(No Model.)

J. M. RAUHOFF.

DRILL OR SIMILAR TOOL.

No. 575,734. Patented Jan. 26, 1897.

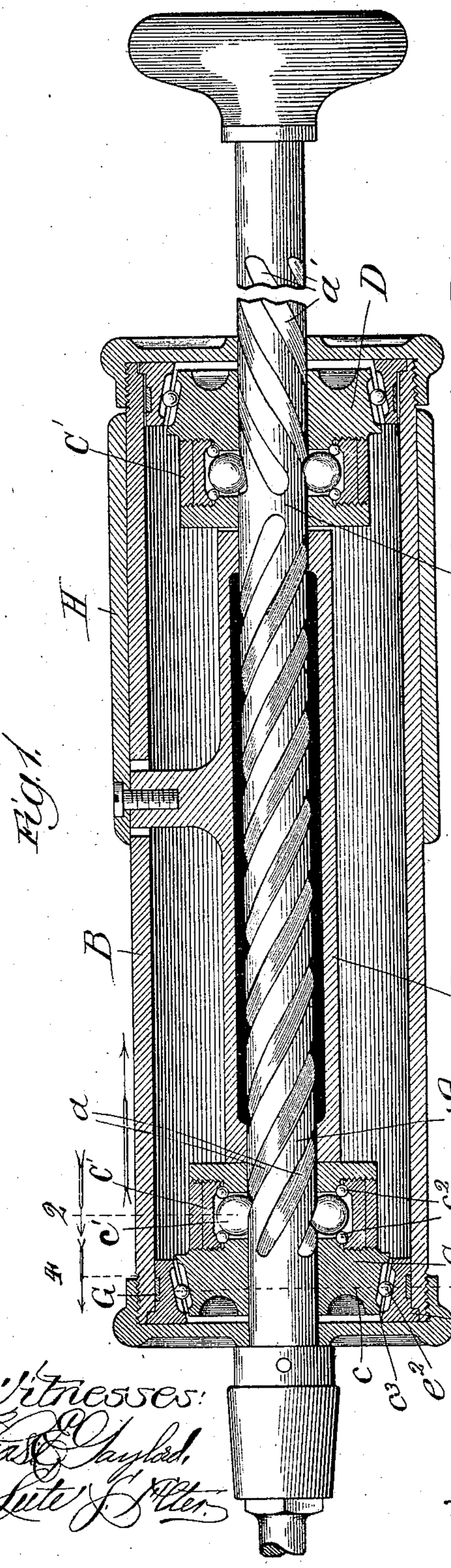

Fig. 1.

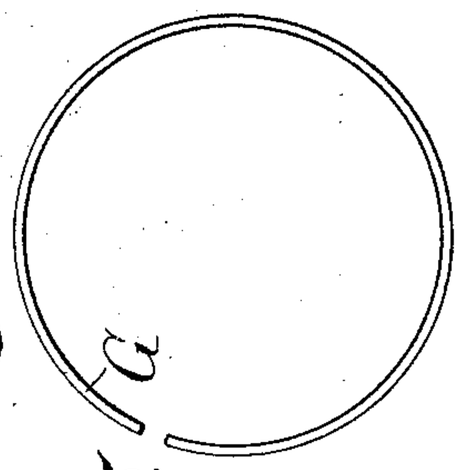

Fig. 5.

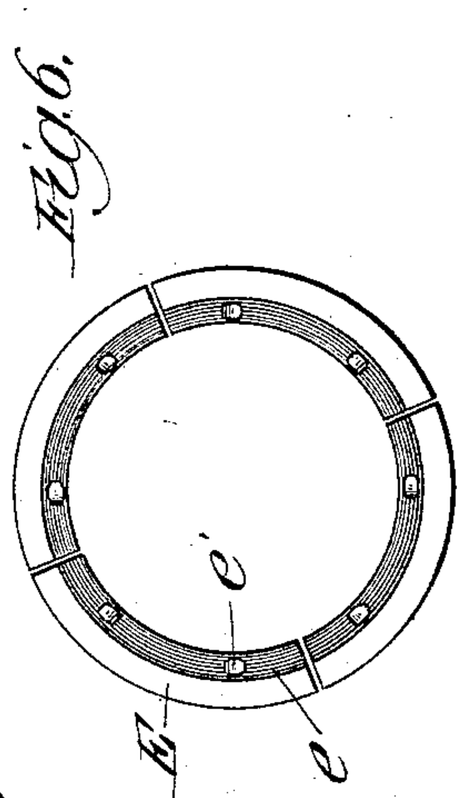

Fig. 6.

