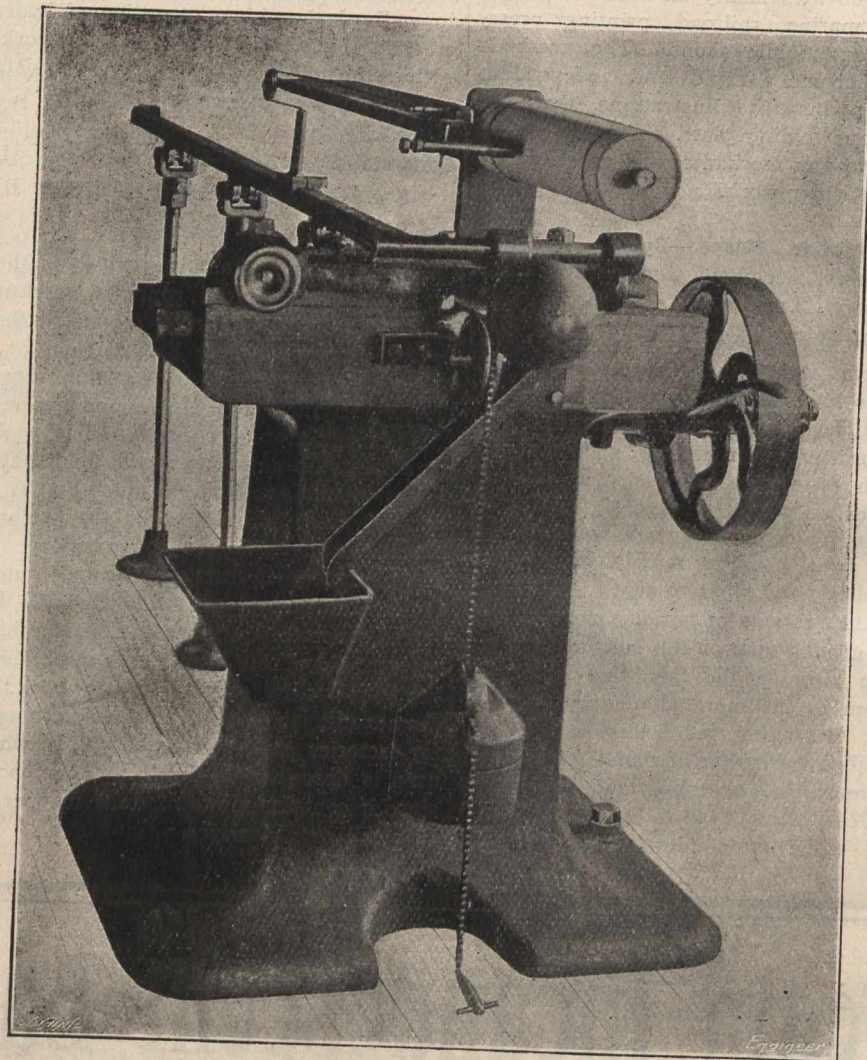


### AUTOMATIC FILE TESTING AND INDICATING MACHINE.

The file to be tested is held between two headstocks on a reciprocating table. The headstock is provided with a nut and a hollow squared screw for holding the tang of the file and exerting end pressure; a slide and a hand wheel is provided the headstock whereby the file may be adjusted with its working face parallel to its direction of motion.

The reciprocating motion of the table is obtained from the pulley and main shaft through a pair of bevel wheels, driving a T slotted crank disc. A crank pin whose position in the T slot can be varied according to the stroke required, carries a slide block of rectangular form, which slides between two vertical bearing surfaces in an extension of the

reciprocates with the file. The end of the stem rests against the back of the file and the inertia of the weight prevents the chattering and jarring of the file which would otherwise take place. The drum round which is wrapped the diagram sheet of squared paper, is driven from a cam on the crank shaft through a pawl and ratchet wheel and a train of reducing gears, so as to make one revolution to 120,000 strokes of the file. A pencil is pressed against the paper by a light spring and is carried on a bar capable of sliding longitudinally in a fixed bearing. A block is attached to the test bar, and a fusee chain is attached to this block, and passing over a pulley on the pencil bar, is held by a fixed terminal. It is evident that as the test bar is filed away it is moved forward by the weight, and a given movement of the test bar causes the pencil to move forward by half that amount. The diagram sheet is graduated in half inches, each of which represents one inch filed off the test bar. The circumference



The Testing and Indicating Machine.

table, and serves to drive the latter to and fro. The driving mechanism is inside the box frame of the machine and entirely protected from the filings. The machine is started and stopped by a clutch operated by a handle.

The test bar is supported in a horizontal position on grooved rollers and is pressed against the file by a weight, and a chain passing over a pulley and under the bar, to the far end of which is attached by a hook. The support rollers are grooved to accommodate the chain. The bar is drawn out of contact with the file during the back stroke of the latter, by means of a clutch lever having two hardened jaws embracing the test bar. At the commencement of the back stroke, motion is communicated from a cam on the crank shaft to the outward end of the clutch lever, causing it to tilt and grip the test bar after the manner of a spanner. A slight continuation of the same motion causes it to draw back the test bar, which is again released at the commencement of the forward or cutting stroke. A spherical weight with a screwed stem, is supported by the headstock and of course re-

of the drum is 12 inches, and as it revolves under the pencil each inch represents 10,000 strokes of the file. At the commencement of a test the pencil is set to zero, and as the drum revolves and the test bar is filed away, a curve is drawn by the compound motion of the drum and pencil. This curve is a complete picture of the life of the file from the commencement of the test until the file is worn out and ceases to cut, the slope of the curve indicating the sharpness or rate of cutting, while the vertical and horizontal ordinates give respectively the total amount of work done by the file and the number of strokes required to do this work and to wear the file out. The file testing and indicating machine was invented in England in 1905. Sample files were procured from the principal English and American makers, and tests were made which revealed extraordinary differences of quality, some files being worn out after filing away less than 1 cubic inch of iron, and cutting at the rate of 1 cubic inch per 10,000 strokes, while the best file removed  $12\frac{1}{2}$  cubic inches of metal and cut at the rate of 5 cubic inches per 10,000 strokes.