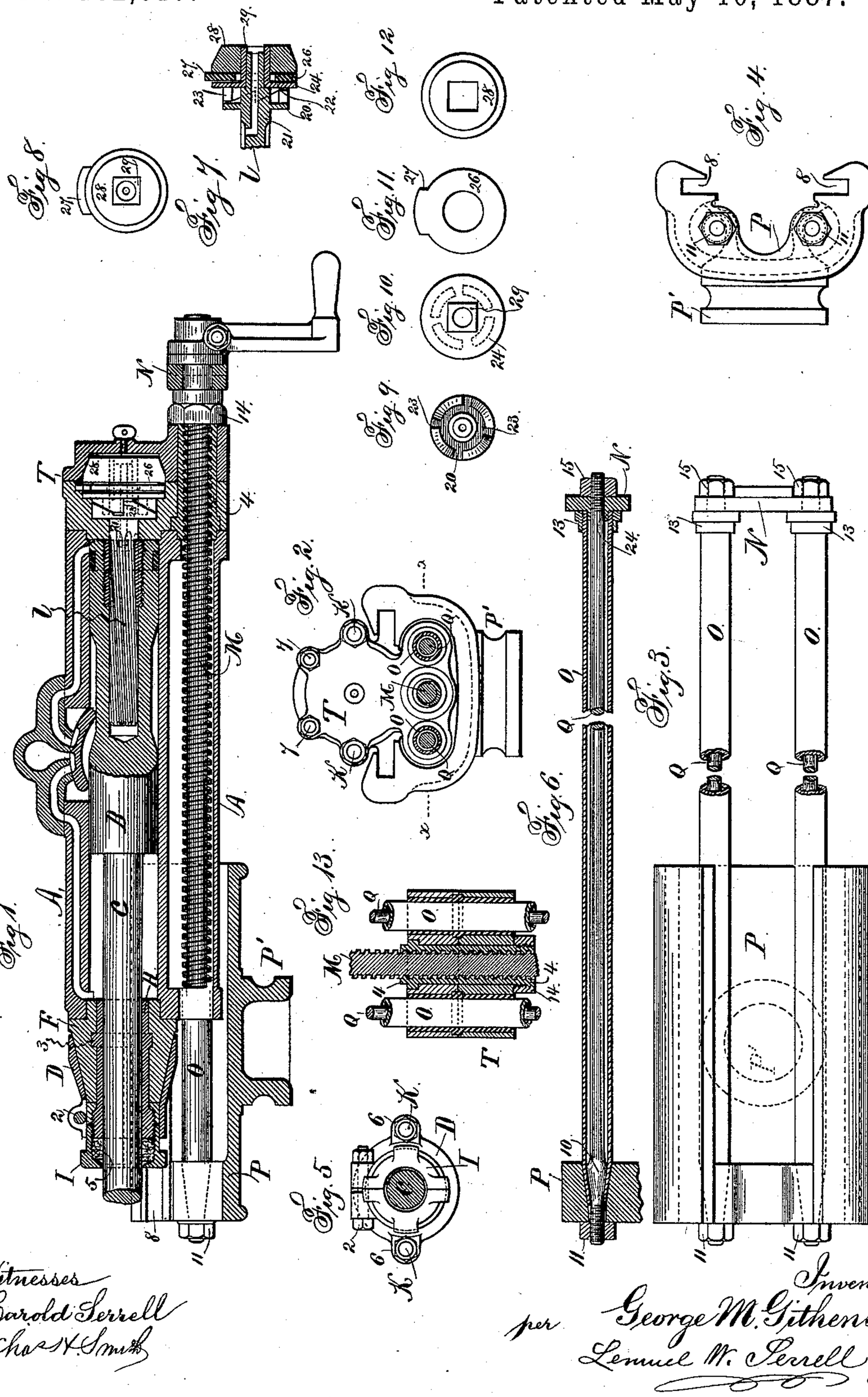
(No Model.)

