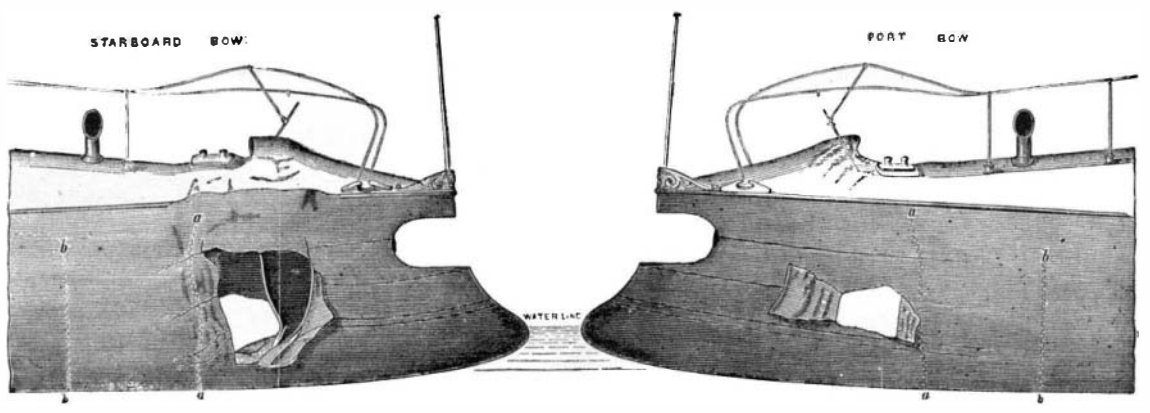
TORPEDO BOATS IN COLLISION.

Last year the Italian Government made some very exhaustive experiments at Spezia with the numerous torpedo boats they then had. Some of these were supplied by Messrs. Yarrow & Co., of Poplar, and the annexed engravings represents one of them, named the Falco, which, during some maneuvers round one of the large Italian ironclads, was run into by a similar torpedo boat built by the same firm. The *Engineer* says, at the time of the collision, which took place inside the breakwater in the Gulf of Spezia, the two boats were running at a speed of nearly fourteen knots, which speed was perhaps reduced to ten knots at the actual instant of the collision. The Falco was saved from sinking partly by the water-tight bulkhead, which happened to be close to where she was struck, and partly by her pumping machinery. An idea of the extent of the damage sustained is very clearly given by the sketches. The fore end of the ram of the other boat not only penetrated the starboard side, but went right through and out beyond the port side of the Falco. However, both the boats could steam on, and reached the dockyard at Spezia in safety. It was satisfactory to find that the engines and all the accessories on board the Falco sustained no damage whatever by the shock, which was entirely confined to the head of the boat. It is the opinion of the Italian authorities that, had the boats been less strongly and substantially built, one at least must have gone to the bottom. These first-class torpedo boats, which are 100 feet in length by 12 feet 6 inches beam, one of which, it will be remembered, attained the remarkable speed of 22·4 knots when tried in London, have been in commission the greater part of last year, making numerous cruises from Spezia along the coast, and constantly at exercise. One important feature in these boats is an arrangement introduced by Messrs. Yarrow & Co., by which means, if the stoke-hole becomes flooded with water through the boat's side being penetrated or otherwise, the fire would not be extinguished, which, on account of the low position of the fire grate in boats of this class, would otherwise almost immediately result from only a very small quantity of water finding its way into the stoke hole The value of this arrangement is clearly evident from such an accident as we now illustrate.



A TORPEDO BOAT COLLISION.

SIR WILLIAM THOMSON follows Dr. Thomas Reid in ascribing to man six senses instead of five, namely, the sense of force, of heat, of sound, of light, of taste, and of smell.

Perpetual Motion Clocks.

There is an automatic clock at the Stock Exchange, London, which has now performed very well for six months, invented by a M. Dardeme. The winding apparatus consists of a small windmill, fixed in a chimney, or any other place where a tolerably constant current of air can be relied upon. By means of a reversed train of multiplying wheels this windmill is continually driving a Hughens' endless chain remontoire, a device well known to clock makers. A pawl acting on a wheel prevents the motor from turning the wrong way, and, by a simple arrangement, whenever the weight is wound up right to the top, the motion is checked by a friction brake automatically applied to the anemometer by the raised weight lifting a lever. When the weight is thus raised to the top, the clock has a sufficient store of energy to go for eight days or more, so that it will be seen that it is by no means dependent on a regular current of air. The Belgian Government has for the past two years adopted this system of clocks on the State railways, and we are informed that they are now being tested by certain English railway companies with a view to their adoption.

CHENOT'S ATMOSPHERIC ROCK DRILL.

The accompanying plate, reproduced from the *Publication Industrielle,* shows the details of a very effective rock-cutting machine devised by Mr. Chenot for forming horizontal grooves in mines or quarries, in order that the rock may be taken out in blocks.

Fig. 1 represents the machine in longitudinal section through the axis of the tool carrier. Fig. 2 is a horizontal projection of it, the frame containing the driving gear for moving the machine on its rails being shown in section. Fig. 3 is an end view of the tool carrier driving gear, but partially in section on the line 5—6. Fig. 4 shows a transverse section of the frame just mentioned.

