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FEEDING MECHANISM FOR AUTOMATIC SCREW DRIVING MACHINES.

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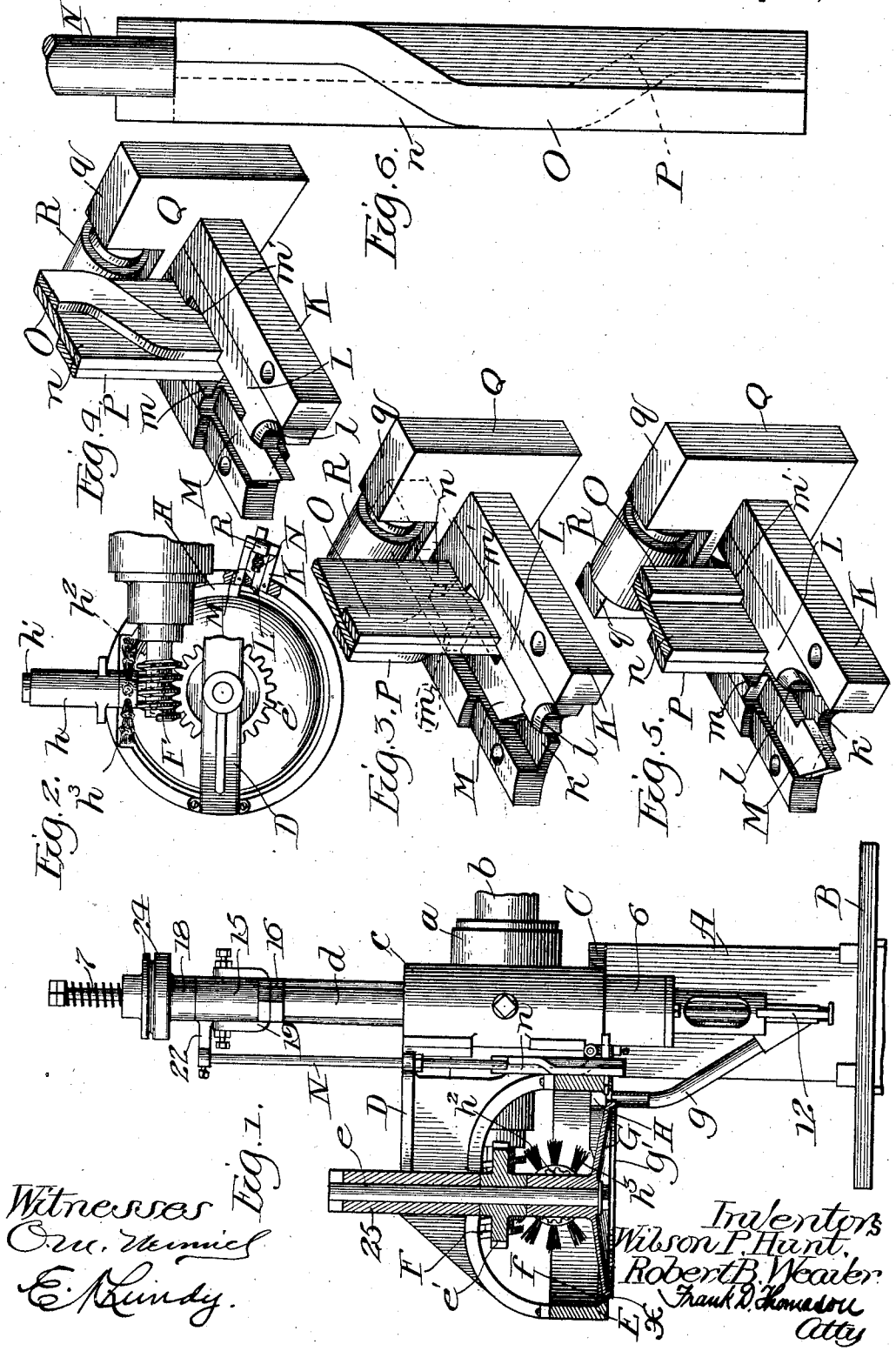

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FEEDING MECHANISM FOR AUTOMATIC SCREW-DRIVING MACHINES.

