends to restrict trade-mark registration, it also operates to enhance the real value of registration in cases properly entitled thereto.

DELIVERY APPARATUS FOR MAIL CARS.

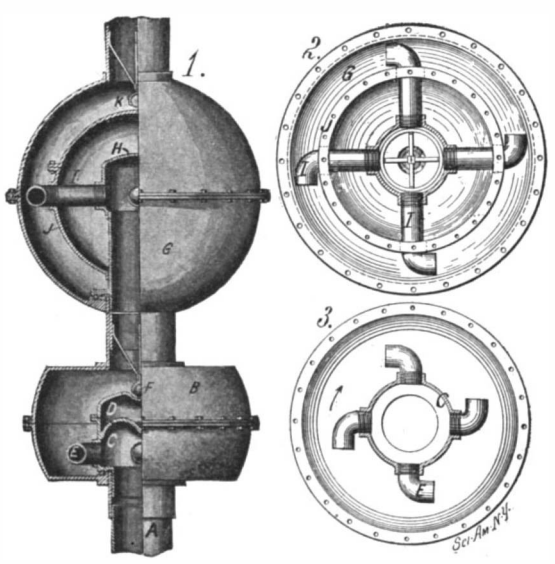
A simple apparatus for delivering mail bags or similar packages from a moving train is shown in the accompanying engraving. The arrangement is such as to deliver the article without a violent shock or blow. A housing is placed adjacent to the track to receive the bag and the apparatus acts automatically to throw the bag into the housing while the train is passing. Our illustration shows a train with the mail car partly broken away to reveal the details of the delivering apparatus. In the car there is a compartment, access to which is had through a lid at the top. At the upper end of the compartment is a holder carried by a lever which passes through the floor of the car and is fulcrumed to the sill below. The other arm of the lever projects downward and is adapted to engage an operating rail secured to the ties. The lever is held in normal vertical position by a spring, but when it strikes the operating rail, which is curved away from the adjacent track rail, it is swung on the fulcrum, throwing the holder through an opening in the side of the car to the position indicated by dotted lines in the engraving. This serves to pitch the contents of the holder into the housing. The mail bag slides along a slideway in the housing and drops into a compartment at the end. There is a compartment at each end of the slideway so as to receive the mail from trains running in either direction. A patent on this invention has recently been secured by Mr. Henry Hoffman, 4608 South Broadway, St. Louis, Mo.



DELIVERY APPARATUS FOR MAIL CARS.

BACK-PRESSURE REDUCER.

The mechanism illustrated herewith is particularly adapted for use with blowers, pumps, standpipes, and like devices, through which a flow of liquid is maintained, and its object is to provide means for bal-

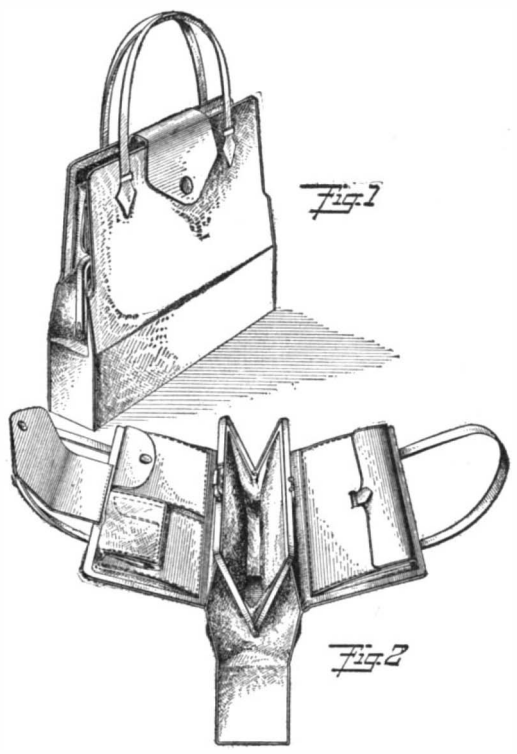


BACK-PRESSURE REDUCER.

ancing the back pressure, and thereby insuring easier running of the blower or pump. As shown in our illustration, the water flows up the standpipe *A*, and into an enlargement or casing *B* secured thereon. The water passes into the casing *B* by way of a chamber *C* and a set of reaction arms *E*. The chamber *C* is mounted on a ball bearing, and as the water flows out through the arms *E*, it is rotated. Float *D* serves to lift the chamber *C*, and relieve the weight on the ball bearing. To prevent it from being lifted off entirely from the ball bearing, the upper surface of the float is engaged by a ball *F*, supported in a bracket. Our illustration shows a second reducer above the one just described, which may be used wherever necessary. This is of spherical form, the casing *G* serving the same purpose as the casing *B*. The water fills the chamber *H* at the top of the standpipe, and flows thence through the reaction arms *I*. To relieve the weight of the rotating member on the ball bearing, a spherical float *J* is provided, and this is prevented from rising too far by a ball *K*, which bears against the top of the float. A check valve is preferably placed in the delivery pipe above the reducer, to prevent downward leakage. The inventor of this back-pressure reducer is Mr. J. B. Ricketts, of Woodland Hall, Forest Park, Baltimore, Md.

ODDITIES IN INVENTIONS.

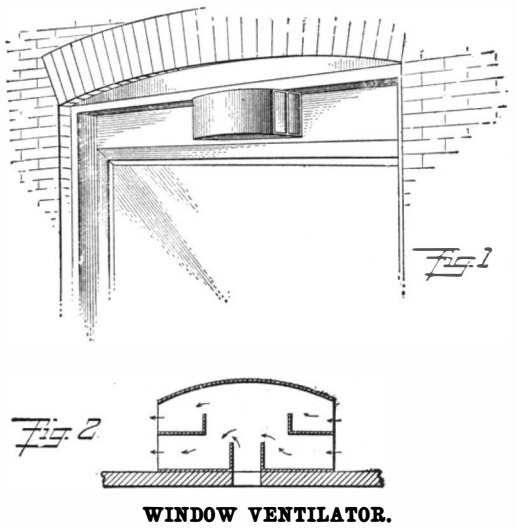
HAND BAG.—A rather complete hand bag is shown in the accompanying engraving. It is formed with a large compartment and a number of smaller compartments or pockets, in which money, visiting cards, etc.,



HAND BAG.

can be carried. Unlike the ordinary hand-bag, access can be had to any or all of these pockets without opening the main bag. The forward pocket on the left-hand side is formed with a catch, in which a pocketbook may be detachably secured.

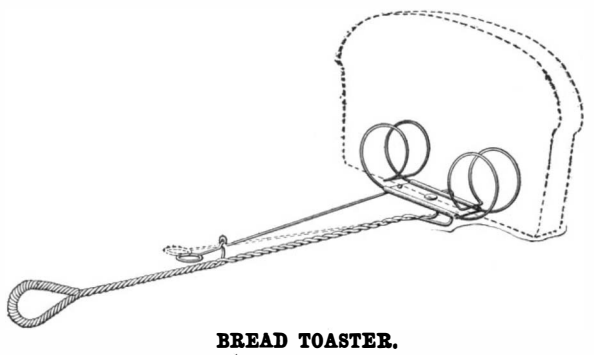
WINDOW VENTILATOR.—The ventilator which is shown herewith is arranged not to admit air into a room, but to withdraw the foul air from the room. The cross-sectional view, Fig. 2, shows how this is done. A small box projects from the upper part of the window at the outside. The ends of the box are open, so as to permit the air to flow through in either direc-



WINDOW VENTILATOR.

tion. An opening through the center of the box communicates with the interior of the room. By an arrangement of baffle plates in the box, an aspirating effect is produced, which will draw out the foul air from the room. The baffles also prevent rain or sleet from entering the room in stormy weather.

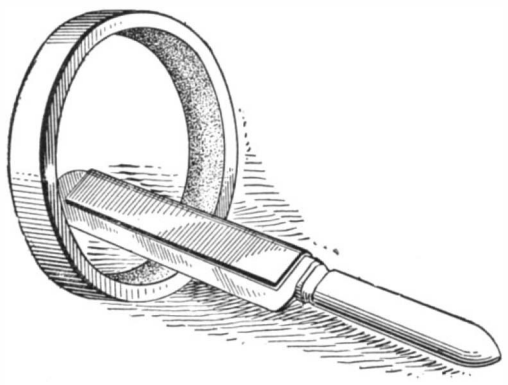
TOASTER.—The toaster which is illustrated in the accompanying sketch is arranged for use in toasting slices of bread in a vertical position. The holder is swiveled on the handle of the toaster, and a rod is



BREAD TOASTER.

attached to one end of it, with which the holder may be turned on its pivot to bring the opposite side of the slice to the fire. The rod passes through an eye formed on the handle, and is provided with a notch, which engages the eye when the holder is at right angles to the handle.

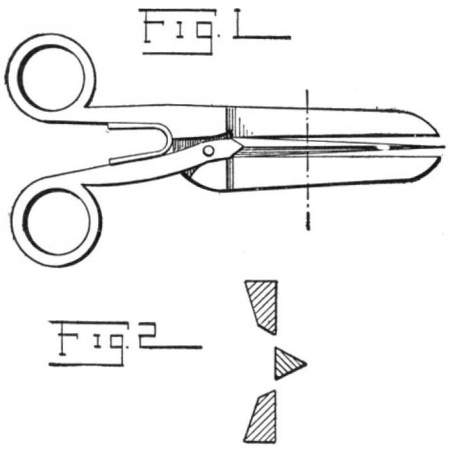
KNIFE SHARPENER.—Something rather novel in knife sharpeners has recently been invented. The device has the shape of a ring, with the sharpening surface on the inside. It can be used on the dining-room



KNIFE SHARPENER.

table. A protector or shield of metal is placed over the back of the knife blade. The blade is then sharpened by pressing it against the inner surface of the ring and rolling the ring along the table. While the ring is rolling, the knife should be moved lengthwise through it.

DOUBLE-ACTING SHEARS.—The ordinary shears or scissors will cut only when the handles are being pressed together. We show here a pair of shears that will also cut when the handles are moved apart. This double cutting action is obtained by the use of three blades, two parallel blades being connected to one handle, while the third is connected to the other handle. The purpose of this arrangement is to en-



DOUBLE-ACTING SHEARS.

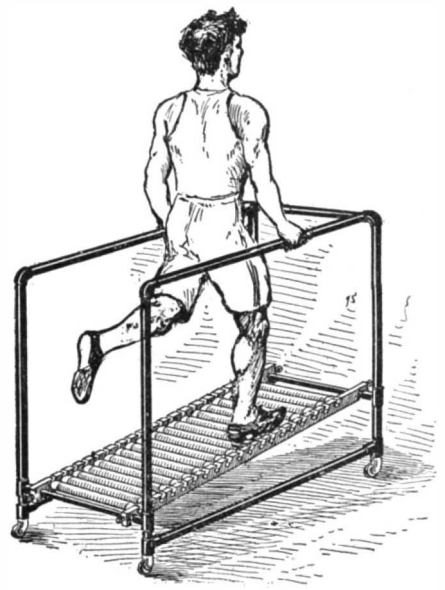
able a person to do the cutting by moving the handles in either direction, thus saving the lost motion in the operation of the ordinary shears.

AN ARTISTIC FLY TRAP.—Fly paper and fly traps are not pleasing objects in the dining room and yet some means of suppressing flies is often absolutely necessary. A Frenchman, bearing this in mind, has designed a trap which makes a pleasing ornament for the table and yet is effective in capturing the annoying insect. He provides a disk formed with a ring of depressions or cups which are baited with jelly or the like. By means of clockwork in the base of the trap the disk

AN ARTISTIC FLY TRAP.

is slowly revolved, bringing the cups, one by one, under a vertical cylinder of wire netting. The trap is covered by a miniature representation of a windmill. The flies enter the door of the mill and while they are busy eating the bait, they are carried under the tower. Alarmed at this they fly upward, easily finding their way through the openings in the top of the two cones. Once in the prison tower they cannot escape, and must await the hand of the executioner.

