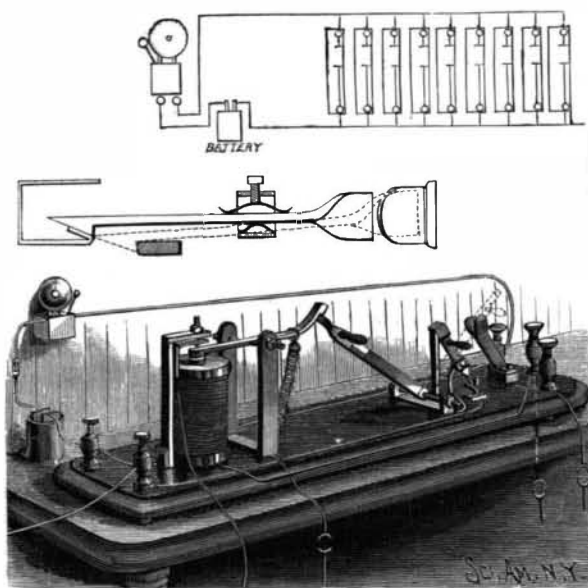


**A LIGHTNING AND HEAVY CURRENT ARRESTER.**

The illustration represents a current arrester, charge grounder, open-circuit alarm, and automatic live wire tester, patented by Miller R. Hutchison, of No. 18 North Commerce Street, Mobile, Ala. It is intended to protect telegraph, telephone, fire alarm, call bell, and all low-potential instruments that are liable to damage from lightning and live wires, giving notice by an alarm bell of the passage of a heavy current, and de-



HUTCHISON'S CURRENT ARRESTER.

termining whether it is due to a stroke of lightning or a continuing and dangerous current from a live wire of high potential. The ordinary line current, entering the instrument at a binding post, passes by wire into jaws on the base of the instrument, thence through a bar constituting a drag switch and into a support, and through an upright and wire to the metal bearing in which is journaled a spring-actuated pivoted shunt bar, the limit of the motion of which is indicated by the dotted lines. From the shunt bar the current passes to a pivoted armature lever normally held out of contact with the magnet by a spiral spring, the bottom end of the magnet wire being also connected with the bearing in which the armature lever is journaled, and the magnet being connected with a ground wire. When a live wire or heavy charge of lightning strikes the line wire, the magnet attracts the armature lever to free the shunt bar from its catch at the other end of the lever, when the shunt bar springs over to the position shown by the dotted lines, and into contact with spring jaws forming a shunt bar support and holder, a grounding wire from which grounds the charge and entirely cuts out the magnet. At the same time the rising of the armature lever effects contact, through a standard, with the terminals of a bell circuit to sound an alarm, the alarm bell ringing continuously until the instrument is reset. This may be effected by grasping a rubber handle of the shunt bar and pulling it over until its end is caught by the catch of the armature lever but in case the alarm had been caused by a live wire, this would burn out the magnet before the armature lever could be again removed from contact, and as a precaution against this provision is made for opening the circuit automatically through the drag switch, the detail of which is shown in one of the small figures. With this switch in circuit there is no current on the shunt bar when reset by the operator, and not until the circuit is reformed by adjusting the drag switch, when, if the heavy current is still on, the shunt bar quickly and sensitively parts from the catch of the armature lever, and the magnet is not burned out. For switchboard use, or where more than one instrument is used, the instruments may be arranged on a table, as shown in one of the small figures, the connections being so made that the alarm will be rung from any one of the instruments.

**AN IMPROVED STEAM CONDENSER.**

The illustration represents a simple and inexpensive condenser designed to condense exhaust steam at a relatively high temperature, thus obviating excessive back pressure on the engine piston. The improvement has been patented by Michael and James V. Spelman and William H. Graves, of Shreveport, La. The shell of the condenser is formed of two parts, united by flanges and bolts, and within its lower part is an inverted cone receiving vessel having an overflow pipe delivering into the bottom of the shell. Above the receiver is an inverted cone perforated distributor, supported by the upper part of the shell immediately below a deflecting cone wherein slides a vertical perforated tube, to more or less fully close the outlet from the condenser. The exhaust pipe delivers into the condenser centrally at the bottom (the drain pipe leading from one side), and the entering steam is directed upward in divided currents until it strikes the deflecting cone at the top, when it is forced downward through the distributor, to be further divided and thrown evenly throughout the whole upper part of the shell, causing it to condense rapidly, and the water of condensation being caught by the receiver and flowing out through the drain pipe.

