IMPROVEMENT IN REVOLVING FIRE ARMS.

The engraving shows an improvement in revolvers, of the class in which the cylinder is arranged to swing outward from its place in the frame, so as to expose the chambers in the cylinder for the insertion and removal of the cartridges or shells. The improvement consists in an ejector which automatically throws all the shells or cartridges from the cylinder which may be in the chambers when it is turned outward from the frame. A part of the frame is made to serve as the center-pin on which the cylinder revolves, it being arranged to swing on a pivot, the axis of which is parallel with the axis of the cylinder. There is an ejector arranged at the rear end of the cylinder to engage the heads of the several cartridges, and mechanism operated by the outward-swinging movement of the part of the frame which supports the cylinder, to give to the ejector the rear movement to force the shells or cartridges from their respective chambers. The frame or receiver, A, is of substantially the usual outline, constructed with a recess for the cylinder B, and provided with the barrel C, hammer D, and lock mechanism, by which the cylinder is rotated to successively present the cartridges introduced into the chambers in line with the barrel for discharge.

On the swinging part E', above the pivot E^2, parallel with it and concentric with the cylinder, is the center-pin E^3, which forms the bearing on which the cylinder turns. This pin is made tubular or hollow. At the junction of the pin and the swinging part E', there is a projection or shield, *e*, which overlaps the adjacent part of the frame and prevents gas from entering at the joint. The cylinder is fitted upon its center-pin or bearing E^3 so as to turn freely, and the relation of the parts is such that when the swinging part is closed, the cylinder is in its place of rest in the frame; but when the swinging part is turned away, as in Fig. 2, the cylinder moves out from its place in the frame sufficiently far to expose the chambers for the insertion or removal of the cartridges or shells.

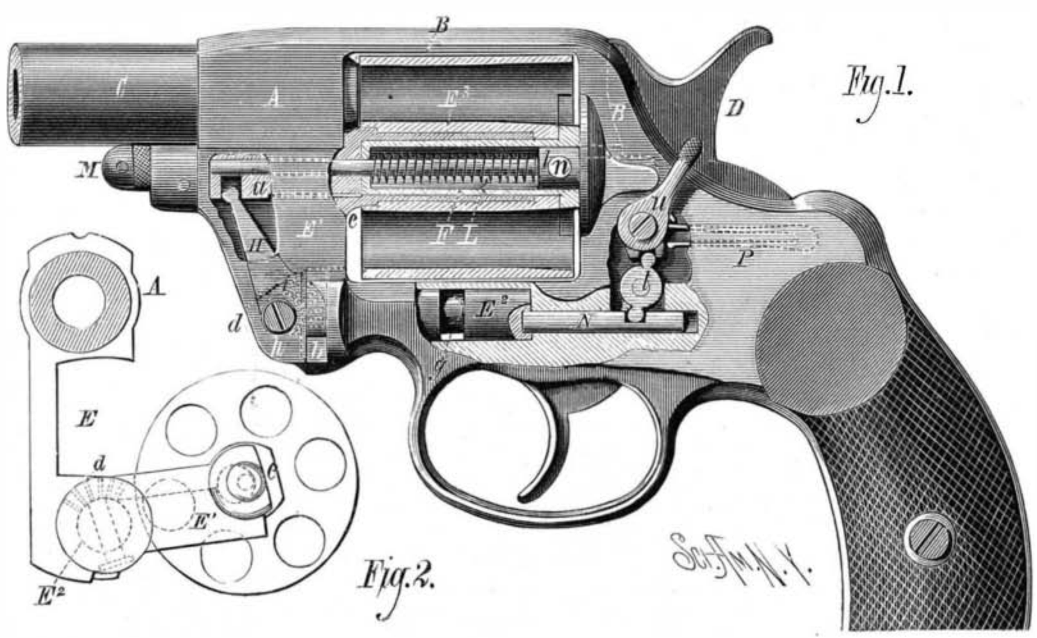
Within the center pin E^3 the ejector-rod F is arranged so as to move longitudinally. On the rear end of this ejector-rod the ejector-plate is arranged. This plate is of star shape, its arms extending outward between the chambers, and so that, when in its place in a recess in the rear end of the cylinder, these arms or part of the ejector-plate will lie at the rear edge of the chamber, so that the heads of the cartridges inserted therein, or a portion of each, will rest on this plate, so that when the ejector is thrown outward, it will force the cartridges or shells from the chambers of the cylinder.