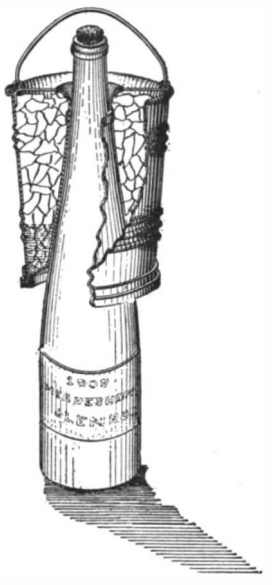
INDOOR RUNNING MACHINE.—An enthusiastic "Marathoner," who evidently does not get sufficient outdoor exercise, has devised a simple apparatus which will en-



INDOOR RUNNING MACHINE.

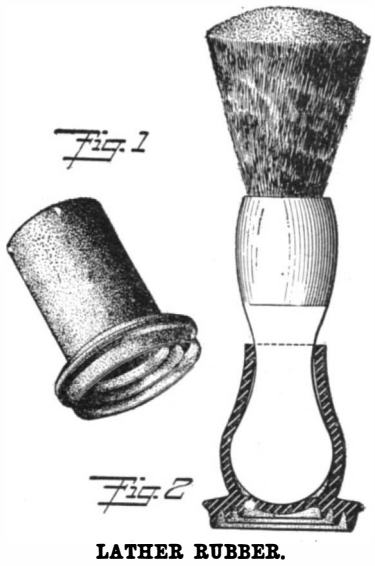
able him to develop his running muscles indoors. The apparatus is on the order of a treadmill. It consists of a rack mounted at an incline in a suitable frame, and provided with a series of rollers on which the athlete runs. The frame is formed with handles at the side, so as to prevent him from falling in case he should lose his balance, and which will permit him to stop running when he desires to do so.

BOTTLE COOLER.—In ordinary bottle coolers no provision is made for covering the upper part of the bottle with ice, and, as a consequence, the liquid first drawn out of the bottle is not as cool as it should be. A German inventor has conceived the idea of placing the ice over the top of the bottle, and as the cooler liquid falls owing to its greater weight, a circulation is set up which will cool the entire contents of the bottle. The cooler consists of a double-walled cylinder, the inner wall being arranged to fit onto the bottle. The ice is placed between the two walls of the cylinder. A rubber band on the inner wall presses against the bottle neck, so as to hold the bottle in the cooler when the latter is lifted by means of the handle.



BOTTLE COOLER.

LATHER RUBBER.—To obviate the necessity of rubbing lather into the skin with the fingers, when shav-



LATHER RUBBER.

ing, a small attachment for the shaving brush has been provided. It consists of a rubber cap which is fitted over the handle of the brush. The end face of the cap is formed with a series of concentric annular flanges which catch the lather and assist in rubbing it into the skin.

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

TAILOR'S SQUARE.—J. A. CARLSTROM, New York, N. Y. The invention relates to drafting and measuring instruments, and its purpose is to provide a square arranged for conveniently obtaining any division of any breast size in drafting garments, without requiring calculation on the part of the tailor, and thus reducing the making of mistakes and errors in drafting to a minimum.

SHOE-CALK.—M. M. SCHANEY, Dubois, Pa. In this invention the improvement is in ice creepers and it has for an object to provide a novel construction built mostly inside of the heel of boots or shoes and including spikes or calks arranged to be projected or retracted by means of cams on a sliding operating rod.

SHOULDER-BRACE.—L. C. ACCOLA, Brush, Colo. The object of this inventor is to provide a brace with few parts, which can be adjusted readily and which will not cause the wearer any inconvenience. Curved metal springs are provided to hold the shoulders back in place without confining or restricting the movements of the body, as is done with ordinary braces which are in the nature of bandages.

Electrical Devices.

INCANDESCENT-LAMP CLUSTER. — F. SCHWARTZ and L. KLEINMANN, New York, N. Y. In the present patent the invention has reference to electric lighting, and the object of the improvement is the production of an electric light fixture having a cluster of lamps or lights constructed and arranged in such a way that the lights may be turned on in groups of one, two, three, or four lights, etc.

POLARIZED RELAY.—P. RIBBE, Halensee, near Berlin, Germany. The invention relates to a relay which can be operated by currents or impulses of a very low pressure, such as from 10^{-5} amperes to 10^{-10} amperes and even less. It may be arranged either to momentarily close a secondary circuit or to control effects of light. As many consecutive impulses as from one hundred to several thousands per second can be permitted to circulate in the primary circuit for causing the relay to produce a corresponding number of secondary effects per second.

DYNAMO-VENTILATOR.—D. R. MCCULLOUGH, Pocatello, Idaho. In the present patent the improvement has reference to means enveloping the dynamic elements of an electric generator or motor, for confining and restricting the ventilation of the machine to the parts to be ventilated, and to means for effecting an interchange of air through said parts.

LEVER-CHECK FOR ELECTRIC CONTROLLERS.—J. THOMAS, New York, N. Y. The lever will operate so as to prevent its being suddenly rotated in a direction which will throw the full strength of the current. The device operates so that while it does not prevent the lever from being moved into the position which will turn the current on, it does not prevent its being swung to that position by a single continuous advancing movement. Even if the controller lever is in the hand of an unskilled motorman, it will be impossible for him to turn the current on suddenly, to the injury of the motor.

MANUFACTURE OF SENSITIVE CELLS. —P. RIBBE, Halensee, near Berlin, Germany. In this new method fine parallel metallic conductors are produced in the shape of hairlines, so that after covering them with a fine layer of selenium or the like a cell sensitive to light is obtained superior to ordinary selenium cells in efficiency and sensitiveness. By this new method the maximum sensitiveness of the cell is obtained.

LIGHTNING-ARRESTER OR LINE-DISCONNECTOR.—J. W. PEDIGO, Chariton, Iowa. The invention relates more particularly to arresters employed in connection with a telephone or other delicate instrument, susceptible to injury from the overcharging of its circuit. An object is to provide a device in which a double disconnection is effected by one movement.

Of Interest to Farmers.

GANG-PLOW.—A. MECHAM, Edinburg, N. D. The object here is to provide details for a plow, which adapt the series of individual plows forming a gang and that are arranged laterally in sequence to automatically adjust themselves to conform to the undulations of the soil; and to so construct the attachment between each individual plow beam and the main frame beam, that the connection will automatically release a plow that is held from progress by an obstruction in or on the soil traversed by the gang plow.

BROODER.—G. H. LEE, Omaha, Neb. This brooder will not require other heat than that developed by the bodies of the chicks within the brooder. An object is to produce a brooder for this general purpose, having a special construction which will tend to conserve the heat from the bodies of the chicks, and which will provide for the ventilation without danger of crowding.

ATTACHMENT FOR THRESHING-MACHINES.—C. O. FREDRICKSON, Osceola, Neb. The object of the inventor is to provide a member which forms a continuation of the concave of a threshing machine, the member being formed of slots which are arranged longitudinally of the machine and which assist in separating the grain from the straw, without impeding the movements of the straw through the machine.

MOTOR-PLOW.—A. E. COOK, Odebolt, Iowa. The invention relates to a form in which the side thrust of one tool or gang of tools is resisted not by an opposing tool or gang of tools, but by means of a device which operates somewhat like the landside of a common plow. This device is in the form of one or more disks which enter the earth and are adjustable to facilitate steering the plow. It may, however, assume various other forms, such as that of a continuous runner or plate which enters the earth to prevent lateral motion after the manner of a keel of a marine vessel.

DRAFT MECHANISM.—H. MESSMAN, Jefferson Township, Ind. By means of this mechanism four horses may be attached to a plow in such a way that none of the horses will be obliged to step in the soft plowed ground. In other words the mechanism affords means for attaching the horses in a laterally displaced position toward the land.

MOWING-MACHINE.—A. M. LEONI, Highland, N. Y. An arrangement is provided whereby the mower bar or cutter may be driven independently of the speed of advance of the implement. The mechanism transmits the driving force to the cutter bar, which will operate in such a way as to prevent injury to the teeth of the cutter when obstructions such as stones and the like become caught in the teeth. It operates automatically to throw the driving mechanism out of operation, thus preventing accidents to the cutter bar and other parts. Mr. Leoni has invented another mowing machine. He drives the mower bar by means of a gasoline engine, and employs a special transmission device which operates in such a way that if obstructions come between the teeth of the cutter, the ignition circuit connected with the spark plug will be opened so as to stop the engine. The mower bar is driven from the engine through a clutch, and he provides automatic means for opening this clutch when the mower bar is raised.

Of General Interest.

PICTURE-FRAME.—J. B. WEBER, Union Hill, N. J. In this case the invention has reference to picture frames, and the object of the inventor is the production of a light and simple frame for a picture or a card, which will hold the card against warping, and which will give the picture or card an ornamental appearance.

FILING CABINET.—H. L. SQUIRES, Morgan City, La. The construction in this instance embodies a plurality of similar box-like receptacles, permits inspection of the interior of the receptacles while closed, through a glazed front wall on each receptacle, permits each receptacle to be rocked into opened condition affording access to its contents, and provides an alarm that will be sounded when any receptacle is opened.

MEANS FOR SECURING PARTS OF FURNITURE TOGETHER.—P. SICOTTE, Lansing, Kan. One purpose here is to provide means for assembling portions of an article of furniture, which will compensate for variations in the thickness of different parts that are assembled, due to warpage or shrinkage. The invention dispenses with the use of screws, nails or pins and with the necessity of using tools in the erection of an article of furniture, which has previously been completed and knocked down so as to separate its members for transportation.

SHUTTER ATTACHMENT.—C. MAECHLER, New York, N. Y. Mr. Maechler's invention refers to shutter attachments suitable for use upon windows and the like, his more particular object being to provide for the leaves of the shutter a comparatively high degree of adjustability, and also to enable the leaves to be held rigidly in position when once adjusted.

METAL DOOR.—A. C. GODDARD, New York, N. Y. This improvement provides a door made in its main parts of sheet metal, the parts being fastened or locked together to render the door exceedingly strong and capable of withstanding a high heat in case of fire, and means for fastening the parts together being invisible, thus rendering the door exceedingly ornamental.

WATERPROOF CEMENT.—M. M. SMITH, Fredonia, Kan. This process is for use in the manufacture of white waterproof cement of a kind suitable for the making of articles of stone, or for other uses where a white waterproof cement is desirable. The object of the invention is to provide a method by which an ordinary cement composed of varying proportions, can be whitened and waterproofed after being burned to a clinker.

APPARATUS FOR FORMING HEADSTONES FROM PLASTIC MATERIAL.—C. C. WINGO, Baltimore, Md. The primary object of the inventor is to provide a substitute for marble head-stones or tomb-stones, and for wall tablets, or inscription plates, etc. To this end he forms the same from hydraulic cement, which, as is well known, becomes exceedingly hard and is practically indestructible.

LETTER AND PARCEL HOLDER.—M. C. LONG, Newton Township, Iowa. This device facilitates the work of mail clerks and saves twine. A plate is laid on the package to be secured with the disk upward, and at approximately the longitudinal center of the package. The string is then brought upwardly around the package and between the spring and the disk, and thence at right angles around the package in a transverse direction, and encircling the disk twice, passing between the spring portion and the disk each time.

BOAT.—G. WHITE, Ashtabula, Ohio. The invention has for its aim the provision of a boat with a series of hydroplanes which are spaced apart and are pivoted to the bottom of the boat, there being means provided to hold the hydroplanes in operative position. Another object is to provide an improved form of hydroplanes.