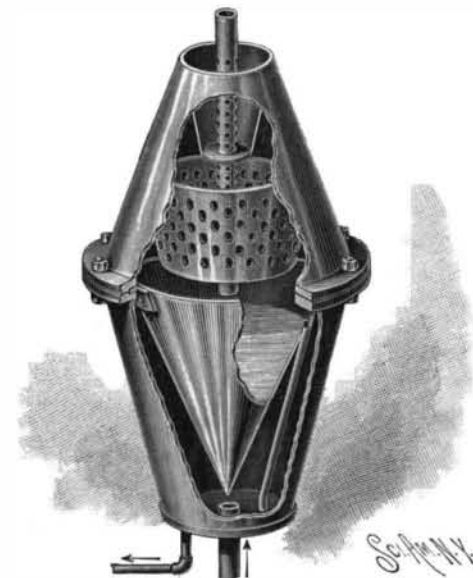
**THE CHICAGO MOTOCYCLE RACE.**

In 1894 a great impetus was given to the automobile carriage by a competition organized in Paris by the Petit Journal. The course was from Paris to Rouen, 75 miles, and the prizes amounted to \$2,000. Fifteen competitors started in the race, the best time being 5 hours and 40 minutes. On June 11, 1895, occurred another race in France, for prizes aggregating \$8,000. The course measured 727 miles, and was from Paris to Bordeaux and return. Sixty-six vehicles competed, and the best time was made by a petroleum carriage, which made the entire journey in 2 days and 53 minutes, or at the rate of 14.9 miles an hour.

With a laudable intent to awaken widespread interest in the motorcycle, two papers offered last July substantial prizes aggregating \$10,000 to be competed for by horseless vehicles. The Chicago Times-Herald offered \$5,000 in four prizes for the winners in the race of November 2, and the Engineer of London offered about \$5,000 for a race to be held in England. Under the existing law in England, which prohibits the use of steam carriages on the roads at a greater speed than four miles per hour, no adequate competitive trial could take place, but a repeal of the law is confidently expected, so that allowing time for necessary legislation the competition can scarcely take place at an earlier date than October, 1896. No vehicle must weigh over two tons, the limit being fixed by the Shaw-Lefevre

over three weeks, only six contestants started on Thanksgiving day morning, November 28. It is probable the terrible storm just preceding the day fixed for the trial and the accumulation of snow and mud deterred many from appearing.

The route selected was as follows: Midway Plaisance, Washington Park, Fifty-fifth Street Boulevard, Michigan Boulevard, Rush Street, Lake Shore Drive through Lincoln Park, the Sheridan Drive and Kenmore Avenue to Evanston; thence



SPELMANS & GRAVES' STEAM CONDENSER.

south on Clark Street and Ashland Avenue to Roscoe Street and Western Avenue, west on Belmont Avenue, southeast on Milwaukee Avenue to Humboldt Boulevard and through Humboldt, Garfield and Douglas Parks to Western Avenue Boulevard, east on Fifty-fifth Street boulevard and Washington Park to Jackson Park and the Midway.

Three days before the race, Chicago was visited with a veritable blizzard, which almost entirely cut off the city from telegraphic communication, crippled railroads, and brought the cable and trolley cars to a standstill. The streets were choked with snow, which was soon mixed with the accumulations of dirt, until they became well nigh impassable. The snow was 12 inches deep in places. It was in the midst of this city of snow and slush that six motorcycles started for their race at 8:55 A. M. on Thanksgiving morning.

The vehicles competing were: The Duryea motor carriage, of Springfield, Mass.; the Morris & Salom electrobat, of Philadelphia, Pa.; the Benz-Mueller motorcycle, entered by Mr. H. Mueller, of Decatur, Ill.; the Roger motorcycle and the De la Vergne motorcycle, of New York; and the Sturges electric motorcycle, of Chicago.