The ratchet by which the cylinder is rotated, is attached to or made a part of the ejector-plate. To give the ejector the required rearward movement as the cylinder is turned outward, a follower, *a*, is arranged in the swinging part E' parallel with the axis of the cylinder, and in line with the ejector-rod F, and bearing against its forward end, as seen in Fig. 1. This follower *a* is made eccentric to the center-pin against the ejector-rod, so that the rear movement of this follower will correspondingly force the ejector rearward.

Loose on the pivot E^2 is a ring, *b*, seen front view in the small figure, which is free to turn on the spindle, yet will turn with it when the part E' swings outward or inward. On the front face of the ring *b* is a bevel segment-gear *d*, and forward of this ring, in the swinging part E', is an arm H, upon a pivot, *h*, the axis of which is at right angles to the axis of the ring. This arm is shown detached in the small figure.

At the lower end of the arm H, and concentric with its pivot, is a segment, *d'*, which works in the teeth *d* of the ring *b*. Their relative arrangement, as seen in Figs. 1 and 2, is so that their toothed portions *d d* work together like a pair of bevel-pinions.

As seen in Fig. 1, the arm H is in its extreme forward position—that is, in place, with the ejector home. When the swinging part E' is turned outward, the ring *b* will turn with it, the center of motion of the swinging part being the axis of the ring. If, therefore, the movement of the ring *b* be not interrupted, it can have no effect whatever upon the arm H; but if during the swinging movement the ring *b* be stopped, then, the swinging movement continuing, the teeth *d'* of the arm H, which are swinging upon the same center as the swinging part, will be forced to travel through the then stationary teeth *d* on the ring, which will impart to the arm H a movement on its center corresponding to the movement of the swinging part on its center, which will turn the arm H rearward, in a plane parallel with the axis of the cylinder. The rear movement of the ejector must not occur until after the cylinder has been turned so far from the frame that the heads of all the cartridges are exposed outside the frame, and that its movement may commence at this time a shoulder, is made on the periphery of the ring *b*, and a corresponding shoulder on the frame below, so that as soon as the shoulder on the ring strikes the shoulder on the frame the further turning of the ring will be arrested. Then as the swinging part continues its movement to the position indicated in the smaller figure the ring will remain stationary, and the arm H will be turned from the position in Fig. 1, and force the ejector rearward from the cylinder, so as to discharge the shells. This invention was lately patented by Mr. William Mason, of Hartford, Conn.



MASON'S IMPROVED REVOLVER.

Fine Drilling.

Professor Edward C. Pickering, of Harvard College, says that, in undertaking to measure the intensity of the light of the satellites of Mars, he had occasion to need an extremely small hole. A hole about the *twenty five-hundredth* part of an inch in diameter was finally secured.

