### THE NAPHTHA LAUNCH OF THE GAS ENGINE AND POWER COMPANY OF NEW YORK CITY.

No type of a power-propelled boat has acquired such popularity in so short a space of time as has the naphtha launch. The proprietors of the establishment where these boats are manufactured, the Gas Engine and Power Company, of Morris Heights, 185th Street, New York City, term it "the only naphtha launch," and with very good reason, as hitherto it has been without real competitor. While these boats are used extensively in all waters, and have become a most familiar object to all, it is fair to say that very few people know how they are operated.

The engine by which they are driven is a three cylinder, single acting engine specially constructed for naphtha, although it will work perfectly well with steam or compressed air. The engine is surmounted by a double asbestos-lined jacket resembling in contour a boiler. Within the jacket is a coil of pipe, immediately below which is a burner for naphtha gas or vapor.

Referring to our illustration of a section of the naphtha launch, a tank for holding the naphtha will be seen in its extreme bow. From the tank a pipe connects with a small pump at the base of the engine, by which naphtha is pumped into the coil of pipe. Into the top of the coil boiler, for such it is, a pipe is tapped that supplies naphtha to the burner. In operation the coil is first made hot. This is done by hand-pumping naphtha vapor mixed with air into the burner, where it is lighted. When the coil is hot, naphtha is pumped into it. This is at once vaporized and develops pressure. The pressure is turned on the engine, which in a few minutes starts to rotate. An injector cock supplies the burner with naphtha, drawing air in also, and the engine thereafter takes care of itself.

At each stroke naphtha is pumped into the coil by the engine. This develops in ordinary practice a pressure of sixty-five pounds in the heated coil. From the top of the coil the naphtha vapor, before it reaches the burner, is drawn off and mixed with air after the fashion of the Bunsen burner. It burns below the coil with a clear blue flame. Near the injector is a damper by which the supply of air is regulated so as to produce this character of flame. After the naphtha vapor has acted upon the pistons and goes off through the exhaust it is condensed. A regular outboard condenser is employed, the pipes running along outside the garboard of the boat. The naphtha thus condensed is forced back into the tank to be used over and over again. The delivery of naphtha from the tank can be cut off by a special valve, shown in a section of the boat, which valve, however, in practice never need be closed.

One of our illustrations gives a perspective view of the engine, while another one shows it in section, giving a complete detail view of the construction. The view in elevation shows the general disposition of parts. At A is seen one of the sight holes, by which the character of the flame can be watched so as to be regulated. Through this hole, too, the burner is lighted, and further up in the casing is a second sight hole, through which, also, the flame can be watched. At C is the injector valve, and immediately below can be seen the flaring mouth with damper, I, by which the air supply to the burner is regulated. D is the naphtha valve through which the naphtha is admitted. B and E are respectively air valve and air pump, which are used only for starting the engine. F is the naphtha pump used for the same purpose. This pump goes out of use once the engine is started, a separate one worked by the engine itself doing the work. The hand wheel, G, starts and reverses the engine according to which way it is turned.

Our view of the section of the engine may be studied more intelligently after inspection of the elevation. The cut shows its three cylinders with the piston rods bearing against hard steel cups beneath the pistons. Each piston is surmounted by its own slide valve, which slide valves are operated by a triple crank shaft. The burner and naphtha coils and the construction of the injector valve, nozzle and air damper are also made clear. Leading out to the right is seen the shaft, whose thrust is taken by a ball bearing, which is seen in section immediately forward of the after sleeve coupling.

In starting it air is pumped into the naphtha tank, escaping therefrom highly carbureted, so as to provide what is practically a gas for starting the fire. The whistle is blown by a hand pump, or in some of the boats an air tank is established forward, which is kept charged with compressed air by the engine, and the whistle is blown by this air. In our sectional view of the boat the air tank is shown immediately aft of the naphtha tank.

The working parts of the engine are completely incased, so that all leakage of naphtha goes direct to the exhaust chamber. Another point of safety is that the fire is taken direct from the boiler, so that if the feed pump should fail to work, shutting off the naphtha supply to the boiler, the fire would at once go out, and the engine would stop.

