

(No Model.)

2 Sheets—Sheet 1.

F. W. TOBEY.

SCREW DRIVING AND WASHER FEEDING MACHINE.

No. 480,530.

Patented Aug. 9, 1892.

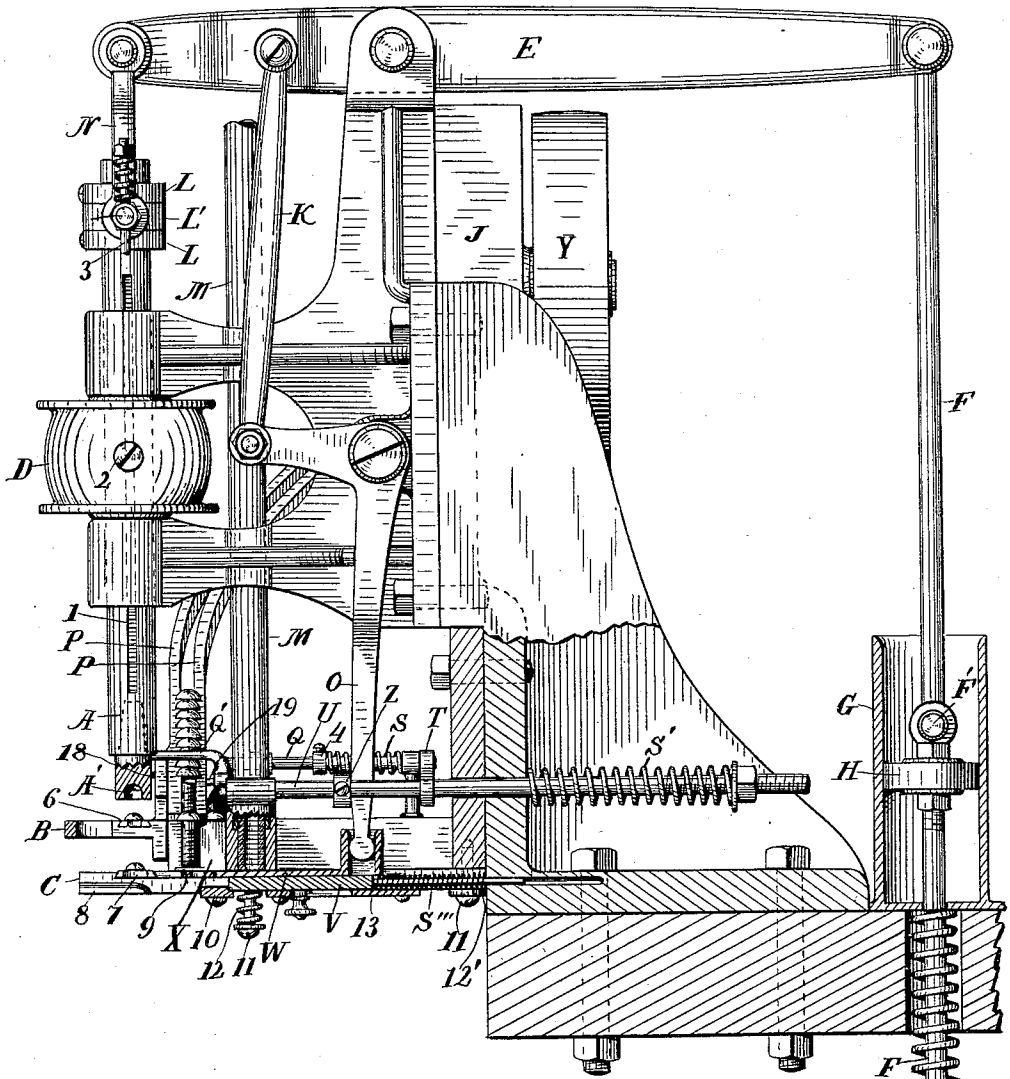
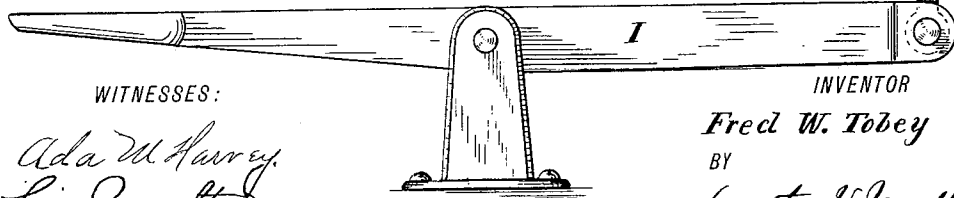


Fig. 1.