HORSESHOE.—W. O'BRIEN, Woodland, Cal. The improvement comprises a body portion, a rib depending from the inner edge of the body portion, the latter extending laterally downward beyond the rib's outer face and such extension perforated for nails, and the inner face of the rib being curved from end to end in cross section on curved lines with a pitch increasing toward the heels and the outer face of the rib and forming an edge extending approximately throughout the length of the rib.

ADVERTISING DEVICE.—J. R. WARREN and G. W. PACKARD, JR., Deadwood, S. D. The improvement relates to devices or signs using the tumbling panels known as "Jacob's ladder," and its object is to provide a device arranged to allow viewing the signs from both sides and to display four different legends on each sign, thus increasing the capacity of the device without increasing the bulk.

INTERCHANGEABLE LOCKING-BORDER. —J. S. VOORHEES, New York, N. Y. The border is arranged to readily connect the border pieces with each other, and to securely hold the same in place, to allow of conveniently interchanging and connecting border pieces of different length, for forming narrow or wide borders for columns of different width and for long or short matter to be inclosed by the border, the arrangement also serving to allow the set up type and its border to be set aside for future use without requiring tying of the border by the use of cords, bands or the like.

CORE-ARBOR.—I. H. LONG and S. A. MILLIGAN, Louisville, Ky. The invention relates to the manufacture of cast iron pipes having integral branches. The arbor is for use in green sand or sharp sand cores, and arranged to permit of securely interlocking the branch with the main core arbor, without danger from the branch core sagging or becoming loose, and to allow quick unlocking of the branch core arbor and removing the cores from the pipe after the casting operation is completed.

PROCESS FOR RENDERING MATERIAL OF ANY KIND PROOF AGAINST THE ACTION OF MOISTURE AND OF CHEMICAL AGENTS.—A. KRONSTEIN, 95 Kreigsstrasse, Karlsruhe, Germany. Mr. Kronstein's process is based upon the property of certain organic bodies to form solid substances at an elevated temperature, which are insoluble in the ordinary solvents, and are not attacked by the action of acids or of dilute alkalies even at the elevated temperature of 270 deg. centigrade.

DOOR-HANGER.—H. FABIAN, New York, N. Y. An object in this case is to provide a hanger for doors, sliding windows or similar objects, by means of which the door or window is supported so that it can be opened or closed with little friction, and requires but a slight expenditure of effort to operate it, and in which the hammer occupies comparatively little space.

GUY-ROPE CABLE CLAMP.—L. H. KNAPP, Syracuse, N. Y. At the ends of guy wires or cables, such as used for staying telegraph poles, stacks, etc., it is necessary to form loops by means of which the guy wires or ropes are secured in position. The object here is to provide a clamp of simple construction which can be quickly applied to clamp the main part of the cable to the end of the loop.

Hardware.

TACK-PULLER.—J. S. SWAN, JR., Mount Vernon, N. Y. The improvement relates to tack pullers in connection with tool handles, and in all analogous relations where it can be used for pulling tacks, the special purpose being to mount the puller upon such a portion of a handle as will render the puller effective for many purposes, and at the same time strengthen the handle.

LOCKING DEVICE FOR NUTS AND THE LIKE.—C. E. RANCILLAZ, Colombes, France. The object of the invention is to produce a construction serving the purpose of locking nuts and the like, by permanently fixing the nut to the intermediate washer before placing in position to avoid the risk of losing this part and to effect automatically the deformation which insures the fixing of the nut without using tools or other external means.

VISE.—J. E. BASHORE and C. W. JENSEN, Tippecanoe City, Ohio. The invention has for its purpose the production of a vise in which a movable jaw may be quickly adjusted by hand toward or from a fixed jaw, according to the thickness of the work to be grasped, and then secured and caused to move slightly toward the fixed jaw by the turning of a handle bar or lever.

LOCK.—M. NADOLSKI, Jersey City, N. J. The aim in this case is to produce a lock of simple construction which will operate in a simple manner without the use of a spring. The inventor contemplates a construction by means of which the bolt is positively held against withdrawal when in its locked position.

COMBINED JOINTER AND RAKER.—J. V. CLOSE, Rowayton, Conn. In this single tool the opposite ends are adapted for bricklayers' uses. The parts which engage with the mortar are detachable from the body of the tool, so that different parts having a different shape and size may be substituted in place thereof. The part used for jointing or pointing constitutes the handle for the tool while it is being used for raking.

Heating and Lighting.

HEATING APPARATUS.—N. M. EDDY, Alpena, Mich. The purpose of the present invention is to provide an apparatus arranged to return the water of condensation from air piping to the boiler and to render the action entirely automatic, without requiring readjustment of the parts at any time. It relates to apparatus such as shown and described in the Letters Patent of the U. S., formerly granted to Mr. Eddy.

WICK-TRIMMER.—W. J. LEE, Arcadia, Mo. In the present patent the invention is an improvement in wick trimmers, and has for its purpose the provision of a novel construction whereby the wicks may be trimmed from without the burner into the desired curved form in order to secure the proper shape of flames.

HEATING APPARATUS.—A. ZECK and F. VAN ZECK, Grafton, W. Va. This invention is such as shown and described in Letters Patent of the U. S. formerly granted to these inventors. The object is to provide an apparatus in which steam and hot water heating are combined in a very simple and effective manner. No sudden change of the temperature of the water in the radiator takes place, as the same water level in the radiator is maintained and the temperature is raised evenly and rapidly.

ACETYLENE-GAS GENERATOR.—T. S. TOWLE, Stanton, Mich. The invention refers to carbid holders employed in the generation of a volume of acetylene gas as a motive agent for portable engines, and more particularly for automobile vehicles. The holder affords a compact, convenient device which is positive in its action for the removal of spent residuum and the constant exposure of fresh carbid to water jets, thus insuring a uniform generation of gas supply as a motive agent.

AUTOMATIC FIRE-KINDLER.—J. C. ST. CLAIR, Butte, Mont. The improvement has in view the provision of a kindler adapted to automatically operate at any predetermined time to start a fire. The invention is more especially designed for cooking ranges. It, however, can be applied to other types of stoves, as well as to open fireplaces, and operate with equal effectiveness.

Household Utilities.

FLAT-IRON STAND.—W. L. HEADLY, Colwyn, Pa. In this invention the intention is to provide a simple, inexpensive, and serviceable stand for irons or the like, which has a bracket for removably securing it to the top of a table or the like, and obviates the danger of the stand with the iron thereon being knocked off or turned over.

FOOT-REST.—J. A. GAERTNER, Baltimore, Md. The invention is especially adapted for use with a rocking chair in that it permits a person using the chair to rock while his feet are supported upon the rest, the latter having a swinging motion in unison with the movement of the chair. It is composed of few operating parts and therefore is not likely to get out of order.

FUEL-ECONOMIZER.—F. W. CONMEY, Wyoming, Iowa. The device may be set close to a heating or cooking stove, being practically out of the way. Means provide for connecting the device directly to the smoke conductor or outlets, and for causing the heated products of combustion to take a downward course through a series of conductors, and then up through a main conductor to a flue.

DETACHABLE HANDLE FOR FRYING-PANS AND OTHER CULINARY VESSELS.— D. T. ABERCROMBIE, Newark, N. J. The intention of the improvement is to provide a handle for frying pans and other culinary vessels, arranged to permit of securely attaching the handle to the vessel when using the latter for its legitimate purposes, and to allow quick removal of the handle from the vessel for convenient shipping and storing.

CHAIR ATTACHMENT.—D. S. CURTISS, Seattle, Wash. The invention relates to furniture, and its object is to provide a rocking attachment and foot rest for use on ordinary chairs and rocking chairs and arranged to permit the user to conveniently tilt the chair back to a desired position, thus insuring comfort to the occupant.

FOLDING TABLE.—A. HUMMEL, New York, N. Y. In this patent the invention relates to folding tables, Mr. Hummel's more

particular purpose being to provide a type of such table in which there are a number of leaves connected together at all times and adapted to fold and unfold for the purpose of extending or reducing the length or width of the table.

IRONING-BOARD.—O. W. MIMS, Dardanelle, Ark. The board can be supported from the wall at right angles thereto, it being possible to change the angularity. Means are provided whereby the board can be quickly and conveniently installed in any room and readily removed from its support, and wherein when the board is connected with a support and is not needed, it can be made to stand paralled with and close to its support.

POWDER-PUFF.—P. E. PAGE, Asheville, N. C. This powder puff is very compact in construction and is arranged to permit of convenient application or storing in a receptacle to retain the puff and the powder therein in good condition for a long time, and to allow of conveniently carrying the receptacle and puff therein around in a pocket, hand bag or other carrier.

Machines and Mechanical Devices.

TRANSMISSION-GEARING.—E. E. LARSON, Thompson, Iowa. The more particular purpose here is to produce a type of gearing in which the power is transmitted through gears acting upon a revoluble member, this member being retarded to a greater or lesser extent by aid of friction gears, the degree of retardation governing the positiveness of the drive, and also controlling the speed of the driven element as compared with that of the driving element.

MACHINE-TOOL.—B. FRANZ, 20 Giesserstrasse, Leipzig-Plagwitz, Germany. The invention relates to tools in which the feed or re-setting of the work or of the tools for the next operation is effected automatically. An object is to cause the feed or re-setting to take place on the one hand during the return movement, and on the other hand directly by means of the mechanism producing the return, so that a special dividing device is unnecessary.

LINE-CUTTER.—J. J. DAVIN, Washington, Pa. This cutter is for use in wells and borings. It is adapted to be slidably arranged on a drill controlling line, and having cutting means for engaging a line at any desired point to sever it. It is also adapted to be slidably arranged on a drill line and has cutting means for severing the line at any desired point, the cutting mechanism being operable by an upward pull on the cutter.

CIRCULATING SYSTEM.—T. E. WARREN, Ticonderoga, N. Y. The object here is to provide a system, more especially designed for circulating fibrous stock, such as sulfite pulp, wood pulp, soda pulp, and the like from a stock chest to beaters and other machines, and arranged to require comparatively little power to circulate the stock through the line and to prevent the water from leaking out of the stock and thus prevent the same from hardening in the pipe line.

TIDE-MOTOR.—W. J. WHITE, Oyster Bay, N. Y. This invention relates to motors adapted to be operated by the rising and falling of a water level. On the rising of the level the motor is operated by the buoyancy of the float, and on the downward movement it is operated by gravity. It can also be used wherever there is a rising or falling of the water level from any cause whatever.

POWER-TRANSMISSION MECHANISM.—F. E. SEDDON, Hoboken, and W. H. DOUGLAS, Belleville, N. J. This mechanism is for use on automobiles and other vehicles and mechanisms requiring a varying and differential action in either direction and arranged to allow forward or backward driving of any desired speed without reversing or changing the speed of the motor, and to permit the driven wheels to run at a differential speed when the vehicle turns around a corner or in a sinuous track.

PORTABLE TURNING-LATHE.—W. D. VERSCHOYLE, Tanrago, Ballisodare, Ireland. The principal object here is to provide a tool which will be little heavier and will occupy little more room than an ordinary drilling brace and which, when required for use, can be assembled and clamped to any convenient support, or can in various situations be employed instead of a brace for boring holes with accuracy and dispatch, while the parts can be quickly taken asunder and carried in an ordinary tool basket.

FEEDER FOR GRINDERS.—R. J. STEEN, Canyon, Texas. The invention involves a new attachment for use within the hopper of crushers or grinders, and the object is to facilitate the feeding of the material to the grinding or crushing mechanism. It is applicable to any form of grinder having a hopper, but it is especially applicable to grinders and crushers for grain.

SPOOL-HOLDER.—F. MAYOR, New York, N. Y. A holder is provided adapted to be applied to the machine either vertically or horizontally, the same embodying two heads arranged at the opposite ends of a cushioned stem, one head being permanently attached to the stem and provided with a number of spool-supporting pins, and the other detachably applied to the stem and secured thereto by a novel lock.

