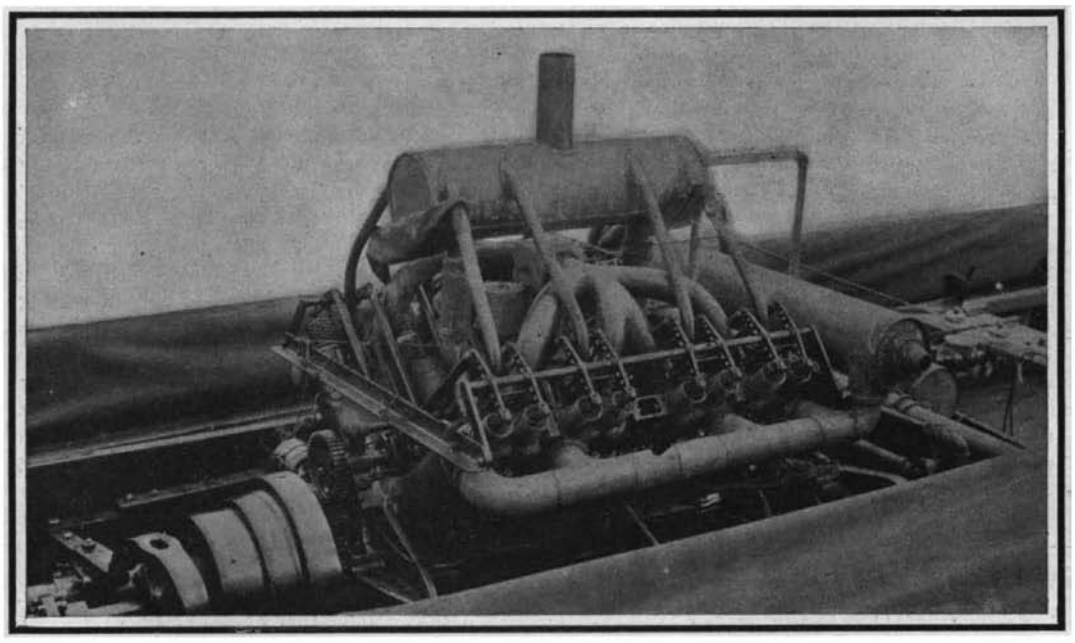
A PRACTICAL GLIDING CRAFT WITH SUBMERGED HYDROPLANES.

For many years there have been numerous attempts to invent and perfect a type of boat that, by reason of its gliding over the surface of the water, or above the surface, would be able to attain a high speed without the expenditure of the tremendous horse-power required with all ordinary craft when an attempt is made to increase their speed to any considerable extent. As is well known, the horse-power required to propel an ordinary boat through the water increases as the cube of the speed; therefore, to double the speed of such a boat, eight times the horse-power is required.

For a number of years past, Count de Lambert, in France, has experimented with catamarans fitted with a series of hydroplanes arranged transversely across the pontoons. In his early experiments, he obtained a speed of 24 miles an hour with about 12 horse-power; but in the later experiments, which were made quite recently upon a much larger scale, a somewhat larger boat, fitted with a 50-horse-power gasoline engine, was unable to exceed this speed very much, whether driven by a water or an air propeller.

In our Motor Boat number of 1906, we illustrated a boat equipped with submerged hydroplanes, that is, hydroplanes arranged on vertical stanchions below the boat, and adapted to raise the boat completely out of water. These experiments were rather primitive, but the Messrs. Meacham, who made them, claimed that this type of hydroplane was considerably more efficient than the surface type usually employed. Another noted experimenter, who has been working along this line for several years past, has recently made a very successful demonstration with his new gliding craft, and some photographs of this novel craft going at high speed and also at rest, showing the planes below the hull, are reproduced herewith. We refer to Dr. Peter Cooper Hewitt, the well-known inventor of the Cooper Hewitt mercury vapor lamp. Mr. Hewitt, like many another man of science of the present day, is interested in the problem of aerial navigation. He believes that much the same laws govern the action of an aeroplane or a hydroplane. The main difference is the density of the two fluid mediums, the air being about 800 times lighter than the water. As experiments are much more readily carried out on the water, Mr. Hewitt undertook to test some of his ideas in a hydroplane boat; and the craft shown, as well as its motor, is entirely of his own design and construction.