WITNESSES:

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INVENTOR

Fred W. Tobey

BY

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(No Model.)

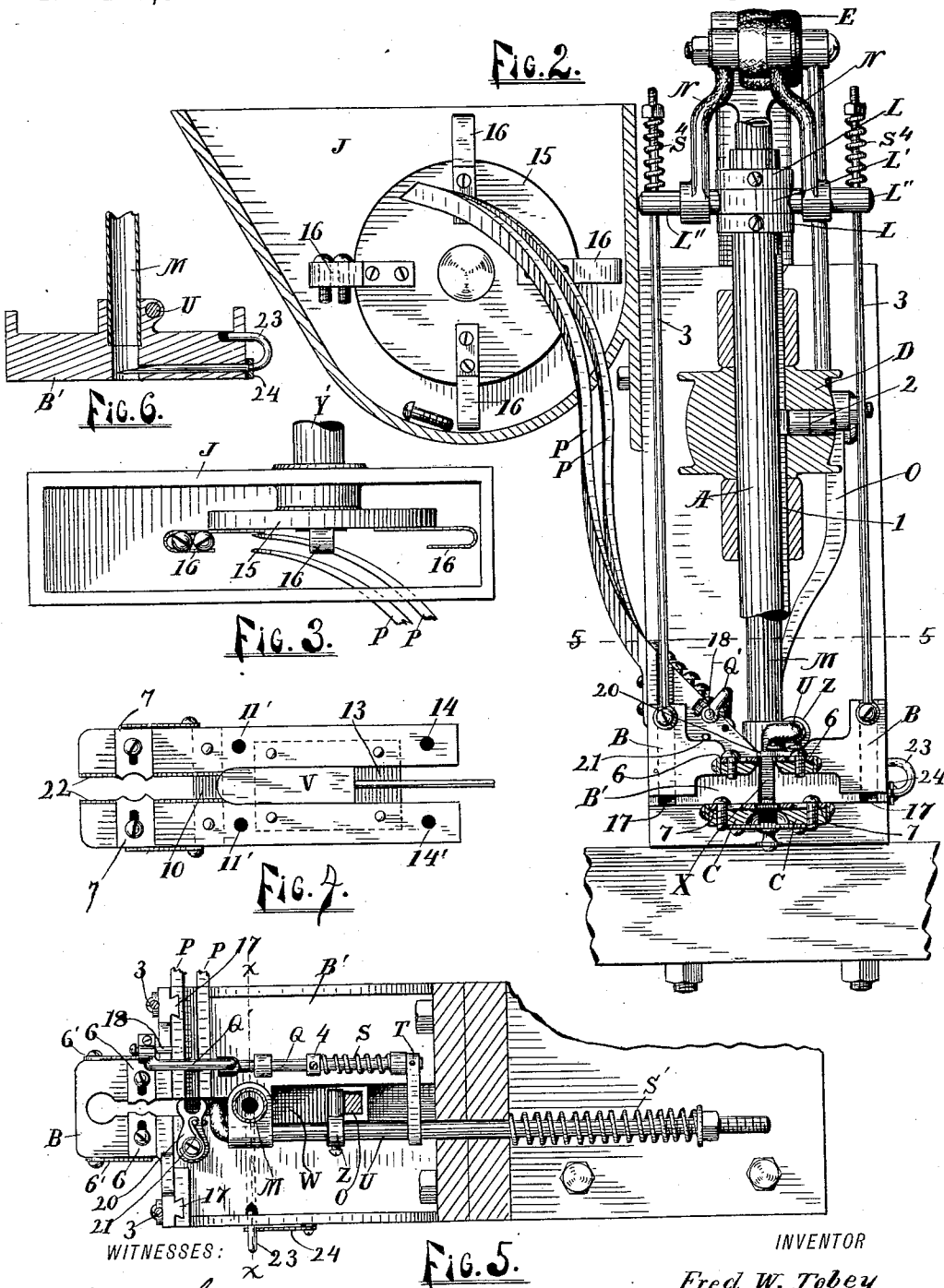
2 Sheets—Sheet 2.