These little boats have won for themselves an astonishing record. They seem to be as absolutely secure from accident as any kind of power-driven craft can be. Every possible precaution is adopted in their construction to render accident impossible. The boiler is made sometimes of seamless copper tubing, sometimes of heavy iron tubing, with sleeve or threaded joints brazed throughout. The entire engine compartment is bulkheaded off and lined with sheet brass, so that if naphtha burns there it does no harm. The naphtha tank compartment is also bulkheaded off and communicates by sea pipes with the water, so that water is continually going in and out, washing away any trace of naphtha. The entire midship section or waist is unobstructed, and under normal conditions whatever slight amount of heat there may be from the engine is carried aft, away from the passengers. The company's tests have been most exhaustive, but nothing proves the safety of the boats so much as the record which they have made since the foundation of the company. Our other views show the interior of the boat building shop, where will be recognized the familiar form of the hull of the naphtha launch.

### Growth of the Phosphate Industry in the South.

It is not generally known that the United States is fast becoming the principal phosphate producing country in the world. The interest is one of the first importance from both the commercial and economic standpoints, and it is remarkable that it has been developed to its present proportions since the civil war. Phosphate beds were discovered in South Carolina as far back as 1837, but they were not worked to any extent until 1868, when their output amounted to some 11,862 tons. Rich deposits of phosphate were found in Florida in 1881. The growth of the industry in these two States during the past few years has been very remarkable. In South Carolina last year some 30 phosphate mines produced 294.000 tons of phosphate and in Florida 106 mines yielded during the year 500,000 tons. The total output of the entire country for the year was 1,550,000 tons, and this exceeded the output of Germany, which was the largest European phosphate producing country, by 50,000 tons.

The importance of the phosphate beds in enriching a vast area of farm land, and thus developing the agricultural interests of the United States, can hardly be overestimated The production of our enormous cereal crops results in a constant exhaustion of the soil. It is estimated that a single crop of cereals in the United States takes from the soil upward of 17,650,270,800 pounds of mineral matter and over 2,000,000,000 pounds of ash and phosphoric acid. An acre of land must supply about 19 pounds of phosphoric acid to produce one cereal crop. The need of returning to the soil some of the phosphoric matter which is constantly beingdrawn from it in time becomes a necessity. The numbers of abandoned farms in New England bear witness to this fact. In the South, and especially in the vicinity of the phosphate beds, the phosphate has been used in immense quantities. Georgia consumed the largest quantity, or 280,000 tons, and South Carolina 200,000 tons. The New England States used in all 60,000 tons; New York 90,000 tons; Pennsylvania 150,000 tons; and Delaware 20.000 tons. It is significant that very little phosphate was used in the West, where the soil is still virgin. The phosphate deposits cover a large territory in North and South Carolina and in Florida, and it is believed that the supply cannot be exhausted for many years.

### Storage Battery Traction in Paris.

Regarding electric storage battery traction on the lines of the Tramways Nord, at Paris, the Revue Industrielle says that the cost per car kilometer has been found to be 0·53 fr., as compared with 0·56 fr. for animal traction. This, however, does not take into account the cost of battery repairs, which would increase the figure for electric traction quite considerably. The storage battery cars used by the company will seat 52 passengers, and, within the city, run at a maximum speed of 7½ miles an hour. Outside of the city limits the speed can be increased to about 10 miles an hour, and even on the heaviest grades does not fall below about 4 miles an hour. Each car is equipped with a battery of 108 cells, divided up into 12 boxes of 9 cells each. These are united into 4 groups, each capable of supplying a 50-volt current. Two motors are on each car.

