

L. C. BAYLES.
 ROTATION MECHANISM FOR PERCUSSIVE DRILLS.
 APPLICATION FILED AUG. 14, 1912.

1,148,649.

Patented Aug. 3, 1915.

3 SHEETS—SHEET 1.

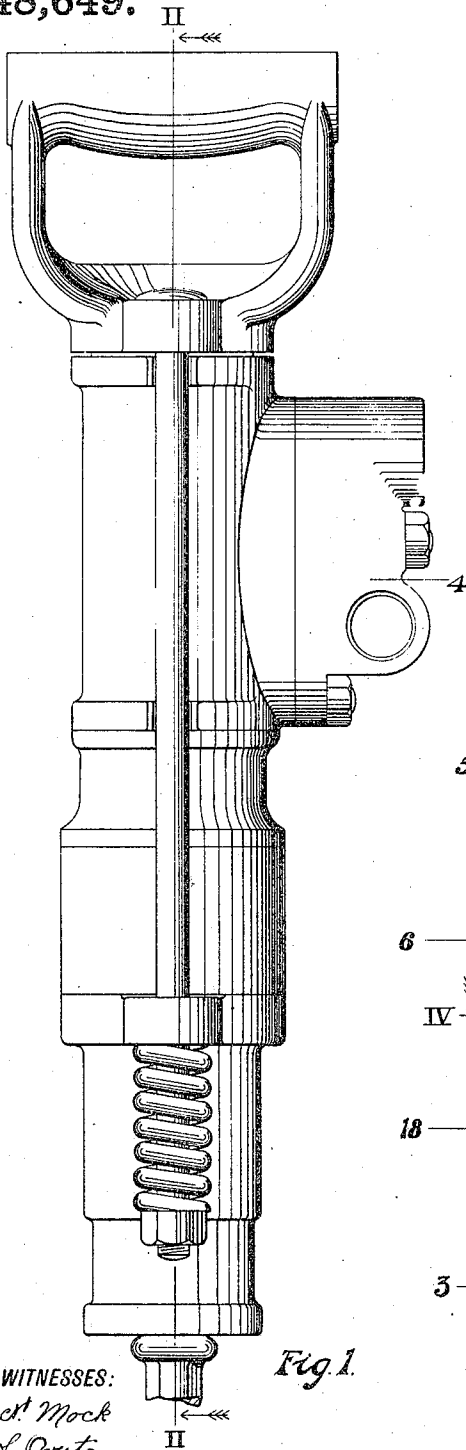


Fig. 1.

WITNESSES:

