

less quite high, as a consequence of the topography of the city, is thus distributed:

Land and outbuildings.....	\$44,000
Generating works.....	54,000
Track and electric railway.....	73,000
Rolling stock.....	45,000
Administration, etc.....	30,000
General total.....	\$246,000

As for the service, that will be 8 or 16 minutes, according to the lines.

As expense of motive power, one reckons about 2 cents per mile car, and an output of about two and a half pounds of anthracite per same unit.

For the water supply, a reservoir of from 2,880 to 3,600 cubic feet is proposed, and a double intake of water from the city mains and the Bret, the washing of the gas and the cooling of the motors requiring quite a large quantity of water.—La Revue Technique.

ELECTRIC IGNITERS FOR GAS ENGINES.

BY GEORGE M. HOPKINS.

Gas, gasoline and petroleum oil engines are daily becoming more popular, and not only is the number of regular manufacturers becoming very large, but many amateurs are trying their hands at the production of engines of this class. The field is very fascinating to mechanics, but no one knows the amount of experiment required, or the vexation experienced in bringing out a motor of this class, who has not already experimented in this line.

One of the most difficult problems is that of providing an efficient means of igniting the explosive charge in the cylinder at the proper instant without intermissions or failures. A red hot tube into which the gas is admitted at the right moment is simple, good and reliable, so long as the tube lasts, but the tube speedily burns out and requires renewal. Ignition by means of a traveling flame necessitates intricate and delicate devices which require constant care to prevent failure.

The electric spark, taken all in all, is probably the best igniter, but even that has its objections. It is largely used and is simple. As many amateurs are seeking information on the subject of ignition for gas engines, we have prepared illustrations showing the principle of the electric igniter, leaving it to the engine builder to make the adaptation to the particular engine to which it is to be applied.

The essential feature of the electrical igniter is the spark coil. This does not differ from the spark coil used in connection with an ordinary illuminating gas burner, and the electric lighting attachment to the gas burner embodies the principle of the igniter for



Fig. 2.—GAS BURNER WITH ELECTRIC IGNITER.

gas engines, but it does not possess the required stability and lasting quality. The smallest practical coil is made by filling a paper mailing tube 7 inches long and 1 3/8 inches in diameter with annealed iron wires of any size from No. 16 to No. 9, the wires being arranged in three or four layers around a 3/8 wooden core. Upon the paper tube are wound four layers of No. 16 cotton-covered magnet wire. Before winding the coil, wooden heads are secured to the ends of the core, as shown, to form a spool. The inner and outer terminals of the coil are connected with binding posts projecting from one of the heads.

The ratchet burner in connection with which the coil is intended to be used is shown in Fig. 2. The plug of the gas cock is provided with two transverse holes at right angles to each other, and the outer end of the plug carries a ratchet having eight teeth. On the shell of the gas cock is placed an angled lever carrying a spring-pressed hooked pawl, which engages the ratchet on the plug, and a spring is provided for returning the angled lever to the point of starting

after it has been operated. By pulling the angled lever the plug of the cock is turned one-eighth of a revolution, so that the gas is turned on or off according to the position of the holes in the plug. To the upper end of the burner tube adjoining the tip is attached a collar which supports a wire contact near the slit of the burner. The collar is insulated from the burner by a piece of asbestos paper. The upper arm of the lever carries a spiral spring terminating in a wire contact arm which makes an electrical contact with the wire supported by the insulated collar whenever the angled lever is swung.

It will thus be seen that by swinging the lever the passage in the burner is alternately opened and closed. The collar at the top of the burner is connected with one pole of the battery and the burner or the bracket to which it is attached is connected with one terminal of the spark coil, the other terminal of the coil being connected with the remaining pole of the battery.

When the angled lever is pulled in the manner described so as to let on the gas, the spring arm at the upper end of the lever comes into contact with the wire supported by the collar, thus completing the elec-