The course was fifty-four miles long. The De la Vergne machine quit at Sixteenth Street; the Morris & Salom electrobat and the Sturges electric motorcycle made short runs and then dropped out of the race. Both the electric vehicles returned in good condition and made a good showing under the circumstances. The Roger machine broke its running gear when half of the course was covered and lost the race.

The probable winner of the first prize was the Charles E. Duryea gasoline motorcycle, which made the fifty-four mile run in ten hours and twenty-three minutes.

The Benz-Mueller motorcycle came in second, covering the course in eleven hours and fifty-eight minutes. Considering the condition of the

roads, this showing was very satisfactory. An engraving of this machine will be found in our paper of November 16, 1895. The prizes offered were as follows:

First prize—\$2,000 and a gold medal, the same being open to competition to the world.

Second prize—\$1,500, with a stipulation that in the event the first prize is awarded to a vehicle of foreign



THE DURYEA FIRST PRIZE MOTOR WAGON.

bill, which was introduced during the last Parliament. When the Times-Herald first made its offer, it was feared that the time was too short for American inventors to construct motorcycles which would stand a fair trial when compared with the skilled construction of the most experienced French and German makers. This prediction was fulfilled, for out of nearly one hundred machines entered, and after a postponement of

invention or manufacture, this prize shall go to the most successful American competitor.

Third prize—\$1,000.

Fourth prize—\$500.

The third and fourth prizes are open to all competitors, foreign and American.

We present an illustration of the first prize winner. The Duryea carriage is made by the Duryea Motor Wagon Company, of Springfield, Mass. The Duryea wagon weighs about 700 pounds and is built for either two or four persons. The one shown in the engraving is arranged for two people. It is driven by two three-horse power motors, which use ordinary stove gasoline, so that the expense of running is less than one-half cent a mile.

The wagons have a carrying capacity of eight gallons, so that they will run from 100 to 200 miles. The wagon needs recharging with water each day, and both the gasoline and water can be supplied to the wagon in five minutes. The object of the tank of water is, of course, to prevent the motor from overheating. It runs backward or forward with equal facility, and has four speeds forward and one speed backward. It can be geared to different speeds to suit the roads of any locality, and may be run at any speed desired below its limit over roads over which ordinary traffic travels. The wheels of the carriage are 34 and 38 inches in diameter and are equipped with  $2\frac{1}{2}$  inch pneumatic tires, and it is easily governed, being steered and speeded by the same lever, being steered by a sidewise motion of the lever and speeded by a vertical motion. It is provided with a powerful brake, and as its motors are wholly independent, one will propel the carriage even if accident affects the other. As an electric spark explodes the charge, the danger of explosion is reduced to a minimum.

#### A Drop of Water.

The water which is now in the ocean and in the river has been many times in the sky. The history of a single drop taken out of a glass of water is really a romantic one. No traveler has ever accomplished such distances in his life. That particle may have reflected the palm trees of coral islands, and has caught the sun ray in the arch that spans a cloud clearing away from the valleys of Cumberland or California. It may have been carried by the Gulf Stream from the shores of Florida and Cuba, to be turned into a crystal of ice beside the precipices of Spitzbergen. It may have hovered over the streets of London, and have formed a part of murky fog, and have glistened on the young grass blade of April in Irish fields. It has been lifted up to heaven and sailed in great wool-pack clouds across the sky, forming part of a cloud mountain echoing with thunder. It has hung in a fleecy veil many miles above the earth at the close of long seasons of still weather. It has descended many times over in showers to refresh the earth, and has sparkled and bubbled in mossy fountains in every country in Europe. And it has returned to its native skies, having accomplished its purpose, to be stored once again with electricity to give it new life-producing qualities and equip it as heaven's messenger to earth once more.—Chas. S. Whiting, in the Museum.