G. M. GITHENS.

ROCK DRILL.

No. 362,617. Patented May 10, 1887.



UNITED STATES PATENT OFFICE.

GEORGE M. GITHENS, OF BROOKLYN, NEW YORK.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 362,617, dated May 10, 1887.

Application filed February 18, 1887. Serial No. 228,020. (No model.)

To all whom it may concern:

Be it known that I, GEORGE M. GITHENS, of Brooklyn, in the county of Kings and State of New York, have invented an Improvement in Rock-Drills, of which the following is a specification.

Before my present invention the cylinder in rock-drills had been made to slide upon a longitudinal support by the action of a feed-screw, and there had been rods extending from one head of the cylinder to the other, and a conical cap and divided head at the end of the cylinder, as seen in my Patent No. 307,642, dated November 4, 1884, and in other instances columns had been made use of extending from end to end of the slide and connected with such ends, and also continuing beyond to the cross-head for the feed-screw.

In rock-drills there is considerable concussion from the rapid movement of the drill, and it becomes necessary to make the parts sufficiently rigid to withstand the strain and at the same time partially elastic, so that the concussion may not tend to disintegrate the metal.

My present invention is an improvement upon the devices set forth in my aforesaid patent, whereby I am enabled to render the parts more durable and to provide for easily replacing any parts that are worn out.

In the drawings, Figure 1 is a longitudinal section through the cylinder and feed-screw of the rock-drill. Fig. 2 is an elevation of the rear or upper end of the cylinder, the feed-screw and columns being in section. Fig. 3 is a plan of the shell, columns, and cross-head for the screw. Fig. 4 is an end view of the shell. Fig. 5 is an elevation of the front end of the cylinder, the piston-rod being in section. Fig. 6 is a section through the ends of one of the columns. Fig. 7 is a longitudinal section of the rotator and adjacent disks, &c. Fig. 8 is an elevation endwise of the conical weight, &c.; and Figs. 9, 10, 11, and 12 are elevations of the head, disk, friction-plate, and conical weight, respectively, as separated; and Fig. 13 is a sectional plan of the two-part head at the line *x x* of Fig 2.

The cylinder A is provided with a piston, B, and piston-rod, C, of any usual character, and they may be made as shown in my aforesaid patent, or in any other desired manner, my present improvements not relating to these features.

I make use of a head, F, to the cylinder A, the said head being divided longitudinally into two pieces, so that they can be placed around the piston-rod C, and the exterior of this divided head is conical, and over it is placed the conical clamping-ring D. These parts are somewhat similar to those in my aforesaid patent, but the conical clamping-ring D is partially split longitudinally and provided with lugs, through which passes the clamping-bolt 2.

In rock-drills the rapid reciprocation of the piston and rod and the dirt and gritty materials that lodge upon the piston-rod rapidly wear both the piston-rod and the interior of the divided head F. I therefore make use of the tubular bushing H, which is preferably of cast-iron, and it is divided longitudinally, so as to be placed at opposite sides of the piston-rod and inclosed within the divided head F, and to hold this bushing in position longitudinally a collar is formed thereon at 3, which is received into a corresponding recess within the divided head F. It is also necessary to prevent the bushing H revolving within the head F. To effect this a pin may pass through the head F into the bushing; but I prefer to turn the collar 3 slightly eccentric, and also to bore out the groove in the head F slightly eccentric, so that the parts will set together, but the eccentricity of the collar and of the groove receiving the same will prevent the bushing revolving.

The outer end of this bushing H is made with a screw-thread to receive the hollow gland or cap I, within which a packing is introduced at 5 around the piston-rod, and this packing can be compressed more or less by screwing up the gland I. The exterior of this gland I is cylindrical, and the outer end of the conical clamping-ring D projects beyond the conical head F and is also cylindrical. The interior thereof corresponds to the exterior of the gland I; hence when the clamping-bolt 2 is slightly loosened the gland I can be rotated to compress the packing 5 more or less, and by screwing up the bolt 2 the parts will be so firmly clamped that they will not

work loose under the severe concussion and agitation to which they are subjected. For small drills the bushing and head will be in one with the hollow gland screwed upon the projecting end of the longitudinal divided head.