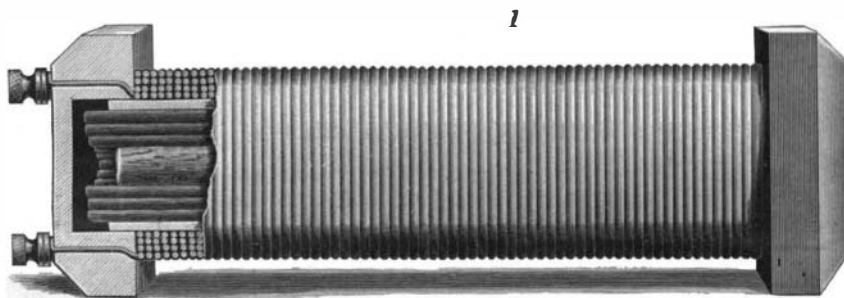
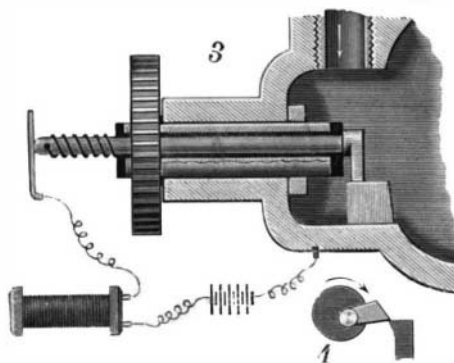


Fig. 1.—THE SPARK COIL.

trical circuit through the coil and connections, causing the core of the coil to be strongly magnetized. The further movement of the angled lever draws the spring arm off from the wire contact supported by the collar, and at the breaking of the circuit the extra or induced current generated in the coil, being of very high potential, leaps across the space between the contact wires and produces a brilliant spark which ignites the gas issuing from the burner.

When it is desired to extinguish the light the angled lever is again pulled, revolving the plug of the cock 1/8 of a revolution, cutting of the gas supply. A spark is again produced at the points of contact, but this is of no consequence.

In Figs. 3 and 4 is shown the adaptation of this principle to the ignition of the explosive mixture in a gas engine. In the passage which admits the explosive mixture to the cylinder is inserted a hollow shaft the bore of which is eccentric, and in the shaft is inserted a spindle which is insulated from the shaft and carries at its inner end a finger piece which is capable of coming into contact with a stud projecting inwardly from the casing of the engine. The finger on the spindle is held in the proper position for contact with the projecting stud by a spiral spring surrounding the spindle and connected with the hollow shaft, but insulated therefrom. The hollow shaft



Figs. 3 and 4.—IGNITER FOR GAS ENGINE—REVOLVING FORM.

is provided with a spur wheel by means of which it is turned, and the spindle extending through the hollow shaft is in electrical connection with one terminal of the spark coil, the other terminal being connected with the battery, the battery in turn being connected with the engine cylinder. When the hollow shaft is rotated in the direction indicated by the arrow in Fig. 4, the finger forms a contact with the projection, and the further rotation of the hollow shaft, by virtue of the eccentric arrangement of the spindle, causes the finger to slip from the projection and thus cause a spark at the moment of separation, as in the case of the electric gas burner. This construction permits of using heavy parts which do not readily wear out or burn out.

In Fig. 5 is shown a modification, in which the igniter is operated by reciprocating movement. The sliding rod to which is attached a contact piece is carried by a sleeve having an insulating lining. When the rod is drawn back the movable contact piece slips off from the stationary contact, as indicated in dotted

lines, and a spark is produced, the arrangement of the circuit being the same as in the case just described. In this case, if the charge is not to be ignited at every revolution, a commutator or switch will be connected with the rotating parts of the engine which will intermit the current as may be desired.

There are many ways in which the making and breaking of the electric circuit in the chamber containing explosive mixture may be effected. The coil might have one, two or more additional layers of magnet wire. The main difficulty with this igniter is the failing of the battery. A battery consisting of four or six Fuller cells should operate the igniter for several weeks. Leclanche cells may be used, but they should be connected up so as to produce a quantity of current rather than high voltage.

A small dynamo has been used successfully for the ignition. In this case no spark coil is required, the extra spark from the machine itself being all that is necessary.

Japanese Demand for Cotton.

