

(No Model.)

H. BALL.

ROTATING MECHANISM FOR ROCK DRILLS.

No. 451,425.

Patented Apr. 28, 1891.

Fig. 1.

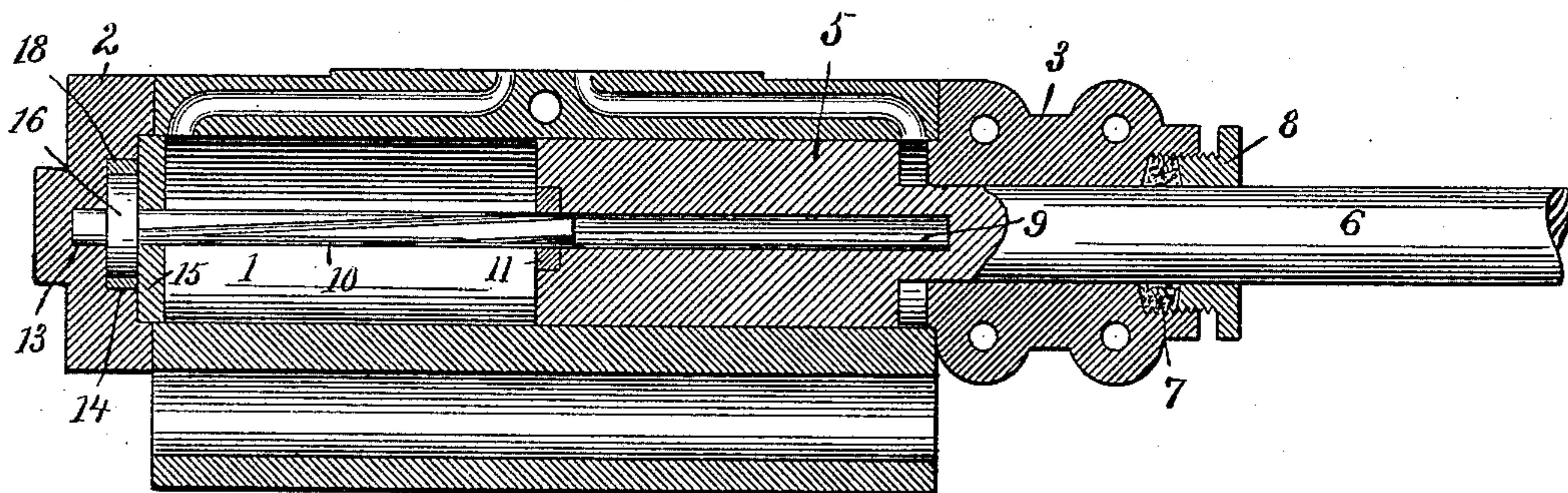


Fig. 2.