It will be understood that if the piston-rod C wear untrue, or the bushing H wears too loose for the rod, the parts can be separated, the piston-rod C turned up true, and another bush and gland H substituted, so as to properly fit the piston-rod, which effects a great saving in repair.

Upon the sides of the conical clamping-ring D there are lugs or ears 6, through which pass the tie-bolts K at the sides of the cylinder, and these tie-bolts K pass through holes in the two-part head T of the cylinder to connect the parts firmly, and there are also short bolts 7 for bolting the two parts of the head T together at intermediate points.

The two-part head T and also the cylinder extend laterally to receive the tubular nut L for the feeding-screw M, with a clamping-nut, 14, at the outer end, to aid in holding the parts of the cylinder-head together.

The feed-screw and nut are somewhat similar to those in my aforesaid patent; but, instead of the screw M being supported by and rotating in an arm or support extending down to the slide, I provide a cross-head, N, and two columns, O O, that connect the cross-head N to the distant end or head of the shell P, in which shell are the slideways S for the guide-slides upon the sides of the cylinder, and the cylinder-head also slides freely on the columns. The holes in the head through which the columns pass are preferably bushed, so that the bushing can be removed when worn out. If these columns O were connected at both ends of the shell P, as has heretofore been done, the columns would thereby be rendered liable to injury by the concussion, because the unsupported portions of the columns would be too short to spring under the concussion to which they are subjected; but when the columns are only connected at their ends, as in my improvements, they are sufficiently long to spring, and there is sufficient opportunity for the slight motion always existing when in use to prevent the ends of the columns being broken off where they are connected with the shell and cross-head, respectively. The ends of the columns O where they pass into the distant end portion of the shell P are conical or tapering, the holes being shaped to correspond, and I prefer and use compound columns, each column being made of a tube the end of which is swaged down conical to fit the conical hole in the shell, and within the tubular column O is a bolt, Q, having a conical end, 10, that fits into the conical interior of the column at the end, as seen in the section, Fig. 6, and the end of the bolt Q projects through the shell P and is screw-threaded to receive the nut 11. By this mode of connections the tubular column is firmly clamped to the shell, and, if it works loose, it is only necessary to tighten the nut 11 to secure the parts in the most rigid manner. Upon the exterior of the tubular column O, at the other end, a screw-thread is cut and a nut or collar, 13, is tightly screwed upon the same, and then the end of the column and of the nut are faced off flat to set against one face of the cross-head N, and there is preferably an annular rib, 24, upon the face of the cross-head to enter the column, and the bolt Q passes through the cross-head and receives the nut 15. By this arrangement the cross-head N is firmly held in place upon the column O; but it can be easily disconnected by removing the nuts 15.

Usually the shell P will extend from one side to the other outside the columns O and be made with the hub or trunnion P′, to which the tripod or other supporting devices are connected; but the shell may pass down between the cylinder and the columns, as indicated by dotted lines in Fig. 3, the other parts remaining unaltered.