#### Calcium Carbide.

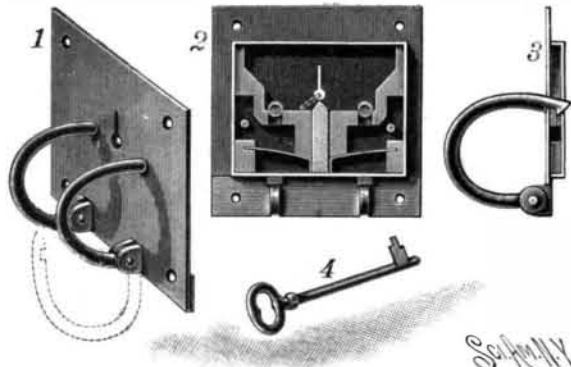
At the annual meeting of the German Electro-Chemical Society, Dr. Borchers exhibited an apparatus by which he not only succeeded, nearly ten years ago, in preparing calcium carbide, but also showed that all the oxides which were regarded as irreducible could easily be reduced by the action of carbon. It consists of a small chamber or furnace of fire brick, through the walls of which pass thick carbon rods 40 mm. in diameter. Inside the chamber these are connected by a thinner carbon rod, 4 mm. in diameter and 40 mm. long. The furnace is fed with a mixture of lime and carbon. The action is not electrolytic; the effect of the current being simply to heat the lime to a temperature at which it is reduced by the carbon. An E.M.F. of 12 volts and a current of 90 amperes is used. The current may be either direct or alternating; and by diminishing the length of the thinner rod calcium carbide can be produced with an E.M.F. of only 1 volt, so that electrolysis is out of the question. The reactions which take place are: (1)  $\text{CaO} + \text{C} = \text{Ca} + \text{CO}$ ; (2)  $\text{Ca} + \text{C}_2 = \text{CaC}_2$ .

The above reactions are supposed to have been discovered by Moissan and Wilson, but the author refers to publications by Wöhler (1862) and himself (1891).—Zeits. f. Elektrotechnik. u. Elektrochem.; Jour. Soc. Chem. Ind.

POTASSIUMORTHODINITROCRESOLOATE is the name of a new antiseptic discovered in Germany, but as it is intended to be used generally, it is also called antinounin. One part of the substance in from 1,500 to 2,000 parts of soapsuds is destructive to all the common parasites injurious to plants. Yeast used in brewing remains fresh for a long time when treated with it; it destroys all bacteria, and yeast can endure a solution as strong as five per cent of the substance. It is odorless and very cheap.

#### A KEY RETAINING DEVICE.

For holding and securing keys in asylums, prisons, hotels and other places where many keys are required to be kept for the usual service, holding them in such way that they can only be removed by one having the proper release key, the Improvement shown in the accompanying illustration has been patented by Richard Hensley, of Salem, Oregon. Fig. 1 is a face view of the device, which is represented in section in Figs. 2 and 3, Fig. 4 showing the key. The key-holding hook is pivoted to swing down, as shown in dotted lines, and at its upper end is a bevel and notch adapted to engage a bolt of the lock on the rear of the face plate, as



HENSLEY'S LOCKING BOARD FOR KEYS.

shown in Figs. 2 and 3, the bolt being spring-pressed and being disengaged from the hook by the release key.

#### THE LEBER PATENT PORTABLE FIRE ESCAPE.

A simple and inexpensive portable fire escape, which may be packed in small compass to take but little room in a traveler's trunk or bag, is shown in the accompanying illustration. It has been patented by Victor Leber, and is manufactured by the Turner Machine Company, of Danbury, Conn. It consists of a clamp adapted to slide upon a rope, as shown in the small figure, the clamping or frictional pressure upon the rope being readily controlled by the person using the device. The two hinged parts of the clamp are provided with registering half grooves adapted for convenient use on different sizes of rope, and the clamp is held in gripping position upon the rope by a threaded locking lever on the outer end of which is a finger wheel. At the top and bottom of the clamp are rings through which the rope passes, affording a slight frictional brake, and at the bottom is also a double hook to which may be attached body and shoulder straps to support one



THE LEBER PATENT PORTABLE FIRE ESCAPE.

making use of the device in escaping from a building. When the escape is permanently fixed in houses or factories, the rope is preferably attached to a hinged arm secured at the inside of the window casing. The device may also be secured to the window casing. When several persons are in one room, the frictional pressure of the clamp may be controlled by one standing in the room to let down different individuals in turn, the looped end of the rope being then secured to the straps by which the person is suspended, and the rope sliding through the clamp. As one person reaches the ground, it is ready for another to descend. Each apparatus is tested to 1,000 pounds before leaving the factory of the manufacturers, and

the whole device is designed to be so simple and safe in its mode of operation that there shall be no reasonable possibility of a person failing to make it work properly in an emergency. This apparatus may also be conveniently employed by painters, builders and electricians, and by all engaged in work necessitating their being suspended outside buildings.