### Drops.

Dr. Eder, in the following table, gives the number of drops required to make a cubic centimeter, showing the variations in the size of drops of different liquids:

| | |
|---|---|
| Water | 20 |
| Hydrochloric acid | 20 |
| Nitric acid | 27 |
| Sulphuric acid | 28 |
| Acetic acid | 38 |
| Castor oil | 44 |
| Olive oil | 47 |
| Oil of turpentine | 55 |
| Alcohol | 62 |
| Ether | 88 |

## Correspondence.

### Commencement of the Manufacture of American Plate Glass.

To the Editor of the SCIENTIFIC AMERICAN:

Mr. Ford built his first works at New Albany, Ind., in the year 1869. This was the first attempt to manufacture polished plate glass in the United States, although rolled plate glass had been made for a number of years prior to that time. In the year 1882, Mr. Ford came to Pittsburg and formed the New York Glass Company and established a plate glass works at Creighton, and from this small beginning emanated the Pittsburg Plate Glass Company of to-day, which leads the world in this particular line of industry. The establishment of the plate glass manufacturing industry in the United States has reduced the cost to consumers over 200 per cent. This has been brought about through wresting the monopoly from the European manufacturers who formerly controlled the market, by reason of greatly improved methods of manufacture introduced from time to time from the inventive minds of American workmen, and by the home production of all the raw materials required in the business, which was developed as the growth of the business created the demand, and which greatly cheapened the cost.

In this connection, it is interesting to note the effect home production has upon the cost of materials, which, up to the time of the introduction of their manufacture in this country, were made and controlled by Europe. When Mr. Ford first started his New Albany works, he was obliged to import all his woolen felt for polishing, at a cost of $1.45 per pound; to-day the entire consumption is made in America, at a cost of less than 60 cents per pound, and not only gives employment to a large number of workmen, but affords a large market for American wool as well. Another remarkable instance is soda ash, or carbonate of soda. In 1869, this material was imported from England, and cost in the neighborhood of $60 per ton. To-day Mr. J. B. Ford is making better soda ash than was ever imported from England, at his works in Wyandotte, Michigan, for about $20 per ton.

F. S. BRACKETT.

Creighton, Pa., February 5, 1895.

### Artificial Whalebone.

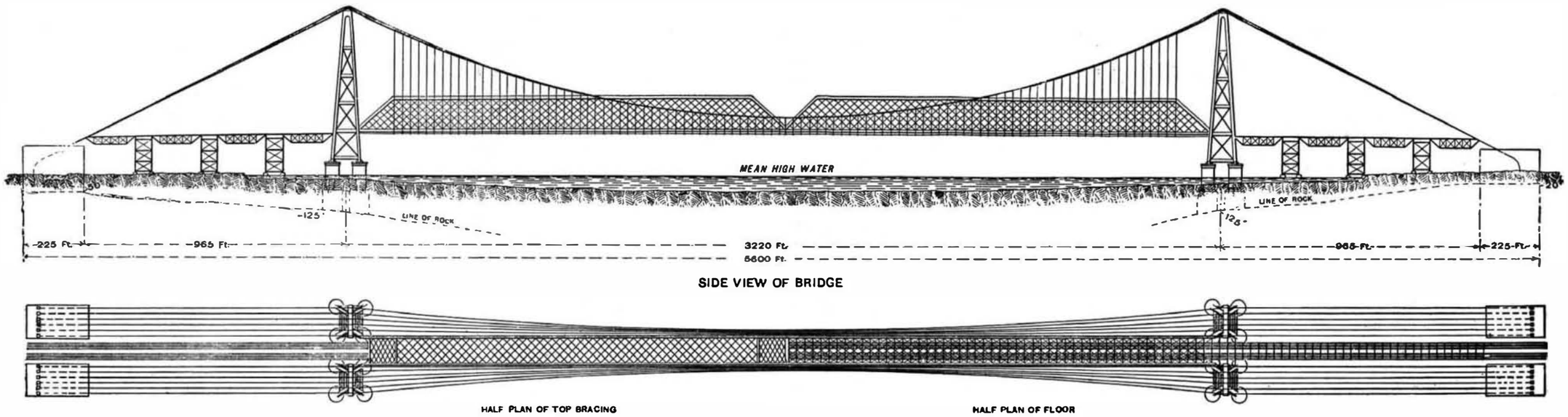
According to Le Genie Civil, the Munck process for the manufacture of artificial whalebone consists in first treating a raw hide with sulphide of sodium and then removing the hair; following this, the hide is immersed for a period of twenty-four to thirty-six hours in a weak solution of double sulphate of potassa and is then stretched upon a frame or table, in order that it may not contract upon drying. The desiccation is allowed to proceed slowly in broad daylight, and the hide is then exposed to a temperature of from fifty to sixty degrees; the influence of the light, combined with the action of the double sulphate of potassa absorbed by the skin, renders the gelatine insoluble in water and prevents putrefaction, the moisture, moreover, being completely expelled.

