

the possibility of building a steel ship which would not roll, or pitch, or heave in the sea, and in which, therefore, the bulk of passengers would be in a less desperate hurry to get ashore. He thought fifteen knots an hour sufficient speed.

"It appeared to me to be perfectly practicable with a draught of water of twenty-six feet. I thought the minimum length and breadth would be 1,000 feet long and 300 feet broad. I estimated that with engines of 60,000 horse power an ocean speed of fifteen knots could be obtained.

"Two sets of apparent difficulties had to be overcome, viz., those connected with the building of the ship afloat, and those relating to receiving and discharging cargo. The ship would be a steel island, incapable of entering any docks. The building difficulties soon disappeared. They had no real existence. To meet the other difficulties, I proposed to form shallow still-water harbors or docks within the ship, entered by gates in the sides, and to carry, always afloat there the loaded barges and tugs, turning the barges out and taking in fresh ones already loaded at the ports of discharge and shipment.

"Such a ship would require to be fortified and garrisoned like a town. She could be made absolutely secure against fatal injury arising from perforation. The subdivisions required for this purpose might be made to serve effectually against the spread of any local fire. I do firmly believe that we shall get the mastery over the seas, and shall live far more happily in a marine residence capable of steaming fifteen knots an hour than we can ever live in seaside towns."  
—*Scientific American*.

#### A NAUTICO-TERRESTRIAL VELOCIPEDE.

Trials have just been made at Marseilles of a velocipede that operates with the same ease upon water as upon land, without its being necessary to make the least change in its arrangement or the least halt in its running. The apparatus is of the tricycle type. It is actuated by pedals, is provided with a brake, is controlled by hand through a transverse lever, turns around with ease, and passes without transition from land into water, and *vice versa*. Let us imagine two plates connected by their edges (that we shall suppose the wheels of a tricycle), flanked upon their faces by two iron plate half shells, four inches deep and of a diameter equal to that of the wheels, and we shall have two hollow, light and strong double convex lenses in which rigidity is secured by cross braces. These lentiform wheels are provided on the edge with a channel for the reception of a strong rubber tire for preventing jolting, as in all velocipedes. In addition, they are provided externally with a dozen small copper paddles, that act like the float boards of the wheel of a paddlewheel steamer as soon as the apparatus enters the water. The accompanying figure shows the arrangement of the parts so well that it is useless to dwell upon details. It represents the apparatus returning to land after operating upon the sea. The wheels of the first model were truncated cones placed base to base. Those of the second model, here represented, are, as above stated, lentiform shells. In this model the small wheel is placed in front as in ordin-

ary tricycles. A piece fixed to the center of the triangle formed by the three wheels supports the seat, double pedal, and the guide bar governing the direction. Motion is transmitted by an endless chain, as in bicycles. The diameter of the wheels is  $4\frac{1}{2}$  feet, their distance apart is 4 feet, and their thickness at the axle is 8 inches. The seat is situated 24 inches above the axle. Finally, with the rider in the seat, the wheels enter the water to a depth of but 16 inches. A few figures gathered with care, during the course of a series of experiments that the inventor and manufacturer made expressly in order to permit us to give our readers further information, will be seen to be very satisfactory. The apparatus started from Castellane Place, traversed, in ten minutes, the  $2\frac{1}{2}$  mile long Prado Avenue (which was obstructed by reason of the autumn horse races), entered the Roucas-Blanc bathing establishment, and then entered the water, wherein it continued its motion without stoppage or effort. The sea was calm and tractable, but there was a little swell. The first trials gave a mean speed of  $2\frac{1}{2}$  miles an hour with the use of six 2 inch wide paddles per wheel, instead of the twelve  $3\frac{1}{4}$  inch wide paddles that the apparatus will carry. The speed in running backward (for which the apparatus is wonderfully adapted) was a quarter less. The muscular effort giving this speed is scarcely equal to that necessitated by a tricycle on a good road. The complete evolution can be effected in a circle of a diameter of about eleven feet. In order to prove this, the manufacturer, in 130 seconds, made the following motions: A rapid immersion, a run of 33 feet, a volt, a run forward, two successive volts forward, then two backward, a volt, a run, another volt and a resumption of the motion toward the water. The apparatus then traversed the somewhat rough water of the establishment, and, followed by the primitive model, left the basin and took to the sea.

After half an hour's evolutions, the two apparatus returned to within sixty yards of the shore for experiments on stability. A tall swimmer then imitated a man in danger, clinging in all directions and in the least supposable poses to all parts of the apparatus. These experiments were made as follows: A man mounted at the back and stood upright upon the axle. The feet of the cyclist then remained out of water. The swimmer took his place upon the seat and his companion leaned upon the brake bar. The effect was the same. The swimmer held on to the axle, the paddles, and the upper edge of the wheels without being able to upset the apparatus, and the cyclist was not unseated. He lifted the apparatus by the front wheel, and the result was the same. The stability and the resistance to upsetting were surprising.

The last test was made near the shore. The swimmer, having taken to his feet, and having a firm position, was finally able, with the aid of the cyclist, to place the tricycle upon the side, and then to overturn it completely. The two men then mounted upon the apparatus, which had become a simple raft, and, afterward, jumping into the water and standing, they righted it. It is indisputable that two men at least (exclusive of the cyclist) might hang on without inconvenience, to any part whatever of the apparatus, and, after having thus escaped an immediate peril, allow themselves to be carried by the apparatus, even when upturned, for many hours.