1,003,462. Specification of Letters Patent. **Patented Sept. 19, 1911.**

Application filed February 13, 1909. Serial No. 477,616.

To all whom it may concern:

Be it known that we, WILSON P. HUNT and ROBERT B. WEAVER, both citizens of the United States, and residents of Moline, Rock Island county, Illinois, and Cleveland, Cuyahoga county, Ohio, respectively, have invented certain new and useful Improvements in Feeding Mechanism for Automatic Screw-Driving Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates particularly to automatic screw-driving machines such as those designed for use in shops and factories where it is desirable to drive screws rapidly and in large numbers. Such a machine, for example, is shown and described in an application for Letters Patent of the United States, filed by said Wilson P. Hunt, on March 30, 1906, Serial No. 309,009, wherein the screws are fed one at a time from a suitable magazine to the revolving screw-driven bit.

It is the object of our invention to provide a positive and reliable feeding mechanism that may be readily attached to the magazine whereby the screws will not be permitted to pile up, one upon another, and the feeding of said screws will be so timed relative to the operation of the bit that a single screw will be fed from the magazine during the movement of said bit away from the work.

These objects we accomplish by the means hereinafter fully described and as more particularly pointed out in the claims.

In the drawings: Figure 1 is a front elevation of one type of screw-driving machine showing our improved feeding mechanism applied thereto, said mechanism being shown in central transverse section. Fig. 2 is a top plan view of the screw magazine and the feeding device, and showing only a fragmental portion of the driving elements of the machine. Figs. 3, 4, and 5 show the three relative positions of the screw-releasing or feeding mechanism, the same being shown in approximately full-sized perspective and detached from the magazine and the other parts of the machine. Fig. 6 is an elevation of one of the side faces of the lower end of the cam-rod for operating the screw-releasing blocks.

Referring to the drawings, A represents a vertical standard having a suitable work-table B adjustable vertically thereon. Said standard extends above the plane in which the work is fed to the machine, where it has a laterally disposed supporting plate C secured to its upper end for the frame-work in which the operative parts of the machine are held in their proper positions. This supporting frame-work comprises a transversely disposed bearing *a* for the drive-shaft *b* of the machine, and has a vertical bearing *c* for a tubular vertically reciprocal shaft *d*. These bearings communicate with each other and permit said vertical shaft to be rotated by said drive-shaft, through the medium of suitable worm-gears or pinions (not shown). The vertical shaft is so arranged that it rotates with said drive shaft but has a vertical reciprocal movement independent thereof. As before stated, this shaft is tubular and its upper end extends above and outside the vertical bearing *c* a suitable distance, where it is surrounded by a sleeve 15. Suitable retaining nuts 16 are provided below the sleeve and a collar 18 surrounds the shaft above it thereby preventing the said sleeve from moving longitudinally independent of the shaft although permitting said shaft to rotate independently. Sleeve 15 is preferably engaged by the forward bifurcated ends of a pivoted lever 19 operated by means of a suitable foot treadle which, when depressed, moves the shaft *d* downwardly. A shaft 7 is connected by frictional devices 24 to the tubular shaft *d* and it extends through the same down to a point below a bushing 6 projecting below the vertical bearing *c*. The frictional devices operating in conjunction with a spring surrounding the shaft *d* permit the latter to revolve independent of the inner shaft 7 so that, when the shaft 7 has ceased to revolve by reason of having driven the screw home, the shaft *d* will continue to revolve by itself and prevent the bit from cutting into the work.

All of the above mechanism, together with the clamping jaws 12 for holding the screws to be driven, is described, claimed, and illustrated in detail in the application for Letters Patent above mentioned, and therefore needs no specific description herein.