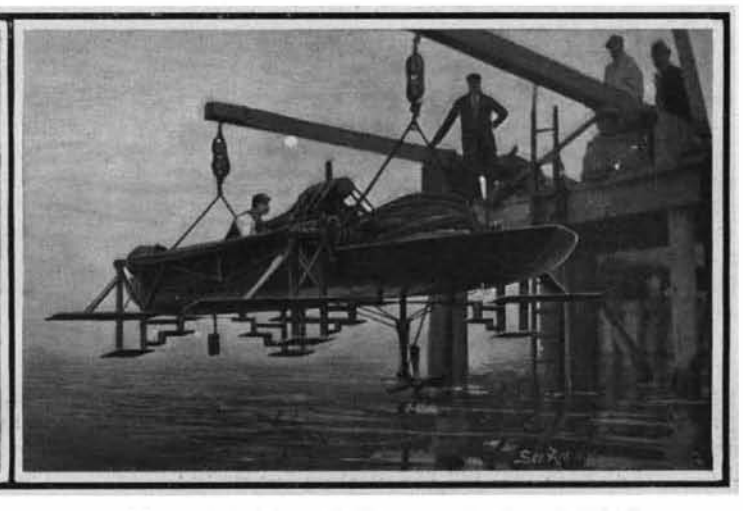
Cooper Hewitt's 8-Cylinder Motor Installed in the Hull of His Gliding Craft.

The Cooper Hewitt gliding craft consists of a light mahogany hull having a rounded bow and stern. The hull is suspended within a strong rectangular framework of heavy steel tubing. This frame contains an eight-cylinder gasoline motor firmly mounted upon a sub-frame forming part of it, and which is within the hull. Near each corner of the outer frame, vertical trussed sheet-steel frames project downward and carry sets of hydroplanes, which are terraced like a row of steps, the uppermost planes of each pair being connected together across under the boat by a horizontal strip. Four larger planes are placed with their forward upper edges about on a level with the bottom of the boat. These planes project outward several feet from the side of the craft, and are suitably braced as shown in the photograph. The propeller is placed at the forward end of the boat on the bottom of a long vertical shaft, which projects downward through the hull, and which is inclosed in a suitable tubular casing. There are two sets of bevel gears, one at the top of this shaft and another at the bottom. Each set consists of two bevels, and both sets are very compact and strong. The short shaft from the upper bevel gear box extends rearward to the friction clutch, which is mounted on the end of the engine crankshaft. The propeller used is a four-bladed one having blades of 22 inches diameter and 38 inches pitch. As it sets in a vertical plane and exerts a horizontal thrust on the water, it has no lifting effect.

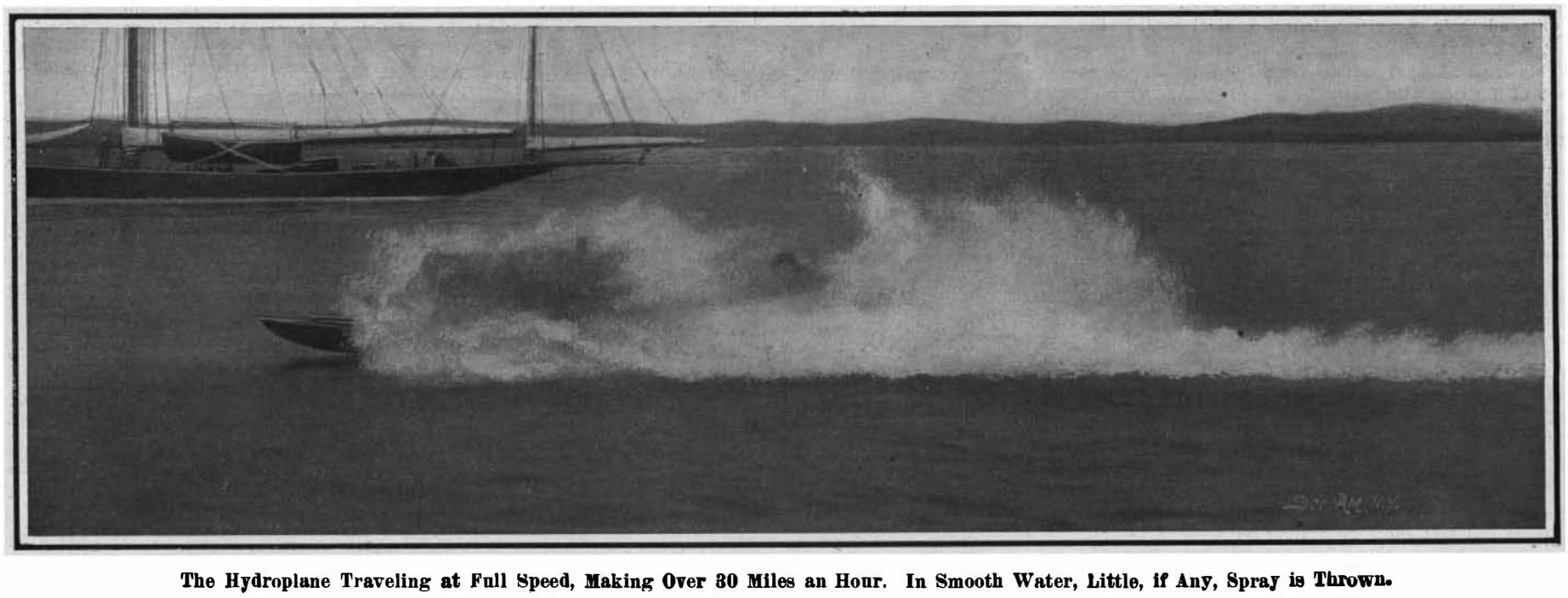
The gasoline engine is of the 8-cylinder type with the cylinders placed at an angle of 90 deg. Its eight thin, light, nickel-steel cylinders are provided with sheet-brass water jackets and bolted to an aluminium crankcase. The cylinder heads screw on the cylinders. The heads carry the valves, which are provided with a cast water jacket. All the valves are mechanically operated from a single camshaft by means of push rods and rocker arms. The engine is fitted with both high-tension and low-tension ignition by means of a battery with single coil and distributer and by a magneto. The top of the latter can be seen back of the exposed 2-to-1 gears in the photograph. The clutch is also visible below these gears. No flywheel is needed. The inlet pipes all connect with a single float-feed carbureter, while the exhaust pipes connect to two pipes running along each side and terminating in a muffler that extends across the boat, back of the engine. The cooling water is circulated on the thermo-siphon principle. From the bottom of the cylindrical tank seen above the engine, eight pipes extend downward to the bottom of the water jackets of the eight cylinders, while eight larger pipes run from the heads of the cylinders into the top of the water tank. A gear water pump sends cold water into the tank continually, and the tank is provided with an overflow. By varying

