THE ADVANTAGES OF IN-TURNING SCREWS ON WARSHIPS.

Of late years there has been considerable discussion in naval circles upon the question as to whether it is more advantageous to have the screws of twin-screw vessels turn, as regards the movement of the top blades, inward toward the vessel, or outward from it. All of the present battleships of the United States navy have outward-turning screws, that is to say, during the upper half of the revolution of the blades they are moving away from the longitudinal axis of the ship. As a result of this arrangement, our ships have shown excellent maneuvering power—a fact which has forced itself on the attention of English naval officers, who mention the fact that during the last West Indian cruise their own battleships with inward-turning screws were inferior in maneuvering ability to our own. It is a curious fact that this inferiority appeared to be noticeable only when the vessels were maneuvering from a state of rest. Naval Constructor Taylor has prepared a diagram, a copy of which we are enabled by the courtesy of the Chief Constructor of the Navy to reproduce herewith, which shows that there is a decided advantage in outward-turning screws in enabling a vessel to turn more rapidly when she starts from rest.

It is known that as ordinarily fitted, the effect of a screw working when the vessel has not steerage way is to throw the stern transversely in the direction in which the upper blades of the screw are moving. This is because the upper blade does not get so good a grip on the water, and the transverse motion of the water, acted on by the upper blades, is more obstructed by the ship than that of the water acted on by the lower blades. In line with this theory, the arrows within the screw circles in the diagrams show the direction of revolution of the screws. The solid arrows above and below the screw circles indicate the transverse forces acting on the ship, the upper blades in each case, in Fig. 1, pulling the stern to starboard, and, in Fig. 2, pulling it to port; the lower blades pulling the stern to port in Fig. 1, and to starboard in Fig. 2. The net result is a transverse force $F_2 + F_4 - F_1 - F_3$, which pulls the stern to port in Fig. 1 and to starboard in Fig. 2. The result of the thrusts on the screws is a force tending to pull the stern to starboard both in Fig. 1 and in Fig. 2. The final resultant then of the transverse forces and thrusts developed by the screws is in Fig. 1 the difference of two forces, and necessarily less than either, while in Fig. 2 it is the sum of two forces, and necessarily greater than either.

If the propeller shafts, as they proceed aft from the engine, diverge, each upper blade meets the water at a smaller angle in Fig. 1 and at a greater angle in Fig. 2 than it would if the shafts were parallel; while each lower blade meets the water at a greater angle in Fig. 1 and at a smaller angle in Fig. 2. The dotted arrows outside the circles indicate the resulting changes in the transverse forces, and it is evident that the transverse forces acting against the screw thrusts are, in Fig. 1, strengthened; while the transverse forces acting to help the screw thrusts are, in Fig. 2, weakened.

The conclusions to be drawn from the above are: First, that in-turning screws reduce or nullify entirely the maneuvering powers under engines alone of twin-screw ships, when they have no steerage way. Secondly, that shafts diverging from the engines are inferior as regards maneuvering to parallel shafts, and shafts converging from the engines are superior in this respect to parallel shafts.

"Narragansett"—the Largest of Tank Ships.

From the Scott yards at Greenock, Scotland, the largest oil-carrying ship afloat has been launched. The vessel is to have a gross tonnage of 11,000 and a carrying capacity of 12,500 tons of oil. She will engage in the transatlantic trade for the Anglo-American Oil Company. Besides being the largest of oil-carrying vessels, the "Narragansett," as the ship has been christened, is the biggest steamship ever built in the lower reaches of the Clyde. Her length is 531 feet, her breadth 63.6 feet, her draft 42 feet. Fully loaded, her displacement will be 21,000 tons. She is built with eight athwartship bulkheads. The compartments thus formed are in turn subdivided by longitudinal bulkheads, with the result that there are in all seventy-two separate compartments below the main deck. Each one of these compartments will be oil-tight.

A most noteworthy departure in the design of the vessel is to be observed in the placing of the engines. In most oil tank steamers the engines are located in the stern. In the "Narragansett," however, the engines will be situated amidships.

There are sixteen main oil tanks, eight of which are located forward, and eight aft of the engine room. Between the upper and main decks are four smaller oil compartments, which are to be utilized when the vessel is loaded down to her summer freeboard.

