THE LEIXOES BREAKWATER, PORTUGAL.

One of the most striking mechanical works is the great crane Titon, which is now at work in the port of Leixoes, Portugal, employed in placing the artificial stone blocks, 50 tons weight each, for the construction of the breakwater. "Nothing is more imposing," says a spectator, "than to see this extraordinary machine transferring itself along the rails, swinging in all directions, raising enormous blocks of stone, and sinking them slowly in the ocean to construct the walls of this remarkable mole."

The larger arm of the crane measures 46 meters from the axis of the machine, and the shorter 22¾ meters, making a total length of 68¾ meters. Its height from the center is 5½ meters, and at the extremities 0·81 of a meter. It has a counterweight consisting of solid masonry. It rests upon a circular tower, and turns upon 16 wheels of steel, in groups of 4. The vertical axis gives lateral movement to this enormous apparatus. The superior part rests upon 32 wheels, arranged in groups of 8, which run upon steel rails. Mounted upon the rear arm are two steam engines, of 50 horse power, which work the machinery of the crane. Its total weight is 450 tons, and the larger arm has sufficient strength, as we have said, to place and move blocks of 50 tons a distance of 27 meters, requiring for this operation, after the stone is fastened, 16 minutes 20 seconds from the time it is attached to the chains.

Our engraving represents the crane at work upon the mole. It was constructed by the Fives-Lille Co., France. Our engraving is from *La Ilustracion Espanola y Americana*.

ROLLING PLATFORMS AND ARMOR-CLAD BATTERIES.

The form of battery described in the following article is in accordance with the plans of Commander Mougin, in which he proposes the use of a platform rolling over an iron track. The project that he has studied admits of the putting in battery of a 6 inch

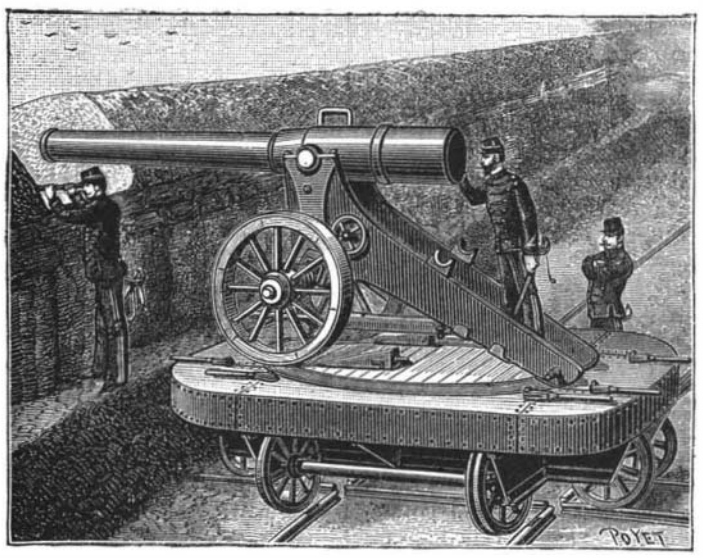


Fig. 1.—ROLLING PLATFORM.

