

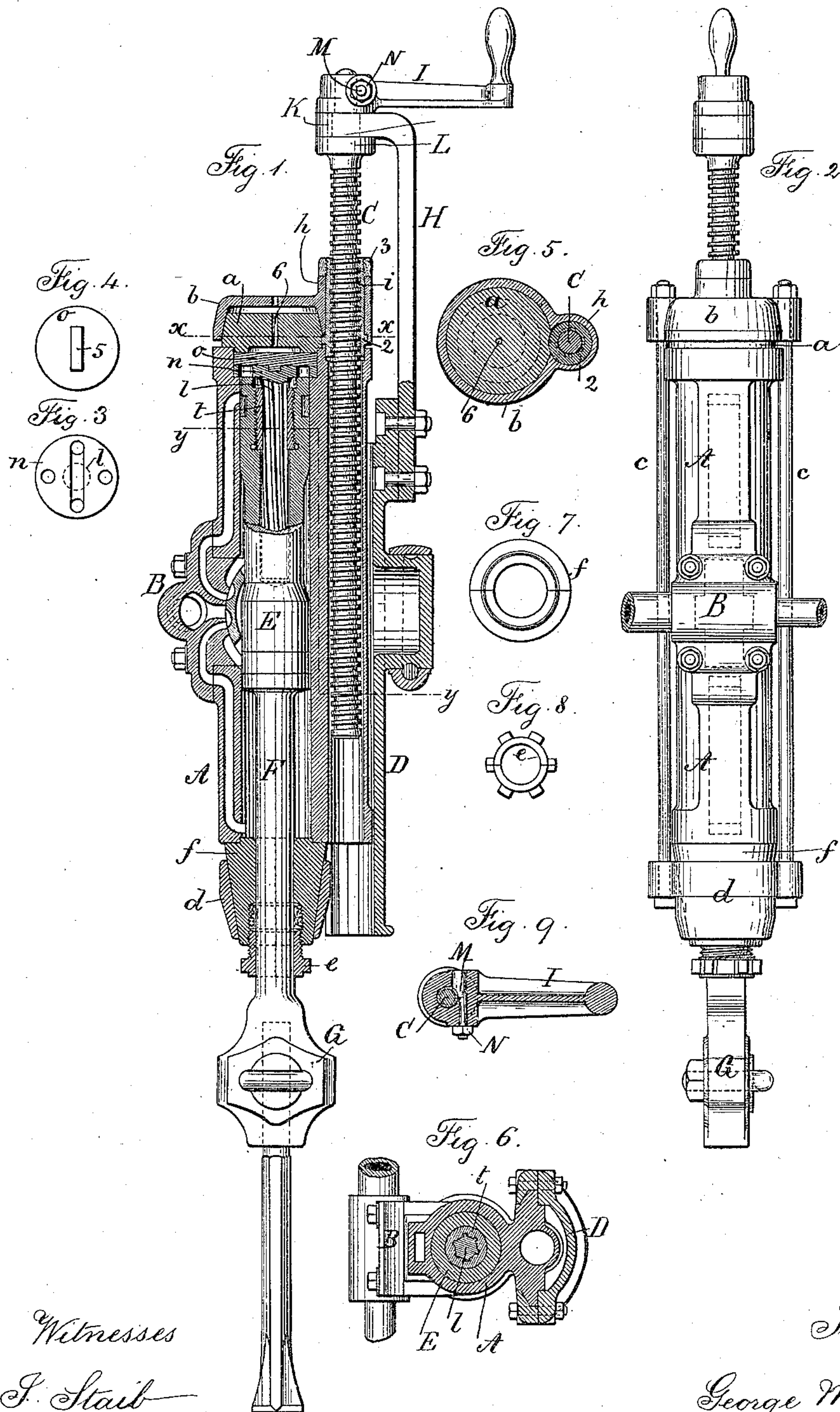
(No Model.)

G. M. GITHENS.

ROCK DRILL.

No. 307,642.

Patented Nov. 4, 1884.



Witnesses
J. Staib
Harold Ferrell

Inventor
George M. Githens
per Lemuel W. Ferrell atty

UNITED STATES PATENT OFFICE.

GEORGE M. GITHENS, OF BROOKLYN, NEW YORK.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 307,642, dated November 4, 1884.