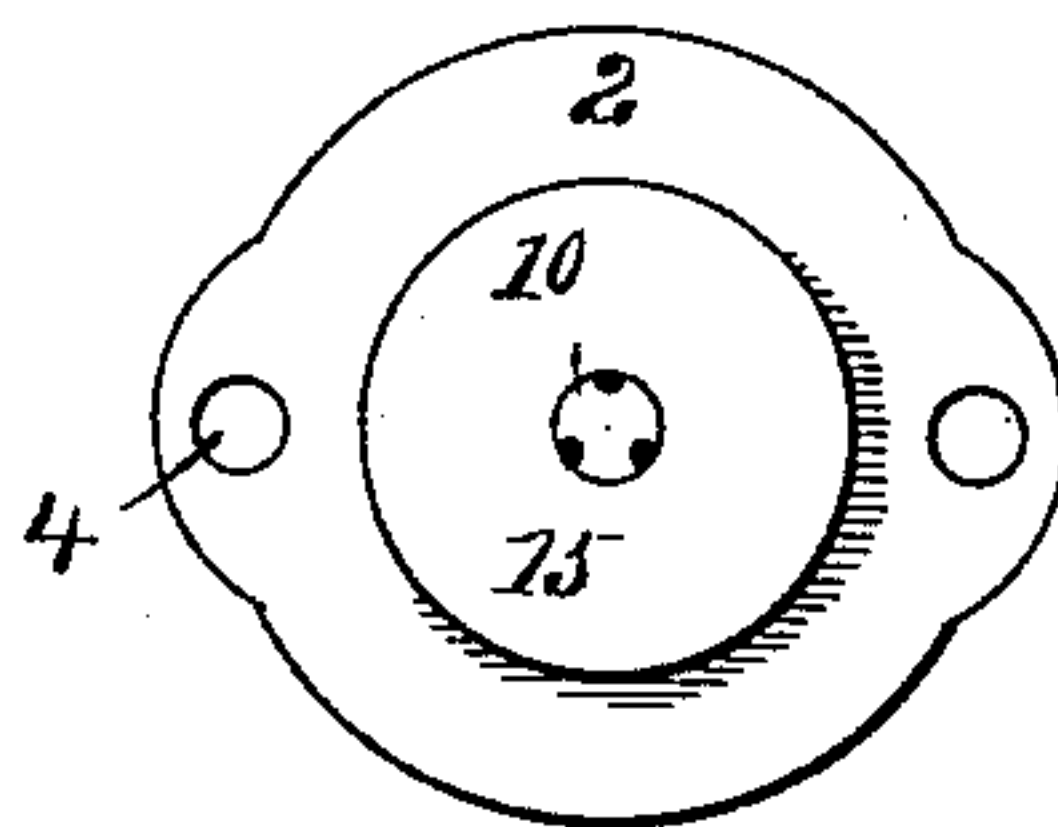


Fig. 3.