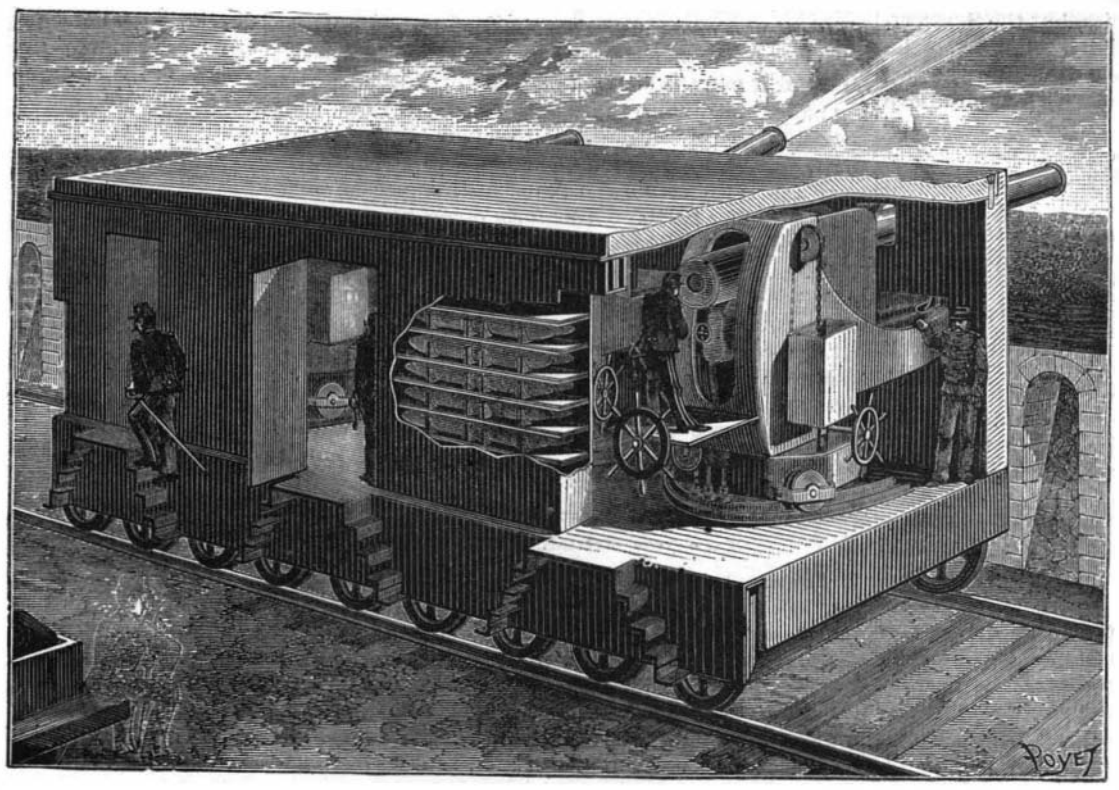


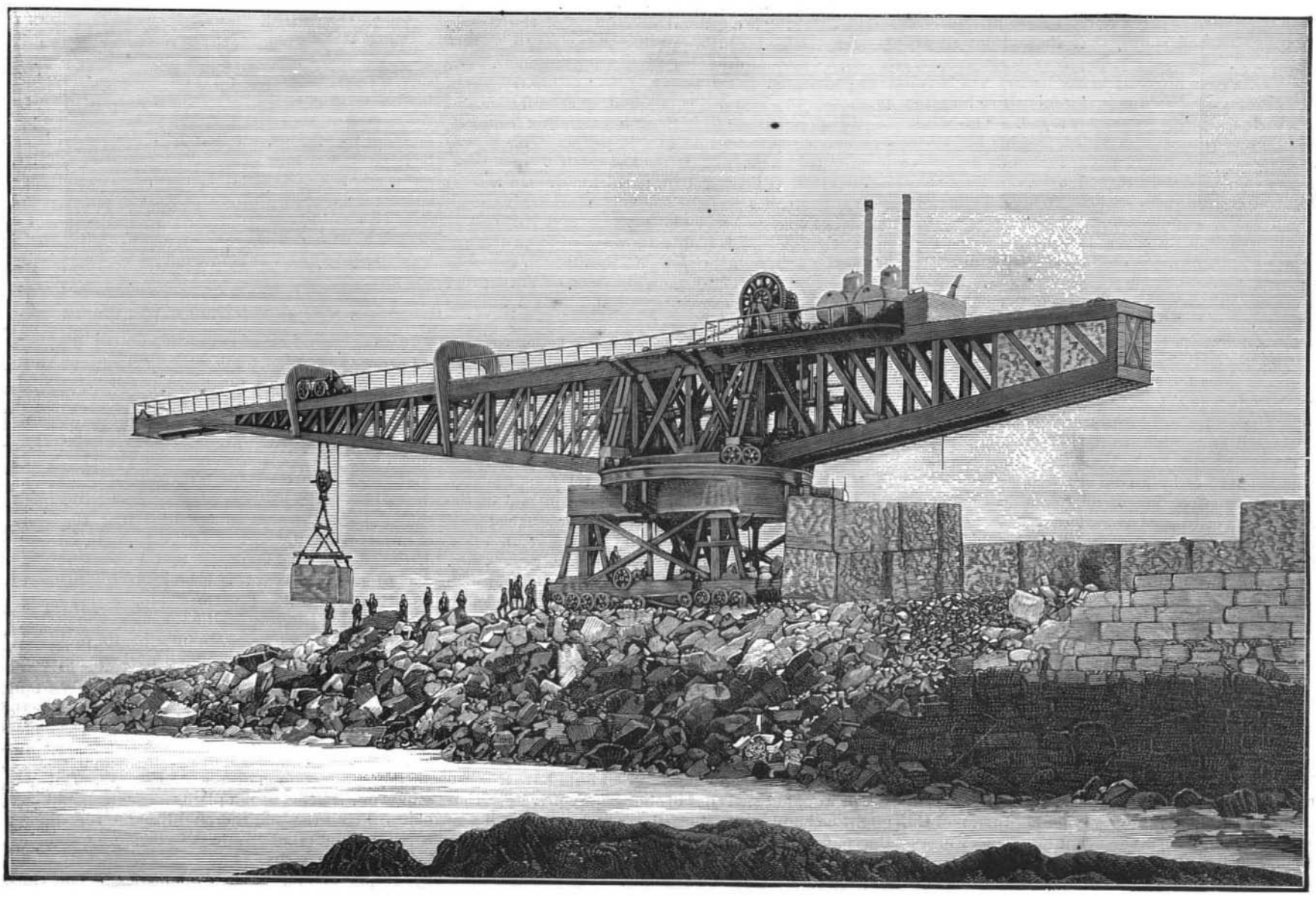
Fig. 2.—ROLLING ARMOR-CLAD BATTERY.

De Bange gun, mounted upon a siege carriage and provided with a hydraulic brake. The platform properly so called is, as he explains it, essentially formed of a frame composed of four iron plate and angle iron girders, which intersect each other in pairs at right angles, and the extremities of which are connected by a cover of iron plate (Fig. 1).

This frame is provided with a circular channel, likewise of plate and angle iron, whose center is the virtual pivot of the carriage. Externally to this channel, the platform is covered with striated iron plate, and internally with a wooden floor. In the channel there moves a cast steel ring, which is centered by a system of guide wheels, and rests upon the bottom of the channel through the intermedium of five rollers, two of which are under the wheels of the carriage, one under the butt end, and the two others at equal distances from the preceding. When the carriage is in battery, the two wheels and the butt bear upon the ring, thus permitting of quickly giving the piece every possible direction of aim in a horizontal position. The platform is supported by four pairs of wheels, the axles of two pairs of which are at right angles with those of the other two. Owing to a very simple mechanism, it is possible, at will, to make each of the wheels bear upon the rail that corresponds to it, or to raise it a few fractions of an inch above it.

From such an arrangement, it results, in the first place, that the direction of the platform can be changed on a crossing of two tracks at right angles, and consequently can be easily moved about at the bottom of a trench; and, second, that it possesses great stability at the moment of firing, although maneuvered on a system of ordinary railway tracks spaced five feet apart.

The positions for firing are marked upon the main track by a small crossing analogous to that for the change of direction. When the piece is to be fired, the entire eight



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