Application filed February 18, 1884. (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 Direct-Acting Engines for Rock-Drills, Steam Hammers, &c., of which the following is a specification.

The object of this invention is to allow for the piston, piston-rod, and tool-holder all being of one forging, and to secure a two-part head in such a manner as to be steam-tight and to receive a packing-gland. I also construct the parts in such a manner that risk of injury by the piston striking the inner end of the head is reduced to a minimum, and I provide means for revolving the piston, rod, and drill or tool progressively and automatically in a very reliable manner. Before my present invention a rotator had been used, over which the piston moved as the same reciprocated, and this rotator turned by the action of the piston when moving in one direction, and remained quiescent when the piston was moving in the other direction, so as to give a partial rotation to the piston and drill. Difficulties have, however, been experienced in operating this device, which the present improvement is intended to rectify.

In the drawings, Figure 1 is a vertical longitudinal section of the steam-cylinder. Fig. 2 is an elevation of the same. Fig. 3 represents the top end of the rotator; Fig. 4, the face of the disk intervening between the cylinder-head and rotator. Fig. 5 is a section at *x x*. Fig. 6 is a section at *y y*. Fig. 7 shows the end of the cylinder-head, and Fig. 8 the screw-follower of the packing-gland; and Fig. 9 is a sectional plan of the crank and key.

The cylinder A, valve B, screw C, slide D, for supporting the cylinder, and the piston E, rod F, and head G are to be of any desired character, and are of the usual construction, except in the particulars hereinafter named. The piston E, piston-rod F, and tool-holding head G, are to be made in one piece, so that there will be nothing that is liable to become loose by the rapid reciprocation. The head *a* for the cylinder A is made to fit the end of the cylinder, and it has an exterior surface that is conical, and made at about the angle shown, and around this head is the conical

ring *b*, having ears at opposite sides for the tie-bolts *c*, that pass to the head or cap at the other end of the cylinder, which is preferably a conical cap, *d*, the interior surface of which is similar to that of the ring *b*, and it fits over the head *f*, the exterior surface of which head is also conical. When a conical metal plug is driven into a conical metal ring, it will not wedge therein if the angle of the taper is about that shown for the head and ring, but there is a certain amount of elasticity. I avail of this feature to prevent injury to the piston, the head, or the bolts by the concussion of the piston against the inner surface of either head, for it will be apparent that there will be a slight yield when the tapering plug of the head may be forced into the tapering ring, and thereby there will not be so much risk of the bolts or other parts being injured. This construction also allows for the use of a head that is divided into two parts, as seen in Fig. 7, so that it may be placed at the sides of the piston-rod after the piston has been passed through the ring *d*; hence the taper will compress the halves of the head together sufficiently to render them steam-tight; hence the tool-holding head can be made in one piece with the piston-rod and piston. The conical head and conical ring are, however, available with pistons and piston-rods where there is not a tool-holding head. The cylinder-head *f* is to be bored out to receive a packing, and the follower *e* screws into the same. This follower *e* should be made in two parts, as seen in Fig. 8, if the head is in two parts. The cap or back head is made with a cylindrical sleeve, *h*, through which passes the nut *i* of the screw C. In order to hold the nut *i* in the sleeve *h*, there is a flange, 2, at one end and a lock-nut, 3, at the other end; but it is necessary to prevent the nut rotating in the sleeve. I accomplish this by turning the exterior surface of the flange 2 eccentric to the axis of the nut, and I bore out the recess at the end of the sleeve in the same manner, so that the eccentric flange passes easily into the eccentric recess, but the nut cannot be revolved in the sleeve on account of the eccentricity of the end flange. This construction is simple and inexpensive. It dispenses with keys, set-screws, or polygonal recesses or heads, and allows for the nut

being driven out with facility and another substituted, if necessary.