John A. Mock
 Fred S. Orton

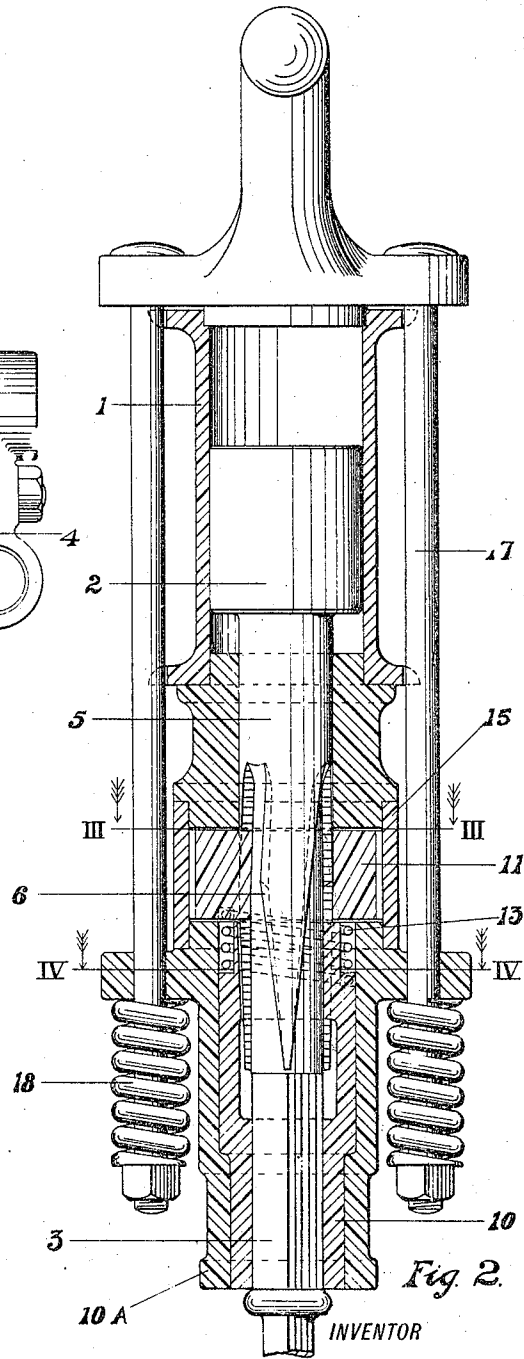


Fig. 2.

INVENTOR

Lewis C. Bayles

BY

Richard M. Good
 ATTORNEY

L. C. BAYLES.
 ROTATION MECHANISM FOR PERCUSSIVE DRILLS.
 APPLICATION FILED AUG. 14, 1912.

1,148,649.

Patented Aug. 3, 1915.
 3 SHEETS—SHEET 2.

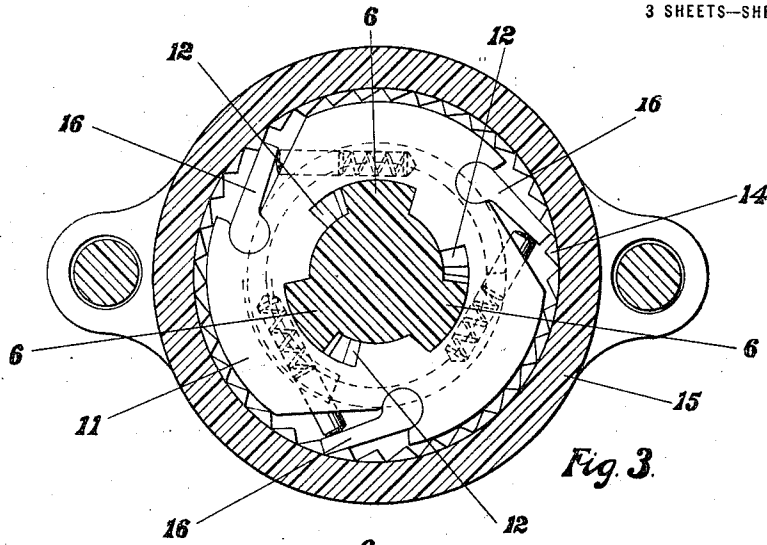


Fig. 3.

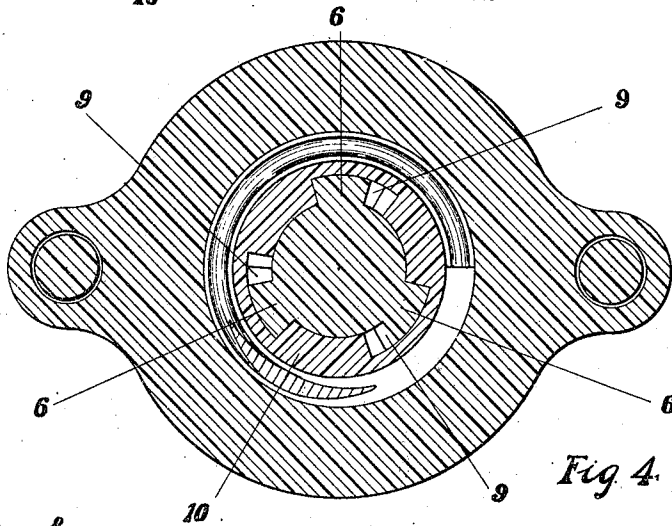


Fig. 4.

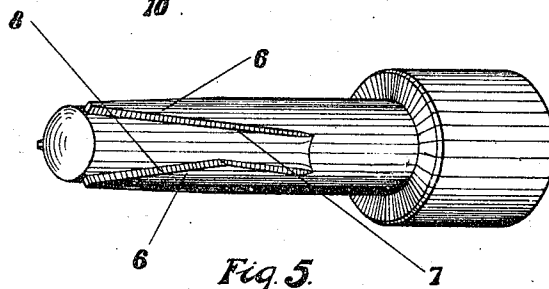


Fig. 5.

