

variation in range. Forty-one shots were fired, not in a continual string but in irregular series of one, two, or three shots from a battery at a time; or a concentration of two, three, or four batteries firing on one target one, two, or three shots as ordered. Two of these batteries made a score of 75 per cent of hits, the others varied from 43 per cent to 62 per cent, resulting in a general average of 61 per cent. Under the practice order then in force, the width of target allowed for scoring a full hit was 75 feet, height 24 feet. The strike of each shot was carefully observed from shore and from the tug and recorded and compared, and the record was finally compiled by Major E. M. Weaver, A.C. The accuracy of the record is not open to question.

Many individual batteries have done much better work. A record of 100 per cent is not at all unusual. War Department orders have limited target practice to one or two batteries at a time. Hence the Fort Monroe practice referred to probably more nearly approaches service conditions than any that has been held.

Some of the results of the recent practice in one of the Artillery Districts are shown in the accompanying photographs.

Three targets were taken in tow at a speed of about 8 miles per hour, over a course such that the ranges were unknown except as determined by the position-finding system. Because of the movement of the tug and the necessity of changing the plates in the camera, only four of the ten succeeding shots were caught at the instant of strike. In the three showing the target and the splash, the measured variation in range on the photograph agrees with the computed variation from observation with the "range rakes." Figs. I. and II. show the strike of an "over" of 24 yards and a "short" of 32 yards, fired at the moving target at a range of about 5,500 yards. The photographs were taken from the tug which was towing the targets.

The battery did excellent work: 5,300 to 6,000 yards is long range for a 6-inch gun. Six hits out of ten record shots fired in 3 minutes and 13 seconds was the record of the practice; that is, six of the ten shots would have hit a ship 24 feet high and 60 feet beam. One shot actually hit the small target on which the gunner sighted his piece. This was the shot shown in Fig. III., and it is interesting as showing that the projectile, weighing 106 pounds, must have been instantly deflected upward, for, although the strike was only a few feet in front of the target, the shot entered the canvas on ricochet at A and passed out at B, Fig. IV.

It will be noticed that the targets occupy a curved line, and the center one is "canted" with reference to the battery, so the projectile pierced adjacent sides and not opposite sides of the target, as would be expected. Fig. V. shows a miss and a ricochet. The second strike is so near the first that the projectile could not have traveled many feet under water, but must have come out at the far edge of the first splash. There is no other disturbance of the water.

Fig. VI. shows the strike of the third record 12-inch shot at the moving target towed at  $7\frac{1}{2}$  miles per hour, at about 6,400 yards from the gun. The flotation timbers of the material target were struck, and only enough fragments were collected and brought in, to prove to any doubting mind that the target had not been cast adrift or hidden among the rocks.

It should be borne in mind that these views were not selected from various artillery districts on different occasions widely separated as to dates, nor from specially-trained companies. The photographs shown are of shots fired at the usual semi-annual practice in the Artillery District of Boston between November 5 and 15, 1907.

#### What Is a Knot?

In referring to the speed of vessels, we speak of the number of knots traveled. A knot is a measure of speed, not of distance, and the term comes from the old method of finding the speed of a vessel by means of a three-cornered piece of wood with a weight attached to one side to hold it upright in the water. To each corner was fastened a cord and to the junction of these cords was attached the log line. This

log and line with a small sand glass completed the apparatus for reckoning a vessel's speed. The log, when dropped into the water, remained where it fell. The log line was divided off by knots, the distance between the knots being the same fractional part of a nautical mile as the time measured by the sand glass was of an hour. Therefore the number of knots which ran out in the time measured by the sand glass represented the number of nautical miles an hour that the vessel was running. For example, if six knots ran out during the time, the vessel's speed was said to be six knots.

#### The "Chartreuse" Trade Mark.

In 1901 the French legislature passed a law known as the "Associations Act," as a consequence of which the order of Carthusian Monks (Pères Chartreux) were expelled from France in 1903. The French courts appointed a "liquidator" (receiver) who seized what there was left of the monks' tangible property, appropriated their French trade marks, and then began the making of a liqueur which he put on the market as "Chartreuse," using the same bottles, labels, wrappers, etc., formerly used for many years by the Carthusians. Under supposed authorization of the French courts, the liquidator then made attempts, several of which were temporarily successful, to have transferred to his name in countries foreign to France the ancient trade marks of the monks. This "Chartreuse" made by the liquidator was put up in the old bottles, and under the old labels made famous by the monks, and was put on the market and extensively advertised in the United States, England, Germany, Switzerland, Belgium, Holland, Brazil, Argentine Republic,



A MOTOR FOR WINTER TRACTION.

and other countries. In all of these countries suit was brought by the Carthusian monks against the liquidator or his agents, which suits have all been decided favorably to the monks.