A rotator, *l*, with a series of inclined ribs upon its surfaces has been provided with a disk 5 or plate, *n*, at the end and integral therewith, and efforts have been made to cause the steam-pressure to hold the disk when the piston is moving in one direction, or to allow it to turn when moving the other way; but the 10 rapid reciprocation of the piston, especially in rock-drills, has prevented this being accomplished satisfactorily. I therefore add an independent friction-disk, *o*, between the disk *n* and the head *a* of the cylinder, and I provide 15 a cross-key, 5, or pins upon the disk *o*, entering a similar recess in the disk *n*, so that the rotator *l*, disk *n*, and plate *o* will all revolve together; but the disk or plate *o* is not vibrated or moved endwise of the cylinder by 20 the piston sliding back and forth upon the rotator *l*; hence the disk *o* will always rest against the inner surface of the head *a* by the pressure of the steam acting through the holes in the disk of the rotator. I provide a hole, 25 6, through the head, and recess the inner surface of the head, so that the disk *o* bears against a ring-shaped surface. The opening at 6 through the head prevents the accumulation of steam-pressure between the disk *o* 30 and head.

In practice I find that the steam-pressure, when acting against the disk *o*, holds the same sufficiently to prevent its turning, and the key 5 prevents the rotator turning as the piston moves along over the rotator; hence the 35 piston and tool are partially revolved, but when the pressure of steam against the disk *o* is relieved, and the piston is being moved the other way, the disk *o* will turn freely with 40 the rotator. The nut *t* of the rotator is screwed into a cylindrical recess within the piston. It is shorter than the depth of the recess, and the base of the rotator at its junction with the disk is slightly rounding and enlarged, so that 45 it will act to enlarge the upper end of the nut *t*, and wedge it firmly into its cylinder in case it should partially unscrew, so that the said enlarged part of the rotator comes in contact with such nut. The rotator is also strengthened 50 by this enlargement of its base. It is necessary that the screw *C* hold the engine firmly, and that there be not any looseness at the crank where the screw passes through and is turned within the arm or support *H*. 55 I screw the crank *I* upon the end of the screw *C*, so that the eye *K* is between the collar *L* of the screw and the crank, and the crank can be screwed up from time to time as the parts wear; but it is necessary to tighten the crank 60 upon the screw; in order that the crank may not become loose and unscrew. To effect this I introduce a key, *M*, in the eye of the crank, as seen in Fig. 9. There is a nut, *N*, at the end of the key, and in the side of the key next 65 to the screw there is a concavity or recess,

and in the surface there are screw-threads corresponding to the screw-threads cut inside the crank-eye; hence when the key is tightened up by the nut the screw is clamped so 70 firmly by the key that the screw can be turned either way by the crank without risk of the eye of the crank unscrewing.

I claim as my invention—

1. The combination, with the cylinder and piston, of a cylinder-head with a conical exterior surface, and a ring surrounding such 75 head, and bolts for attaching the same, substantially as set forth.

2. The combination, with the cylinder and the piston and piston-rod, of a cylinder-head 80 made in two parts, a ring surrounding the head, and bolts securing the head in place, substantially as specified.

3. The combination, with the cylinder, piston, and piston-rod, of the divided head having a recess for the packing, and a follower 85 for securing the packing in place, and a ring around the head, and attaching-bolts, substantially as set forth.

4. The combination, with the steam-cylinder and piston and rod, of two heads the surfaces of which are conical, rings surrounding 90 such heads, and connecting-bolts, substantially as set forth.

5. The combination, with the adjusting-screw, of a nut having an eccentric flange, and a sleeve for the reception of the nut, with 95 an eccentric recess for the flange, substantially as set forth.

6. In combination with the steam-cylinder, 100 piston, and rotator, an independent disk between the disk of the rotator and the head of the cylinder, substantially as set forth.

7. The rotator having a head, in combination with the frictional disk, keys or pins to 105 cause the disk and rotator to turn together, a head having a bearing for the disk, and a hole to the external atmosphere, and the cylinder and piston of a rock-drill, substantially as specified. 110

8. The combination, with the rock-drill piston, of a nut screwed into the piston, a rotator passing through such nut, having a disk 115 at the end of the rotator, and an enlargement at the junction of the rotator and its disk, for the purposes and as set forth.

9. The combination, with the screw *C*, the arm *H*, and the collar *I* on the screw, of a crank-arm the eye of which is screwed upon 120 the screw *C*, the key *M*, passing across the eye, and having a threaded recess on one side, and the nut to draw the key up and clamp the screw, as specified.

Signed by me this 11th day of February, A. D. 1884.

GEO. M. GITHENS.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.