(*Continued on page* 78.)

The Boat at Rest, Showing the Waterline.



The Hydroplanes and Propeller Below the Hull.



The Hydroplane Traveling at Full Speed, Making Over 30 Miles an Hour. In Smooth Water, Little, if Any, Spray is Thrown.

VIEWS OF MR. COOPER HEWITT'S NEW GLIDING CRAFT WITH SUBMERGED HYDROPLANES.

indeed a high tribute to the perfection of the simple light-weight American car.

In going over the results of the tour, one is struck by the fact that there was relatively very little engine trouble on any of the cars. The same can be said of the radiators, which, with the exception of a few that were damaged in collision, did not spring any leaks. Structural weaknesses were the main weaknesses developed, and the ones which chiefly hampered the continuance of the cars in the run. The Autocar, for instance, first strained and then cracked its frame, while several cars broke their rear axles, and a considerable number encountered broken springs. No less than five cars stripped their gears, and the one gearless car, the Columbia gasoline-electric, as noted above, also had its transmission give out. One of our photographs shows a White steamer whose front axle was sprung. Notwithstanding such damage, three of these cars finished with a perfect score. Many of the drivers wished to equip their cars with shock absorbers after the first day's run, but this was not permitted. Several of the winners had these devices.

The 21 cars which finished with a perfect score consisted of four Pierce machines (three 40-45 4-cylinder cars and one 60-65 6-cylinder), two 60 horse-power Thomas Flyers, two 30-horse-power Peerless cars, two White steamers (a 30 and a 20-horse-power), and one each of the following: 50-horse-power Haynes, 50-horse-power Welch, 40-horse-power Walter, 40-horse-power Berliet, 45-horse-power Royal Tourist, 24-horse-power Premier, 25-horse-power American Mors, while a 30-horse-power White steam runabout and a 35-horse-power Stoddard-Dayton runabout were tied for the Hower trophy. A 6-cylinder Pierce runabout lost but 6 points on the ninth day. Three other contestants, a 35-horse-power Gaeth, a 40-horse-power Oldsmobile, and a 16-20-horse-power Maxwell, lost only 3 points throughout the entire test. When these facts are taken into consideration, it will be seen that fully half the cars that contested for the Glidden trophy finished with practically perfect scores. This was indeed a splendid showing, in view of the extremely difficult roads that had to be traversed in many places at the high average speed of about 18 miles an hour. In all probability, the tour will be more popular than ever another year; for, despite all the hardships which they went through, the tourists all expressed themselves as eager and willing to compete again. It is safe to say that no other form of competition gives a modern automobile such a terrible racking as a tour or endurance run of the character of this last Glidden tour, and only by such a test can the weak points of their machines be forcibly brought out and demonstrated to the automobile manufacturers.

