

Aug. 21, 1934.

A. G. SLATCHER

1,970,775

FLUID OPERATED TOOL

Filed Dec. 5, 1931

2 Sheets-Sheet 1

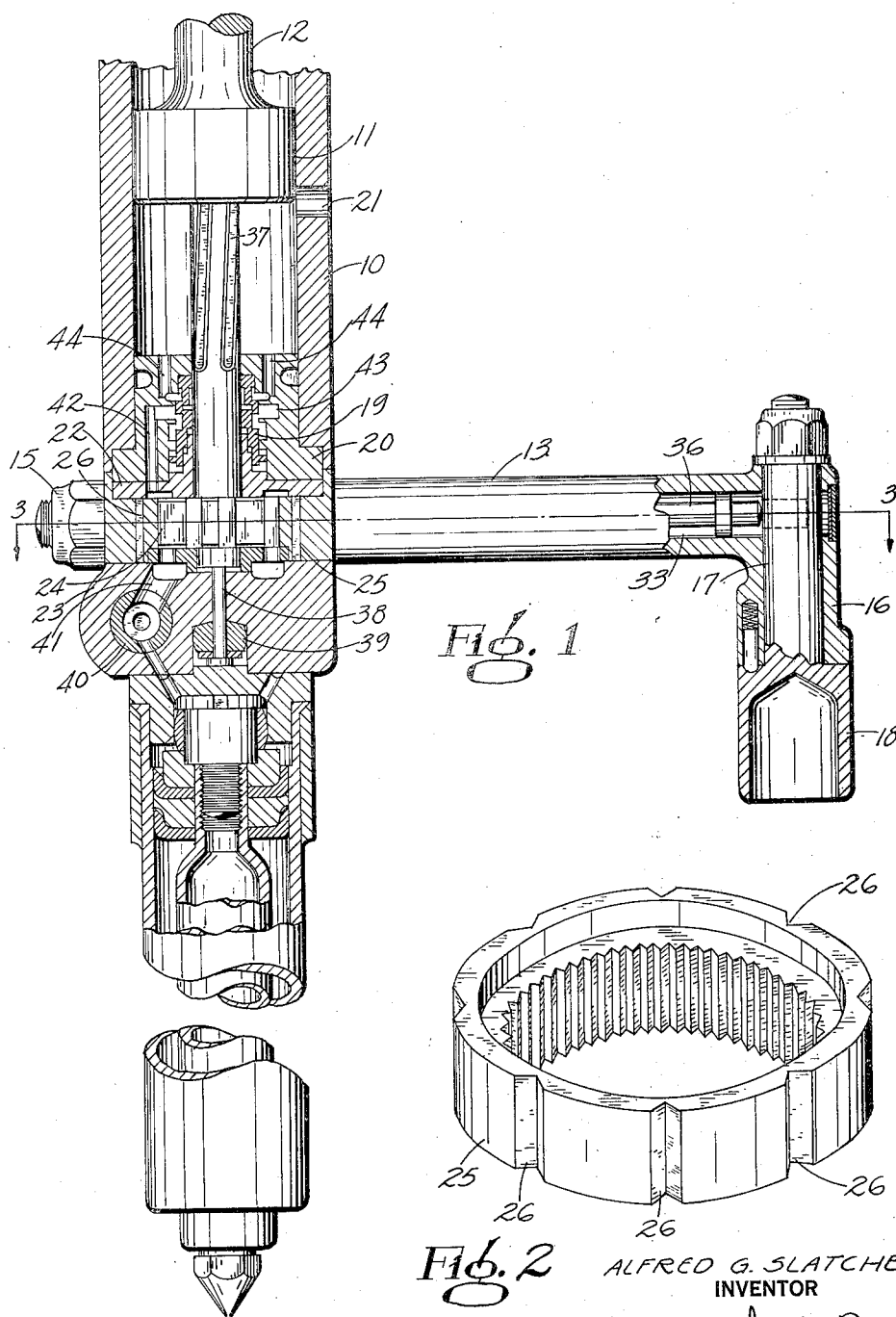


FIG. 1

FIG. 2

ALFRED G. SLATCHER
INVENTOR

BY *John E. Penfer*
ATTORNEY

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2 Sheets-Sheet 2

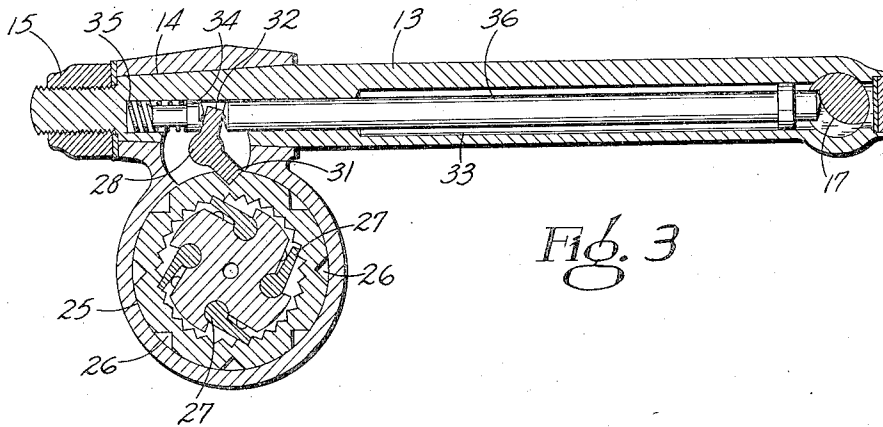


Fig. 3

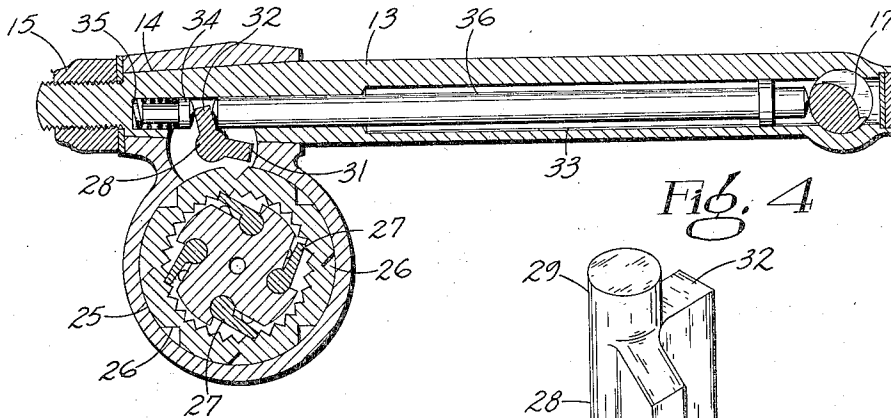
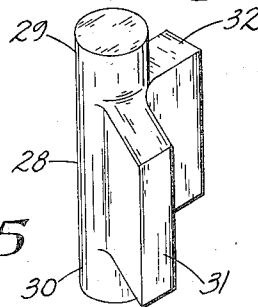


Fig. 4

Fig. 5



ALFRED G. SLATCHER
INVENTOR

BY *John E. Rumpf*
ATTORNEY

UNITED STATES PATENT OFFICE

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FLUID OPERATED TOOL

Alfred G. Slatcher, Cleveland, Ohio, assignor to
The Cleveland Rock Drill Company, Cleveland,
Ohio, a corporation of Ohio

Application December 5, 1931, Serial No. 579,216

8 Claims. (Cl. 121-7)

This invention relates broadly to fluid operated tools of the percussive type and more specifically to improvement therein which embody mechanism for effecting the rotation of the cutting tool.

One object of this invention is to provide mechanism within a fluid actuated tool which will facilitate the positive rotative drive of the cutting tool or the frictional engagement thereof.

Another object of this invention is to provide a fluid operated tool with a frictional driving mechanism which can be readily manipulated by the operator when the rotative movement of the cutting tool becomes restrained while drilling rock or similar material of a variable density.