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WITNESSES:
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Fig. 5.

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UNITED STATES PATENT OFFICE.

FRED W. TOBEY, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO THE GRAND RAPIDS BRASS COMPANY, OF SAME PLACE.

SCREW-DRIVING AND WASHER-FEEDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 480,530, dated August 9, 1892.

Application filed December 5, 1891. Serial No. 414,099. (No model.)

To all whom it may concern:

Be it known that I, FRED W. TOBEY, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Screw-Driving and Washer-Feeding Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in machines which are supplied with a quantity of screws and washers and which automatically take one of each in succession, place the washer upon the screws, and put said screws in place in draw-pulls, knobs, locks, latches, and other small articles of manufacture; and its object is to provide such machines with certain new and useful features, hereinafter more fully described, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a device embodying my invention, having a portion in vertical section to show the construction. Fig. 2 is a front elevation of the same with a portion in vertical section at right angles to Fig. 1. Fig. 3 is a detail of the screw-feeder, showing plan view of the same. Fig. 4 is a plan view of the bottom plate C and attached parts. Fig. 5 is a plan view of the bed of the machine, showing parts in section on the line 5 5 of Fig. 2. Fig. 6 is a vertical section of the same on the line *xx* of Fig. 5, showing stop for washer-tube.

Like letters and numerals refer to like parts in all of the figures.

The screw-driver consists of a vertically-movable spindle A, having at its lower end a detachable driver A', which may be changed to suit the particular size and style of screws to be used. The one shown is adapted to fit round-head machine-screws and drive the same by friction of the screw-head upon the inner surface of the cup in driver A'.

D is a pulley driven by any suitable belt and connected to said spindle by the key 2, which traverses the groove 1 as the spindle is moved vertically by the lever E, which lever is connected to the upper end of said spindle

by means of the rods N N, pivoted to said lever at their upper ends and at their lower ends to oppositely-projecting arms L' L' on a loose collar L', which collar is engaged at its respective sides by the fixed collars L L on said spindle. The lever E is operated by a treadle I, which is connected at its rear end to the rear end of said lever by a rod F, which rod is provided with a spring S'', which depresses said rod to raise said spindle, the opposite movement being effected by depressing the forward end of the treadle I. Said rod F is also provided with a joint F' to accommodate the curved movement of its upper end, and also with a dash-pot consisting of the cylinder G, surrounding said rod, and the piston H, fitting in said cylinder and attached to said rod. This prevents too sudden return of the parts when the treadle is released, the air under the piston serving as cushion to retard the motion.

The screw-holder consists of an angle-plate B, arranged to move vertically in dovetail ways 17, being moved upward by rods 33, attached to said plates and extended through the arms L'' and provided with springs S⁴ at their upper ends. Said holder is depressed by the spindle A as it engages the screw, which latter is held in place by the grippers 6 6, which grippers are laterally movable on said angle-plate, are pressed toward each other by the springs 6' 6', and have concave adjacent faces to hold the screw in line with the axis of the spindle A and also inclined faces, between which the screw is forced into said concavities by means of the head X on the rod U, which rod is longitudinally movable in suitable bearings and is pushed forward by the bell-crank lever O, which lever is connected to the lever E by the rod K, by means of which as said lever E rises at the forward end the lower arm of said bell-crank lever moves forward, and vice versa.

Z is an adjustable arm on the rod U, with which the lever O engages to move said rod forward. Said rod is retracted by the spring S' as the said lever returns.

J is a hopper, in which is a disk 15, mounted on a shaft Y', said shaft having a pulley Y and being rotated by any suitable belt. Said hopper has a concave bottom, upon which the

screws are placed and from whence they are taken by the U-shaped arms 16, the open ends of which arms are toward the axis of the disk 15, to which they are radially attached. The respective sides of said arms are parallel and at such distance apart that the body of the screws will pass between and the heads engage the side of the same. The screws are thus picked up as the arms pass among them.