A PRACTICAL GLIDING CRAFT WITH SUBMERGED HYDROPLANES.

(*Continued from page* 76.)

the quantity of water pumped into the tank, the cooling water is kept at the proper temperature. On account of the high compression, the best results are obtained with the water at a temperature below 180 deg. F. As each pair of opposed cylinders are in the same vertical plane, a four-throw crankshaft is used, the connecting rods of each pair of pistons being suitably jointed together at the crank. One of the rods is forked and attached to the crankpin bushing, while the other fits in between the fork of its mate and reciprocates upon the bushing. The engine is placed horizontal and oiled by splash lubrication.

A representative of the Scientific American recently witnessed a demonstration of Cooper Hewitt's gliding craft. As soon as the motor was started and the clutch thrown in, the craft shot forward, accelerating very rapidly until, after two or three seconds, the large planes left the water and the boat was entirely raised. It then ran on the four sets of lower planes at high speed and without any commotion, except when the upper planes happened to strike a wave, when the spray would be thrown in sheets, as shown in the photograph.

The force of the waves striking the emerged planes must necessarily have a decided retarding action upon the boat, and, as was explained to our representative, for rough water the craft should be designed to lift them higher above the water. The pressure of the waves when striking the emerged planes, while the boat is traveling at 30 miles an hour, is estimated to be 300 pounds to the square foot, which is also equivalent to the lift pressure on the submerged planes at the same speed. The blows received by the hull itself from the crests of the waves were sufficient to open seams, and drive water and spray into the boat. Of course, all this can be obviated by placing the step-like sets of planes farther below the hull, so that both it and the large upper planes will be lifted a foot or more above the surface instead of 3 or 4 inches, as at present. Such development will undoubtedly occur in the next craft that Mr. Hewitt builds.

According to the generally accepted formulas of Froude and others, the lift of a hydroplane increases or decreases as the square of the speed. Consequently, since the weight is constant, much less plane surface (about ¾ less) is required at 30 miles an hour than at 15, for example. Either that, or else a lesser angle of the planes can be used to accomplish the same purpose. To avoid complications and to obtain as accurate results as possible, Mr. Hewitt chose the former method and arranged to diminish the surface of the planes progressively by causing them to emerge step by step as the speed increased. As the lift per horse-power is better with large planes, such planes would be chosen were it not for the fact that the skin friction increases with the surface, and when large planes are used this becomes very great. Consequently a small or moderate-sized plane is preferable. The angle of the plane is another important factor. As the angle decreases, the surface of the plane (and consequently the skin friction) increases for any given lift. Naturally, there is a certain best angle with relation to the horse-power in each particular case. This angle is modified by the coefficient of friction of the material of which the plane is formed, and it must be such as to cause the minimum expenditure of energy for the required lift. It of course differs according to the material used in constructing the planes. In any case, the angle is relatively small, practically between 1 in 8 and 1 in 20 for the materials ordinarily used. An angle of 1 in 12 would probably prove to be about the right one in most instances. As the angle is relatively a small one, a small variation in it will produce a large variation in lift. In each experiment Mr. Hewitt preferred to keep the angle practically constant after the planes had been once set. This was done for purposes of level and equilibrium, and instead of changing the angle, the area of the planes was varied in the manner mentioned above. It would be feasible to vary the area of the planes mechanically if this were necessary, but it is simpler to take advantage of the surface of the water and to vary the surface of the hydroplanes by causing them to emerge step by step. Mr. Hewitt believes that varying the surface of the planes is essential, especially when it is desired to leave and return to the original supporting medium at such speeds as will be found safe in practice. Of course it is doubtless also practical to vary the angle of inclination of the planes if this is found necessary.

The weight of the Hewitt boat, together with the planes which emerge at full speed, is about 2,500 pounds. With two men and some 300 pounds of water aboard, the boat was lifted above the surface of the water at a speed of about 16 miles per hour, and a speed of over 30 miles an hour was readily attained, while the inventor believes that he has attained a speed of over 38 miles per hour. As the boat raised above the surface and the top of the propeller blades came within a foot thereof, the thrust was seriously affected and rapidly fell off. When the tips of the blades came close enough to the surface the engine would race for a moment till the boat slowed down and settled. This can be overcome by placing the propeller lower.

