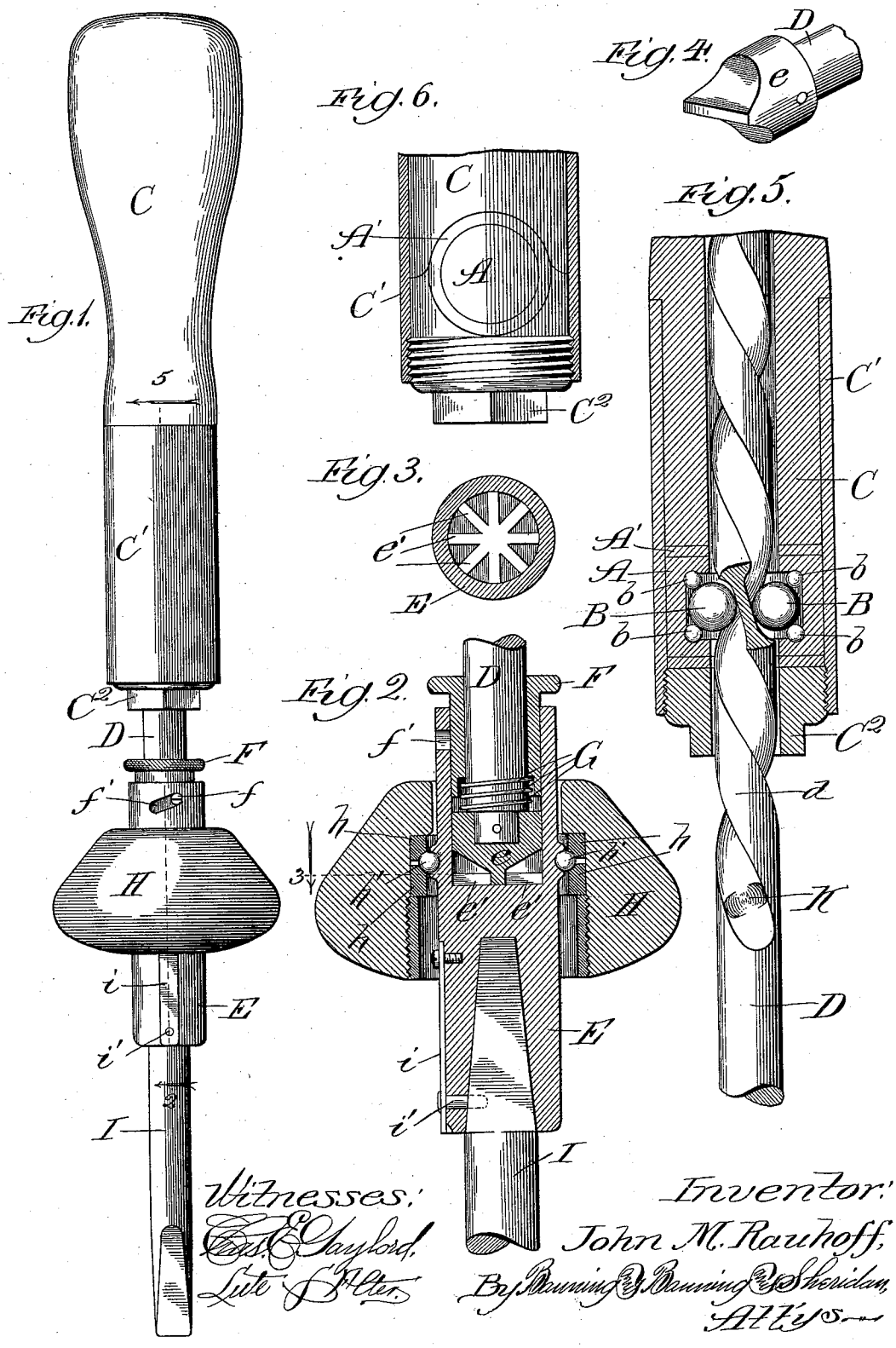
(Model.)

J. M. RAUHOFF.

TOOL.

No. 588,879. Patented Aug. 24, 1897.



Witnesses:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN M. RAUHOFF, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO JAMES SAUNDERS, OF MARIETTA, GEORGIA.