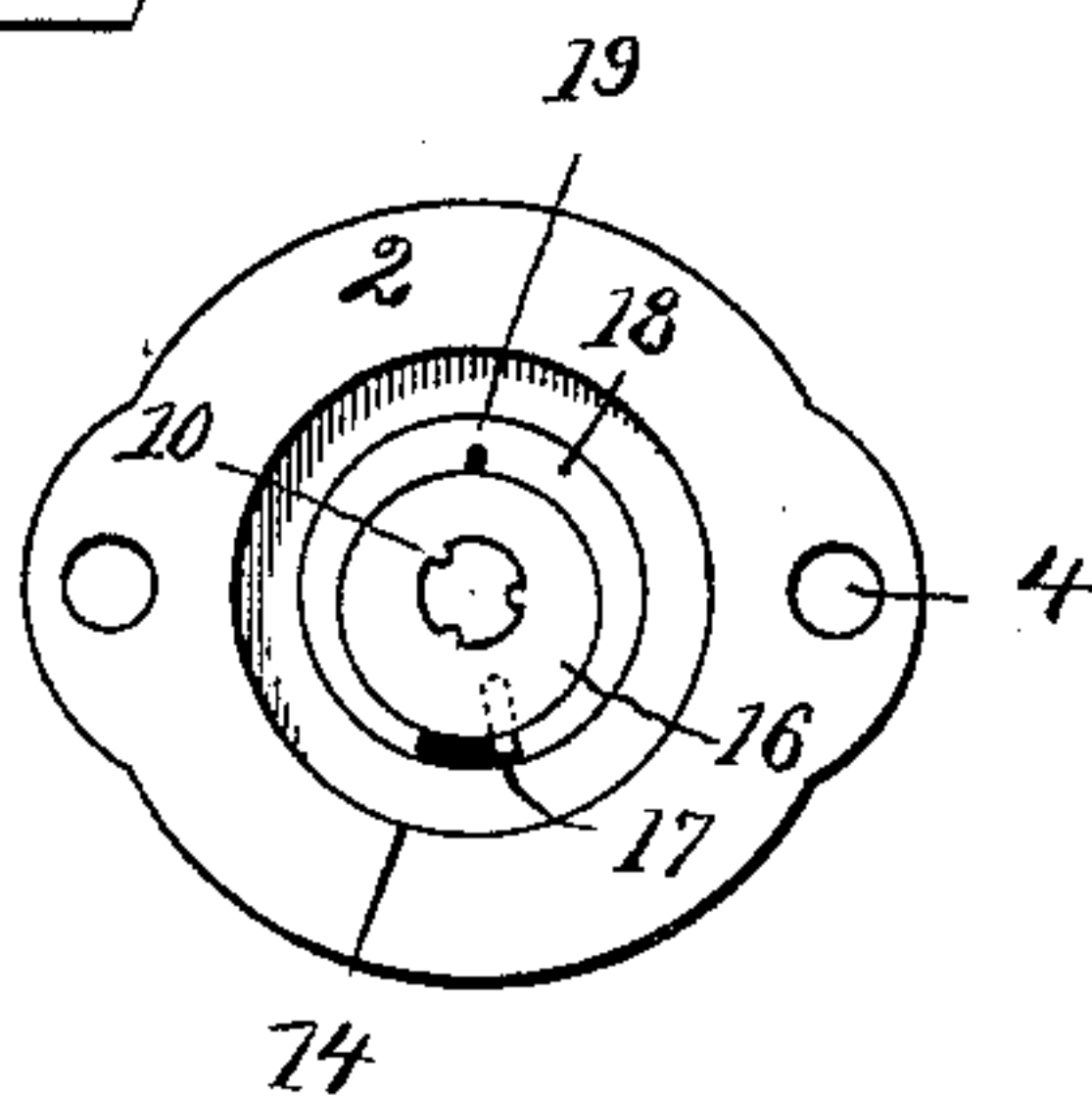


Fig. 4.

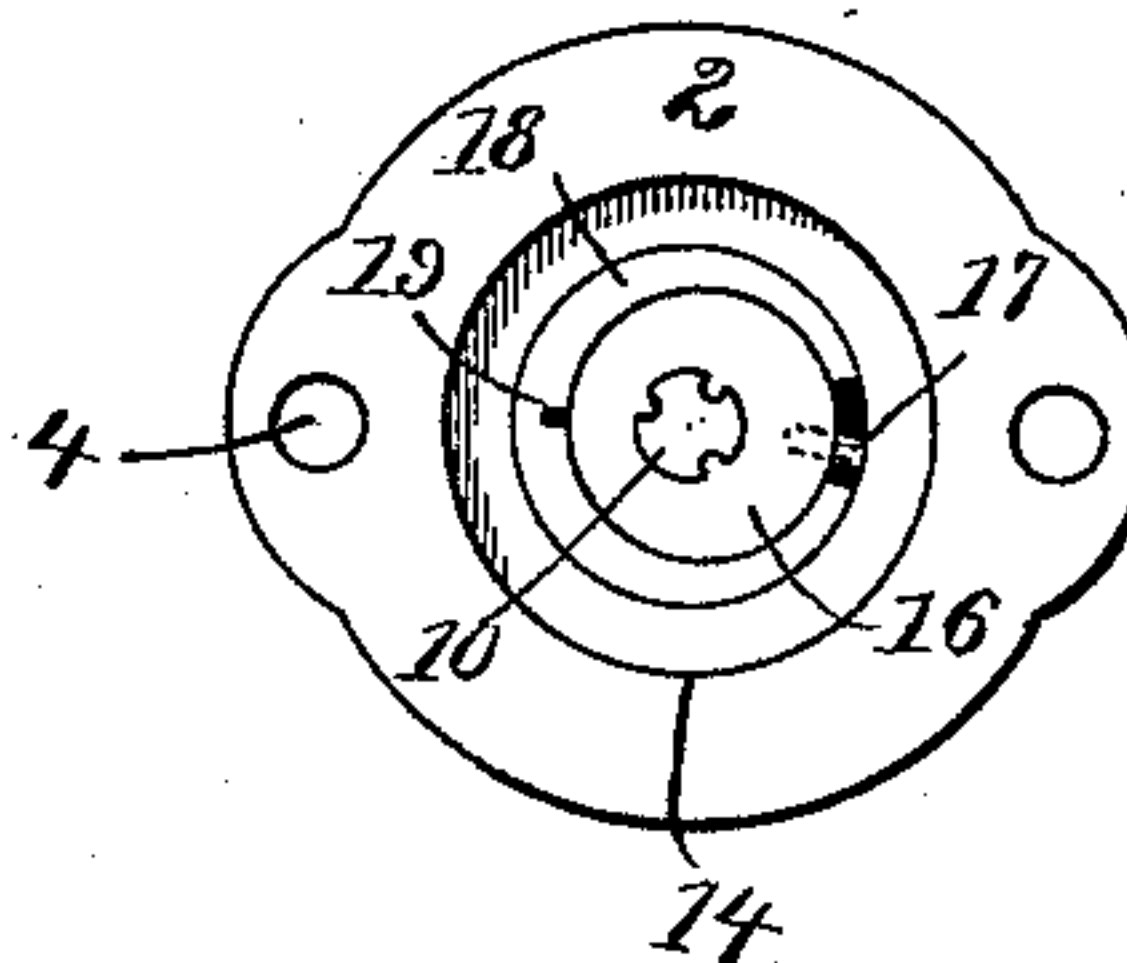
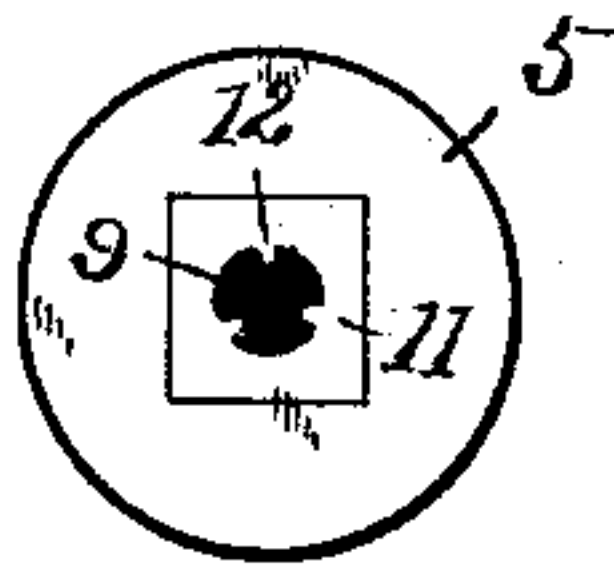