As the conditions were such that accurate observations were difficult to obtain, one could not tell with absolute accuracy by looking over the side of the craft at the various speeds just how far out the hydroplanes emerged, but Mr. Hewitt says that as far as he was able to judge, the craft was supported upon the four bottom planes when it was traveling at full speed, and that the other planes were above the surface. The combined surface of these four planes was about 8 square feet, so that the weight lifted per square foot was over 300 pounds. As no tests have been made of the horse-power the engine develops at the speed it was running, Mr. Hewitt does not state the horse-power that was required, though it is safe to say that this was slight in comparison with that which would be required to propel an ordinary boat at such speed.

As already stated, the lift of the planes tends to increase as the square of the speed, and the skin friction also tends to increase in the same ratio. At very high speeds, however, it is thought to be probable that the lift tends to increase in a greater ratio and the skin friction in a lesser one. If this is so, the increase in air resistance would be counterbalanced by this effect, and the horse-power required would tend to increase directly as the speed. Whether this is so or not cannot be determined until these very high speeds are actually attained.

The question naturally arises as to whether such a boat, supported as it is on four small planes, is stable. This can be answered in the affirmative, for, since each step in the system of hydroplanes is only a few inches in height, if the boat sinks at one corner due to any of its occupants changing their position, for example, it can only sink a few inches before another plane is lowered into action, and this, with the increased surface it affords, will quickly counterbalance the added local weight.

Comparing the usual surface hydroplane with the submerged type, it can readily be seen that although the supporting area of the former diminishes as the boat's speed increases, whereby only the rear third of the plane is made to carry the weight, nevertheless the front plane especially is subjected to terrific retarding blows when struck by a wave, and there is also trouble from interference of the planes. All this is obviated with submerged planes. It is also a well-known fact that the front third of a plane supports about one-half of the weight. The submerged hydroplane can be made so small, thin, and light that the resistance to advance of such a plane through the water is probably less than that of the large, cumbersome plane used on the surface, while the lifting power is far superior. As can be seen from the photograph, the planes that support Mr. Hewitt's 1½-ton craft are surprisingly small, which makes it seem probable that submerged hydroplanes suitable for large boats would not be unwieldy nor unpractical, while the hull required could be built strong and light and would serve simply as a means of flotation when the craft was at rest. It would certainly seem as if a great stride had been made in marine navigation by the successful demonstration recently made with Cooper Hewitt's novel craft.

The Use of Hydrolith for the Inflation of Balloons.

BY DR. G. F. JAUBERT.

All the chemical processes for the production of hydrogen which are at all suitable for use in the field are rather complicated. This is true both of the wet method, in which metallic iron or zinc is employed to displace and evolve hydrogen from dilute sulphuric or hydrochloric acid, and the dry method, in which calcium hydroxide (slaked lime) is decomposed by pulverized zinc at a high temperature. In practice the wet process is always used for the inflation of hydrogen balloons.

The reaction between the metal and the acid is affected by a number of conditions of diverse nature, and as the composition of the metal filings employed is far from uniform, it is found that, while some specimens act quickly upon the dilute acid, others remain almost passive, so that the disengagement of gas is extremely slow.

These objections, in addition to the consideration of weight, which is of paramount importance in field operations, led me to seek a chemical compound which would evolve pure hydrogen on simple contact with water, as calcium carbide evolves acetylene and oxylith evolves oxygen.

After long study of the question I turned to the hydrogen compounds of calcium, and in particular to calcium hydride, CaH_2, to which I have given the name of hydrolith. In marked contrast to oxylith which yields only 150 liters of oxygen per kilogramme (2.4 cubic feet per pound) and calcium carbide, which produces from 280 to 300 liters of acetylene (4.6 to 4.8 cubic feet per pound), hydrolith gives a copious flow of hydrogen, amounting, if the compound is chemically pure, to 1,143 liters per kilogramme (18.3 cubic feet per pound).

The commercial hydrolith which we are now making and delivering to various governments for use in military ballooning, contains about 10 per cent of impurities and furnishes about 1,000 liters or one cubic meter of hydrogen per kilogramme (16 cubic feet per pound).

The large quantity of hydrogen produced by a small weight of transported material and the promptness with which the gas is disengaged make hydrolith preeminently suitable for the use of military ballooning, both for the initial inflation on the ground and for replacing lost gas without landing—a thing hitherto impossible.

Three types of military balloon have been adopted by the French central aeronautic station at Chalais-Meudon: The colonial balloon of a capacity of 350 cubic meters (12,350 cubic feet), the field balloon of 500 cubic meters (17,650 cubic feet), and the siege balloon of 800 cubic meters (28,250 cubic feet).