TOOL.

SPECIFICATION forming part of Letters Patent No. 588,879, dated August 24, 1897.

Application filed March 2, 1896. Serial No. 581,528. (Model.)

To all whom it may concern:

Be it known that I, JOHN M. RAUHOFF, a citizen of the United States, residing at Chicago, Illinois, have invented certain new and useful Improvements in Tools, of which the following is a specification.

The object of my present invention is to apply the principle of the worm-screw described and claimed in an application filed by me August 23, 1895, Serial No. 560,216, to the construction of various kinds of tools—as, for instance, screw-drivers, augers, drills, and other tools which are intended to be operated by rotary movement; and the invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of a complete screw-driver embodying my invention; Fig. 2, a longitudinal section taken in line 2 of Fig. 1; Fig. 3, a plan view of a section taken in line 3 of Fig. 2; Fig. 4, a perspective view of a bit hereinafter described; Fig. 5, a longitudinal section taken in line 5 of Fig. 1; and Fig. 6, a section showing the means for supporting and retaining the ball-bearing shown in Fig. 5, viewed from another position.

In making my improved tool I make a ball-bearing A, preferably in the form of a ring composed of two parts and adapted to receive and retain the balls B, resting upon the balls *b*. The balls *b* are preferably of small size, and the balls B rest upon them, so as to have balls resting upon balls in the bearing. I do not, however, intend to limit myself to two sets of balls, except in those claims which specifically call for them. The ball-bearing A is intended to be inclosed in a transverse tube A′, which is preferably received into a hollow or groove in the inner end of the handle C. The inner end of the handle and the tube A′ are inclosed in a metal tube or case C′, and the tube A′, containing the ball-bearing and balls, is held in place in the tube or case by a plug C^2, screwed into the end, as shown in Fig. 5.

A rod or shaft D, provided with spiral bearing-surfaces *d* of long pitch, passes through a hole in the plug and the inner end of the handle, with the balls resting in contact with the spiral bearing-surfaces. If the ball-bearing or the rod or shaft, either one, be moved in a direction longitudinal to the axis of the rod or shaft, a rotary movement will be imparted to the rod or shaft and the balls caused to roll as the spiral bearing-surface moves past them. The outer end of the handle is intended to be shaped and finished in the usual way, as shown in Fig. 1. The rod or shaft, after it leaves the handle, passes into the end of the tool-holding chuck E, as shown in Fig. 2. It carries a bit *e*, which is fastened to it, so as to be rotated with it. This bit is adapted to engage into one of a number of slots *e′*, arranged in the face of the inner end of the chuck. These slots are shown particularly in Fig. 3 and are shown as a number arranged close together, so that when the bit or tool is out of engagement it will come into engagement with one of the slots upon a very slight rotation.

Surrounding the end of the bit is a cap F, which enters the hollow in the end of the chuck, as shown in Fig. 2. It is retained in place by a screw *f*, passing through a slot *f′*, as shown in Fig. 1, so that by turning the cap in the one direction or the other it will be moved in or out. When moved out, which I term the "normal" position of the cap, its inner end does not reach to or rest upon the bit *e*, so that a sufficient longitudinal movement of the rod and bit may take place to lift the bit out of engagement with the slots *e′* in the inner end of the chuck. In this position the engagement of the bit with the slots is an intermittent one, only occurring when the rod is pushed or thrust forward, so that the rotation of the chuck and the tool that it carries will also be intermittent and occur only in the advance movement of the handle. When, however, it is desired to rotate the tool in both directions and to change the intermittent engagement of the bit with the chuck to a constant engagement, which may be done at will, all that is necessary is to turn the cap in, so that its inner end will rest upon and be in contact with the bit, which will prevent the bit from being drawn out of engagement with the slots in the inner end of the chuck. I have interposed a spiral spring G between the bit and a shoulder on the inner end of the cap, as will be readily under-

stood from an examination of Fig. 2. The object of this is to hold the bit in engagement with the chuck when the tool is held in a vertical position with its operating-point up, when in the absence of a spring the bit would fall out of engagement with the chuck. This spring, however, is made of so mild a tension that it does not prevent the bit from being drawn back out of engagement with the chuck, as already explained, when only a movement of the chuck in one direction is desired.