Fig. 5.



WITNESSES

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ROTATING MECHANISM FOR ROCK-DRILLS.

SPECIFICATION forming part of Letters Patent No. 451,425, dated April 28, 1891.

Application filed August 25, 1890. Serial No. 362,960. (No model.)

To all whom it may concern:

Be it known that I, HARRY BALL, a citizen of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Rotating Mechanism for Rock-Drills; 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 rock-drills operating either by steam or compressed air, and has for its object to provide novel mechanism for rotating the piston and piston-rod to which the drill (not shown) is attached in any ordinary or preferred manner, the effect of my present invention being to simplify the construction and reduce the number of parts, thereby cheapening the cost of production and securing at the same time durability, non-liability to get out of repair, and thoroughly effective operation in use, the construction, moreover, being such that in the event of the breakage of any of the parts the broken parts may be removed and new ones substituted with but slight expense by any person capable of running a rock-drill, thus avoiding the necessity of going to a machine-shop or stopping the drill but for a very short time.

For the sake of clearness I have omitted from the drawings all portions of the drill except such as are necessary to clearly illustrate the construction and operation of the rotating mechanism.

Figure 1 is a section of the cylinder and piston, also showing the rotating mechanism partly in elevation and partly in section; Fig. 2, an elevation of the upper—i. e., the left head of the cylinder—and the plate covering the eccentric and crescent-shaped piece, the cylinder being removed; Fig. 3, a similar view with the covering-plate removed, showing the eccentric and crescent-shaped piece in the position they occupy during the upward movement of the piston, the eccentric and crescent-shaped piece rotating with the grooved rod, so that the piston can move straight up; Fig. 4, a similar view showing the position of the parts during the down-

ward movement of the piston, the grooved rod, eccentric, and crescent-shaped piece being locked against rotation, so that the piston is compelled to rotate; and Fig. 5 is an elevation of the end of the piston, showing the hardened-steel nut provided with lugs which engage the grooves of the rod.

1 denotes the cylinder, and 2 and 3 the heads thereof, said heads and the cylinder proper being in practice clamped together by longitudinal bolts (not shown) which pass through holes in the heads. (See Figs. 2, 3, and 4.)

5 denotes the piston, and 6 the piston-rod, which passes through an opening in cylinder-head 3, being in practice ordinarily made in two parts and provided with a recess to receive packing 7, said recess being closed by a screw-cap 8, through which the piston-rod passes. The piston is provided with a central longitudinal opening 9, which receives spirally-grooved rod 10 freely. At the upper end of the opening in the piston is a nut 11, which is preferably made of hardened steel, and which is provided with lugs 12 to engage the grooves in the rod.

Head 2 of the cylinder is provided with a socket 13 to receive the other end of rod 10, and with a recess 14, which is concentric with the socket. This recess in practice is closed by a plate 15, which is provided with a central opening through which the rod passes, and is made the exact diameter of the bore of the cylinder. The plate is made to fit closely and lies partly in the bore of the cylinder and partly in a recess in head 2, adapted to receive it. This plate acts to effectually close this end of the piston against the passage of steam.

Within the recess and secured rigidly to the rod is an eccentric 16, which is provided with a pin 17, extending outward from its periphery at a point slightly at one side of the longest radius of the eccentric.