Secured to and projecting laterally from the side of the vertical bearing *c* is a bracket

D, which, at about its center of length, is provided with a vertical boss or bearing 25 for vertical spindle *e*. The bracket D has its ends bent or curved downwardly to form an arch for the support of the screw magazine, that preferably comprises an annular side-wall E, and a circular revoluble table G mounted on the lower extended end of spindle *e*. The annular side wall E has its lower edge *f* flanged inwardly and beveled on its upper face, and the edge of the circular table G, (which is secured to the spindle so that its outer portion is in a plane parallel with said flanged edge *f*) is substantially concentric to said edge but is spaced therefrom a distance less than the diameter of the head of the screws and slightly greater than the thickness of the shank of said screws. The circumferential edge of the table may, if desired be beveled to correspond to the bevel of the flanged edge *f* of the annular wall and is provided with a downwardly turned flange *g'*. The space between said flanged edge *f* and the circumferential edge of the table forms a circular space or runway *x* into which the barrels of the screws slide and are suspended by their heads prior to their being fed out of the magazine. The spindle *e* is driven at a comparatively slow speed through the medium of a worm-gear *e'* thereon, that meshes with and is engaged by a worm F on the adjacent extended end of drive-shaft *b*. As the table revolves slowly the screws are moved around to a point near the vertical bearing *c*, where they are dispensed one at a time through the medium of suitable ejecting mechanism into a tubular chute *g*, that extends from the rim of the magazine downwardly to the screw-driving chuck or bit.

Secured to the rear portion of the annular wall E is a horizontal bearing *h* for a short shaft *h'*, whose forward end extends beyond its bearings over the magazine and is driven by a worm gear h^2 (shown in dotted lines, Fig. 2) actuated by the same worm F that drives the spindle *e*. Between this worm gear h^2 and the adjacent end of the bearing of shaft *h'*, the latter is provided with a circular brush h^3 having wire bristles, the diameter of whose outer periphery is such that the said wires brush any surplus screws, that may be accidentally carried forward, back or to the revolving table, and only allow those to pass which are suspended by their heads in the annular runway *x*. In order to do this it is obvious the brush is revoluble in a direction opposite to that of the table.

From a point approximately under shaft *h'* to a point beyond the discharge opening of the magazine, we prefer to cover over the runway *x* by a segmental-shaped bar H that fits inside and is secured against the inner surface of the annular wall E just above the flange *f* thereof. This bar prevents the screws, after passing the brush, from crowding over each other to such an extent that they would clog the runway. The discharge opening is preferably made by recessing the under edge of the annular wall E, including a portion of the flange *f*, on the side of the magazine nearest the vertical bearings *c* of the machine. This recess is occupied by a screw-releasing mechanism, that preferably comprises a suitable rectangular-shaped plate K having a shallow channel *k* cut longitudinally along the upper surface thereof, and the vertical portions on each side thereof are provided with screw-holes through which suitable bolts are passed and tapped into the underside of the annular wall E. Channel *k* forms a seat or guide for a pair of coöperating screw-releasing blocks L and M that are adapted to be reciprocated back and forth therein.

The forward edge of the block L (which may be termed the "screw-ejecting block") is preferably concaved as indicated with its upper edge countersunk substantially as shown at *l*. The companion block M (which may be termed the "screw-retaining block") has its outer end cut away diagonally and is pointed, preferably toward the corner next to its companion block L. These two blocks are adapted to be reciprocated in an intermittent manner by means of a vertically disposed cam-carrying plunger N. Said plunger is secured at its upper end to an arm or bracket 22 projecting laterally from the sleeve 15 from which it derives longitudinally reciprocal movement. The lower end of said plunger is provided with a flat elongated extension *n*, of preferably rectangular shape and has cams O and P upon its opposite side faces, that are adapted to engage and operate in suitable transverse recesses *m*, *m'*, cut substantially vertically in the contacting adjacent side edges of the blocks L and M. These cams are adapted to time the movements of the blocks so that the screws are fed one at a time to the screw-driving bit. These movements are as follows, reference being had to Figs. 3, 4, and 5, of the drawings:—In normal position, when the plunger is elevated, the ejecting block L is in a forward position covering the recess above the chute *g*, while the head of a screw is preferably seated in the countersunk concavity *l*. As the plunger is lowered, cam P moves retaining block M forward (Fig. 4) until its pointed end separates the screw resting upon the ejecting block L from those remaining in the runway *x*, and prevents the latter from moving forward. Upon the further downward movement of the plunger the retaining block remains stationary, while the cam O causes the ejecting block to move backward sufficient to permit the screw sup-