Other objects more or less ancillary to the foregoing and the manner in which all the various objects are realized will appear in the following description.

In the drawings:

Fig. 1 is a vertical sectional view of a pneumatic tool illustrating a preferred embodiment of the invention.

Fig. 2 is an enlarged detail illustration in perspective of the ratchet ring.

Fig. 3 is a transversal sectional view taken upon a plan indicated by line 3-3 in Fig. 1 illustrating the locking member in engaged relation with the ratchet mechanism.

Fig. 4 is a view similar to Fig. 3 illustrating the locking member in disengaged relation with the ratchet mechanism.

Fig. 5 is an enlarged detail illustration in perspective of the locking member.

The fluid actuated tool herein chosen for the purpose of illustrating the invention embodies a stope drill of the hammer type which comprises a cylinder 10 within which is reciprocally mounted a piston 11 having an extended stem portion 12, operatively associated with a drill steel or cutting tool in the usual manner. The cylinder body is formed to accommodate the support of a handle 13 which is mounted thereon with a tapered socket 14 being held in place by a screw threaded nut 15. Adjacent of the handle 13 there is a vertically disposed casing 16 in which is mounted a cam 17 having a rotatable control knob or grip 18. The cam 17 is machined in such a manner as to provide a straight portion or stop 17', the purpose of which will be explained later.