In the present instance the parts are so organized as to produce a rotation of the piston and piston-rod during the downward movement—i. e., the movement toward the right. This requires that the pin be placed at the right of the greatest radius of the eccentric, as seen in the drawings. Should rotation of

the piston and piston-rod be required during the upward movement—*i. e.*, the movement toward the left—the pin would require to be placed at the left of the longest radius of the
5 eccentric, as will be fully explained.

Outside of the eccentric and lying within recess 14 is a crescent-shaped piece 18, between the ends of which is an open space in which pin 17 lies.

10 19 is a notch in the inner side of the crescent-shaped piece, the object of which is to permit said piece to yield sufficiently to allow it to be sprung into place over the eccentric. The periphery of crescent-shaped piece 18 is
15 concentric with recess 14 and with rod 10, the inner line of said crescent-shaped piece corresponding with the periphery of the eccentric.

The operation is as follows: Suppose the parts to be in the positions shown in Figs. 1
20 and 3. When the upward movement—*i. e.*, the movement of the piston toward the left of the cylinder—takes place, pin 17 will engage one end of the crescent-shaped piece, the right end, as shown in Fig. 3, and will carry said
25 piece with it. It will be apparent in view of the engagement of lugs 12 on the piston with the spiral grooves of rod 10 that at each movement either the piston itself or the rod must rotate. In the position of the parts shown in
30 Fig. 3 the piston moves straight up—that is, without rotation—and the rod is rotated by the engagement of the lugs with the spiral grooves carrying the eccentric with it, and the
35 the end of the crescent-shaped piece, carries the latter also, the rod, eccentric, and crescent-shaped piece turning freely in recess 14. The instant the downward movement of the piston—*i. e.*, the movement toward the right—
40 commences, the spirally-grooved rod is necessarily turned in the opposite direction. This moves the eccentric in the opposite direction, moving the pin away from the end of the
45 crescent-shaped piece with which it has been in engagement. The effect of this reverse movement of the eccentric is to carry the point in the periphery of the eccentric having the longest radius against the inner side of
50 the crescent-shaped piece, springing the latter outward and causing it to be locked tightly in recess 14 by friction. In fact, the rotary movement of the grooved rod in this direction is stopped almost instantly, so that as the
55 piston moves downward it is necessarily rotated through the engagement of the lugs with the grooves in the rod.

Having thus described my invention, I claim—

1. In a rock-drill, a piston having a longi-

tudinal recess and lugs extending into said
60 recess, in combination with a spirally-grooved rod which is adapted to enter the recess in the piston and is engaged by the lugs, an eccentric rigidly secured to said rod and having a
65 pin projecting from its periphery at one side of the longest radius thereof, and a crescent-shaped piece lying in a recess outside of the eccentric, one end of said piece in use being
70 engaged by the pin, so that when the piston is moved in one direction it will rotate the rod, eccentric, and crescent-shaped piece, and when moved in the opposite direction the
75 longest radius of the eccentric will be forced against the crescent-shaped piece, springing the latter outward against the wall of the recess, thereby locking the eccentric and rod
80 against rotation and causing a rotary movement of the piston.

2. The combination, with the piston having longitudinal opening 9 and lugs 12, of spirally-
85 grooved rod 10, engaging said opening and lugs, and having rigidly secured thereto an eccentric with a pin extending from its periphery at a point at one side of the longest
90 radius, and a crescent-shaped piece lying outside of the eccentric, one of whose ends is engaged by the pin when the piston is moved in one direction, substantially as described.

3. The piston having an opening 9 and lugs 12, the piston-rod, and the cylinder having a
95 head 3, through which the piston-rod slides, and a head 2, having a socket 13 and recess 14, in combination with a spirally-grooved rod, one end of which engages the lugs and opening in the piston, the other lying in socket
100 13, and an eccentric lying in recess 14, said eccentric having a pin 17 at one side of the longest radius and a crescent-shaped piece 18
105 lying in said recess outside of the eccentric.

4. The cylinder, one of whose heads is pro-
110 vided with a socket 13 and recess 14, and the piston having a longitudinal opening, and a nut at the outer end thereof having inwardly-projecting lugs, in combination with a rod having spiral grooves adapted to be engaged
115 by the lugs and whose opposite end rests in the socket, an eccentric in the recess, which is rigidly secured to the rod and is provided with a pin 17, and a crescent-shaped piece
120 lying in the recess outside of the eccentric, said parts acting as described, and for the purpose set forth.

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

HARRY BALL.

Witnesses:

RICHARD BOLSTER,
BENJAMIN LOCKWOOD.