#### Remedial Foods.

This list of food remedies compiled by the House-keeper is well worth preservation for reference:

Celery is invaluable as a food for those suffering from any form of rheumatism; for diseases of the nerves and nervous dyspepsia.

Lettuce is useful for those suffering from insomnia.

Water cress is a remedy for scurvy.

Peanuts for indigestion; they are especially recommended for corpulent diabetics. Peanuts are made into a wholesome and nutritious soup, are browned and used as coffee, are eaten as a relish, simply baked, or are prepared and served as salted almonds.

Salt to check bleeding of the lungs, and as a nervine and tonic for weak, thin-blooded invalids. Combined with hot water is useful for certain forms of dyspepsia, liver complaint, etc.

Onions are almost the best nervine known. No medicine is so useful in cases of nervous prostration, and there is nothing else that will so quickly relieve and tone up a worn-out system. Onions are useful in all cases of coughs, colds and influenza; in consumption, insomnia, hydrophobia, scurvy, gravel and kindred liver complaints. Eaten every other day, they soon have a clearing and whitening effect on the complexion.

Spinach is useful to those suffering with gravel.

Asparagus is used to induce perspiration.

Carrots for suffering from asthma.

Turnips for nervous disorders and for scurvy.

Raw beef proves of great benefit to persons suffering from consumption. It is chopped fine, seasoned with salt, and heated by placing it in a dish in hot water. It assimilates rapidly, and affords the best of nourishment.

Eggs contain a large amount of nutriment in a compact, quickly available form. Eggs, especially the yolks of eggs, are useful in jaundice. Beaten up raw with sugar are used to clear and strengthen the voice. With sugar and lemon juice, the beaten white of egg is used to relieve hoarseness.

Honey is wholesome, strengthening, cleansing, healing and nourishing.

Fresh ripe fruits are excellent for purifying the blood and toning up the system. As specific remedies, oranges are aperient. Sour oranges are highly recommended for rheumatism.

Watermelon for epilepsy and for yellow fever.

Cranberries for erysipelas are used externally as well as internally.

Lemons for feverish thirst in sickness, biliousness, low fevers, rheumatism, colds, coughs, liver complaint, etc.

Blackberries as a tonic. Useful in all forms of diarrhoea.

Tomatoes are a powerful aperient for the liver, a sovereign remedy for dyspepsia and for indigestion. Tomatoes are invaluable in all conditions of the system in which the use of calomel is indicated.

Figs are aperient and wholesome. They are said to be valuable as a food for those suffering from cancer. They are used externally as well as internally.

Bananas are useful as a food for those suffering from chronic diarrhoea.

Pieplant is wholesome and aperient; is excellent for rheumatic sufferers and useful for purifying the blood.

#### Alumina from Clay.

An important contribution appears in Comptes Rendus, by Heibling, indicating the production of alumina from clay, so as to be absolutely free from silica and readily convertible into sulphate, etc. To this end the clay is thoroughly incorporated with a mixture, in equal parts, of ammonia and potassium sulphates, in such proportion that three molecules of ammonium sulphate may be present to every molecule of alumina, and the mixture is made into hollow bricks, which are then heated in an oven at 270 deg. to 280 deg. C. At this temperature both gaseous ammonia and acid ammonium sulphate are given off, which immediately reacts with the potash salt present, acid potassium sulphate being formed—the latter, at the above temperature, combining with the alumina of the clay to form alum. The alum is finally extracted from the bricks by means of water and freed from iron by recrystallization, and the insoluble silica remaining behind may be employed in cements. Granular alumina is prepared by spreading out the powdered alum in a thin layer on shelves arranged in a vertical tower, which is traversed by the warm, moist, ammoniacal fumes derived from the brick oven. Thus the alum is transformed in situ into alumina, retaining the form of the original powder, and potassium and ammonium sulphates.