For the conveyance of compressed hydrogen for the inflation of colonial and field balloons (siege balloons being filled by stationary apparatus) the military authorities have adopted wagons, each of which carries 180 cu. m. (6,356 cu. ft.) of hydrogen compressed to 135 atmospheres in eight or ten steel tubes. The loaded wagon weighs 3½ tons and is drawn by six horses. Three wagons and eighteen horses are therefore required for the service of a field balloon.

It may be doubted whether this heavy and cumbrous equipment would render the service expected of it on the battlefield.

Gen. Langlois, in a recent excellent article on the German heavy artillery, asserts that even 2 tons is an excessive weight for a field vehicle, and cites experiences of the Austrian-Prussian and Franco-Prussian wars in support of his opinion.

What, then, can be accomplished with wagons weighing 3½ tons in the service of a field balloon station, which is essentially a portable observatory and should possess the same maneuvering qualities of lightness and mobility that are now demanded of field artillery?

Safety is another advantage of the employment of hydrolith. The transportation of highly compressed gases requires special precautions, and is subjected to elaborate and rigid regulations by railway companies. In war these great tube wagons would be easy marks for the enemy, and if a tube charged to 135 atmospheres (210 in Italy) should be hit by a shot, it cannot be doubted that its explosion would involve that of all the other tubes in the vicinity. The balloon station would be annihilated, and a large area swept clean by the explosion of so tremendous a mine.

No such accident is possible with hydrolith, which is as harmless as a mass of pebbles until its hydrogen has been liberated by the action of water.

The manufacture of hydrolith comprises two operations: the preparation of metallic calcium, and the combination of the metal with hydrogen. The metal is obtained by the electrolysis of fused calcium chloride. About 300 kilowatts of electrical power (7,800 amperes at 40 volts) produce 100 kilogrammes (220 pounds) of metallic calcium in 24 hours. Commercial electrolytic calcium is furnished in cylindrical ingots of a few pounds' weight, which are slightly oxidized on the surface, are very hard and brittle, and give a clear metallic tone when struck. When polished the surface has a white silvery luster. The density of the metal is 1.85, its melting point 760 deg. C. (1,400 deg. F.). It scratches lead, but does not scratch Iceland spar. The hydrolith is prepared by exposing metallic calcium to a current of hydrogen in horizontal retorts heated to a high temperature. The calcium gradually aborbs the gas, and is soon converted into calcium hydride, or hydrolith.

Chemically pure hydrolith forms a white crystalline mass, of the density 1.7, which has no known solvent. It dissociates when heated to 600 deg. C. (1,100 deg. F.). Commercial hydrolith occurs in irregular lumps of a slate gray color. Its impurities, which amount to about 10 per cent, consist chiefly of oxide and nitride of calcium.

The reaction which takes place when hydrolith is mixed with water is indicated by the following equation:

$$\underset{\text{Hydrolith}}{CaH_2} + \underset{\text{Water}}{2H_2O} = \underset{\text{Slaked lime}}{Ca(OH)_2} + \underset{\text{Hydrogen}}{2H_2}$$

From this equation it may be calculated that 1 kilogramme of pure hydrolith evolves 1,143 liters of hydrogen, measured at the ordinary atmospheric pressure and temperature. The 10 per cent of impurities in commercial hydrolith reduces the yield of gas to about 1 cubic meter per kilogramme, as was stated above.—Translated for the Scientific American from La Revue Génerale de Chimie Pure et Appliquée.

Nicotineless Tobacco.

Upon an American request, Consul-General Frank H. Mason, of Paris, has prepared the following report on the introduction of "nicotineless tobacco" in France:

What is popularly known as "Caporal Doux," or the so-called "nicotineless tobacco'" in France, is simply ordinary caporal tobacco which has been treated by washing with water until the ordinary proportion of 2½ per cent of nicotine has been reduced to 1 per cent. In this form it is used for smoking in pipes and for the manufacture of cigarettes, which find a certain favor among smokers who prefer a light flavor or who, by reason of nervous or cardiac weakness, are wary of nicotine.

Ordinary caporal is a mixture of French, American, and oriental tobaccos, prepared by the "Régie," or government establishment, which has a complete monopoly of the manufacture of tobacco, cigars, and cigarettes in France. It has a somewhat rank, but not unpleasant flavor, and is the cheapest, most popular form of tobacco used in France for smoking purposes.