The screws will be carried up by said arms with their heads upward, and, being discharged by gravity from the arms, will pass between the upper ends of the parallel curved ways P P, arranged at such distance from each other that the heads of the screws will engage the upper sides of said ways and the bodies of said screws pass between them. Passing down these ways the screws are stopped by the pin 19, passing loosely through one of the ways P and attached to one end of the yoke Q', which embraces said ways, rising above the same far enough to let the screws pass. To the other end of said yoke is attached another pin 18, which passes through the other way P in like manner at the point where it will pass between the first and second screw in the series. Said yoke is moved longitudinally by a rod Q, attached to the same, mounted in suitable bearings, and provided with a spring S, which moves said rod forward, and an arm T, which is engaged by the lever O to move the same backward as the bell-crank completes the backward stroke. This movement withdraws the pin 19 from in front of the lower screw, and at the same time thrusts the pin 18 in front of the next screw in the series. As the bell-crank moves forward, the pins assume their former position and the screws move down against the pin 19, thus releasing one screw at each stroke of the machine, which passes into the forked end of the arm 20, which prevents the head of the screw from catching. Said arm swinging upon its pivot discharges the screw into the grippers 6 6 as moved forward by the rod U. The spring 21 restores said arm to position again as the rod U recedes. M is a vertical tube, in which are placed the washers. The bottom of this tube is closed by a gate V, held in place by a plate 13 and a cross-bar 10, and closed by a spring S''. By sliding this gate back the contents of the tube may be discharged.

If for any reason only one washer is to be removed, (a defective one that will not feed, for instance,) the cut-off 23 is inserted by turning the same so that its short arm enters the upper hole in the bed-plate B', when it will be forced forward by the spring 24. Its longer arm passing beneath all but the lower washer will hold them in place until said washer is removed. Then the cut-off may be withdrawn, when by turning it partially around the short end of the same will engage the side of the bed-plate and hold it out of the way of the descending washers, which will rest upon the slide W, which slide rests

and reciprocates upon the upper surface of the gate V. Said slide is of the same thickness as one of the washers and is operated by the end of the lever O, which as it recedes pulls said slide from under the column of washers, which, dropping down upon the gate, brings the lower one in front of said slide, which latter advancing pushes this washer along the grooves 22 and between the grippers 7 7, which are of similar construction to the grippers 6 6, before described, except they are larger to fit the washers. A shoe 9 on the lower end of the head X holds the washer down as it moves forward.

To accommodate washers of variable thickness or slightly bent, the bed-plate is attached by screws 11, provided with springs 12 between their heads and the plate, or compressible washers 12' may be used. These will yield when a thick or bent washer is reached and allow the plate to descend enough to let it out. Said plate is also cut away at 8 to guide the article in which the screw is to be inserted to place and bring it properly beneath the end of the screw.

From the foregoing the operation of my invention will be readily understood. A constant rotary motion is imparted to the spindle A and also to the feed mechanism in the hopper J, which latter constantly supplies the ways P P with screws as they are removed at the lower end of the same. When the ways chance to be full, the screws will be dropped back into the hopper until there is room for more in the ways. The parts are shown in mid-stroke. The spring S'' pulls down the rear end of the lever E, which throws the rod U and slide W forward, placing a screw in the grippers 6 6 and a washer in the grippers 7 7, directly beneath the screw, and the axis of each in line with that of the spindle A, which, being now depressed by the treadle I, engages the screw-head and rotates the same, at the same time depressing the angle-plate B in the ways 17. The screw passes through the washer and engages whatever article is held beneath the plate C to receive the end of the screw. When the screw has been driven tightly in place and binds upon the washer, the friction of the socket A' is overcome and said socket will slip around the head of the screw, so that said screw-head will not be torn or the screw driven into the material any farther. This movement has thrown the lever O back against the arm T and dropped another screw into the forked arm 20 and also withdrawn the slide W, bringing another washer in front of the same, releasing the treadle, which now repeats the operation, and in the meantime the first screw and washer are moved forward and removed from the grippers and a new article placed in position to receive a screw.

What I claim is—

1. In combination with a spindle provided with mechanism for simultaneously rotating and longitudinally moving the same, a screw-driver attached to said spindle, grippers for

holding a screw in line with the axis of said spindle and movable in line with the same, and mechanism for automatically feeding screws to said grippers, substantially as described.