WATER-METER.—C. LORY, New Windsor, and C. A. LORY, Fort Collins, Colo. The fact is made use of in this invention that there is a definite relation between the rate of discharge and the varying depth of the water, this rate of discharge being different in different instances, yet capable of being calculated from measurements or appropriate weir formulæ.

CAN-STRAIGHTENER.—T. H. HART, Everett, Mass. The purpose in this instance is the provision of a supporting former provided with surfaces arranged at an angle to each other adapted to respectively engage in the inside of the breast and body of the can, and a pivoted compressing former having corresponding surfaces for engaging the outside of the breast and body opposite the supporting former.

DITCHING-MACHINE.—E. J. SCHRAMKE, Saginaw West Side, Mich. In this machine a wheeled truck is mounted on a wagon, so that the truck can travel on the wagon. The wheeled truck carries a motor and at its front has a reciprocating frame carrying cutters at the under side and has a belt elevator for the dirt. The motor serves to reciprocate the frame and cut the ditch as the truck moves rearwardly on the wagon. The wagon serves to shift the whole apparatus to a new position.

COIN PACKAGING AND COUNTING MACHINE.—A. SERENA, New York, N. Y. This machine is for use in facilitating the forming of packages or cartridges of coins of different dimensions. These packages are simply small cylinders of paper which are of sufficiently large diameter to receive the coins laid side by side. When the package is filled its ends are simply folded over the coins at the outer ends so as to form a compact package of the coins.

ACTUATING MECHANISM FOR PRINTING-PRESS THROW-OFFS.—J. SPRINGER, San Francisco, Cal. The invention is an improvement in the actuating mechanism for printing-press throw-offs, and has for its object to dispense with the conventional hand-operated lever for this purpose and provide a treadle as a substitute, whereby the operator may have the free use of both hands for feeding the press.

ABRADING-MACHINE.—J. MILNE, JR., Cleveland, Tenn. This machine will sandpaper and smooth wood and other like materials. Means provide for increasing or decreasing the pressure of the abrasive members, thereby regulating their action on the material which is being worked. Means also provide for new abrasive surfaces being brought into operative position.

FLOOR-SCRAPING MACHINE.—R. S. LA RUE, Bellefontaine, Ohio. The invention pertains to machines used for leveling and smoothing the surfaces of floors, and has for its purpose to provide details of construction for a machine of this type, that afford a scraper which is simple, strong, and durable, perfect in operation, readily adjusted, and easily operated.

ROTARY MEASURING DEVICE.—S. IRINO, Salt Lake City, Utah. The invention relates more particularly to a measuring device which has a rotatable measuring wheel, distance indicating mechanism controlled thereby, a detent for holding the wheel immovable when not in use, and means for positioning the wheel with its point of contact with the ground, at a predetermined distance from a fixed point, so that it is possible therewith to measure accurately a distance starting from a wall or other obstruction.

OPERATING MECHANISM FOR DOORS.—W. H. EVANS, Buffalo, N. Y. This mechanism is for use on exit or other door for pay-as-you-enter cars, but may be employed to operate doors of almost every description. A vertical shaft having a crank secured thereto, the latter being connected by an adjustable connecting rod to an operating lever disposed so as to open the door, one end of the lever being supported in a swivel hanger, provided with roller bearings which act as a fulcrum. A detachable handle is also provided to engage the connecting means secured to the shaft.

Prime Movers and Their Accessories.

INTERNAL-COMBUSTION ENGINE.—C. W. SNYDER, Hudson, N. Y. The inventor's object is to provide an improved construction of valve mechanism, whereby the exhaust gas may be more completely scavenged from the cylinder at the end of the explosion stroke and the fresh charge more effectively admitted thereto. It relates more particularly to two-cycle engines.

LINE-CHECK.—W. H. FOWLER, Selma, Ala. This invention is an improved line check for use in connection with injectors and boilers. In its use the line check is placed half way between the injector and the boiler check, and the purpose is to provide a simple construction which will insure the working of the injector when the boiler check is stuck or otherwise inoperative.

INTERNAL-COMBUSTION TURBINE.—P. KRAUSE, Babylon, N. Y. This invention refers to turbines and more particularly to special construction whereby successive charges of an explosion mixture are ignited and the resulting gases under high pressure are delivered into engagement with the vanes or blades of the turbine. The specific construction involves certain improvements over the previous construction illustrated in the patent formerly granted to Mr. Krause.

Railways and Their Accessories.

RAILWAY PORTABLE COUCH.—E. BERLINGER, New York, N. Y. The invention has reference to couches, and more particularly to couches of such type as to be readily carried around by hand and useful to passengers upon railways, as a means for enabling a traveler to recline while aboard a car. When not in use the couch may be taken apart and the two cushions placed together.

CAR-FENDER.—G. R. WATSON, North Yakima, Wash. The purpose in this instance is to provide details of construction for a fender, that are practical and inexpensive, and which, when assembled and mounted upon a street car, will prevent serious accidents by catching and lifting into a safe position any one who has been struck by the fender.

SWITCH-ROD.—H. M. MITCHELL, Salt Lake City, Utah. A yielding rod allows the switch to be run through by a car either direction without damaging the switch points or breaking the operating connections; and after being passed, the points will automatically resume normal closed position. The improved rod is made in sections with a spring between, the latter being held in a novel manner and the rod section being so constructed as to maintain alinement and position, and adjustable to take up any slack and to properly make the connection between the switch point and the stand.

AUTOMATIC RETAINING-VALVE.—C. MARTIN and M. BEASLEY, Dickson, Tenn. The invention relates to fluid pressure brakes of the Westinghouse and like types, and its object is to provide an automatic retaining valve, arranged to allow of recharging the auxiliary reservoir without releasing the brakes, thus preventing the acceleration of the train, especially when running down a steep grade.

Pertaining to Vehicles.

SEALING COMPOSITION FOR VEHICLE-TIRES.—W. W. MCCORD, G. F. CLARK, and P. M. HALL, Seattle, Wash. In this patent the invention has reference to certain improvements in pneumatic vehicle tires, and more particularly to a fluid or plastic substance, so arranged in the tire that in case of a puncture, the substance will immediately fill the aperture and prevent the escape of air.

WAGON-JACK.—D. A. GILCHRIST, Belgrade, Mont. Upon this lifting jack a wagon may be readily mounted and its wheels raised from a floor or the ground, and thus be free for removal for lubrication of the spindles that the wheels rotate upon. This lifting and supporting jack will serve effectively as a stock chute for a wagon.

STEERING-GEAR FOR TRACTION-ENGINES.—D. H. RANDALL and C. C. WHITCOMB, Coon Rapids, Iowa. This invention is in the nature of a gear designed more particularly for use on traction engines and motor vehicles, but applicable also to other uses. In such vehicles the usual method of steering is by a deflection of the front axle in a horizontal plane about its vertical kingbolt and it has been common heretofore to effect this by the motor mechanism of a steam piston acting through a chain passing around pulleys to the opposite ends of the front axle.

EMERGENCY-STOP FOR MOTOR-VEHICLES.—P. KRAUSE, Babylon, N. Y. In this case the invention pertains to improvements in motor vehicles, and more particularly to an emergency stop mechanism whereby the brakes may be applied and the engine stopped by a passenger other than the chauffeur, should the chauffeur be unable or unwilling to act in an emergency.

PORTABLE APPARATUS AND PROCESS FOR VULCANIZED REPAIRS OF PNEUMATIC TIRES.—E. ANSELMI, Viterbo, Italy. The present invention refers to an apparatus which allows all vulcanized repairs for damages in pneumatic tires in general, and in automobile tires more particularly, to be made without the aid of special workshops. The repairs may be made anywhere, in a short time, easily and with the best results.

Pertaining to Recreation.

SCORE-BOARD.—M. J. SHIMER, Bethlehem, Pa. The invention consists of a form of metal board supported above the table and having a movable tray pivoted to the under side thereof in such a manner as to be normally held in place, but readily movable to such a position that the pins may be taken therefrom or inserted therein. The score-board is for use in different games, but particularly in "cribbage."

FISH-HOOK.—R. E. SHEWARD, Council Bluffs, Iowa. The hook is more especially designed for holding live frogs, and while operating to securely hold the frog against displacement, will not impale or otherwise injure it, whereby the frog will appear natural in the water and will remain alive and fit for bait a comparatively long time.

Designs.

DESIGN FOR A JUNCTION-BOX.—H. ASHWORTH and A. D. WELCH, Kennebunkport, Maine. In this new and original design for a junction-box the construction shows a box of very simple and plain ornamental effect.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Kindly write queries on separate sheets when writing about other matters, such as patents, subscriptions, books, etc. This will facilitate answering your questions. Be sure and give full name and address on every sheet.

Full hints to correspondents were printed at the head of this column in the issue of March 13th or will be sent by mail on request.

(12070) N. R. Co. says: For some time we have been getting complaints from our customers that our radiators contain core sand, which gathers and obstructs the pipe leading to the radiators. We were confident that it was not core sand, since the trouble only appeared where the steam supply came from central heating plants using exhaust steam. The deposit usually gathered on the vertical pipes connecting with the radiator valve, collecting gradually until the pipe is entirely closed. We were anxious to know the nature of the material causing the obstruction, and had it analyzed by a chemist and inclose copy of analysis. You will note that it is composed almost wholly of iron peroxide. If the obstruction was caused by core sand, the analysis would undoubtedly show at least 95 per cent silica, as we use sand crushed from silica rock for our cores. Our chemist was unable to give us any idea why the formation would appear only in the pipe connecting with the brass radiator valve, or why it would start to accumulate at the valve and extend down the pipe. We believe some of your engineers can solve the problem, and would thank you for an early reply, sending your bill for services along with your reply. [Note: The Editor of the Notes and Queries Column prosecuted investigations as requested, and rendered a bill for $5 for same. Questions of a purely special nature requiring considerable research will be answered at cost.—ED.] A. Your letter presents an interesting and rather mysterious problem, and after careful study of the possibilities we beg to submit the following alternative hypotheses for its explanation: The explanation on the whole most probable is that your clients are at least partially right, and that the deposit, while not core sand, may come from the inside of the radiator. The particular form of the deposit carefully shown in your sketch rather strongly suggests this. Any material in solution or suspension in the condensed steam collecting above the valve, upon closure of the latter, would upon the opening of the valve or by leakage past it be admitted to the vertical pipe, which would be much hotter. The material can readily be imagined, therefore, to be deposited by re-evaporation of the conveying liquid before the latter has had time to trickle far down the vertical pipe. The interior surface of the radiator, while carrying no core sand, may readily be supposed to be sufficiently spongy on the surface for particles of iron to become detached by the alternate heating and cooling of the radiator and the alternate action of steam and air. If this is the explanation, the action should not be repeated, or should be so much reduced as to be negligible upon the deposit being removed and the radiator and pipes being cleaned after a few weeks' use, so that a noticeable cessation in the action should be contributory evidence that such is the cause. The occurrence of the deposit at a junction between brass and iron immediately suggests galvanic action, but electrolytic deposit of iron could not take place unless iron were already present in acid solution in the water. A very slight acidity would be sufficient to cause the iron to be attacked in some part of the system, most probably the boiler, and very little sulphate or other soluble salt of iron would cause a slight galvanic action between the brass and iron, the cumulative effect of which would be sufficient to produce the deposit. The fact that analysis shows the deposit to be peroxide and not metallic iron is no proof to the contrary, as the deposited metal, although in metallic form, is spongy and readily attacked by water, steam, and air, the electrolysis itself accelerating oxidation. If this is the explanation, the trouble is more serious, as iron must be attacked continuously elsewhere by the acid to provide electrolyte. The remedy is, however, comparatively simple: substitution of iron for brass valves would immediately stop the deposit, but a change of boiler water is to be recommended, or failing that, neutralization of the acids is solution by addition of alkali. We hope that the foregoing will at least suggest the means by which you can discover the cause of the trouble, and that the remedy will easily follow. Analysis of your boiler water for acids and recommendation of an anti-corrosive in accordance with analysis is the most obvious course.