About eight months ago the French government, finding that there was a growing demand for a so-called "nicotineless tobacco," which had been made on a small scale by certain druggists, and which was also manufactured in Belgium, began the manufacture of a similar product by denicotinizing caporal tobacco through the action of water, which, in reducing the proportion of nicotine from 2½ to 1 per cent also washes out other ingredients, so that the weight of the tobacco is reduced, according to the quality of the leaf, from 15 to 30 per cent. It is this loss of weight rather than the actual expense of the process which constitutes the cost of denicotinizing and explains the fact that ordinary caporal tobacco, which sells at $2.41 per kilo (2.2 pounds), is advanced in value when denicotinized to $3.08 per kilo. The process of washing is simple, and is facilitated by the use of automatic machinery, but it requires careful and constant supervision by a skilled and trustworthy operator in order that a uniform product, containing the specified percentage of nicotine, may be obtained. "Caporal Doux" is retailed at the government tobacco shops in packages of 50 grammes for 80 centimes, or 16 cents per package, equal to about $1.46 per pound avoirdupois.

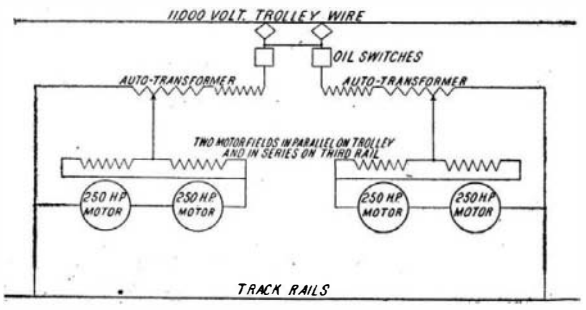
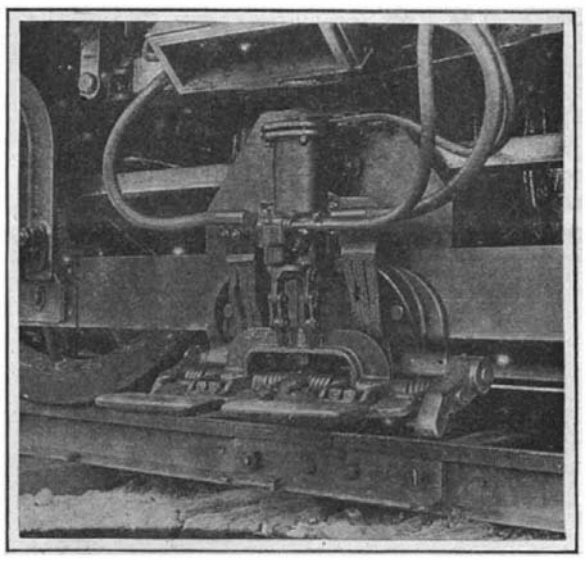


Diagram Showing the Wiring of the Locomotives.

Cigarettes of the same tobacco are sold in packages of ten each for 35 centimes, or 7 cents per packet, whereas ordinary caporal cigarettes of the same number and size retail for 30 centimes, or 6 cents per packet.

It is too soon to form any conclusion as to the extent to which denicotinized tobacco and cigarettes may be used in this country. It is now on sale in Paris, and in eighty other municipalities throughout France. During the four months from January 1 to April 30 there were sold by the Régie to dealers in Paris 26,000 kilos of denicotinized tobacco, and 5,000 kilos, or 50,000,000 cigarettes, made from the same material. To smokers accustomed to full-flavored tobacco the smoke of Caporal Doux is somewhat insipid. Its one advantage is that 25 cigarettes made of it contain only the same amount of nicotine as 10 of ordinary caporal, and its narcotic action upon the heart and nervous system is proportionately reduced.



The Collector Shoes for Taking Current from the Third Rail. When Not in Use the Shoe is Drawn Up Clear of the Rail by the Compressed-Air Cylinder Shown Above the Shoes.

"Touching Up" Faulty Places in Electroplated Coatings.

It often happens that articles which have been electroplated show spots that are badly or not at all coated. This is caused by imperfect cleaning, by the adherence of particles of dirt, contact of two articles in the bath, or by the wires which are used to hang the articles. No matter what the cause, the result is the same—an imperfect coating. To replace the entire article in the bath and let it stay there the requisite time for plating as at first would be a great loss of time, and would also be expensive. As sometimes it is only necessary to give the faulty spots a light coat, it is well to have a process by which they may be "touched up" without an entire repetition of the ordinary process. Sometimes these faulty places are not discovered before polishing the articles; in this case they would have to be cleaned again most carefully, before being put into the bath. Sometimes it has been found necessary to remove the entire coating, before starting over again.

A process which will enable the defective places to be covered is as follows:

First there is provided a sponge dipped in the bath liquor. The article on which there are faulty places in the plating is connected by a suitable conductor with the dynamo in the same manner as though it were lying in the bath. Around the sponge there is wound, as anode, a thin strip of the metal which is to be deposited. The entire arrangement then represents the conditions of the ordinary bath; and the current being turned on, the local plating can take place by the mere application of the sponge to the faulty places.