The ship will be equipped with four Snow oil pumps, whereby it is possible to discharge oil at the rate of 900 tons an hour.

Pupin and Jentsch on Trans-Oceanic Telephony.

Dr. Jentsch, of the German telegraph service, recently criticised Prof. Michael Pupin's system of long-distance telephony. His objections were leveled, not at the electrical features of the system, but simply to certain mechanical difficulties that might be encountered. In his opinion, external pressure of the water would increase with the depth to which a submarine cable was laid. At a depth of two or three miles it would not be impossible that a pressure of 3,000 pounds to the square inch would be found. From this Dr. Jentsch concluded that the inductance coils of Pupin, unless constructed with extraordinary strength, would be crushed in. Dr. Jentsch, however, as well as Prof. Pupin himself, agrees that the difficulty is by no means insurmountable.

It has also been said that transatlantic telephony will not pay. Prof. Pupin is himself of that opinion, not because of any inherent fault in his system, but because of the customs of the business world. A transatlantic telephone system would be used chiefly during the business day of six or seven hours. Since the day begins in London and Paris five hours earlier than it does in New York, it follows that only during a period of one or two hours would the line be in use. Prof. Pupin's system, however, is equally adapted to the improvement of the submarine telegraph cable, so that its practical utility is by no means as curtailed as it might seem.

Further Curie Experiments With Radium.

Prof. Curie has announced to the French Academy of Sciences that radium possesses the extraordinary property of continuously emitting heat without combustion, without chemical change of any kind, and without any change in its molecular structure. Radium, he states, maintains its own temperature at a point 1.5 deg. Centigrade above the surrounding atmosphere. In other words, the quantity of heat evolved is such that a pure radium salt will melt more than its own weight of ice every hour, and half a pound of a salt of radium will evolve in one hour heat equal to that generated by burning one-third of a cubic foot of hydrogen gas. Despite this constant activity, the salt apparently remains just as potent as it was at the beginning.

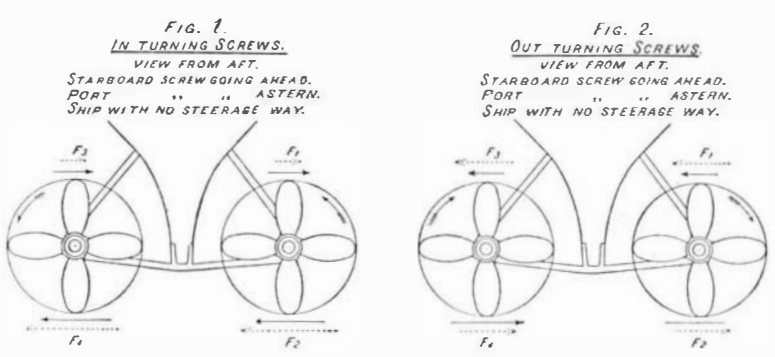

DIAGRAM SHOWING RELATIVE EFFECTS OF IN-TURNING AND OUT-TURNING SCREWS.

News From the British Antarctic Expedition—A New Record.

Last July, the British wooden steamer "Morning" sailed from England to relieve the "Discovery," which left England in 1901, for the Antarctic zone. The "Morning" arrived at Auckland, New Zealand, March 25, and reports that the "Discovery" has been in winter quarters at Victoria Land since February last year. The "Discovery" entered the ice pack December 23, 1901, in latitude 67. On January 9, 1902, she reached Cape Dare, where she was detained by ice and storms. A party was, however, sent ashore on January 20 at Wood Bay, latitude 76 deg. 30 min., to deposit a record of the voyage. Two days later Cape Crozier was reached. On February 3 the "Discovery" entered an inlet in the barrier in longitude 174 deg. Here a balloon ascension was made. An exploring party in sledges examined the country to latitude 78 deg. 50 min. On March 24 the ship was frozen in; but the expedition passed a comfortable winter near Mounts Erebus and Terror. The lowest temperature recorded was 62 deg. below zero. On September 2 two sledge parties were sent out. One party under Royds and Skelton made a record expedition to Mount Terror, traveling over a barrier under severe sleighing conditions with the temperature 58 deg. below zero. But the best record made was that of Capt. Scott, Dr. Wilson, and Lieut. Shackelton. These intrepid explorers traveled 94 miles to the south, reaching land in latitude 80 deg. 7 min., longitude 136 deg. This is the most southerly point yet attained. The expedition proved a most severe test of the endurance of both men and animals. All the dogs died, so that several men had to drag the sledges back. Lieut. Shackelton almost died from exposure. The best previous records were those made by Sir James Ross (78 deg. 4 min.) and Borchgrevinck (78 deg. 50 min.)