WITNESSES:

John M. Mock
 Fred S. Overton

INVENTOR

Lewis C. Bayles

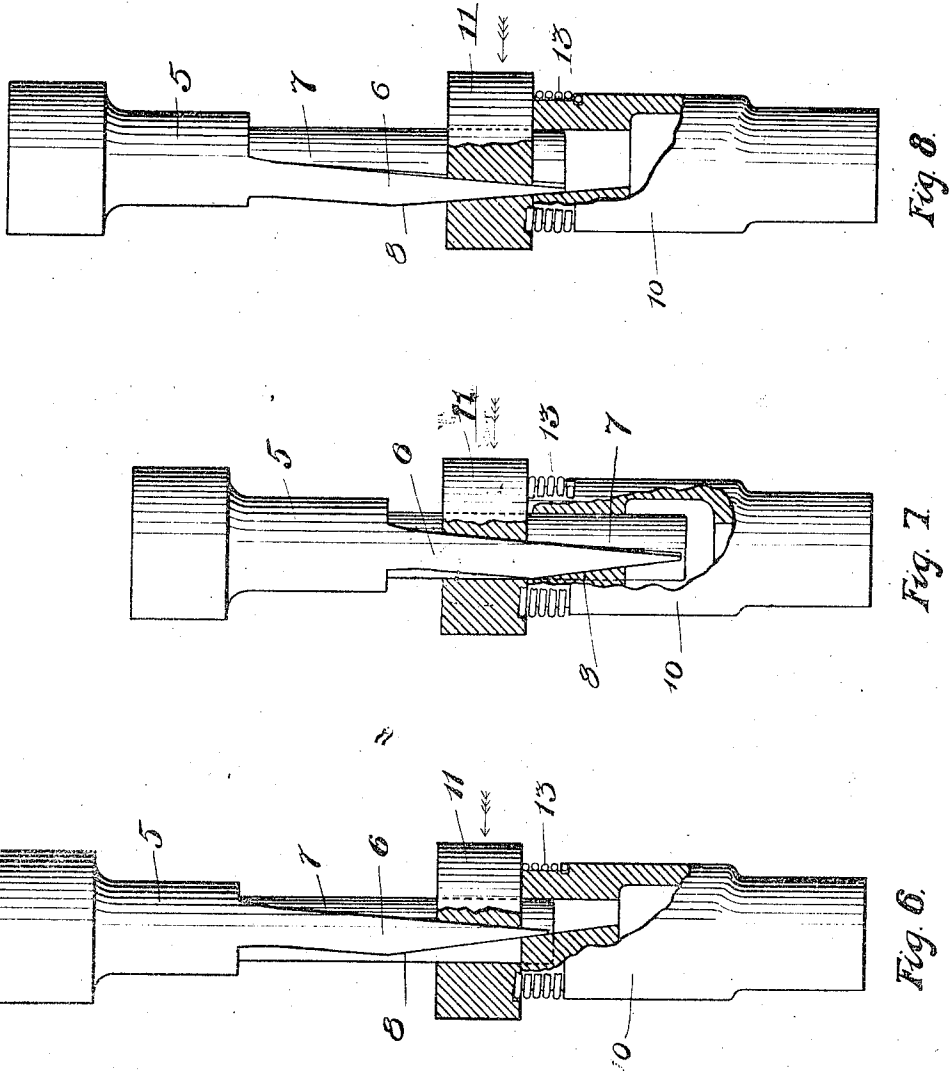
BY

Philip C. Bayles
 ATTORNEY

L. C. BAYLES.
 ROTATION MECHANISM FOR PERCUSSIVE DRILLS.
 APPLICATION FILED AUG. 14, 1912.

1,148,649.

Patented Aug. 3, 1915.
 3 SHEETS—SHEET 3.



WITNESSES:
 John A. Mock
 Fred S. Austin

INVENTOR
 Lewis C. Bayles
 BY
 Philip S. Curwell
 ATTORNEY

UNITED STATES PATENT OFFICE.

LEWIS C. BAYLES, OF EASTON, PENNSYLVANIA, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

ROTATION MECHANISM FOR PERCUSSIVE DRILLS.

1,148,649.

Specification of Letters Patent.