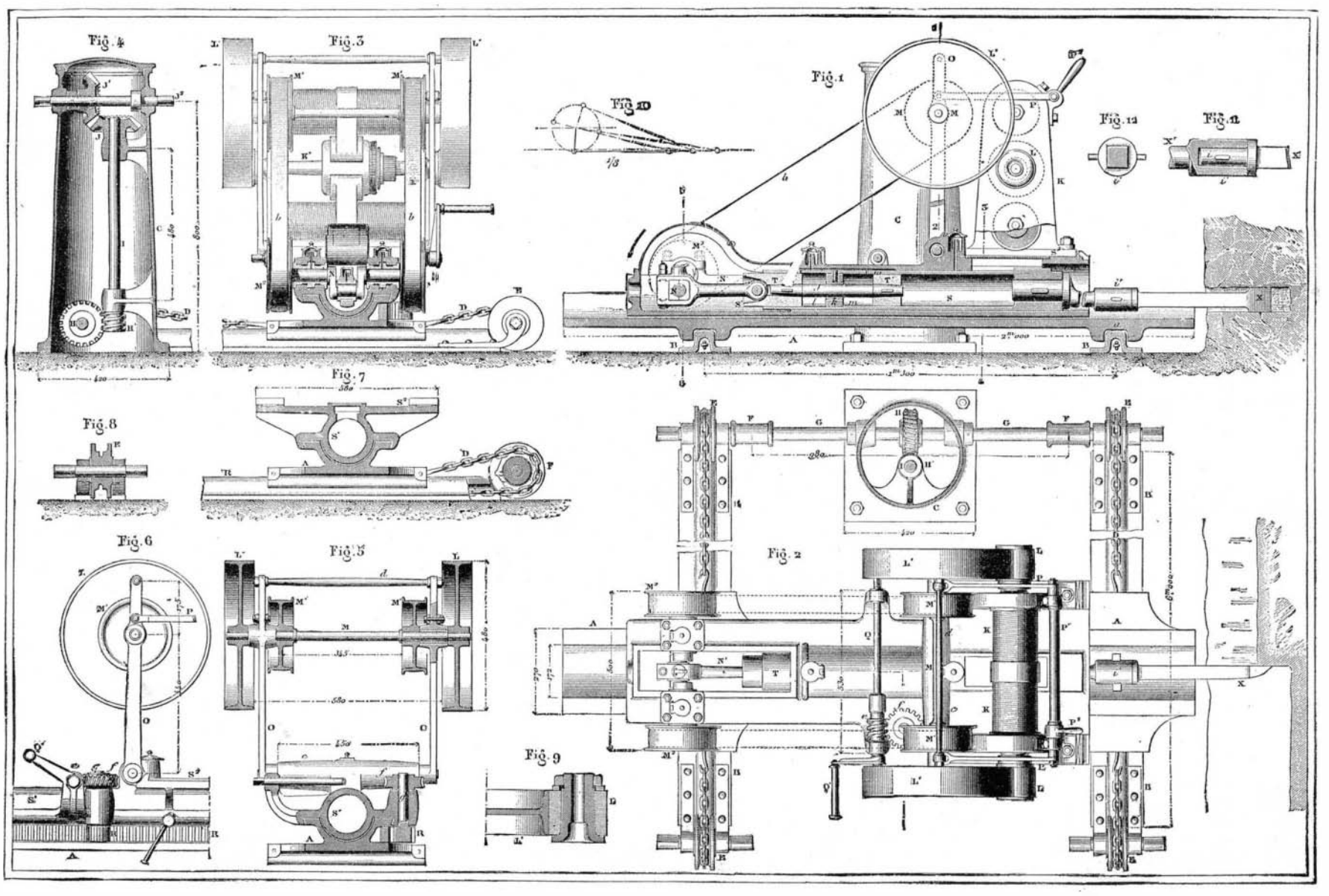
The machinery of this hammer, which is here arranged horizontally and terminates in the tool, X, is placed upon a platform, A, which is provided underneath with two grooves, *a*, by means of which it rests upon the rails, B. It is upon these latter that the entire machine moves according to the advance made by the tool. This motion of the machine on the rails is effected by means of a mechanism whose principal parts are contained in the frame, C, which is affixed to the bottom of the quarry.

The platform, A, is, in fact, attached to the extremities of two chains, D, which at one end run over the indented pulleys, E (Figs. 7 and 8), then pass through the interior of the rails, and afterward run over two like pulleys whose axles are united, through sleeves, F, with a transverse shaft, G. This latter carries in the interior of the frame, C, a wheel, H, with helicoidal teeth, which engage with an endless screw, H′, forged with the vertical shaft, I. The upper extremity of this latter carries a bevel wheel, J, which is driven by the similar wheel, J^1, mounted on the shaft, J^2, to which are attached the maneuvering winches.

It will be seen that through this easily movable arrangement of the wheels and shaft, G, the frame or rails may be moved, the driving gear be arranged at one or the other extremity of the latter, or the position of the two rails be reversed, since the four pulleys, E, are exactly alike.

The motor used to drive the apparatus is a Gramme dynamo electric machine, which is itself set in motion by a like machine that may be placed outside of the mine or quarry, and at a considerable distance away from it. This electric machine, K, is fixed upon the same platform as the hammer, and the axle, K′, of the induced ring is provided at each of its extremities with a friction wheel, L, designed for actuating two large disks, L′, that are affixed to the transverse axle, M, which carries two pulleys, M′. These latter are put in connection, through the belts, *b*, with two pulleys, M^2, on the cranked shaft, N, to which is attached the connecting rod, N′, that sets the tool carrier in motion. This part of the mechanism may be seen not only in Fig. 1, but also in Fig. 5, which is a transverse view of the machine on the line 1—2, and in Fig. 6, which is a corresponding side view of the same mechanism.

The shaft, M, is not absolutely fixed, but is carried, on the contrary, on two vertical rocking levers, O, which are affixed to a horizontal axle revolving in a bush, *c*. These two levers, which are connected at their upper part by a crosspiece, *d*, are coupled with two rods, P, which are pivoted upon pins belonging to an axle, P′, but which are made



IMPROVED PNEUMATIC ROCK DRILL.