I surround the chuck with a handhold H, which is preferably provided with a ring or collar *h*, made in two parts, and with an annular groove, in which balls *h'* may be arranged. The chuck is provided in this case with an annular groove also, in which the balls may rest and be retained in position, as will be readily understood from an examination of Fig. 2. The outer end of the chuck is adapted to receive a tool I, which may terminate in a screw-driver, auger, drill, or other tool or implement, which is operated with a rotary movement. The tool when inserted in the chuck may be held in place by a spring *i*, carrying a pin *i'*, which rests in a hole provided in the end of the tool, as shown in Fig. 2. By looking at Fig. 5 it will be seen that I have provided a depression K at or near the end of the spiral groove in the rod or shaft. This is intended to receive the ball B when the handle is pushed in to the completion of its forward movement, so that the rod or shaft and tool will be held as one piece and may be rotated or turned together in either direction, as can an ordinary screw-driver or other tool. This will enable the operator after partially inserting a screw, for instance, to reverse the movement and remove it without turning in the cap F, thus saving time and trouble.

The depressions K should be very shallow, and they will be found very effective, so as to prevent the balls B and *b* from dropping out of operative position, and which will at the same time permit an easy return into the helical grooves when it is desired to reciprocate the handle portion.

What I regard as new, and desire to secure by Letters Patent, is—

1. In a tool of the class described, the combination of a rod or shaft provided with a spiral bearing-surface of long pitch, a handle portion provided with a ball-bearing interposed between it and the spiral grooves of the rod or shaft such shaft being provided with depressions K, nearest its lower end into which the balls may drop and make a rigid engagement between the handle portion and the rod or shaft to rotate it in either direction as a rigid tool, substantially as described.

2. In a tool of the class described, the combination of a rod or shaft provided with spiral grooves of long pitch, a bit *e* carried on the rod or shaft, a reciprocating handle portion arranged to rotate the rod or shaft, a chuck on the lower portion of the rod or shaft and provided with an axial opening having grooves or depressions *e'* and an inclined slot extending through its side from the axial opening, a longitudinally-adjustable sleeve surrounding the rod or shaft and inserted in the axial opening of the chuck and provided with a screw or pin *f* extending out through the inclined slot of the chuck, whereby as the sleeve is rotated it is moved longitudinally and adjusted in or out, substantially as described.

3. In a tool of the class described, the combination of a rod or shaft provided with spiral grooves of long pitch, a bit *e* carried on the rod or shaft, a reciprocating handle portion arranged to rotate the rod or shaft, balls arranged in the grooves of the rod or shaft and inclosed in the handle portion, a chuck on the lower portion of the rod or shaft and provided with an axial opening having grooves or depressions *e'* and an inclined slot extending through its side from the axial opening, a longitudinally-adjustable sleeve surrounding the rod or shaft and inserted in the axial opening of the chuck and provided with a screw or pin extending out through the inclined slot of the chuck, a handhold on the chuck, and a series of balls interposed between the chuck and the handhold to lessen the friction and hold the handhold against longitudinal movement, substantially as described.

4. In mechanisms of the class described, the combination of a rod or shaft provided with a spiral bearing-surface, a reciprocating handle portion adapted to rotate the rod or shaft by its reciprocations, a chuck on the outer end of the rod or shaft adapted to be rotated in one or both directions by the rod or shaft or be free to rotate in one or both directions independent of the rod or shaft, and means for locking the rod or shaft and the chuck portion rigidly together against independent movements so that both parts have a common rotary motion, substantially as described.

5. In mechanisms of the class described, the combination of a rod or shaft provided with a spiral bearing surface or surfaces, a reciprocating handle portion thereon adapted by its reciprocations to rotate the rod or shaft, a chuck on the outer end of the rod or shaft arranged to be rotated in one or both directions by the rod or shaft and free to have independent rotary motions, means for automatically locking the spiral bearing-rod and handle portion together, and means for locking the rod or shaft and chuck portions rigidly together to provide common rotary and reciprocating motions, substantially as described.

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