(12071) W. C. D. says: As a subscriber of your paper I ask for the following information: I have two tanks, one for copper solution and the other for nickel. I would like to know what chemicals should be used, and in what proportions, both for nickel and copper plating, and what kind of a current must be used. Can I use a storage battery for the purpose? Articles to be plated are

such as braces for cripples, which are made of steel. Please explain to me how many amperes or volts it requires. A. Carbonate of copper is commonly used for copper plating, and a double sulphate of nickel and ammonium for nickel plating. The methods for making the solutions are given in Van Horne's "Modern Electroplating," wh' h we send for $1. We cannot write out the several pages given to the description. A direct current must be used, either from a battery or from a dynamo. For copper a voltage of about 2 is perhaps a mean, and for nickel 3.5 to 5 volts are used. The amperes depend upon the area of surface to be worked. We would suggest that there is more to plating than simply to make a solution, place the articles in the bath, and turn on the current. The chances of failure are numerous. It would be prudent to secure a man of experience to run the plant and teach you the trade secrets.

(12072) G. S. asks: One of the mural paintings found at Herculaneum and exhibited at the Metropolitan Museum of Art represents an object resembling a globe, with the lines of latitude and longitude plainly visible. Taking into consideration that the ancient Romans imagined the earth having the form of a disk, what could this picture mean? A. Since Hipparchus, a Greek who lived in the second century before Christ, invented trigonometry for the use of astronomers, and both Hindoos and Romans were fully trained in the subject, it is suggested that globes and circles of the sphere were well understood at the time of the highest splendor of Herculaneum and Pompeii. See Encyclopædia Britannica under "Ptolemy" and "Astronomy," vol. 2, p. 749, for the work of Hipparchus.

(12073) P. M. E. asks: 1. To what height has man ascended in the air? A. A height of 33,790 feet is claimed by Dr. Breson as the height gained by himself in a balloon. We have not noted any ascent higher than this. Upon mountains the record is much below this altitude. We have no exact figures at hand. 2. How is lightning generated? What kind of electricity is it? A. Lightning is due to the burning of something by the intense heat produced by the resistance of the air to the passage of an electric current. The electricity is the same in kind as all electricity. There is but one kind of electricity. If it has a low intensity, it cannot jump across an air gap; if it is of great intensity, it can do so, and a spark is the result. When a trolley leaves the wire, or a wire breaks in which a current is flowing, we see a spark due to the flow of electricity through the air. This is lightning on a small scale. 3. How can oxygen and hydrogen be transformed to water? A. By burning oxygen and hydrogen they will unite and form water. The burning is most violent and makes a great noise if they are mixed and set on fire. If burned in a proper jet, such as is used in the oxyhydrogen lantern for the production of the lime light, the burning is quiet but the heat is very intense.

(12074) L. W. D. asks: Noting inquiry No. 12036, by A. E. H., in your SCIENTIFIC AMERICAN of March 27th last, I wish to know where I can get some information on delicate electroplating of that nature. A. Full and satisfactory instructions for electroplating delicate structures may be found in the SCIENTIFIC AMERICAN, Vol. 99, No. 22, price ten cents. Much beautiful work has been done in this direction recently, which has sold at high prices in the holiday season.

(12075) R. D. asks: The matter of the rusting of galvanized barb wire under various conditions is a very interesting one, and to my mind has never been clearly explained. Whether or not there are yet sufficient data to warrant a satisfactory explanation I do not know; but if some one of your readers can give a reason why the zinc coating should all drop off some of the wire, and it becomes thoroughly rusty, and the other wire under nearly the same conditions retain all of its coating and brightness, I should be very glad. The conditions of a case in point are as follows: About twenty rods off an ordinary reel of barb wire was stretched in two strands, the lower one two feet from the ground and the upper one three feet from the ground. The balance of the reel was left on the ground coiled up as it came from the factory. It is now four years since this was done. The reel has been turned over a few times to keep the wood from decaying. That is all that has been done. The strands on the fence have entirely lost their coating of galvanizing, and are completely covered with a thick coat of rust. The coil on examination was found to have lost none of its coating, and almost as bright as when it came from the factory. A clear and cogent reason for the above conditions might interest others as well as myself. A. Variations in the deterioration of galvanized wire are generally due to unavoidable variations in the uniformity of the zinc coating, and the frequently marked difference between one part very rusted and another quite bright is due to the fact that once the zinc coating is penetrated by moisture, galvanic action is set up, which accelerates rusting considerably. In your case, however, the difference is obviously due to the protection both from moisture and circulation of air afforded by the reel to the wire coiled upon it, whereas that stretched upon the fence has been exposed to rain and air currents from every direction.

NEW BOOKS, ETC.

DER MOND. By Dr. M .W. Meyer. Illustrated. Stuttgart: Kosmos Gesellschaft der Naturfreunde, 1909. Pp. 98. Price, paper, 50 cents.

Dr. Mayer has here presented in a very popular and readable form what is at present known about the moon. To the man who does not care to read long technical treatises, this book ought to prove an acceptable medium of acquiring much useful information.

ALASKA. THE GREAT COUNTRY. By Ella Higginson. New York: The Macmillan Company, 1908. 16mo.; pp. 537. Price, $2.50.

The wonders of our great northern possession which we purchased from Russia are very numerous, and all those who have traveled in this delightful region will never forget the exciting experiences and the beautiful views obtainable. The illustrations in the present book give some slight idea of the very great beauties of this country. A vast mass of excellent material has been collected by the author. The book is exceedingly well written.

SOCIAL ENGINEERING. By William H. Tolman, Ph.D. New York: McGraw Publishing Company, 1909. 380 pp.; 8vo.; ill.

The author describes himself as a "social engineer," and to the average reader this does not at first convey much—one wonders if it does not mean perhaps municipal, even sanitary, engineering—but his book reveals that the term engineer is used in the larger sense to apply to one whose work is concerned with the application of exact sciences, for such social engineering aspires and even promises to be. A glance through this book shows the results of most interesting experiments and achievements in industrial betterment on the part of large manufacturing and other concerns throughout the country, and it is a great pleasure to observe what is being done to improve conditions of life and labor for the employee in, as it would seem, a philanthropic or humanitarian way. Further perusal of the treatise inclines one to believe, however, as the author claims, that industrial betterment is a "cold business proposition." Setting aside any considerations of philanthropy, it is shown that attention to the hygiene of factories has a direct result upon efficiency, in other words, that it increases output, which is what all producers are after. Manufacturers are prepared to spend large amounts upon improvement of the efficiency of their machines, and it is shown that proportionate results are obtainable by attention to the efficiency of the more complex human organism which operates them. And this goes much further than the evident fact that the individual workman can accomplish more in good light and fresh air. The effects of indigestion following a too hasty breakfast or a cold lunch eaten at a work bench cannot be figured on cost tickets, but its elimination or palliation by the provision of attractive lunch rooms and warm food supplied at cost, figures as an appreciable economy in the books of many a firm. The provision of club rooms for social purposes has proved an effective counter attraction to the saloon and promoted temperance among workers, as has the improvement of housing conditions added to their self-respect and general cheerfulness. Rest rooms and sick rooms for women and girl workers and the supply of simple remedies have saved many a half day's work on the part of an employee who would otherwise have gone home, as well as forestalling many an incipient epidemic which would otherwise have decimated a factory. Preference in choice of time and even in length of vacations given to those having the best record for attendance and punctuality has proved a marked stimulus to those virtues. The provision of safety devices and educational facilities, mutuality, opportunities for thrift, recreation, profit-sharing schemes, and communal or social benefit all receive attention from the author. Each is shown to be an economic problem; but though told in a plain, straightforward, matter-of-fact style, the whole is woven by the sympathy and enthusiasm of the author into a most attractive story. Where so many firms have made experiments so praiseworthy, it would be invidious to mention any; but it is most gratifying to learn that so many American captains of industry are making these endeavors, which must lead to greater harmony between capital and labor and therefore greater national efficiency.

APPLIED MECHANICS FOR ENGINEERS. By E. L. Hancock. New York: The Macmillan Company, 1909. 382 pp.; 8vo.; ill. by diagrams. Price, $2.

In the preparation of this work the author has followed the excellent rule that each new principle developed in the study of applied mechanics should be illustrated by its application to a practical problem, with the result that after each theorem showing how to find the moment of inertia of a parallelopipedon or the center of gravity of a paraboloid of revolution or similar bodies not frequently encountered, we are shown the kind of practical problems to which the formula developed can be applied. This, we should say, would make the subject much more interesting to the student, as the average engineering student is keenly in search of the practical, and apt to be skeptical about what seems to him only mental gymnastics. All the principles of the subject are amply covered, and the mathematics from which it is inseparable are as adequately given as anywhere, but it is the practical applications which distinguish the book from others on the subject. Tables of logarithms, trigonometric functions, etc., are given in the appendix, and the only improvement we can suggest is a little more cross reference in the index. The diagrams are clear, and the printing and paper in the usual excellent style of the Macmillan Company.

THE BOOK OF WHEAT. By P. T. Dondlinger, Ph.D. New York: Orange Judd Company, 1909. 370 pp.; fully ill. with photographs and diagrams. Price, $2.

The growth of a great industry, which synchronizes with and is sometimes essential to the growth of a state or nation, does not always receive from historian or economist attention proportionate to its importance. While many phases of the wheat industry have been adequately covered from the standpoint of the botanist, the farmer, the miller, or the merchant, no attempt has been made to cover the history of the industry as a whole as completely as its importance deserves, and it is this need that it is the endeavor of the author to supply. There are industries in which perhaps so complete a treatment would be more of a task, or even impossible in the same space—industries into which enter a greater variety or complexity of supplementary mechanical processes; but we cannot imagine that any industry could be more thoroughly or systematically treated than in the present work. Beginning with the etymological history of the very name, the botanical history of the plant, and its physical properties, the author conducts us through its evolution by selection, artificial cross fertilization, and environment, to its distribution, cultivation and harvesting, telling of the kind of soils it likes and their correction by fertilizers, and of the development of machinery accessory to its cultivation, from the earliest "header," described by Pliny a thousand years ago, to the monstrous combined steam plow, disk-harrow seeder, and fertilizer, or the combined harvester and thresher of the wheat belts of the great West to-day. The costs are carefully noted throughout, yield and cost of production, crop rotation and irrigation being considered in turn. There is a chapter on fertilizers, and one each devoted to diseases and insect enemies of wheat. Then we come to the transportation, storage, marketing and causes of fluctuation of prices of wheat, from which latter many an operator who knows wheat only through the medium of the ticker (and the baker) could learn much. Milling is adequately treated, as are consumption, production, and movement. Under consumption even breakfast foods in all their endless variety and the spectacular growth of this allied industry are discussed. The author's style is admirable, the language being lucid without the attempt to be unnecessarily ornate, and so well adapted to the subject. The book as a whole is as interesting reading to the layman as it should be valuable to farmer, miller, or merchant. Not the least valuable feature is an excellent bibliography of the subject and topical index.

THE MANUFACTURE OF EXPLOSIVES. Twenty Years' Progress. By Oscar Guttman, M. I. C. E. London: Whitaker & Co., 1909. Imported by the Macmillan Company. 85 pp.; 8vo.; ill. Price, $1.10.

The present work reproduces the Cantor Lectures delivered by the author before the Royal Society of Arts and, although not designated as a sequel, forms a supplement to the author's larger work with the first title, which remains the most complete and reliable practical and theoretical treatise on the history, physical and chemical properties, and manufacture of explosives. Within the limits by which a lecturer is confined the present volume describes as fully as possible the improvements and researches of the last twenty years; especially interesting are the experiments to determine what if any explosives are safe in fire damp, coal dust, and other dangerous atmospheres, and the manufacture of unfreezable nitroglycerin. The whole is told in an entertaining manner as attractive to the amateur as to the scientist.