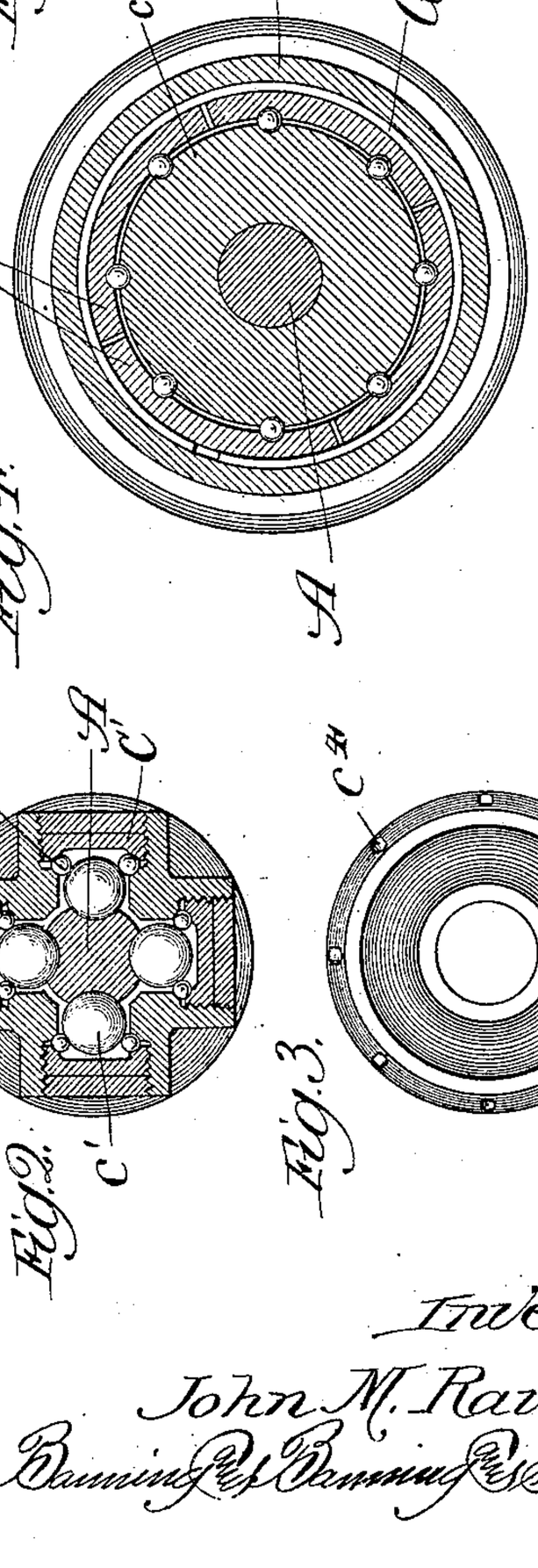

Fig. 4.

Fig. 2.

Fig. 3.

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UNITED STATES PATENT OFFICE.

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DRILLING OR SIMILAR TOOL.

SPECIFICATION forming part of Letters Patent No. 575,734, dated January 26, 1897.

Application filed April 4, 1896. Serial No. 586,223. (No model.)

To all whom it may concern:

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

The object of my invention is to provide a simple, economical, and efficient drilling-tool; and it consists principally in the combination of a main rotatable spindle having helical grooves or their equivalent located therein—a set of right-hand near one end and a left-hand set of grooves at the opposite end—a reciprocating portion mounted on such rotatable spindle, and friction-clutches interposed between the reciprocating portion and the spindle to alternately and rigidly engage the reciprocating portion and the rotatable spindle, so as to impart a rotary motion to the spindle from the reciprocating motion of the reciprocating or body portion.

