to be deviated by the rapid current. Upon the carriage is a vernier for each of the bars, placed at a determined height, 4·8 feet above the head of the rail. The boat being solidly fixed in the bed of the river by vertical posts, the rail-level is taken with reference to a given point on the bank, and then by the vernier readings of each of the vertical bars, the exact depth of the bottom is known, and the amount of rock to be removed is calculated. For each position of the carriage four points are thus obtained, and the boat has a capacity for fifty positions of the carriage. After the plans have been thus drawn up and the calculations made, the rock is removed by blasting or by vertical cutters.

The boat shown in the illustration is used to carry the drills for the mines; the holes are pierced in the rock from 1 to 2 yards deep. The boat is solidly fixed by four vertical supports, two in front and two in the rear. It is kept in place by steam or hydraulic pressure, the boat being lifted a little above the water level. This boat is made in two types. In the model shown at the Exposition the drills are placed in the rear in a single line, moving upon rails, and thus one line of holes perpendicular to the channel are pierced in one position of the boat. In another type, all the drills are placed upon a movable carriage which may be displaced at will. A section of the cartridge used for the blasting is shown in front of the boat. When the mines of one line of holes are charged, the vertical supports of the boat are lifted and the boat retires a certain distance. All the mines are exploded at once, and the boat then comes back to drill a second set of holes from 5 to 10 feet from the former. The rock is also removed by rock-cutting boats, which carry a heavy cutter in the form of an iron bar of square section, terminating in wedge-shaped form. The cutting edge is formed of a steel piece inserted in the middle. The bar is lifted to a certain height by a steam windlass and let fall to cut the rock. It is supported upon a derrick 40 feet high.

The Hungarian government has thus successfully accomplished the work entrusted to it, and has received expressions of satisfaction from all the sovereigns of Europe. The navigation of the Lower Danube, which before was carried on under great difficulties, has now been rendered easy, and boats may pass even at low water. As an example, before the work was carried out, the boats of the Lower Danube, loaded generally to a draught of 5½ feet, could not pass the "Iron Gates" during the season, March 1 to November 30, but for 91 days on an average. At present they are able to pass for 271 days, a gain of 180 days for navigation. This has naturally resulted in an enormous increase of traffic and a corresponding benefit to the surrounding countries.

PILOT BOAT WRECKED BY A WHALE.

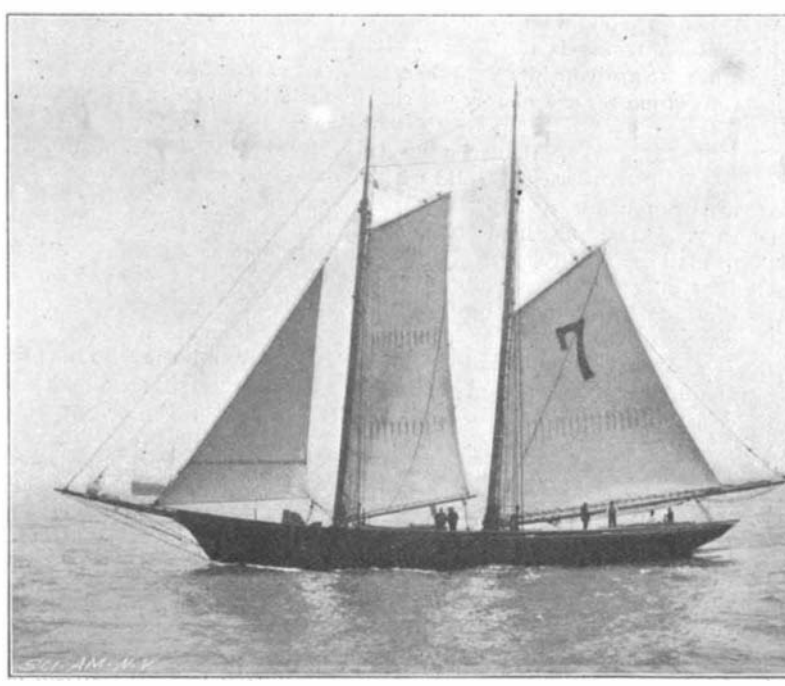
The wreck of the pilot boat "Bonita," on the night of July 20, off San Francisco Bay, was an incident, if not unparalleled in maritime annals, sufficiently rare to make it worthy of record.

The "Bonita" was one of the finest of her class, and since 1892 has been stationed off the Golden Gate, intercepting vessels bound for that difficult and fog-infected harbor.