2. In combination with a spindle provided with mechanism for simultaneously rotating and longitudinally moving the same, a screw-driver attached to said spindle, grippers for holding a screw in line with the axis of said spindle and movable in line with the same, and mechanism for automatically feeding screws to said grippers, grippers for holding washers in line with the axis of said spindle, and mechanism for automatically feeding washers to said grippers, substantially as described.

3. In a screw-driving machine, a hopper to contain screws, a rotative disk in said hopper, U-shaped arms attached to said disk with their open end toward the axis of the same, and parallel ways located to receive the screws as they are discharged from said arms, substantially as described.

4. The combination, with a longitudinally-movable spindle having a screw-driver at one end, a lever E connected to said spindle, a treadle, a rod connecting said lever and treadle, and a spring encircling said rod, of parallel ways, pins passing through said ways, one a short distance above the other and longitudinally movable therein, a yoke embracing said ways to which said pins are attached, a rod attached to said yoke, a spring on said rod to move the same in one direction, an arm, also attached to said rod, and a bell-crank lever O, connected at its upper end with said lever E and at its lower end engaging said arm on the rod for moving said rod in the other direction.

5. In a machine for driving screws and feeding washers, the combination, with a longitudinally-movable spindle having a screw-driver at one end, ways having mechanism for discharging one screw at a time, grippers for holding said screws in line with said spindle, and means for feeding the washers, of a reciprocative rod having a head adapted to engage said screws and force them between said grippers, said rod also having a sleeve adapted to engage the under side of a screw, substantially as described, and for the purposes specified.

6. In combination with ways provided with mechanism for singly discharging screws therefrom, a forked and pivoted arm normally opposite said ways, and a reciprocative rod having a head engaging said screws and forcing the same out of said forked arm and into grippers arranged to receive said screws, substantially as described.

7. In combination with mechanism for automatically feeding and driving screws, substantially as described, a vertical tube to contain washers, a reciprocative slide beneath said tube, and grippers in line with the axis of the screw-driving mechanism to hold said washers, substantially as described.

8. The combination, with screw feeding and driving mechanism, substantially as described, of a vertical tube, a stop, as 23, near the bottom of the same, a gate opposite the end of the same, a reciprocating slide between said gate and tube, and grippers in line with said slide, the axis of said grippers also in line with the axis of the screw-driving mechanism, substantially as described.

9. In a washer-feed, a fixed vertical tube M, a horizontal bed-plate B', means for flexibly supporting said bed-plate, a plate 13, a gate V, having spring S'', a slide W, means for reciprocating said slide, and grippers 77, said parts being arranged, combined, and operating substantially as shown and described.

10. In combination with a longitudinally-movable spindle having a loose collar and a tight collar at each side of the same, a vertically-movable angle-plate having grippers to hold a screw in line with the axis of said spindle, rods connecting said angle-plate with said loose collar, and springs on said rods, substantially as described.

11. The combination of a longitudinally-movable spindle having a screw-driver attached, grippers in line with the axis of said spindle, parallel inclined ways having mechanism for discharging screws one at a time, a reciprocating rod to move the screws into said grippers, a lever connected to said spindle, a treadle connected to said lever, and a bell-crank lever, also connected to said lever and operating said rod, substantially as described.

12. The combination of a longitudinally-movable spindle having a screw-driver, grippers in line with the axis of said spindle, parallel inclined ways having mechanism for discharging screws one at a time, a reciprocative rod to move the screws into said grippers, a treadle connected to said lever, and a bell-crank lever also connected to said lever and operating said rod, with a vertical tube to contain washers, washer-grippers in line with the axis of said spindle, and a reciprocative slide beneath said tube to move said washers from said tube to said grippers, said slide also being operated by said bell-crank lever, substantially as described.

13. In combination with grippers to hold screws and grippers beneath the same to hold washers, and a reciprocating slide to move the washers into said grippers, a reciprocating head to move the screw into said grippers, and a shoe on the bottom of said head to hold the washer down while being moved forward by said slide, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRED W. TOBEY.

Witnesses:

LUTHER V. MOULTON,
LOIS MOULTON.