From the news brought by the "Morning," it would seem that the "Discovery" expedition has gathered much valuable information. The ice barrier probably is a floating mass, which is fed by land ice. In latitude 82 deg. mountains two miles high were discovered. It is probable that the coast line continues at least as far as 83 deg. 20 min. due south. A rich collection of marine fauna forms not the least valuable part of the scientific work of the expedition.

Volcanic Dust Falls in Georgia.

On the evening of March 17 a shower of volcanic dust fell in the city of Athens, Ga. All over the yards and walks, and gardens there could be seen a yellow deposit which was very evidently of a sulphurous nature—in fact, it was almost pure sulphur. Along the gutters on the streets the rain had washed it in considerable quantities, and in some places it was found floating upon the surface of water where the water had collected in little puddles.

Large numbers of citizens gathered at places where the dust had accumulated and discussed the phenomenon. All practically agreed that the dust was probably from some volcanic eruption in Central America and had been wafted to this section on some breeze from that direction. It was undoubtedly sulphurous and no other explanation could account for its presence.

It developed during the day that the shower of sulphur was not confined to Athens, but was scattered throughout this section of the State.

The Selden Patent and the Automobile Trust.

The Selden patent, which was discussed in the SCIENTIFIC AMERICAN for November 24, 1900, and which, if sustained by the United States courts, may have a depressing influence on the automobile industry of this country, has been indirectly acquired by the recently formed automobile trust. The Electric Vehicle Company, by whom the Selden patent was purchased in 1900, is one of this trust, the members of which have pledged themselves not to prosecute one another for infringement of patents, but to submit their claims to a special board of their own appointment. Automobile makers, not members of the trust, should the Selden patent be upheld, will suffer.

The Selden patent for a hydrocarbon "road engine" was applied for on May 8, 1879. By skillful maneuvering and by filing his amendments just as the statutory time limit was about to expire, the inventor succeeded in delaying the issuing of his patent until November, 1895, when automobiles began to make their appearance. The claims cover about every essential element of a gasoline vehicle.

A New Star.

It is announced that a new star has been discovered by Mme. Ceraski, of Moscow. The star (Algol variable 41,903) proves to be an object of unusual interest. The Carnegie grant has enabled an examination of the photographs, taken with the Draper telescopes, to be made. This has shown that the star has a period of 1.3574 days = 1 d. 8 h. 34.7 m. and range of 2.4 magnitudes. About half an hour before minimum, the rate of diminution in light amounts to between two and three magnitudes an hour, and is probably greater than that of any other star yet discovered. A minimum was predicted here, and was observed photographically and photometrically, 1903, March, 19 d. 16 h. 24 m. G. M. T.

Harvard University. EDWARD C. PICKERING.

A third subsidiary barrage upon the Nile—the Zifta Dam—which is midway between Cairo and the sea, and forms a complement to those at Aswan and Asyut, has been opened. This latest work, although not to be compared with the other two Titanic erections, is yet an important section of the general irrigation project of Egypt. The Zifta barrage is only 1,224 feet in length and contains fifty arches each 16 feet broad. There is also a navigation lock 184 feet long and 40 feet wide. This barrage has been built at a cost of $2,250,000.

J. C. Whitlock, of Terre Haute, Ind., an employe of the Vandalia line, is the inventor of a method of avoiding the jolting which is usually experienced when a train passes over an intersection of tracks. He has designed a crossing which has some movable parts, which make a solid connection for the train to pass over. The device is being tried in the Vandalia line, and if entirely successful will be adopted.