Regarding the recent heavy shipments of cotton from this country to Japan, Edward Atkinson, an authority on the cotton manufacture in New England, says: "There is no doubt that Japan will establish cotton spinning with considerable rapidity, and in the course of some years will probably be enabled to supply the increasing wants of the modern world, heretofore mainly supplied by England. But in order to make any of the fabrics which would have any considerable sale in this country merely as cotton fabrics, without regard to the design of the weaving or the printing, and in order to supply that part of the demand of China for what are known as gold end and red end shirtings, made of medium fine yarns, it will be impossible for Japan to use her own limited supplies of cotton or any of the cotton of China, which, although produced in very large quantities and admirably handled, is so short in staple as not to make it fit for the work, or even the India cotton, which is only fit for coarse, low numbers. Her whole supply of cotton must be found in this country. Hence it follows that the progress of Japan may to some extent check the demand for American cotton for English mills and may, at least, prevent the increase, if it does not work a reduction, in the export of cotton fabrics from Great Britain, but will have no influence whatever upon the cotton manufacturers of this country so far as the making of the fabric is concerned. What we have to fear, if there is anything to fear, in getting the goods which people desire, are the skill, taste, and aptitude of the

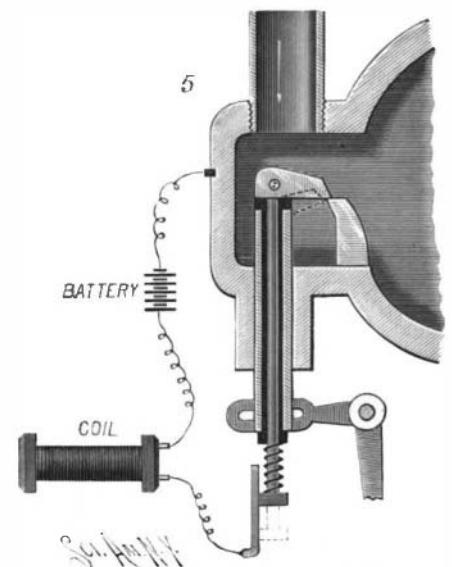


Fig. 5.—IGNITER FOR GAS ENGINES—RECIPROCATING FORM.

Japanese in devising both woven and printed cotton fabrics. The influence of this demand upon the South will be very beneficial in hastening improvements in ginning, handling and baling, which have lately attained great prominence among the cotton growers of the South."

THE New York Carbide and Acetylene Company was incorporated at Albany December 24, to manufacture and sell gas-producing materials and acetylene gas, and to distribute other than by the use of mains, liquefied gas, and to manufacture and deal in gas apparatus in Milbrook, Dutchess County.

The capital is \$7,000,000, divided into 70,000 shares. The directors are: E. C. Benedict, Anthony N. Brady, Edward N. Dickerson, J. Bertschmann, Charles F. Dietrich, Walton Ferguson, John Fox, R. Somers Hayes, Erasmus J. Jersmanowski, Frederick P. Olcott, Arthur B. Proal, John Sloane, and Samuel Thorne, of N. Y. City. Julius J. Suckert, of New York, subscribes for 69,988 shares of the capital stock of the company.

The Causes of Death in Pneumonia.

Dr. Bollinger maintains that croupous pneumonia is a typical local infectious disease, pursuing in the majority of cases a very regular course. It is not dangerous on account of the duration or the intensity of the fever. The impairment of the function of the lung is likewise insufficient to explain death. The oedema so frequently found in the parts of the lung spared by the disease is not the result of a passively increasing collateral hyperæmia, but of cardiac failure. The collapse symptoms in croupous pneumonia and the fatal weakening of the heart are dependent on oligæmia, which leads to impaired nutrition of the cardiac muscle, already weakened by the fever and the extra demands upon it. Anæmia of the brain may cause disturbances of innervation of the heart, and this may be an additional factor. The exudate into the lung tissue may be likened to a venesection produced by the pneumococcus, which in a few days deprives the blood of a large quantity of important constituents. The reason why death takes place so early, and usually in the same stage of the disease, from the sixth to the eighth day (corresponding to the transition from red to gray hepatization), is probably because the exudate has to attain a certain acme before life is imperiled. If these facts are applied to therapeutics, it follows that, in addition to the usual treatment of pneumonia, every effort should be made to combat the oligæmia. Large quantities of fluids should be supplied to the system through every available channel, even in the form of saline infusions. This should be done at an early period, before collapse symptoms have manifested themselves.—Münchener medicinische Wochenschrift.

Uses for Old Corks.

Corks are thrown away in great quantities, and very few people think that there is any value attached to that material after it has served its purpose once as stopper of a bottle. Nevertheless it has become one of the most valuable components of a city's refuse. Great quantities of used corks are now used again in the manufacture of insulating covers of steam pipes and boilers, of ice boxes and ice houses and other points to be protected from the influence of heat. Powdered cork is very useful for filling in horse collars, and the very latest application of this material is the filling in of pneumatic tires with cork shavings. Mats for bathrooms are made of cork exclusively, and it also goes into the composition of linoleum. Cheap life preservers are now filled exclusively with bottle stoppers, cut into little pieces.