On the night of the wreck the officers and crew, with the exception of the man at the wheel, were just at supper. The fog was so dense that objects a cable length away were invisible. Suddenly a shock of sufficient violence to knock the men off their seats was felt throughout the ship. Supposing that a collision had occurred, the crew rushed to the deck, but no other vessel was in sight. Sounding the pumps, it was discovered that the "Bonita" was sinking, and at the same time one of those enormous gray whales loomed up on the side of the craft and disclosed the cause of the accident. The "Bonita" remained afloat long enough to allow the crew time to secure their effects and launch their boats. They were subsequently picked up by incoming vessels. The wreck occurred about six miles southeast of the Farallones, and now lies in six fathoms depth of water. She may be raised, though the operation will be difficult on account of the strong currents at this point.

The California gray whale is the largest of the species, and is seen on the California coast from November until May. Its favorite haunt seems to be at the entrance of San Francisco Bay, where it is observed often in large numbers. One caught in this vicinity forty years ago measured 97 feet in length. Their weight is prodigious. Their scientific designation is sibbaldius sulfureus.

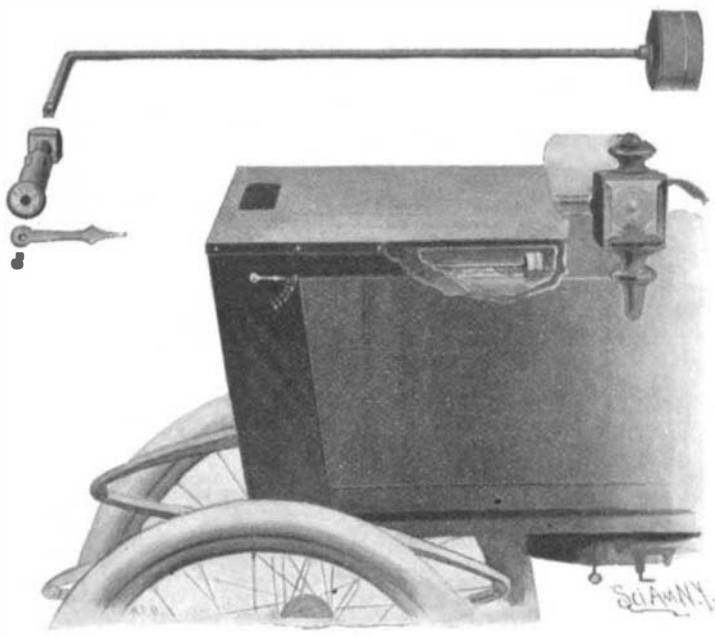
The "Bonita" was built in 1892 and was of 75 tons register. Her dimensions were 88 feet over all, 23 feet breadth and 9·8 depth. Her crew numbered five. Four pilots were aboard when the wreck occurred.



PILOT BOAT SUNK BY A WHALE.

A SIMPLE INDICATOR FOR LOCOMOBILE WATER-TANKS.

Steam-carriages are unprovided with any means for readily ascertaining the level of the water in the supply tank. The ordinary method of roughly gaging the water by thrusting a stick in the tank has its disadvantages, chief among which may be mentioned the necessity of first removing the hot tank-cover with a cloth. For obviating this difficulty, a member of the SCIENTIFIC AMERICAN staff, who has for some time driven a locomobile, has devised a very simple expedient which has proven remarkably efficient. The accounts of automobile improvements which we have published in past numbers have met with sufficient approval to justify the publication of a brief description of this simple indicator.



A SIMPLE WATER-INDICATOR FOR LOCOMOBILES.

To the longer leg of a brass rod, bent at right angles, a brass float is secured which rises and falls with the water in the tank. The short leg of the rod passes through a brass sleeve which bridges the space between the carriage body and the tank, and which is held in place by a nut screwing upon the threaded end of the sleeve. The short leg of the rod projects from the sleeve, and its squared outer end receives a finger or pointer which plays over a scale graduated in gallons. As the float falls in the tank, the pointer is turned a corresponding distance and indicates on the scale the number of gallons of water still left in the tank.

The indicator can be made even by a man of no great mechanical skill. The float pictured consists merely of an ordinary brass box, 1¾ inches in diameter at the ends and 1¼ inches high, the cover being soldered to the body to form an air-tight joint. The brass rod is likewise soldered to the box. It will be observed that all the parts, including the sleeve, are made of brass to resist the action of the water. The pointer is made preferably removable, so that it can be detached whenever it is found that the float is not absolutely air-tight.

Krupp Iron Works.