The invention finally consists in the features, combinations, and details of construction hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal section, taken through the main portion and showing the rotatable spindle in full lines; Fig. 2, a transverse section of a portion of the mechanism, taken on line 2 of Fig. 1; Fig. 3, an end elevation of a portion of the clutch mechanism; Fig. 4, a transverse section, taken through the friction-clutch, reciprocating piston, and rotatable spindle, on line 4 of Fig. 1; Fig. 5, an end elevation of one of the clutch-springs, and Fig. 6 an end elevation of the outer or segmental clutch-collar.

In constructing my improvement I make a rotatable spindle A, and provide it at one end with a set of helical grooves a, having a right-hand pitch, and its opposite end with a set of helical grooves a', having, preferably, a reverse or left-hand pitch. On this rotatable spindle I mount the main or reciprocating portion, which in drilling-tools might be termed the "main" portion B. The rotatable spindle is shown as broken off; but it will be understood that it may be of any convenient length for the purposes required, so that the handle or main portion may have considerable reciprocating movement thereon.

In order to transform the reciprocating movements of the handle or main portion into a continuous rotary motion of the spindle portion, I provide two clutches C and D, one arranged at each end of the main handle portion, and which are constructed as follows:

I provide a sleeve or box portion c, having an axial opening, through which the rotating spindle is passed. This sleeve portion is provided with four inwardly-projecting antifriction-balls c'—one for each of the helical grooves—which are held against the spindle and in the helical grooves by means of the plugs C', and a series of smaller balls c^2. These antifriction-balls furnish inward rotating projections and compel the spindle to rotate when it has a relative longitudinal motion as regards the main or handle portion. Interposed between this sleeve and box and the main or handle portion B is a segmental collar E, arranged to contact the inner surface of the main handle portion when spread to its largest diameter and to firmly grip the same, so as to make the sleeve or box portion and the handle or main portion practically one integral portion and compel the spindle to rotate. The outer peripheral surface of the box, as at c^3, and the inner circumference of the segmental collar are tapered, so as to more readily furnish engagement and disengagement of parts, and in order to further assist the engagement and disengagement of the parts I provide each of these tapered surfaces with longitudinal grooves and insert therein a series of antifriction-balls e^2. One of these clutches, C, is mounted upon that portion of the spindle that is provided with grooves of a right-hand pitch and the other, D, is mounted upon that portion of the spindle which is provided with grooves of a left-hand pitch, so that a rotary motion in either direction may be obtained. It is always desirable to keep the segmental collar in the smallest diameter, so as to efficiently cause a disengagement of the clutch at the desired times, and in order to accomplish this result the segmental collar is provided with an annular groove, in which is placed a flat split circular spring G, as shown clearly in Figs. 1 and 5.

The operation of the parts is as follows: When it is desired to rotate the spindle to the right, the operator grasps the main or handle

portion B and reciprocates the same. In moving the main or handle portion to the right, speaking now relatively with regard to Fig. 1 of the drawings, the segmental collar E is forced into engagement with the sleeve or box portion, thus making the main portion and the sleeve or box portion substantially one integral portion and forcing the spindle to rotate to the right. After the main portion has been moved to the right the desired amount an opposite movement is given, which releases the clutch at the left of the main portion and forces the segmental collar on the clutch at the right hand to engage with its sleeve or box, and thus forces the spindle to continue its movement to the right.