AN IMPROVED RAILWAY TRICYCLE.

The illustration represents a light, strong, and inexpensive tricycle, adapted to carry one or more persons, as well as tools and appliances for repairing electric lines and railway tracks. The improvement forms the subject of a patent issued to William J. Mellor, of Langtry, Texas. The front and rear main wheels are journaled in a frame, on which is a crank shaft and sprocket wheel to rotate the rear wheel. The other track rail is engaged by a flanged guide wheel on a short axle clipped to a transverse bar whose other end is bent to the form of a post and journaled in the middle portion of a U-shaped bracket attached to the frame. On the post is a collar engaged by an eye on a rod carrying the handle bar, the collar being adjustable to raise or lower the handles to suit the rider. From the lower end of the post a stiffening rod extends to an eye on the transverse rod, which is also further strengthened by a detachable brace rod, connecting it with the frame, but, by disconnecting the latter, the guide wheel may be folded upon the frame so that the machine will take up but little room, and may be conveniently moved about when not in use. A brake is arranged in the rear of the front wheel, and on the frame, in front of the sprocket wheel, is carried a tool box, a platform at the rear affording space for another passenger or for fixtures and appliances to be carried. By the movement of the handle bar the rider keeps the guide wheel in a proper forward or rearward position on curves, preventing any binding of the wheels, and readily balancing the frame where there is considerable difference in the elevation of the rails.

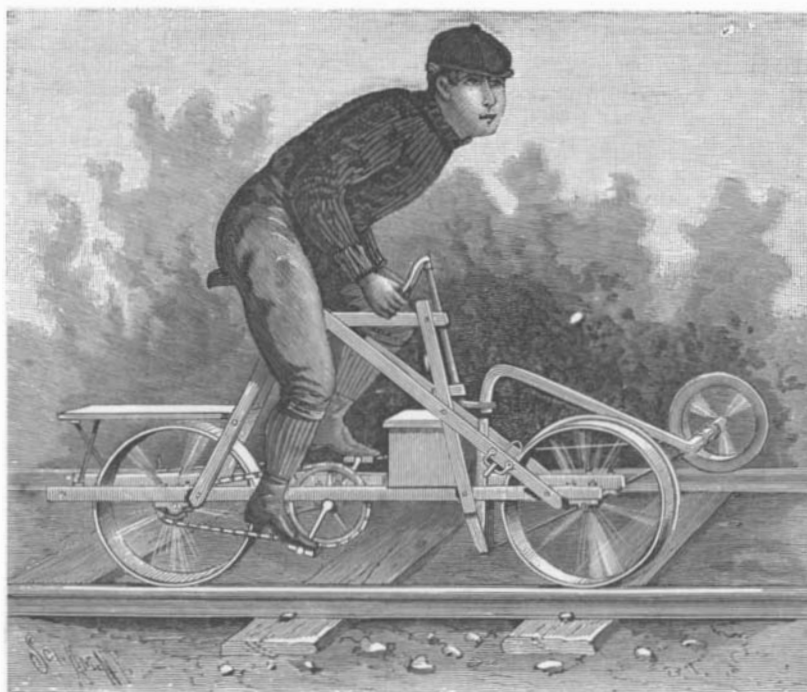
In the Boston Museum of Fine Arts there are many casts of works of sculpture which are dusted in a novel manner. A large air pump is mounted on a truck and is rolled around to the various rooms. One man operates this pump, the other applies a fine jet of air to the sculptures, blowing off the dust. This blowpipe is connected to the pump by means of a pole and rubber tube.

CYCLIST POLICEMEN IN NEW YORK CITY.

The introduction of the bicycle into municipal service has been tried in this city with excellent results. So far the introduction has been experimental, but the success of the service has been such that it will lead to a considerable extension in the near future. Police Commissioner Andrews, himself a wheelman, is

**A NEW YORK CITY CYCLIST POLICEMAN.**

made directly responsible for the innovation. Four policemen were mounted on bicycles, and assigned to duty in the upper part of the city. Already a number of meritorious arrests of reckless drivers and cyclists have been made by them. In the case of a driver the tactics followed are for the officer to ride ahead of the offending vehicle and allow himself margin enough for dismounting and making the arrest. In the case of a cyclist who was obdurate, the officer in one case ran into him, bringing wheels,

**MELLOR'S RAILWAY TRICYCLE.**

officer, and cyclist down in a heap, but, as the commissioner expressed it, with "their man on top."