ported thereby to gravitate through the recess in the rim of the wall of the magazine and fall through the chute to suitable clamping jaws 12 just below the lower end of the bit. After the plunger is reversed and moved upwardly, the retaining block remains forward while the ejecting block L returns to its normal position. The final movement restores block M to its normal position so as to permit the next screw in the runway to move on to its seat on the forward end of the ejecting block as said screws are swept forward by the rotary motion of the table.

In order to provide a guide for the plunger and keep the same properly positioned, a substantially U-shaped guide-yoke Q is mounted over the outer end of the plate K. The upper arm of this yoke has its top edge provided with two upwardly extending lugs *q*, *q*, between which any suitable antifriction means, such as a roller R, is journaled so that the outer edge of the plunger will touch the edge of said roller at a tangent as the former reciprocates. While we have described a specific device for this purpose it is of course obvious that any well known or desirable expedient may be employed.

What we claim as new is:—

1. In a screw-driving machine a magazine provided with a wall, a table revoluble within the same, there being an annular space between said wall and table, means for ejecting screws from said annular space one at a time, and a brush the axis of which is at an angle to that of said table and revoluble in a direction opposed to that of said table and in a plane tangential to said annular space.

2. In a screw-driving machine a magazine comprising an annular wall, a table revoluble within and substantially concentric with said wall, there being an annular space between said wall and table, means for ejecting screws from said annular space one at a time, and a brush the axis of which is at an angle to that of said table and revoluble in a direction opposed to that of said table and in a plane above and tangential to said annular space.

3. In a screw-driving machine a magazine comprising a revoluble table, an annular side-wall having its lower edge flanged inward in the same horizontal plane with the periphery of said table, there being an annular space between said flanged edge and table, means for ejecting screws from said annular space one at a time, and a brush the axis of which is at an angle to that of said table and revoluble in a direction opposed to that of said table and in a plane tangential to said annular space.

4. In a screw-driving machine a magazine provided with a wall, a table revoluble within the same, there being an annular space between said wall and table, means for ejecting screws from said annular space one at a time, a brush the axis of which is at an angle to that of said table and revoluble in a direction opposed to that of said table and in a plane tangential to said annular space, and a segmental bar covering the portion of said annular space between said brush and the screw-ejecting means.

5. In a screw-driving machine, a magazine, a rotatable table having an annular slot between the same and the wall of said magazine, in which the screws hang, and reciprocal means for ejecting screws through said slot one at a time.

6. In a screw-driving machine, a magazine, a rotatable table having its edge provided with a downwardly projecting flange and providing an annular slot between the same and the wall of said magazine in which the screws are pendent, and reciprocal means for ejecting screws through said slot one at a time.

7. In a screw-driving machine a magazine having a laterally flanged lower edge, a rotatable table having an annular slot between the same and the flanged edge of said magazine in which the screws are pendent, and reciprocal means for ejecting screws through said slot one at a time.

In testimony whereof I have hereunto set my hand and seal this 1st day of February A. D., 1909.

WILSON P. HUNT. [L. S.]

Witnesses:
OLIVE HERO,
G. D. REYNOLDS.

In testimony whereof I have hereunto set my hand and seal this 6th day of February A. D., 1909.

ROBERT B. WEAVER. [L. S.]

Witnesses:
W. C. BROCKETT,
C. W. SCHILLING.