In January, 1905, suit was brought in the United States against the distributing agent of the liquidator and his successor, to restrain the importing and selling of the imitation liqueur in this country under the name "Chartreuse." The case was argued in the United States Circuit Court before Judge Hough, and attracted much attention, both because of the importance of the property involved and because of the novelty of the questions presented. Judge Hough has now decided that the word "Chartreuse" signifies a liqueur manufactured by the monks, and not a locality or place of manufacture; that the business of the monks was not seized by the liquidator, but was transferred to Spain; that the liquidator was not a successor to the business of the monks, but a competitor; and that the American trade marks of the monks could not pass to the liquidator by operation of French law.

In July, 1907, a decision was rendered against the monks in England; but after the decision by Judge Hough in this country, an appeal was argued in England before the Lord Chief Justice, the court below was reversed, and a broad injunction, similar to that in this country, was granted.

A first shipment of Tongaland and Zululand rubber has been dispatched to London from Durban. A large tract of rubber country is being worked under a concession granted by the Natal government, and regular shipments are expected.

#### A MOTOR FOR WINTER TRACTION.

BY WILLIAM ALLEN.

Among the types of motors employed in the logging industry, are several intended especially for use in winter. The problem of transporting loads of logs from the forests in winter has been given much study by inventors, with the result that snow locomotives, as they might be termed, are now in successful use. Several years ago the SCIENTIFIC AMERICAN described a motor which was used successfully in Michigan. The one illustrated here is of a radically different design, especially in the method of securing traction.

Although as many as twenty-one loaded log sledges have been hauled by a motor of this type, its total weight including water supply is less than twenty tons. It develops about 100 horse-power with 200 pounds steam pressure, and on a fairly level surface will move a sleigh train at a speed of from three to five miles an hour. It can be utilized in a rough country, provided the snow is well packed down so as to give a fairly smooth surface.

There are four cylinders, attached in pairs, two engines on each side of the boiler, and fastened to frame and boiler in an upright position as shown. Each pair of engines is equipped with reversing link motion. The traction device consists of two heavy runners, one on either side of engine, carried on a  $\frac{1}{2}$ -inch iron shaft. On each end of these runners is attached a pair of heavy boxes in which hammered iron shafts run. Each shaft has a heavy sprocket wheel. These sprocket wheels mesh into and carry the tread or lag chains.

When the engines are started, power is transmitted by a spur pinion on crank shafts to pinions on the front end of the driving shafts. On the rear end of these driving shafts are attached bevel pinions, which mesh in large bevel gears running on brass-bushed quills on main bearing. These bevels also have spur gears attached to them, which carry the power through intermediate gears to another spur gear on the shaft to which the rear sprocket is keyed.

The water tank is carried under the boiler on the same frame, and has a capacity of about ten barrels, sufficient for an average run. The frame in turn is supported by the heavy traction wheels in rear and sled in front. The boilers are 15 feet in length and 36 inches in diameter, and are built to stand a working pressure of 200 pounds to the square inch.

These motors are in wide use in Minnesota and Wisconsin, where one will cover a distance of 50 miles a day, performing a service equal to that of twelve to eighteen four-horse teams.

#### A Proposed New Style of Lighthouse.

A proposition coming from Germany for a new system of lighting coasts and dangerous marine points for the protection of vessels at sea is noted in the New-Yorker Staats-Zeitung, October 20: A plan worth considering for the entire abolition of lighthouses, which are usually quite expensive, was recently proposed by retired Corvette-Captain Arenhold before the Kiel nautical society. Arenhold starts out with the fact that the navy searchlight signals are visible, in good weather, at a distance of 50 nautical miles, although they are given off at an angle of 45 degrees. He believes, now, that a cone of light which should be cast by means of a reflector perpendicularly upward toward the sky would be visible for at least 80 nautical miles, and that such a perpendicular light (even if of less strength) must be visible further than the horizontal pencil of light from a light-tower 65 to 98 feet high. The important discrimination among the individual beacons could be accomplished without difficulty by means of different colors and different forms for the sheaf of light. The German Imperial navy office purposes to make extensive experiments at Friedrichsort, near Kiel, in the near future, with a view to testing the practical utility of Arenhold's plan. Besides the cheapness, the new system of lighting coasts would have, in case of war, the special advantage that lighthouses would no longer present to the enemy, as now, even when their lights are extinguished, marks visible at a great distance that tell him his position; the low new lights, when they are put out, would be very much less easy to find.