CHILDREN AND GARDENS. By Gertrude Jekyll. London: "Country Life," S. W., 1908. Imported by Charles Scribner's Sons. 8vo.; 111 pages. Price, $2.

A charming book filled with delightful engravings of flowers and children. Children's gardens and playgrounds are extensively treated.

INDEX OF INVENTIONS

For which Letters Patent of the Upited States were Issued for the Week Ending April 27, 1909,

AND EACH BEARING THAT DATE

[See note at end of list about copies of these patents.]

Acid, magnesium salt of dibrombehenic, E. Fischer 919,335
Adding and listing machine, Vincent & White 919,656
Aeroplane, W. S. Romme 920,085
Agricultural tool, hand, P. H. Withington .. 919,799
Air brake system, automatic, G. Macloskie. 919,609
Air compressor, compound, A. H. Meech 919,909
Air compressor governing mechanism, R. H. Rice 919,953
Air cooler, C. F. Martin 919,611
Airships, etc., propeller mechanism for, P. Jamnitzky 920,064
Alcohol and making the same, solidified, Perelzveich & Rosenbusch 919,759
Annunciator, E. Pickel 919,377
Armor plates, etc., manufacture of, Hartley & Deby 919,859
Automatic switch, Ingram & Allen 919,871
Automobile, G. A. Schacht 919,779
Bag or can carrier, W. E. Kleine 919,729
Baker, fireless, Thoits & Gronberg 919,494
Baking apparatus, confection, Lanier & Driesbach 919,601
Baling press, self-tying, G. E. Jackson 919,585
Barrel head, J. Leicht 919,441
Barrel or cask, metal, R. H. Hackney 919,345
Barrel press, J. Heagerty 919,720
Bath tub attachment, M. & N. L. Gilmore. 919,848
Battery charging apparatus, F. E. Case 920,103
Beaking mill, J. Kennedy 920,067
Bearing box, adjustable, J. F. & H. E. Dodge 919,700
Bedstead crib attachment, C. D. Beeland ... 920,009
Beet puller, W. D. Nason 919,748
Beet topper, G. Nicol 919,929
Belt striking device, P. Karthaus 919,437
Belt tightening device, J. E. Delhomme 919,548
Bench clamp, A. V. Davis 919,546
Bench stop, carpenter's, D. F. Larkin 919,732
Bib seat dresser, R. McBee 919,618
Binder, loose leaf, S. C. Nott 919,453
Binder, loose leaf, F. B. Jordan 919,589
Binder, temporary, C. D. Trussell 919,497
Binders, leaf or sheet for loose leaf, C. C. Maltby 920,072
Bird and insect catcher, combined, Martin & Ross 919,907
Bit, R. I. Watts 919,503
Blank-conveying apparatus, P. H. Standish .. 919,487
Block. See Die block.
Blowpipe, J. Harris 920,054
Boat, land and water, A. G. Cummings 919,829
Boat, life, J. H. Stoelt 919,974
Boat or yacht, J. M. Gibbons 919,343
Boat, roller, R. E. Sharp 919,782
Bobbin holder, C. E. Lovejoy 919,899
Bobbin winding machine, J. Scharer-Nussbaumer 919,475
Body brace and suspenders, combined, C. Klopf 919,885
Boiler, W. A. Henry 920,057
Boiler appliance, steam, J. A. Ray 919,462
Boiler cleaner, F. X. Bayer 919,680
Boiler tubes, machine for removing scale from, J. A. Silver 919,785
Bolt and nut, C. G. Ette 919,840
Book and filing case, sectional, J. S. McComb 919,619
Book, copy, E. H. Roudebush 919,642
Book, manifold, H. P. Brown 920,015
Boots and shoes, making vamps for, A. G. Legg 920,070
Boring, drilling, and tapping machine, T. M. Boggs 920,011
Bottle, E. C. Royer 919,468
Bottle, R. L. Williams 919,987
Bottle cap, C. F. Jenkins 919,872
Bottle closure, H. A. Olsson 919,937
Bottle, non-refillable, A. V. Westerlund 919,664
Bottle sealing machine, E. J. Godman 920,048
Bottle soaking machine, S. Volz 919,796
Bottling machine, A. Calleson 919,319
Box-making machine, W. H. Holland 919,866
Box or case for cigarettes and like articles, J. Rheinberg 919,952
Box strap supply reel, C. W. Mitchell 919,371
Bracelet bag, C. O. Mason 919,613
Bracelet, elastic link, F. Speidel 919,486
Bracket, G. R. Cockrum 919,421
Brake, W. S. Adams 919,671
Brake beam finger guard, W. E. Fowler, Jr. 919,565
Brake hanger, car truck, J. H. Baker 919,676
Brake shoe, C. W. Armbrust 919,518
Breast strap attachment, hame, H. M. Dingsley 919,555
Brush, C. W. Patrick 919,756
Brush filling machine, S. Levi 919,734
Brush, fountain, Lawson & Smith 919,440
Brush, fountain bath, P. Ford 919,844
Brush handle, E. Maeder 919,610
Brush, leader, M. Blackman 919,813
Brush, shaving, E. C. Ripley 919,466
Bucket, clam shell, F. W. Lovell 919,446
Buckle, lock, W. H. McGee 919,919
Buckle, suspender, J. B. Russ 919,959
Bumper guard, G. Hipwood 920,060
Buoy, log, C. M. Boll 919,531
Burglar alarm for suit cases, satchels, etc., A. T. Ruthven 919,385
Butter mold, R. A. Simpson 919,478
Button making machine, J. W. Miller 919,914
Buttons, buckles, etc., to boots, shoes, gaiters, etc., machine for attaching, T. H. & W. H. Stringer 919,791
Cabinet, lace, R. A. Thornton 919,398
Calcimine, sanitary, C. Ellis 919,560
Can body making machine, J. C. Donnelly .. 919,557
Can lacquering machine, C. B. Hanthorn ... 919,858
Car ajustable platform, railway, W. Robinson 919,383
Car brake, J. S. McWhirter 919,746
Car coupling, J. F. & V. S. Durbin 919,331
Car coupling uncoupling device, T. M. Ramsdell 919,949
Car fender, F. A. Nelson 919,451
Car folding step, subway, J. M. Ernst 919,333
Car gate, E. L. Gillespie 919,711
Car, mining, C. M. Dibler 920,033
Car, muck, Henderson & Sheriff 919,863
Car packing case or box, motor, E. Weinacht 919,798
Car, passenger, H. Howson 920,062
Car roof construction, L. G. Nilson 919,931
Car roof construction, freight, Queenan & Murphy 919,461
Car, semiconvertible, E. S. Bucknam 920,020
Car stake or spike, logging, D. W. Marsh .. 919,447
Car underframe, C. H. Howard 919,356
Cars, etc., life guard or obstruction remover for tram, J. Bowring 919,688
Card table, F. E. Faulkner 919,709

Legal Notices

Card wire, jacquard, W. Cochran..... 919,321
Carpet beater, E. G. Oszman..... 919,754
Carpet sweeper, C. A. Smith..... 919,479
Carriage drive, J. J. Sullivan..... 919,793
Carriage, folding baby, Kaufmann & Goldenberg 919,880
Carving machine, F. H. Richards..... 919,769
Casing or pipe wrench, J. C. Lafferty..... 919,599
Cask, etc., W. Houlker 919,433
Caster, T. F. Jennings..... 919,873
Chain bolt, J. P. Holtzhouser..... 919,581
Chain grip and clevis, J. W. Davis..... 919,699
Chain making machine, P. H. Standish..... 919,488
Chairs and vehicles, infant holding strap for, E. F. Rose..... 919,774
Chimney, N. B. Dieterich..... 919,550
Chimney and mantle holder, combined, W. S. Stapley 919,652
Chuck, L. A. Carter..... 919,536
Churns, etc., suspended dasher for, J. R. Castle 919,693
Cigar safe, combined, J. L. Nail..... 919,926
Circuit breaker, time limit, W. Fellenberg.. 920,045
Clamping and heating device, A. B. Herrick 919,350
Cleaning and polishing apparatus, S. C. Carroll 919,417
Cleaning apparatus, pneumatic suction, Locke & Dunn..... 919,606
Cleaning system suction apparatus, pneumatic, Locke & Dunn..... 919,369
Clip or tie, J. S. McComb..... 919,622
Clock, alarm, W. E. Porter..... 919,765
Clock, alarm, Lapham & Walker..... 919,892
Clock case, watch holding, H. C. Karr..... 919,879
Clock, electric, E. E. Clement..... 920,024
Clock electric attachment, alarm, A. Lewis. 919,368
Clock, secondary electric, Steiger & Besancon 919,790
Clock spring releaser and winder, V. C. Taylor 920,098
Clock systems, transmitter for impulse driven, F. M. Schmidt..... 919,646
Clock trains, feed and positive lock for, F. M. Schmidt 919,647
Cloth folding apparatus, Kay & Trattles.... 919,591
Clothes line reel, S. Settles..... 919,388
Clutch, friction, C. K. Tripp..... 919,401
Clutch machine, electrical, W. T. Price.... 919,400
Coal or stone drilling machine, A. Ball..... 920,007
Coat hanger or suspender, W. Wall..... 919,501
Coffee percolator, J. D. Houck..... 919,583
Coin controlled apparatus, F. Magidson..... 919,904
Coin controlled mechanism, W. M. Probasco. 919,948
Collar protective shield, horse, F. Martell.. 919,906
Collar supporter, C. T. Wittstein...919,800, 919,801
Collector ring, J. E. Noeggerath..... 919,626
Commode seat, sanitary, H. W. Young..... 919,512
Composing and line casting machine, B. Cade 920,021
Composing machine, A. Savarese..... 920,086
Concrete, float or reinforced, C. Gabellini.. 920,046
Concrete structure, reinforced, G. M. Graham 919,714
Concrete walls, apparatus to be employed in building, R. Bowen..... 919,687
Conduit outlet fixture, H. T. Paiste..... 919,940
Conveyer, A. J. Meyer..... 919,615
Conveyer, belt, T. Robins..... 919,638
Conveyer flight, W. R. Clarkson..... 919,419
Cork puller, A. Baumgarten..... 920,008
Cork sheet cutting apparatus, A. Bogdanffy. 920,010
Corn comminuting machine, F. S. Ulery..... 919,499
Corn husker, R. N. Thomas..... 919,794
Corn husking rollers, J. A. Stone..... 919,392
Corset, apparel, S. Kops.....919,889, 919,890
Cot or bedstead, G. Holden..... 919,865
Cottage, outing, W. W. Keen..... 919,361
Cotton picking apparatus, T. J. Gessman.... 919,847
Cotton press, R. E. Haynes..... 919,861
Counting machine, G. W. Katzung..... 919,590
Coupling device, O. Rude..... 919,469
Cradle, A. R. Clapp..... 919,320
Crane, fire escape, and similar apparatus, I. F. Taylor 919,393
Crate, collapsible, F. M. Crawford..... 919,828
Crusher balancing means, O. P. Hood..... 919,582
Cultivator frames, adjustable arch and beam balance for, E. M. Buckhannon..... 920,019
Culvert, corrugated metallic, J. Zelch..... 919,997
Curtain pole, J. Hershko..... 920,058
Cutting machine, R. A. Lancey..... 919,363
Dead centers, device for overcoming, A. H. Gurley 919,855
Delivery mechanism, W. Scott..... 919,387
Dental appliance, R. Bradbury..... 920,013
Dental engine, M. Kelly..... 919,593
Dental syringe, H. F. Hamilton..... 919,717
Desk table, H. W. Bertram..... 919,682
Die block, interchangeable sectional, Olson & Hayden 919,936
Die supporting block and swager, W. T. Lyon 919,901
Display rack, W. R. Hayes..... 919,574
Display rack, J. G. Huffman..... 919,725
Distilling apparatus, M. B. Blouke..... 919,685
Distribution system, F. W. Peek, Jr..... 919,633
Ditching machine, tile, R. Y. Kessler..... 919,595
Door bolt or door holder, J. P. Holtzhouser. 919,580
Door holder, J. P. Holtzhouser..... 919,579
Door locking device, emergency exit, F. L. Putney 919,634
Door operating lever, dump, W. H. Yost... 919,413
Door stop and supporting box flange, Keene & Schuster 919,727
Door structure, sliding, E. C. Pitcher..... 920,083
Dough molding machine, long loaf, F. Streich 920,096
Draft device for agricultural implements, J. A. Dietz 919,551
Draft equalizer, H. C. Scott, reissue..... 12,949
Drag, flexible road, O. H. Gillespie..... 919,428
Drawer pulls and similar articles, making, H. J. Bleaking..... 919,815
Dress shield, K. E. Allport..... 919,299
Drill frame, magnetic, Klouse & Brockett... 919,597
Drilling machine, stock, E. Childs..... 919,823
Drinking glass, electrically illuminated, J. H. Cahill 919,691
Driving mechanism, T. E. Drohan..... 919,836
Dry press, knee joint, J. Schuring, Jr..... 919,781
Drying apparatus, R. Grauer..... 920,050
Drying furnace, J. C. Kuebler..... 919,598
Drying machine, J. Black..... 919,529
Dye and making same, blue sulfur, L. Haas 919,572
Dyeing, preparation of the indigo vat employed in, H. Chaumat, reissue..... 12,946
Egg beater, S. A. Nicholas..... 919,625
Electric battery, primary, G. A. Lutz..... 919,900
Electric cable terminal, C. W. Davis..... 919,830
Electric controlling means, C. S. Reno..... 919,463
Electric demand instrument, W. J. Lloyd... 919,605
Electric device, vapor, P. A. Huguenin.... 919,584
Electric drive for machines, E. R. Whitney. 919,986
Electric heater, G. E. Stevens..... 919,489
Electric heater, W. C. Fish..... 919,843
Electric light, incandescent, Carpenter & McDermott 919,821
Electric machine, dynamo, J. J. Wood..... 919,511
Electric machine, dynamo, W. F. Dawson... 919,547
Electric machine, dynamo, H. Lippelt..... 919,604
Electric machine field pole, dynamo, H. Poth 919,458
Electric motor, E. F. W. Alexanderson..... 919,514
Electric motor, R. E. Barker..... 919,523
Electric power distribution panel board, M. E. Ames 919,516
Electric switch, G. Wright..... 919,994
Electric switch, C. W. Denny..... 920,032
Electric switch, automatically operated, J. C. Calhoun 919,535
Electrical circuit automatic trunking apparatus, L. O. Surles..... 919,491
Electrical distribution system, J. L. Woodbridge 919,670
Electrical furnace, H. Nathusius..... 920,078
Electrical resistance device, H. S. Martin... 919,908
Electrical switch, F. W. Sanford..... 919,472
Electrical switch, H. A. Beynon..... 919,811
Electrolytic meter, Hookham & Holden..... 919,724
Elevating and dumping apparatus, A. Verschuren 919,795
Engine cylinders, system for air cooling gas, Martin & Swanson..... 919,612
Engine houses, smoke jack for railway, R. J. Evans 920,041
Engine starter, gas, G. Buress..... 919,818
Esters, producing isobornyl, C. Philipp..... 919,762
Excavating machine, G. E. Turner..... 919,498
Excelsior machine, W. R. Phelps..... 919,454
Expense register, S. Johnsen..... 919,587
Explosive engine, C. J. Farrar..... 919,842
Explosive engine, M. Tsckimperle..... 919,980
Fabric roll edge protector, G. W. Loughman, 919,607, 919,608, 919,739