Patented Aug. 3, 1915.

Application filed August 14, 1912. Serial No. 715,010.

To all whom it may concern:

Be it known that I, LEWIS C. BAYLES, a citizen of the United States, residing at Easton, in the county of Northampton and State of Pennsylvania, have invented a certain new and useful Improvement in Rotation Mechanism for Percussive Drills, of which the following is a specification.

This invention relates to rotation mechanisms for percussive drills and more particularly to that type of rotation mechanism wherein the rotation is effected by the movement of the drill piston.

The object of the invention is to produce a simple and effective mechanism which is all contained in the forward part to the drill cylinder, thus obviating the necessity of the usual rifle bar and ratchet in the back end of the cylinder. With this object in view, I have devised a mechanism a practical embodiment of which is shown in the accompanying drawings, in which—

Figure 1 is an elevation of the complete drill. Fig. 2 is a longitudinal section on the line 2—2 of Fig. 1. Fig. 3 is a transverse section on the line 3—3 of Fig. 2. Fig. 4 is a transverse section on the line 4—4 of Fig. 2. Fig. 5 is a detail view showing the piston in elevation, and Figs. 6, 7 and 8 are diagrammatic views showing the operation of the rotation mechanism.

As shown the drill comprises a cylinder 1 in which is located the piston 2 which actuates by its impact the drill steel 3. The reciprocation of the piston is controlled by a valve (not shown) operating in a valve chest 4, the construction and operation of the valve forming no part of the present invention. The forward end of the piston consists of an elongated shank 5, the forward end of which is grooved leaving a series of longitudinal wedge shaped flutes 6 each having a long face 7 set at an angle to the line of the piston, and a shorter face 8 set at an opposite angle to the piston line. The forward ends of these flutes 6 slide in correspondingly shaped but wider grooves 9 on the inner surface of a drill rotating chuck 10, the faces of the grooves contacting with the faces 7 being set at the same angle to the piston line. The chuck 10 is rotatably mounted in the forward part 10^a of the drill casing and is provided with a chuck aperture into which the shank of the drill steel slides. Immediately to the rear of the chuck 10 is a pawl ring 11 which surrounds

the forward end of the piston and also has grooves 12 in it, which have faces contacting with the faces 7 of the piston and set at the same angle to the piston line. The pawl ring 11 is angularly movable relatively to the chuck 10 but the forward rotation of the ring 11 relative to the chuck is opposed by a spring 13, the ends of which abut against shoulders 13^a in the faces of the chuck ring and chuck, this spring being compressed by forward movement of the chuck ring relative to the chuck and when so compressed tending to move the chuck forward also.

The pawl ring is mounted for rotation in one direction in the drill casing, movement in the other direction being prevented by ratchet teeth 14 on the inner surface of a ratchet ring 15 which are engaged by spring pressed pawls 16 in the pawl ring 11.

The ratchet ring 15 is frictionally held in place between the cylinder 1 and the forward part 10^a of the drill casing, the parts being held together resiliently by means of bolts 17 and springs 18. This allows the ring 15 to slip slightly if an undue strain is put on the steel in turning it, which sometimes occurs when the steel becomes wedged in the hole and it is necessary to turn the drill to extricate it.

The operation of the device which can be clearly seen in Figs. 6-8 is as follows: Supposing the piston to be at the end of its back stroke and the parts in the positions shown in Fig. 6, as the piston moves forward the long face 7 of the piston flute engages one face of the groove in the pawl ring 11. The pawl ring is arranged so that it can move only in the direction of the arrow, consequently the piston will be rotated slightly, say through an angle of 10°, as it slides forward; at the same time the short face 8 of the piston flute engages the corresponding face of the groove in the drill steel chuck. As the piston moves forward the relative slant of the two faces will cause the chuck to rotate say 10° while at the same time the motion of the piston through a 10° angle will cause this much additional rotation, the total effect being that the drill steel chuck and therewith the steel are moved through an angle of say 20°, the parts at the end of the forward stroke being in the position shown in Fig. 7. On the next back stroke of the piston, the steel, being in contact with the rock, will remain stationary as

will the chuck 10, as the face 7 of the piston flute recedes, the pawl ring will follow it by reason of the tension of the spring 13. The spring will also cause the short face 8 of the piston flute to be kept in close contact with the adjacent face of the chuck groove 12, and thus as the piston moves back it will be turned through an angle of 10° by the action of the spring, the pawl ring at the same time moving through an angle of 20° and overtaking again the chuck 10. This brings the parts in the position shown in Fig. 8, where they are in the same relative position as shown in Fig. 6 but moved through an angle of 20° in the cylinder. On the next stroke of the piston, forward and back, the whole combination will be again rotated through a like angle of 20° , the piston and steel rotating on the forward stroke and the piston and pawl ring rotating on the back stroke.