The annual report of the Chamber of Commerce for the district of Essen contains statements concerning the cast-steel works of Frederick Krupp. These comprise the following: Cast-steel Works, at Essen; Krupp Steel Works, formerly F. Asthöwer & Company, at Annen, in Westphalia; the Gruson Works, at Buckau, near Madgeburg; four blast furnaces at Duisburg, Neuweid, Engers, and Rheinhausen (this latter consists of three furnaces with a capacity for each of 230 tons per twenty-four hours); a foundry at Sayn; four coal mines (Hanover, Saelzer, Neuack and Hannibal), with interest in other coal mines; more than 500 iron mines near Bilbao, in northern Spain; shooting grounds at Meppen, with a length of 10⅝ miles and a possibility of extension for 15 miles; three ocean steamers, several stone quarries, clay and sand pits, etc. In addition, the firm of Frederick Krupp operates the Ship and Machine Stock Company Germania, at Berlin and Kiel, under contract, says Consul General Guenther.

The most important articles of manufacture of the cast steel works at Essen are cannons (up to the end of 1899, 38,478 had been sold), projectiles, percussion caps, ammunition, etc.; gun barrels; armor plates and armor sheets for all protected parts of men-of-war, as also for fortifications; railroad material, material for shipbuilders, parts of machinery of all kinds, steel and iron plates, rollers, steel for tools and other purposes. The steel works in 1899 operated about 1,700 furnaces, forge fires, etc., about 4,000 tool and work machines, 132 steam hammers of from 200 pounds to 5,000 metric tons force, more than 30 hydraulic presses (among them 2 of 5,000 tons each, 1 of 2,000 tons, and 1 of 1,200 tons pressure), 316 stationary steam boilers, 497 steam engines with an aggregate of 41,213 horse power, 558 cranes of from 400 to 150,000 tons lifting power. During the last year, the iron mines yielded an aggregate of 1,877 tons of ore per day. The coal production from the mines belonging to the Krupp Company (excepting the Hannibal) amounted, on an average, to about 3,738 tons for each working-day.

The consumption of coal and coke in 1899 was as follows: In the cast-steel works at Essen, 952,365 tons; in the other works and on the steamers of the company 622,118 tons; in all, in round numbers, 5,000 tons per day. The consumption of water at the cast-steel works in 1899 was 15,018,156 cubic meters, which equals about the consumption of the city of Frankfort, with 229,279 inhabitants. The consumption of gas in the steel works at Essen was 18,836,050 cubic meters in 1899.

The electrical power plant of the works at Essen has three machine houses, with six distributing stations, and supplies 877 arc lights, 6,724 incandescent lamps and 179 electric motors.

For the traffic of the works, railroad tracks of standard gage of about 36 miles are laid, which connect with the tracks of the main railroad station at Essen. Sixteen locomotives and 707 cars are operated on the grounds. In addition, there are narrow-gage tracks of 28 miles, with 26 locomotives and 1,209 cars.

The telegraph system of the steel works has 31 stations, with 58 Morse telegraphic instruments and 50 miles circuit. The telephone system has 328 stations, with 335 telephones and a circuit of 200 miles.

On April 1, 1900, the total number of persons employed in the different works was 46,679, viz., 27,462 at Essen, 3,475 at the Gruson Works of Buckau, 3,450 at the Germania Works at Berlin and Kiel, 6,164 in the coal mines, and 6,128 at the blast furnaces and on the testing-grounds, at Meppen, etc.

From Europe to America Overland.

Reuter's Agency is informed that Mr. Harry de Windt is leaving for the purpose of crossing Siberia to the Behring Straits, and thence over the straits and via the Mackenzie River to Winnipeg and New York. Mr. de Windt attempted a land journey from New York to Paris in 1896, but was captured and imprisoned by the Tchukehis near East Cape with such results to his health that the project had to be abandoned. This time he will make the journey in the reverse direction. Proceeding from Paris, he will leave Moscow on August 12, and will travel by the Trans-Siberian Railway to Irkutsk. Thence he will go to Yakutsk to make final preparations for his journey, which will occupy about 18 months. The explorer will carefully avoid the natives of Ounvadjek, on the Behring Strait coast of Siberia, who gave him so much trouble on the last occasion, and will proceed direct to the small settlement of East Cape, which is much to the southward of his previous route. There he will remain for four months, when he will be called for by an American whaler and will be conveyed across the straits to the Mackenzie River. Mr. de Windt will be accompanied by his servant, Harding, who has been his sole companion on most of his previous expeditions.