It is often desirable to obtain an opposite rotary movement of the spindle—viz., to the left. In order to accomplish this, I provide an outer sleeve or handle portion H and rigidly connect it to an inner tubular sleeve I, both of these portions having the same or rotary motion as the main or handle portion B, but a slightly independent longitudinal movement. By moving this supplemental outer sleeve or handle to the right, speaking again with reference to Fig. 1 of the drawings, the sleeve or box portion to the right of the drawings is forced into rigid engagement with the main portion by means of its segmental collar, and thus moves or causes the spindle portion to rotate to the left. An opposite movement of this supplemental handle releases the clutch to the right and forces the sleeve or box portion to the left to rigidly engage with the main portion by means of its segmental collar and compel the spindle to continue its rotary movement to the left. It will thus be seen that the clutches bear on the inner surface of the sleeve B, and when it is desired to rotate the spindle to the right the main or handle portion B must be used as the reciprocating medium, and when it is desired to rotate the spindle to the left the supplemental sleeve or handle portion H must be used as the reciprocating medium.

While I have described my invention with more or less minuteness as regards details, and as being embodied in certain precise forms and adapted to certain specific uses, I do not desire to be limited thereto unduly any more than is pointed out in the claims. On the contrary, I contemplate all proper uses, changes in form, construction, and arrangement, the omission of immaterial parts, and the substitution of equivalents as circumstances may suggest or necessity render expedient. For instance, instead of helical grooves their equivalents in the shape of helical ribs could be used and located between two of the balls.

It will be understood, of course, that I intend to use my invention broadly in connection with all mechanisms in which it is desired to convert a reciprocating into a rotary motion, and I have merely chosen this form, as shown in the drawings and described in the specification, as one class of mechanism to which my improvements are applicable.

I claim—

1. In a machine of the class described, the combination of a rotatable spindle provided with right-hand helical grooves on one portion and left-hand helical grooves on another portion, a main reciprocating portion on the spindle, two clutches interposed between the main portion and the spindle to engage the main portion and transform its reciprocating motion into a continuous rotary motion of the spindle, and a second or supplemental portion on the main portion for throwing the proper clutch into action during the reciprocations of such portions and transforming the reciprocating motion of the same into a continuous rotary motion of the spindle in the opposite direction, substantially as described.

2. In mechanisms of the class described, the combination of a rotatable spindle provided with right-hand helical grooves on one portion and left-hand helical grooves on another portion, a main reciprocating cylindrical portion, two clutches interposed between the main cylindrical portion and the spindle adapted to engage the main portion and transform its reciprocating motion into a continuous rotary motion, and a supplemental cylindrical sleeve portion surrounding the main portion and arranged to operate the parts and throw the proper clutch into engagement during its reciprocations and transform its reciprocating motion into a continuous rotary motion of the spindle in an opposite direction, substantially as described.

3. In a machine of the class described, the combination of a rotatable spindle provided with right-hand helical grooves on one portion and left-hand helical grooves on another portion, a cylindrical reciprocating portion surrounding the spindle, two friction-clutches one near each end of the cylindrical portion, each consisting of a sleeve portion mounted on the rotating spindle and provided with balls resting in the helical grooves thereof, a segmental collar on the sleeve portion adapted to be expanded during the movements of the sleeve portion, a circular spring for keeping the segmental collar in the smallest diameter and balls interposed between the segmental collar and the sleeve portion, the whole acting to transform the reciprocating movements of the main cylindrical portion into a continuous rotary motion of the spindle, substantially as described.

4. In a machine of the class described, the combination of a rotatable spindle provided with right-hand helical grooves on one portion, and left-hand helical grooves on another portion, a main reciprocating cylinder portion, two friction-clutches one near each end of the cylindrical portion, each consisting of a sleeve portion mounted on the rotating spindle and provided with balls resting in the helical grooves thereof, a segmental collar on the sleeve portion adapted to be expanded dur-

ing the movements of the sleeve portion, a circular spring for keeping the segmental collar in the smallest diameter and balls interposed between the segmental collar and the sleeve portion, the whole acting to transform the reciprocating movements of the main cylindrical portion into a continuous rotary motion of the spindle, an inner tubular sleeve surrounding a portion of the rotating spindle between the two clutches, an outer cylindrical sleeve connected with the inner sleeve so as to operate the parts and cause engagement or disengagement of the proper clutch and transfer the reciprocating movements of the cylindrical portion into a continuous rotary motion of the spindle portion in an opposite direction, substantially as described.

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