The German journal which describes this process (Deutsche Metall Industrie Zeitung) states that the process is admirably adapted to plating with silver, gold, copper, and brass; but that with nickel the results are far from being satisfactory.

The necessary apparatus consists of a pipe of glass or other material which does not conduct electricity, and on one end of which is placed the sponge; at the other end there is a rubber bulb containing some of the bath liquor. Through the bulb and the tube passes a rod which at the outer end of the tube ends in a clamp, so that the sponge and anode may be readily attached. On the other end of the rod, inside the glass tube, is fastened the anode rod, reaching into the sponge. The best material for this rod is platinum, so as not to be attacked by the bath liquor.

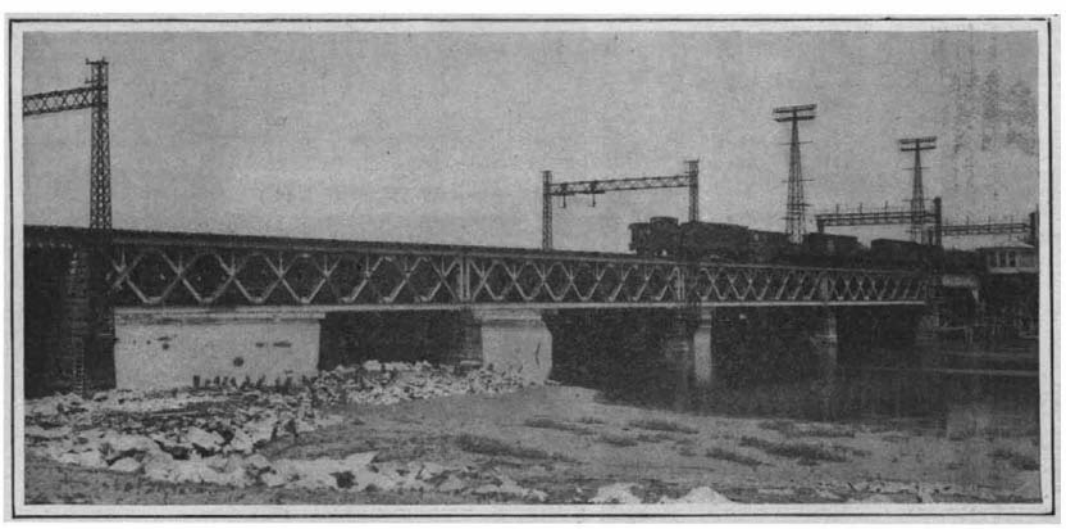
The operator's hands do not come into contact with the solution. Pressing the bulb causes a supply of bath liquor to penetrate the sponge, replacing what is used up in the plating process.

THE INAUGURATION OF THE NEW HAVEN RAILROAD ELECTRIC SERVICE.

Because of the fact that the inauguration of electric service on the New Haven system marks the first application of an alternating current system to the operation of a trunk line railroad in this country, the event will necessarily command widespread attention. It is true that the alternating current has been so used for several years in Europe, notably on the Valtellina line in Italy. In this country, also, single-phase current has been in successful operation on certain interurban lines. The New Haven Railroad equipment, however, is the first instance of the application of single-phase traction to an important trunk railroad; and the fact that, throughout the whole of the 22-mile electric zone, the road is equipped with four tracks, and carries an unusually heavy suburban and express service, gives this service an importance equal to that which attaches to the third-rail equipment of the New York Central lines, which has now been in successful operation for over six months. The electric zone of the New Haven system extends from Stamford to Woodlawn, a distance of 22 miles. From this point to the Grand Central terminal station in New York, the trains run over the tracks of the New York Central Railroad.

THE COS COB POWER STATION.

The electric zone, throughout its entire length, is served from a power station located on the water front at Cos Cob, some three and a half miles from Stamford, Conn. The site selected is a picturesque point of land, which was formerly the summer home of the celebrated tragedian Edwin Booth. The architectural treatment of the building is simple and dignified, and harmonizes well with the natural features of the site. Unlike many of the later power stations, the structure rises only one story above ground level; although there is a deep excavation below the engine and boiler rooms for the accommodation of the coal bunkers and various auxiliary machinery. The boiler house occupies the westerly portion of the building, while the easterly bay is given up entirely to the turbines and generators. The whole build-



Cos Cob Bridge, Showing the Tall Towers for Carrying the 11,000-Volt Transmission Lines Over the Rolling Lift Bridge.

INAUGURATION OF THE NEW HAVEN RAILROAD ELECTRIC SERVICE.