It is to be observed that the only operative faces on the pawl ring and drill steel chuck are those engaging respectively the faces 7 and 8 of the piston flute, and the shape and direction of any other surfaces of the ring and chuck, such as the other faces of the grooves therein are immaterial.

In the device as shown the pawls are shown on the ring rotating with the piston and the ratchet on the inner surface of the drill casing. It is evident that these could be reversed without invention.

It is to be understood that the present showing and description discloses only one specified modification of my invention and other forms and modifications are included in the spirit and scope of the invention as expressed in the claims.

What I claim is:

1. In a percussive drill of the hammer type, a cylinder, its piston, a revoluble drill steel chuck having a face engaging said piston, a pawl ring rotatable relatively to said chuck, resilient means opposing said relative rotation, a face on said pawl ring at an angle to said chuck face, and a flute on said piston having faces engaging said chuck and pawl ring faces to rotate said chuck.

2. In a percussive drill, a cylinder, its piston, a revoluble drill steel chuck having a face at an angle to the line of the piston, a pawl ring rotatable relatively to said chuck, resilient means opposing said relative rotation, a face on said pawl ring at an angle to said chuck face, and a flute on said piston having faces engaging said chuck and pawl ring faces to rotate said chuck.

3. In a percussive drill, a cylinder, its piston, a revoluble drill steel chuck having a face at an angle to the piston line, a pawl ring rotatable relatively to said chuck, said chuck and pawl ring having a resilient connection opposing relative rotation and caus-

ing said pawl ring to follow the rotation of the said chuck, said pawl ring having a face at an angle to said chuck face, and a flute on said piston having faces engaging said chuck and pawl ring faces to rotate said chuck.

4. In a percussive drill, a cylinder, its piston, a revoluble drill steel chuck having a face at an angle to the piston line, a pawl ring rotatable relatively to said chuck, said chuck and pawl ring having a resilient connection opposing relative rotation and causing said pawl ring to follow the rotation of the said chuck, said pawl ring having a face at an angle to said chuck face, and a flute on said piston having faces engaging said chuck and pawl ring faces to rotate said chuck, said resilient connection serving to rotate the piston on its stroke in one direction.

5. In a percussive drill, a cylinder, its piston, a revoluble drill steel chuck having a face at an angle to the piston line, a ring rotatable relatively to said chuck and having ratchet connection with the drill cylinder, said chuck and ring having a resilient connection opposing relative rotation, a face on said ring oppositely inclined to said chuck face, and a flute on said piston having faces engaging said chuck and ring faces to rotate said chuck.

6. In a percussive drill, a cylinder, its piston, a revoluble drill steel chuck having a face at an angle to the piston line, a ring rotatable relatively to said chuck and having ratchet connection with the drill cylinder, said chuck and ring having a resilient connection opposing relative rotation, a face on said ring oppositely inclined to said chuck face, and a flute on said piston having faces engaging said chuck and ring faces to rotate said chuck, said resilient connection serving to rotate said piston on its stroke in one direction.

7. In a percussive drill, a cylinder, a piston having a fluted forward end, a pawl ring surrounding said piston and in sliding engagement therewith, a ratchet ring for said pawl ring, said ratchet ring being frictionally held against rotation.

8. In a percussive drill, a cylinder, a forward casing divided into two portions, a piston having a fluted forward end, a pawl ring surrounding said piston and in sliding engagement therewith, a ratchet ring for said pawl ring, said ratchet ring being frictionally secured between said two portions of the forward casing.

In testimony whereof, I have hereunto set my hand.

LEWIS C. BAYLES.

Witnesses:

A. H. TAYLOR,
R. H. WILHELM.