Thus prepared the skin is submitted to a strong pressure, which gives to it almost the hardness and elasticity which characterize the genuine whalebone, with the advantage that before or after the process of desiccation any color desired may be imparted to it by means of a dye bath. The material can be rendered still further resistent to moisture by simply coating it with rubber, varnish, lac, or other substance of the kind.

### Hotels in East India.

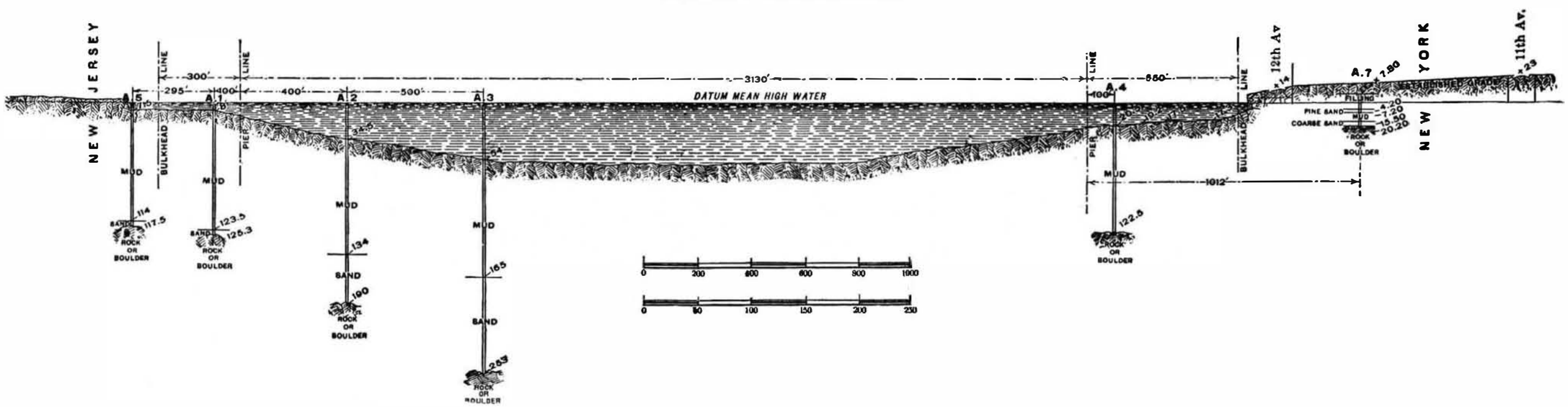
A hotel in India is in some respects quite unlike a hotel anywhere else in the world. Every guest has a servant of his or her own. The hotel has some servants, but the guests do not depend upon them at all. My servant takes care of my room, brings me my tea and toast when I arise, prepares my bath, and waits upon me at table. He also keeps my clothes clean and my boots blacked, sees to my laundry, gets me a carriage when I want one, and does my errands. When traveling he will attend to the tickets and the luggage and make my simple bed on the cars, for India is a country of magnificent distances, involving considerable night travel. There are no regular sleeping cars like ours, but the seats are long enough for the passengers to stretch out on and wide enough to make a reasonable couch, which the traveler provides with his own thin mattress, pillow and wraps. The number of servants in a great hotel is confusing at first. In a long corridor you see one before each door. They usually sleep there, wrapped in a sheet or blanket and curled up on the floor.

RECENTLY a court in New York decided that money dropped upon the floor of a street car, although by falling between the slats of the wooden mat it had become entirely hidden, was a lawful tender of fare, which the conductor must not only accept, but supply the required change.




PLAN OF SUSPENSION BRIDGE, 3100 FEET CLEAR SPAN.

RECOMMENDED BY THE SECRETARY OF WAR.




THE PROPOSED GREAT SUSPENSION BRIDGE OVER THE HUDSON RIVER AT NEW YORK.