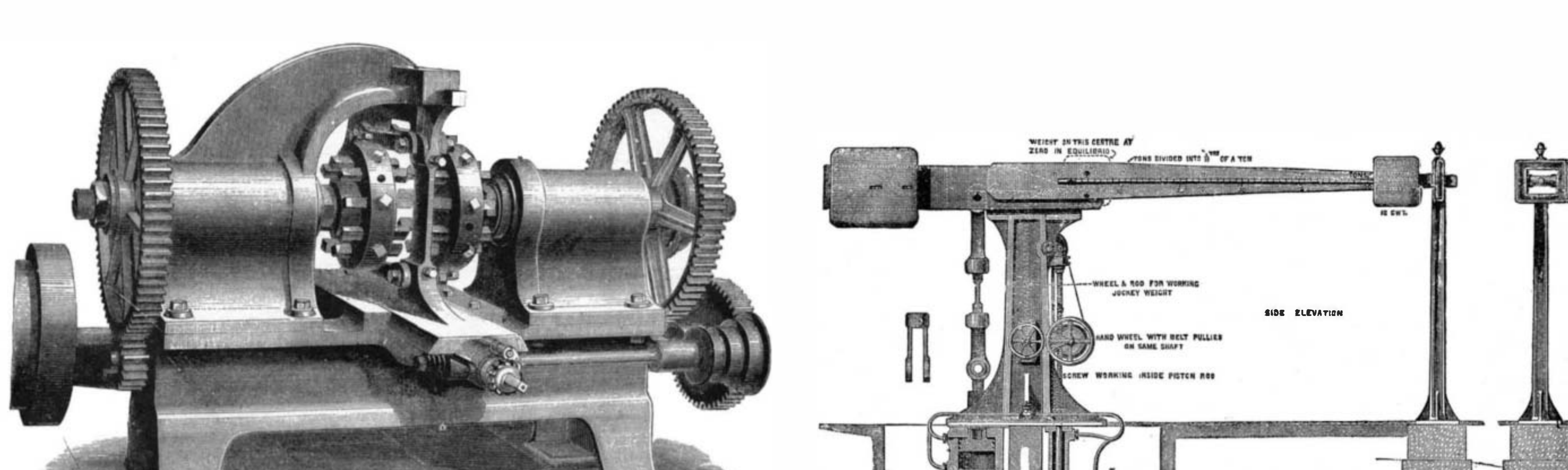
IMPROVED TESTING MACHINE.

IN order to meet the increasing demand for mild steel ship and boiler plates, and also to carry out the requisite tests—tensile—specified by the Admiralty, Board of Trade, Lloyd's and Liverpool Registry, Bureau Veritas, etc., the Steel Company of Scotland found it necessary to have a machine capable of getting through a great number of tensile tests in a comparatively short time with precision and accuracy, and also to save the delay and inconvenience to which shipbuilders and boiler-makers were subjected when the materials had to be tested at their own yards.

Through the inefficiency of the hand-moved machine at the works, the machine we illustrate was designed by Mr. Thomas Williamson, works manager to the Steel Company of Scotland, and was made by Messrs. Westray, Copeland & Co., of Barrow-in-Furness. It has been in use for about two and a half years, and has been found to fulfill all the requirements in a satisfactory manner. The average number of tensile tests, for several months' actual work, was ninety per day of nine hours, or ten per hour, and the machine is capable of breaking one test piece every two minutes with perfectly accurate results, whence it becomes a question of measuring, checking, calculating, and reducing the strains per square inch, etc., in order to keep pace with the work of the machine. The labor has been reduced by one-half, while the work done has been increased about two-thirds per day, thus effecting a great saving in time and labor.

The machine is driven by two hydraulic rams, the small one for forcing and the large one straining. The small forcing ram—pump—is worked by a screw driven by worm gear and strap by power from line shafting, which arrangement gives a steady flow of pressure in the large cylinder, and does away with the objectionable intermittent reciprocating action of the ordinary plunger pumps, which may affect the real accuracy of a test when strain has gone beyond the limit of elasticity. The capacity of the forcing to the straining cylinder is such that the cubic contents of both are nearly equal, so that the displacement is nearly the same at either side of the piston, the one forcing and the other drawing, the water leaving the bottom side of the large ram while it is being forced down on the top side; therefore, when a piece is being tested and it breaks, the water under the ram acts as a stop and so prevents it from falling through any distance, and thus causing a sudden jar on the ram or steelyard levers, which jar is injurious to the knife edges of the machine.

The levers are compound and of the first and third orders, are graded 100 to 1, and balanced; the fulcrums have long knife bearing edges, viz., one inch equal to five tons, and are hardened to wear well. The traveling jockey weight, which is 10 cwt. standard imperial weight, runs on rollers guided by a groove, and can be worked automatically or by hand out and in on the main lever, which is just kept floating at the level of a finger pointer fixed to the column. The jockey weight is worked by a quick pitched screw through the center of the main lever, which is in turn worked by a pair of small toothed wheels, one of which is fixed to the machine column, and the other to the lever and on the dead center of the first lever. The pitch line of the toothed wheels being exactly in a line with the dead center knife edge, the motion at this point is virtually nothing. It is at the same time at right angles to the line of knife edge, conse-



FIFTY-TON TESTING MACHINES, DESIGNED BY THOS. WILLIAMSON.