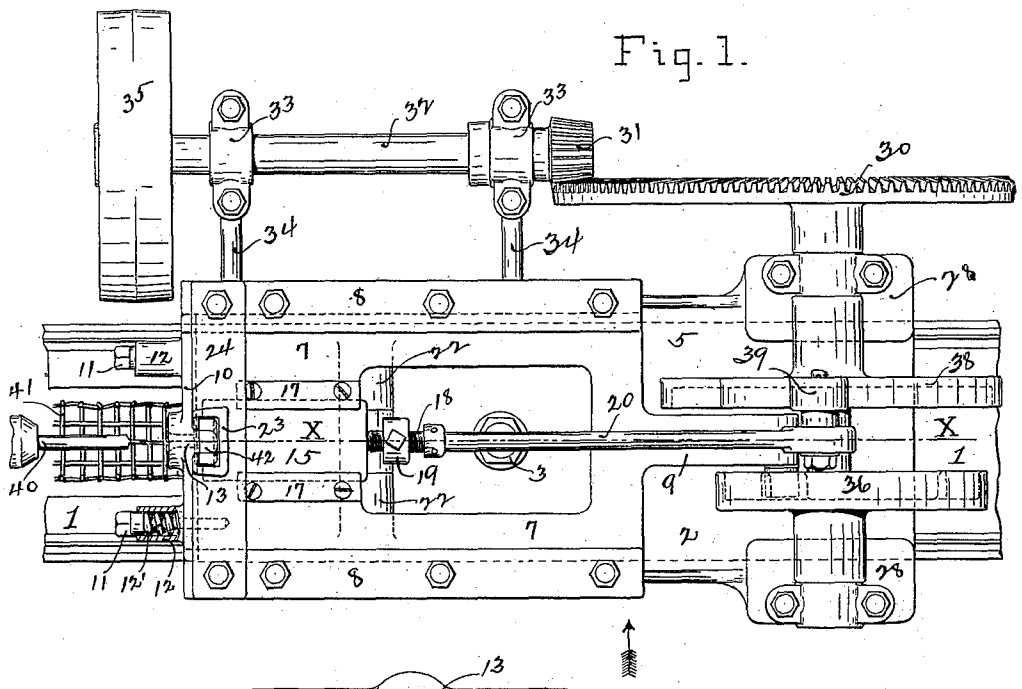
(No Model.)

W. WATTIE

DRILLING MACHINE.

No. 378,747. Patented Feb. 28, 1888.

Fig. 1.



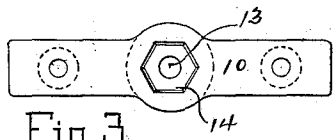
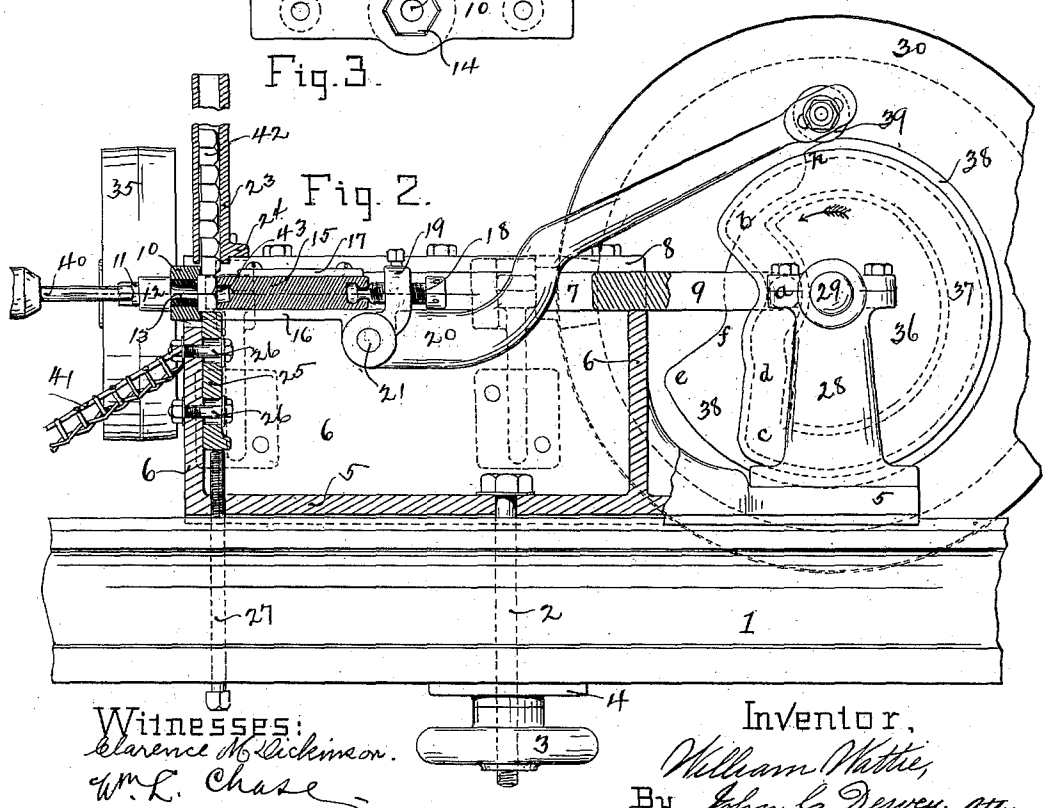


Fig. 3.

Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM WATTIE, OF WORCESTER, MASSACHUSETTS.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 378,747, dated February 28, 1888.

Application filed November 21, 1887. Serial No. 255,687. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WATTIE, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Drilling-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to drilling-machines in which the pieces to be drilled are fed to the machine through a magazine; and the object of my invention is to provide a machine for drilling nuts and other metal pieces which shall be automatic in its operation; and my invention consists in certain novel features of construction and operation of a drilling-machine, as will be hereinafter fully described, and the nature thereof indicated by the claims.

Referring to the drawings, Figure 1 is a plan view of a machine embodying my improvements. Fig. 2 is a side elevation of the same, partly in section on line *x x*, Fig. 1, looking in the direction of the arrow, same figure; and Fig. 3 is a detail view of the plunger-head bar, showing the centering-socket.

In the accompanying drawings, 1 represents a portion of the bed of an ordinary drill-lathe, upon which the frame proper of my machine is fastened by means of the bolt 2, hand-wheel nut 3, and clamp 4. The frame proper consists of a base, 5, upon the front end of which is cast a box, 6, open at the top and provided along its sides, at the top, with flanges, in which is planed out a recess to receive the plunger-carrier 7, which is held in the recess, so as to slide longitudinally in the direction of the length of the frame, by the strips 8, bolted to the flanges.

The plunger-carrier 7 is a rectangular frame having a tail, 9, extending backward, the purpose of which will be explained hereinafter. The front end of the plunger-carrier frame is cast open, and the two ends are connected by a head-bar, 10, fastened to the plunger-carrier by the bolts 11, which fit loosely through the head-bar, and are screwed into the ends of the plunger-carrier.

Between the heads of the bolts 11 and the face of the bar 10 are inclosed firm open coil-springs 12', covered by the shells 12. In the center of the head-bar 10 is a bushing, the hole 13 in which is the size of the hole to be drilled by the machine, the front end of which is rounded out slightly to facilitate the entrance of the drill. On the back side of the head-bar is a shallow recess, 14, Fig. 3, of the same shape, and at the bottom of the same size, as the outline of the pieces to be drilled.

The walls of the recess 14 are made flaring, so that the piece to be drilled can enter the recess a little out of center, and as it is pushed into the recess be brought exactly concentric with the hole through the head-bar.

Planed into a recess in the sides of the plunger-carrier frame 7 is a gripping-plunger, 15, supported on flanges 16, Fig. 2, and held in place free to slide in the same direction as the plunger-carrier 7 by the strips 17, screwed to the plunger-carrier. In the rear end of plunger 15 is a T-slot, which takes the shouldered point of the adjusting-screw 18, which is screwed through the hub 19 of the lever 20, which is pivoted at 21 in ears 22, cast to the plunger-carrier frame 7. The purpose of the screw 18 is to adjust the gripping-plunger 15 according to the thickness of the piece to be drilled.

The swinging of lever 20 will be seen to effect the forward and back movement of the gripping-plunger 15 through the connecting-screw 18, the point and neck of which are so rounded, in conjunction with the T-slot, as to allow the movement to take place. The forward end of the gripping-plunger is recessed, as shown at 43, Fig. 2, to receive the point of the drill as it comes through the work, which is held between the head-bar 10 and the end of the gripping-plunger 15.

Immediately over the opening between the head-bar 10 and the gripping-plunger 15, when the plunger-carrier 7 is in its backward position, is the magazine or supply-chamber 23, supported by wings 24, which extend across the frame and are bolted to the strips 8. The size of the magazine inside is such as to allow the pieces to be drilled to slide freely through it by their own weight.

Directly underneath the gripping-plunger

15 and the mouth of the magazine 23 is an adjustable stop, 25, Fig. 2, the top face of which is shaped to correspond with the shape of the piece to be drilled. The stop 25 is held in place against the frame by bolts 26, passing through slots to allow adjustment by the screw 27, tapped into the base of frame and extending below the lathe-bed for convenience in getting at it.

Mounted in standards 28 on the back end of the base of the frame is a cam-shaft, 29, Fig. 2, which carries on its outer end a large bevel-gear, 30, which is driven by bevel-pinion 31, fast on shaft 32, resting in bearings 33, carried by stands 34, bolted to the back side of the frame. Shaft 32 receives its motion by belt on the pulley 35 connecting it with an overhead counter-shaft, (not shown,) from which also the drill-spindle receives its motion.