Fabrics, means for attaching plates to, J. W. Clapp 919,695
Fan or blower, electrically driven, E. J. McDuffie 919,623
Fan support, electric, E. C. Lipps..... 919,898
Fastening device, W. Favreau..... 920,044
Faucet jewel cup, D. B. Lee..... 919,602
Fence post mold, C. B. Bruner..... 920,017
Fence tie, wire, G. A. Scheele..... 919,476
Fence tool, wire, B. B. Wood..... 919,989
File, letter, W. A. Kramer..... 919,730
Filler strip, D. J. Kelly..... 919,592
Filling can, L. Granda..... 919,429
Filling carrier or bobbin, S. W. Wardwell.. 919,502
Film reeling mechanism, A. C. Roebuck.... 919,773
Filter, S. B. Goff..... 919,849
Filter, continuous vacuum, E. L. Oliver..... 919,628
Filter, milk pail, J. F. Horne..... 919,431
Fire alarm box attachment, Dorsey & Keyser 919,702
Fire escape, J. Hegedus..... 919,721
Fire extinguisher, D. W. Diggs..... 919,552
Fish hook, artificial fly, C. D. Caldwell..... 919,820
Fishing pole, J. F. Scanlan..... 919,778
Fishing rod support, C. W. Unger..... 919,981
Flax and other fiber-yielding plants, machine for treating, E. Bosse..... 919,532
Flower holding and grave covering device, J. C. Van Aken..... 919,655
Fluid controlled mechanism, F. H. Richards. 919,465
Fluid pressure motor, P. J. Darlington..... 919,326
Fly catcher, Wiegand & Kronenberg..... 919,507
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Heating system, H. Lemp.....919,365, 919,366
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Hinge, W. J. Keene..... 919,881, 919,882
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FOR SALE OR ROYALTY.—Patent No. 889,013. Combined snap hook and buckle. One of the handy things about harness. For particulars address J. W. Hutchison, New Matamoras, Ohio.

Inquiry No. 8904.—Wanted to buy new or second hand machinery for making "bow type," mouse and rat trap springs and wire parts, single machine or ull outfit.

FOR SALE OR ON ROYALTY BASIS.—Patent No. 916,791, issued March 30, 1909. Improved lap-link. Sell on sight. Easily adjusted. No spreading. For full particulars address J. M. Scott, Etoile, Ky.

Inquiry No. 8908.—For a dealer in tapes and cords for Venetian blinds.

FOR SALE.—Patent No. 912,603. An apparatus for filling bottles. A boon to saloon keepers and a fortune for the lucky buyer. For full particulars address P. Nestor, Norwood St., Germantown, Pa.

Inquiry No. 8909.—For a machine to paint shade or blind rollers.

FOR SALE.—Patent No. 902,630. Electric boat signal. Absolutely prevents errors between captain and engineer. Half or two third interest. Address W. P., 820 Woodward Avenue, Detroit, Mich.

Inquiry No. 8918.—For manufacturers of "Wydt's Electro-Catalytic Sparking Plug."

FOR SALE.—Patent No. 912,708. Hand massage machine with tools for making same. Very durable and quick seller. Runs without electricity. One order for 15,000 just received. Will sell machines on commission for person buying patent. Want money for other business. For further information address P. O. Box 816, Kalamazoo, Mich.

FOR SALE.

FOR SALE.—Apparatus for demonstrating high-frequency electrical phenomena. 25,000 volt transformer, etc. Will light 110 volt incandescent lamp through human body. AFDP., Box 31, Wilmington, Del.

Inquiry No. 8921.—For the manufacturers of gilt paper

HELP WANTED.

LOCAL REPRESENTATIVE WANTED.—Splendid income assured right man to act as our representative after learning our business thoroughly by mail. Former experience unnecessary. All we require is honesty, ability, ambition, and willingness to learn a lucrative business. No soliciting or traveling. This is an exceptional opportunity for a man in your section to get into a big paying business without capital and become independent for life. Write at once for full particulars. Address E. R. Marden, Pres., The National Co-operative Real Estate Company, Suite 878, Marden Building, Washington, D. C.

Inquiry No. 8922.—Wanted the address of Worthington Boiler Co.

THOROUGHLY COMPETENT Mechanical Engineer, superintendent and designer, with practical experience in sugar machinery line and machines for tropical plantations; must be active and able, and know how to handle men. A fine position for the right man. Send references as to experience, character, reliability, etc. Address Sugar and Coffee Machinery, Box 773, N. Y.

Inquiry No. 8928.—For the manufacturers of a steam rotary excavator as described in the Scientific American of December 12, 1908, page 547.

WANTED.—Mechanical foreman in high grade mill work factory. Good salary. National Reference and Investment Co., 574 Brandeis Building, Omaha, Neb.

Inquiry No. 8931.—For parties who manufacture the Western Stump Borer for boring stumps.

PARTNERS WANTED.

PARTNER WANTED for promoting new article of manufacture. Must have $30,000. Give references. Address G. Larsen, care Independent, Minot, No. Dakota.

Inquiry No. 8936.—Wanted machinery used to spin or wrap paper pencils in the manner that paper pencils are made.

MISCELLANEOUS.

"HOW TO SUCCEED AS AN INVENTOR." 80-page book written by an expert, sent for two stamps. Address Goodwin B. Smith, No. 700 Stafford Building, Philadelphia, Pa.

Inquiry No. 8941.—For manufacturers of machinery for making fly screens.

WANTED NAME OF FIRM that manu acture patent pour out for ink bottle tops, screw or otherwise. For further particulars address Reliance, Box 773, N. Y.

Inquiry No. 8952.—For firms making apparatus for using oil for fuel under a steam boiler instead of coal.

LISTS OF MANUFACTURERS.

COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., List Department, Box 773, New York.

Inquiry No. 8953.—For manufacturers of water turbines.

A LIST OF 1,500 mining and consulting engineers on cards. A very valuable list for circularizing, etc. Price $15.00. Address Munn & Co., List Department, Box 773, New York.

Inquiry No. 8955.—For a machine to extract the small kernel from the pea-nut.

Inquiry No. 8957.—Wanted manufacturers of angle bars either malleable steel or sheared.

Inquiry No. 8960.—For the address of the Windsor Mfg. Co., manufacturers of waterproof collars and cuffs.

Inquiry No. 8961.—For the manufacturers of imitation pearls.

Inquiry No. 8964.—For address of parties making imitation horse hair.

Inquiry No. 8965.—Wanted the address of the Dirt Mover Magazine.

Inquiry No. 8966.—Wanted the address of the Cohendet Motor Co.

Inquiry No. 8967.—Wanted to buy cheap grade of cotton by the bale.

Inquiry No. 8969.—Wanted machines that make accordion dress plaiting (steam).

Inquiry No. 8972.—Wanted to buy complete outfit for making meat hooks.

Inquiry No. 8974.—For address of firms interested in fishing reels.

Inquiry No. 8975.—Wanted the address of the builders of moving stair cases.

Inquiry No. 8976.—For the manufacturers of novelties, mail order articles, etc.

Inquiry No. 8977.—For manufacturers of machinery for manufacturing denatured alcohol.

Inquiry No. 8978.—Wanted the address of manufacturers of dry pans or crushers to grind sand for plastering and cement works.

Inquiry No. 8979.—For parties who can make an article of moderately complex form of molded or stamped papier mache or other plastic material.

Inquiry No. 8980.—For the address of manufacturers of mortars and pestles that are used by druggists.

Inquiry No. 8981.—Wanted a gas machine making gas from gasoline or distillate, using a mixer to keep the gas regular.

Inquiry No. 8982.—Wanted a machine or process for slitting or laminating the edges of heavy cardboard, impregnating the slit or laminated edge with a waterproof material and compressing the edge after treatment. The object of the process is to produce an edge that shall be waterproof and which shall not fray or split when in use.

Inquiry No. 8983.—Wanted address of firms who turn wood novelties and wood carvings.

Inquiry No. 8984.—Wanted the address of the manufacturers of Cypress wash tubs.

Inquiry No. 8985.—Wanted the address of firms manufacturing puzzles.