The photograph shows one of the Boulevard police on duty. As the service is extended a special color or other designation will be adopted for the police wheels.

Commissioner Andrews told of one man who was recently promoted to the position of roundsman for meritorious arrests with the aid of the bicycle. Although a foot patrolman he impressed into his service on each occasion a private wheel, mounted it and

caught his men, who, otherwise, on account of their long start, would infallibly have escaped.

The next move is to be the mounting of roundsmen on wheels. The duty of a roundsman involves the overseeing of a large district and the control of the patrolmen who are performing their tours therein. The bicycle mounted roundsman will, it is thought, be the ideal officer for this work.

For patrol work in the annexed district the cyclist policeman will be able to cover his round four or five times where the foot policeman would do so but once. In the case of an equestrian or mounted policeman the difference would probably be as great, as the horse is kept at a walk not exceeding a pedestrian in speed.

The Magical Mistletoe.

Few plants belonging to the English flora have associated with them so much that is of interest as the mistletoe, and the spoils of our orchards and of those of Normandy with which the markets are now crowded testify in no uncertain manner to the high estimation in which this remarkable plant is held by all classes of the community. Nor to those familiar with the traditions with which the mistletoe is surrounded is it surprising that it should be regarded with so much favor by rich and poor alike. The origin of the plant, about which a correspondent inquires was, according to tradition, an event of the most remarkable character, and it has had ascribed to it almost every conceivable virtue. We read in Norse mythology that Frigga, the mother of Baldr, the Apollo of the north, endeavored to preserve her son from harm by an oath from all, as she believed, created things, that they would not injure him. She, however, overlooked the mistletoe, "so small and feeble," that she did not take an oath from it. Loki, an evil spirit, discovering this omission, made an arrow of one of the branches and placed it in the hands of the blind god Hödr, who, throwing it at a venture, fatally wounded Baldr. The gods, however, restored him to Frigga, and, as some reparation, dedicated the plant to her, and gave her control over it for so long a time as it did not touch the earth. From this tradition has probably arisen the practice of suspending a bough from the ceiling and of persons saluting each other under it. The views held by some of the older herbalists and others with regard to the growth of the mistletoe are not less remarkable than the mythological account of its origin, and with reference to this Gerarde writes: "This excrescence hath not any roote, neither doth encrease himself of his seed as some have supposed; but it rather cometh of a certain moisture gathered together upon the boughs and joints of the trees, through the barke whereof this vaporous moisture proceeding bringeth forth the mistletoe." We may, however, excuse Gerarde for writing what we now know to be nonsense, for before him Bacon treated with ridicule the views of those who contended that the plants were raised from seeds, and declared that they were produced by sap which "the tree doth excrete and cannot assimilate." As befits a plant with so remarkable an origin and manner of growth, the mistletoe had traditionally many virtues. The Druids attributed to it curative properties of a magical character, and, among other things, water in which a bunch had been dipped was distributed among the faithful as a talisman against witches and sorcerers.

Allusion is made to the magical properties of the mistletoe by Virgil, Ovid, and other old writers, one mentioning the power of opening locks. Clusius asserted that a spray worn as a charm round the neck was a sure protection from the evils associated with witchcraft, and another famous old herbalist, Matthiolius, declared it to be a certain cure for epilepsy, and it was held in considerable esteem as a remedy for that malady as late as the end of the eighteenth century. Since that time the mistletoe has fallen into disuse both as a charm or curative agent, and become popular for Christmas decorations, with the result that it now contributes more to the enjoyment of the Christmas season than at any other period in its history.—The Gardeners' Magazine.

The year 1895 was the nine hundredth anniversary of the first appearance of the fork in western Europe, according to the *Nazionale Zeitung*. In 995 a son of the Venetian Doge Pietro Orseolo married the Byzantine Princess Argila, who at the wedding breakfast brought out a silver fork and gold spoon. She was copied by the great Venetian families, though the Church opposed the fashion as an insult to Providence. It took 360 years for the fork to reach Florence; in 1379 it is found in France, but it was not till 1608 that "the traveller Corgate brought it direct from Venice to England."