Fast upon cam-shaft 29 is the cam 36, provided with a groove, 37, in which may run a roller free to turn on a stud in the end of tail-piece 9 of plunger-carrier 7. It will be seen that the revolution of the cam will cause the forward and back movement of the plunger-carrier 7, which is timed by the shape of the cam. Also, fast upon the cam-shaft 29 is cam 38, upon the rim of which bears a roller, 39, on a stud in the end of lever 20.

It will be seen that the revolution of the cam 38 swings the lever 20, causing a slight movement of the gripping-plunger 15, as before mentioned. The drill 40 (shown in the forward end of chuck) is carried by an ordinary drill-spindle, (not shown,) mounted in the usual way on the lathe-bed.

The operation of the machine is as follows: Supposing the drill 40 to be running and the magazine filled, as represented in the drawings, with hexagonal nuts 42, the plunger-carrier 7 and the gripping-plunger 15 are first carried to their extreme rearward position, which allows one of the nuts 42 to drop into the space between the end of the gripping-plunger 15 and head-bar 10 and rest on the stop 25. The nut, as it drops from the magazine, is kept from going out of center to one side by projections on each side of the gripping-plunger, which act as a continuation of the sides of the magazine. The cam-shaft 29 is now turned in the direction indicated by the arrow. The cam 38 lifts the lever 20, which throws forward the gripping-plunger 15, pushing the nut off the adjustable stop and into the recess in the head-bar 10, thereby centering it, and at the same time gripping it firmly and holding it square with its face. This is an important feature of my invention, as the drilled hole is bound to come square with the face of the nut no matter if the punched hole is not perfectly so, provided, of course, that the machine is properly lined up. The springs 12′ in the bolts 11 allow the head-bar 10 to spring forward a little, and thus provide for variation in the thickness of the pieces to be drilled. The two cams 36 and 38 are so timed that as soon as the nut has been gripped the plunger-carrier 7 starts forward, rapidly at first, as the roller passes from the point *a* to point *b* in the groove 37 of cam 36, Fig. 2. This part of the movement brings the nut about to the point of the drill, and between the points *b* and *c* in the groove of cam 36 the increase is slow and gradual while the drilling of the nut is accomplished. While this movement has been taking place the lever 20 has moved forward with the gripping-plunger 15, to which it is attached, and in order to retain the grip on the nut the cam 38 so increases from the point at which the roll 39 rests in Fig. 2 to point *e* as to compensate for the forward movement and hold the grip tight. The two cams are so constructed that when the forward movement of the gripping-plunger 15 is completed the roll 39 drops over the point *e* of cam 38, thereby suddenly loosening the grip on the drilled nut. At the same time the roller on the tail 9 turns the point *c* on cam 36, and the retrograde movement of the plunger-carrier 7, while the roller passes from point *d*, withdraws the point of the drill from the nut. There is a slight dwell in cam 36 at point *d*, which gives the nut, now unsupported, time to drop from between the gripping-plunger 15 and head-bar 10 upon the screen 41, whence it rolls to a keg or other receptacle (not shown) under the bed of the lathe. The screen 41 serves to separate the chips, which pass through it, from the nuts, which roll away on the screen. Continuing the movement of the cam-shaft 29, the plunger-carrier 7 is returned to its normal position by that point of cam 36 between *d* and *a*, and the lower nut in the magazine, which, during the operation of drilling its predecessor, has been resting upon the gripping-plunger 15, drops into the space between the end of said gripping-plunger and the head-bar 10, and is gripped by the passage of the roller 39 over the point *b* of cam 38, which completes the circle.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a drilling-machine, the combination, with a drill-carrying spindle, of a cam-actuated reciprocating plunger-carrier, a cam-actuated gripping-plunger acting in the direction of the length of the drill-spindle at right angles to the face of the piece to be drilled, and a magazine or feed-chamber, substantially as described.

2. In a drilling-machine, the combination, with a drill-carrying spindle, of a magazine or feed-chamber, a cam-actuated reciprocating plunger-carrier provided with a head-bar containing a hole for guiding the drill, and concentric with the hole a centering recess or socket, into which the work to be drilled is forced by a gripping-plunger, and said gripping-plunger acting in the direction of the length of the drill, substantially as described.

3. In a drilling-machine, the combination, with a drill-carrying spindle, of a magazine or feed-chamber, a cam-actuated reciprocating plunger-carrier provided with a spring-con-

fined head-bar, and a gripping-plunger, substantially as described.

4. In a drilling-machine, the combination, with a drill-carrying spindle, of a magazine or feed-chamber, a reciprocating plunger-carrier, a gripping-plunger, a grip-operating cam-lever, a cam-shaft at right angles to the length of the drill-spindle, carrying actuating-cams for the said plunger-carrier and gripping-plunger, and a pulley and pinion shaft parallel with the length of the drill-spindle and geared to the said cam-shaft, substantially as described.

5. In a drilling-machine, the combination, with a drill-carrying spindle, of a cam-actuated reciprocating plunger-carrier, a gripping-plunger, a magazine or feed-chamber, and an adjustable table or stop upon which the pieces to be drilled rest, substantially as shown and described.

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