Trolley, J. T. Minahan	919,449
Trolley wheel bearing, A. C. Sloan	919,968
Trolley wire clamping ear, F. Guillot	919,571
Trolley wire support, J. W. Porter	919,763
Truck bolster and car truck, J. J. Byers	919,690
Truck brake, J. S. McWhirter	919,747
Truck, car, A. F. Batchelder	919,305
Truck for harrows, W. H. Parlin	919,755
Truck for harvesters and other machines, short turning two wheeled tongue, W. M. Wadleigh	919,404
Truck, hand, G. D. Parker, reissue	12,948
Truck, maximum traction, W. S. Adams	919,803
Truck, railway car, W. F. Richards	919,770
Truck side frame, car, J. H. Baker	919,677
Tube, W. F. Murphy	919,915
Tuck marker and folder, combined, W. R. Parsons	920,081
Turbine, C. Lemale	919,895
Turbine, elastic fluid, J. S. Green	919,853
Turbine, steam, J. D. Fraivillig	919,340
Turbo generator, Hamilton & Ver Planck	920,052
Type, machine for composing or setting up, H. Weiniger	919,408
Type setting up and casting machine, E. M. M. Retaux	919,951
Type writer, electrical, H. C. Horstmann	919,432
Typewriter's copy holder, W. P. McNatt	919,923
Umbrella and parasol notch or runner head, J. B. Riehl	919,954
Umbrella, stick, R. Genck	919,567
Universal joint, C. W. Spicer	919,651
Valve, D. T. Williams	919,508
Valve, air, V. C. Washburn	919,658
Valve attachment, radiator, P. R. Moses	919,372
Valve, balanced, W. Ord	919,753
Valve controlling mechanism, P. L. Wormeley, Jr.	919,992
Valve, discharge, O. S. Sleeper	919,787
Valve, double seated, F. M. Smith	919,480
Valve for the supply pipes for water motors, relief, H. E. Warren	920,099
Valve, motorman's, B. Lewis	919,443
Valve, relief, E. V. Anderson	919,300
Valve, steam engine, E. Dugar	919,330
Vapors issued from volatile liquids, apparatus for recovering, Diamanti & Lambert	919,832
Vault, G. W. Bonnell	919,686
Vegetable washer, A. Williams	919,668
Vehicle, P. Forschler	919,337
Vehicle attachment, self propelled, J. Wood	919,990
Vehicle wheel, T. B Jeffery	919,358
Vehicle wheel, W. H. Clausen	919,826
Vehicle wheel designated as double safety bolster wheel, L. Clark	919,825
Vending apparatus, card, Neumann & Gammelgaard	919,927
Vending apparatus, coin controlled, T. R. Chisolm	919,824
Vending machine, E. X. Somers	919,390
Vending machine, H. H. Daniels	919,543
Vending machine, A. Merckens	919,912
Vending machine coin controlling mechanism, N. D. Nelson	919,749
Vessel, double walled, M. Anacker	919,517
Vessels, apparatus for cleaning the hulls of, E. Otidys	919,939
Vibration neutralizer, E. J. Jolivet	919,876
Vibrator, H. M. Sciple	919,649
Violin and like stringed musical instrument, M. B. Hern	919,722
Vise, hand, J. G. Smith	919,971
Voting machine, general, L. R. Winslow	920,101
Voting mechanism for voting machines, independent, L. R. Winslow	920,102
Wagon brake or lock, F. G. Wetzel	919,985
Wagon coupling, S. A. Biggers	919,684
Wagon, dump, O. C. Seelow	919,964
Wall bracket, adjustable, Savin & Harvey	919,777
Washbench, W. J. Holly	919,353
Washboiler, E. L. Ridgway	919,382
Washer. See Overhead washer.	
Washing machine, J. M. O'Neall	919,629
Watch glasses and grooves and fillets, gage for, A. Guerineau	920,051
Watch, stem winding and setting, W. E. Porter	919,764
Water closets, coupling for the flushing pipes of, H. Oidtmann	919,935
Water craft, J. S. Chase	919,694
Wave motor, A. T. Newman	919,928
Waxing pad and iron holder, combined, V. F. Good	920,049
Weather strip for windows, J. E. Williams	919,509
Weaving cut pile carpets, Jacquard mechanism for, Baker & Chamberlain	919,414
Whip socket and lock, combined, T. K. Scott	919,963
Winding and drying reel, S. M. McMurray	919,922
Winding machine, edgewise, J. J. Wood	919,510
Window, J. Austin	919,521
Window, automatic, J. Austin	919,520
Window fastener, E. Bollbach	919,311
Window holder and weather strip, Davis & Lutz	919,426
Window lock, A. G. Neumeister	919,750
Window lock, self-locking, Thomas & Lewis	919,653

Wire coating machine, G. H. Rupley 919,470
Wire covering machine tension device, D. Noble 919,751
Wire joints, tool for twisting, C. E. Cook. 919,323
Wire staple, W. H. Page 919,631
Wire stretcher, O. Phillips 919,944
Wire stretcher, E. Edwards 920,039
Wire stretching and splicing device, P. O. Larson 919,893
Wire twisting machine, L. Blessing 919,309
Woodworking clamp, Nichols & Hastings.. 919,930
Woven fabric and producing same, S. J. Solley 919,485
Wrench, G. L. Hindman 920,059
Writing a plurality of signatures or inscriptions, means for simultaneously, J. S. Brand 919,689
Zinc compounds and ammonia, apparatus for recovering, E. G. & M. M. Pearlman.... 919,376
Zinc compounds and ammonia, recovering, E. G. & M. M. Pearlman 919,375

DESIGNS.

Badge, J. J. Coccaro 39,941
Bedstead, H. H. Hirsch 39,943
Braid, F. Doebeli 39,944
Clock case, P. G. Giroud 39,942

TRADE MARKS.

Antiseptic powder, Paris Medicine Co..... 73,523
Beer, lager, Kips Bay Brewing & Malting Co. 73,563
Belting, pump cups, valves, and washers, leather, L. P. Degen Belting Co..... 73,553
Boots and shoes, leather, A. A. Williams.. 73,503
Brick and building blocks, Kittanning Brick & Fire Clay Co. 73,552
Candies and chocolates, Camp Chocolate Co.. 73,510
Candy, cocoanut, American Caramel Co..... 73,505
Canned, dried, and evaporated fruits and vegetables and canned and dried fish, Corby Commission Co..... 73,534
Canned fruits, California Fruit Canners' Association 73,507
Canned fruits and vegetables, California Fruit Canners' Association 73,506
Canned fruits and vegetables and dried fruits, California Fruit Canners' Association... 73,508
Canned fruits, vegetables, and oysters, Hale-Halsell Grocery Co. 73,518
Canned fruits, vegetables, and pork and beans, Elliott Grocery Co..... 73,513
Canned salmon, Columbia River Packers' Association 73,533
Canned vegetables, California Fruit Canners' Association 73,509
Cleaners, vacuum, J. W. Duntley..... 73,559
Clothing, certain, J. G. Miller & Co..... 73,492
Codfish, cured, Lane-Libby Fisheries Co..... 73,520
Coffee, blended roasted, Renfro Bros. Co.... 73,525
Coffee, blended roasted, J. J. Schotten..... 73,527
Corsets, Higbee Co. 73,491
Cream, toilet, Marietta Stanley Co..... 73,529
Cutting compound, Cataract Refining and Manufacturing Co. 73,546
Dress skirts and waists, ladies', L. Deutsch. 73,489
Engines and parts thereof, internal-combustion, Loane-Hiltz Engineering Co. of Baltimore City 73,539
Engines, certain, Litchfield Laundry & Machine Co. 73,538
Food for cattle, J. Marcus 73,522
Footwear, Williams Shoe Co..... 73,557
Garment supporters, W. A. Arledge 73,532
Garment supporters, Jaeger Automatic Machine Co. 73,537
Gloves and gauntlets, leather, Gloversville Auto Glove Co. 73,550
Gloves, leather, California Glove Co..... 73,488
Gloves, leather, Trefousse & Cie.....73,493, 73,572
Harness for horses, Page Belting Co..... 73,554
Horse blankets, Beckman Co.....73,542, 73,545
Hot water bottles and fountain syringes made of rubber, L. & M. Rubber Works. 73,564
Instep supports, Adjustable Arch Co..... 73,558
Jewelry and precious metal articles, certain, Geo. H. Fuller & Son Co..... 73,517
Jewelry and precious metal ware, Stern Bros. & Co. 73,530
Labels, woven, A. L. Kahn 73,551
Lamps, arc, Economy Electric Co.. 73,535, 73,536, 73,560
Leather goods, dressing and preservative for, Abercrombie & Fitch Co. 73,504
Marine, field, and opera glasses, Andrew J. Lloyd Co. 73,531
Mowers, lawn, Marshall-Wells Hardware Co. 73,540
Oil, olive, J. C. Kubias 73,519
Paper, carbon, De-Fi Manufacturing Co..... 73,511
Paper, envelops, and cardboard, writing and printing, Union Card and Paper Co..... 73,567
Paper, wrapping, Union Paper and Twine Co. 73,568
Paper, writing, Esleeck Manufacturing Co... 73,561
Pens, stylographic and fountain, Simpson & Harvey 73,565
Percales and canton flannels, Tootle, Wheeler & Motter Mercantile Co. 73,555
Percales, batistes, and canton flannels, Tootle, Wheeler & Motter Mercantile Co. 73,566
Plasters and medicines, certain, Queens Pharmacal Co. 73,524
Polishes, certain, B. Levy 73,521
Rope for transmitting power over pulleys and for hoisting purposes, Dodge Manufacturing Co. 73,549
Salt, Salt Union 73,526
Salves, Craft Remedy Co. 73,548
Shoes, leather, F. Hageman & Sons..... 73,490
Silk piece goods, Desenberg & Ganster..... 73,512
Soap, Marietta Stanley Co..... 73,528
Stoves and ranges and parts thereof, cooking and heating, Chicago Stove Works. 73,547
Textiles, certain, Friedman & Krieger. 73,514, 73,516
Tonic beverage, non-alcoholic carbonated, W. B. Nethery 73,541
Toothpicks, A. Herz 73,562
Watches, watchcases, and watch movements, American-Swiss Watch Co. 73,486, 73,487
Whips, H. M. Van Deusen Whip Co..... 73,556

LABELS.

"Amor y Zelo," for cigars, Perfecto Garcia & Bros. 14,777
"Billy Possum," for soap, The Harper Supply Co. 14,786
"Caperon," for a shampoo, toilet article, and scalp remedy, A. Nelson 14,784
"Colgate's Rapid Shave Powder," for soap powder, Colgate & Co. 14,787
"Easter Confections," W. R. Montague..... 14,780
"Eyvin Colorito," for soap for washing and dyeing, S. Andersen 14,788
"Phillips's Celery Sauce," for celery sauce, M. A. Phillips 14,781
"Qilo," for hair tonic, J. B. Davis..... 14,783
"Rockwood Heel and Toe Hose," for hoisery, Rockwood Hosiery Mill 14,790
"Root Beer," for root beer, American Beverage Co. 14,779
"Salamandergundi," for plaster casts, H. Rosenstein 14,789
"Sawyer's Crystal Ammonia and Borax," for ammonia and borax 14,782
"The 'Billy Possum' Cigar," for cigars, The Harper Supply Co. 14,778
"Washezee," for a detergent, Wm. A. Hoag & Co. 14,785

PRINTS.

"Perin's Pride Flour," for flour, Perin Bros.. 2,471

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New York.

Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address Munn & Co., 361 Broadway, New York.

SEALED PROPOSALS.

SEALED PROPOSALS will be received at the office of the Light-House Engineer, Tompkinsville, N. Y., until one o'clock, May 24, 1909, and then opened, for furnishing miscellaneous articles required in the Third Light-House District for the fiscal year ending June 30, 1910, in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to the Light-House Engineer, Tompkinsville, N. Y.