In order to make the rotator 1 more prompt and efficient in its action I provide a head, 20, on the end of the rotation-bar 21, and there is an adjacent disk, 22, the contact-faces between 20 and 22 being a circular range of inclines and flat axial faces, 23, and there is a ring-flange, 24, to the disk 22, resting in a recess in the cylinder-head. Next to the disk 22 and its flange 24 there is a friction plate or ring, 26, which is free to move in either direction lengthwise of the cylinder, but it is kept from turning by a projection, 27, at one side entering a notch at the end of the cylinder. The conical weight 28 is in a corresponding recess in the cylinder-head, and it has a polygonal hole for the similarly-shaped stem 29 of the disk 22. As the piston moves back it tends to turn the rotation-bar 21, and the inertia of the disk 22 and weight 28 are sufficient to keep these from moving as the inclines on 20 and 22 force the disk 22, plate 26, and weight 28 endwise, wedging the conical surface of the latter tightly in the head; hence the piston will be partially rotated upon the bar 21 and in the cylinder. When the piston is moving in the other direction, the parts are loose and the axial faces 23, being pressed against each other, will cause 22, 24, and 28 to turn together, as the piston moves in a straight line and partially revolves the rotation-bar 21, thus in one direction insuring looseness and in the other direction a reliable frictionable hold of the cone in its head and of the parts against the opposite faces of the friction-plates 26.

If desired, three friction-plates may be used instead of one, the two outer plates having the ears 27 and the intermediate plate having a square hole for the stem 29, so as to increase the frictional surfaces.

I claim as my invention—

1. The combination, with the cylinder, piston, and piston-rod, in a rock-drill, of a head, F, conical clamping-ring D, and a bushing, H,

around the piston-rod and within the head, substantially as set forth.

2. The combination, with the cylinder, piston, and piston-rod, in a rock-drill, of a conical head, F, divided into two parts, the tubular bushing H, also divided longitudinally into two parts, and the conical clamping-ring D, substantially as set forth.

3. The combination, in a rock-drill, with the cylinder, piston, and piston-rod, of a tubular bushing around the piston-rod, a head around the bushing, and a gland screwed upon the bushing with a packing around the piston-rod, substantially as set forth.

4. The combination, with the piston-rod and cylinder-head, of a tubular bushing around the piston-rod and within the head, a gland screwed upon the end of the tubular bushing, and a conical clamping-ring surrounding the cylinder-head and acting to clamp the gland and hold the same in position, substantially as set forth.

5. The combination, with the piston and piston-rod, in a rock-drill, of a tubular bushing, a gland, and a cylinder-head, each of which is split longitudinally into two parts, so as to be placed around the piston-rod, and a conical clamping-ring to secure the parts in place, substantially as set forth.

6. The combination, with the rock-drill cylinder and the feeding-screw, of a cross-head through which the feeding-screw passes, a shell in which the cylinder slides, and columns extending from the cross-head to the distant end of the shell, and nuts for connecting the columns to the shell and cross-head, respectively, whereby the columns are unconfined except at their ends, for the purposes and substantially as specified.

7. The combination, with the cylinder and the shell in which the cylinder slides, the cross-head, and feed-screw, of tubular columns, each of which is tapered at one end and received into a tapering hole in the shell, a tie-bolt passing through the tubular column and having a tapering plug to fit the tapering portion of the column, screws at the ends, and nuts for clamping the parts, substantially as set forth.

8. The tube O, having a tapering or conical end to enter correspondingly-shaped holes, in combination with a bolt having a conical portion fitting the interior of the tube at the end, and a clamping-nut, substantially as set forth.

9. The combination, with the cylinder, piston, and piston-rod, of a head surrounding the piston-rod, a gland around the piston-rod screwed on the head and containing the packing, and a ring to hold the head in place and to clamp the gland, substantially as set forth.

10. The combination, with the piston and cylinder, in a rock-drill, of a rotating bar having a head with inclined and axial faces, a disk with corresponding faces, a conical weight in the recessed cylinder-head with a hole receiving the stem of the disk and turning with it, and an intermediate friction-plate, substantially as set forth.

11. The combination, with the shell having guide-slides, of the cylinder guided in such slides, the columns attached at one end to the shell, the cross-head to the columns, the feeding-screw and nut, and the cylinder-head having holes through it for the columns, so that the head moves upon and is guided by the columns, substantially as set forth.

Signed by me this 11th day of February, A. D. 1887.

GEO. M. GITHENS.

Witnesses:
GEO. T. PINCKNEY,
WILLIAM G. MOTT.