Within the cylinder 10 there is a valve 19 which is organized to effect the distribution of the compressed fluid. The valve is mounted for reciprocative movement within a valve block 20 the latter being fitted snugly within the cylinder

10. The movement of the valve 19 and the consequential reciprocative movement of the piston 11 are effected in a manner common to tools of this type and since the operation of this portion of the mechanism forms per se no part of the present invention no further description of these elements need be given here further than to direct attention to an orifice or exhaust port 21 in the cylinder 10 which is arranged in relation to the mean and extreme position of the piston strokes to afford communication between the cylinder and atmosphere during the operation of the piston.

Adjacent the valve block 20 and interposed between bearing plate 22 and the head block 23 there is a ratchet mechanism 24 comprising a toothed ring 25 provided with a plurality of external recesses 26, and a plurality of pawls 27. The pawls are adapted to engage the teeth of the ratchet and the ring is restrained from rotation by a hand operated locking mechanism comprising a pawl 28 formed with two trunnions 29 and 30 rotatably supported with the cylinder body 10 and provided with a wing 31 capable of engagement with the recesses 26 and operable by a second wing or blade 32 extending within the handle 13. The handle 13 is provided with a bore 33 within which there is located a plunger 34 subjected to the effort of a compression spring 35 for constant engagement with the blade 32 tending to move the pawl 28 in a clockwise direction and consequently maintaining the wing 31 in engagement with the recess 26. Slidably mounted within the handle bore 33 there is a push rod 36 having its leftward end in constant engagement with the other side of the blade 32 and its rightward end engageable with the cam 17 rotatably disposed within the end of the handle 13. A rifled stem 37 is coordinated with the ratchet ring 25 and is maintained within the head of the piston 11 in a bore of complementary configuration. The ratchet and its appurtenances effectuate the rotative movement of the piston and in turn the cutting tool or drill during the reciprocation movement of the piston.

The head block 23 is formed to support a water tube 38 and a packing gland 39 which is provided to convey water or air to the cutting tool in accordance with the practice common in a mechanism of this type. A throttle valve 40 is provided to control the supply of compressed fluid admitted to the machine.

In the practice of this invention, compressed fluid is admitted through the port 41 where it flows through the ratchet mechanism 24 to the valve

19 by way of ports 42. The reciprocative movement of the piston 11 is effected by the intermittent flow of fluid into the cylinder 10, as controlled by the valve 19 by way of recess 43 and ports 44. By maintaining the cam 17 in the position illustrated in Fig. 4 the rod 36 bears against the blade 32 and acts against the tension of the compression spring 35 to maintain the wing 31 out of engagement with the recess 26 thus permitting the ring 25 to rotate relative to its casing. Since the ring 25 is fitted snugly within its seat it may remain in a stationary position until the tool engages a material which will offer sufficient resistance to overcome the frictional engagement of the ratchet ring within its bearing seat.

The wing 31 may be moved into engagement with the ratchet ring or the recess 26 by turning the cam 17 or its integral knob 18 in a counterclockwise direction, thus allowing the rod 36 to be moved toward the right by the effort of the compressed spring plunger 34 acting upon the blade 32 causing a consequential rotation of the pawl 28 in a clockwise direction and permitting the wing 31 to drop into one of the recesses 26 thus securing the ring to its casing and affecting the ratchet function (see Fig. 3). The rotation of the cam in the counterclockwise direction is limited by the engagement of the straight portion or stop 17' with the side of the push rod 36, preventing thereby the cam to be rotated past the normal position with respect to the rod 36.

The pawl 28 is positioned in respect to the ratchet ring 25 in such a manner as to transform the torque applied to the ratchet ring into a radial force applied upon the trunnions 29 and 30 thus overcoming a possible disengagement of the wing 31 with the ratchet ring and precluding any stress to be applied upon the spring 35 during the engagement of the wing 31 within the recess 26. The cam 17 is preferably arranged in respect to the direction of the rotation of the tool in the manner shown in the drawings so that the knob 18 may be turned in the direction of the rotation of the tool to establish the leftward movement of the rod 36 against the spring 35 and disengage the wing 31 from the ratchet ring. In this manner, the operator may hold the knob 18 stationary and when the handle 13 tends to move away from the operator due to a seizure of the tool in the hole being drilled, the knob 18 will be automatically turned to the position shown in Fig. 4 to release the rotation mechanism.

Although the foregoing description is necessarily of a detailed character, in order to completely set forth the invention, it is to be understood that the specific terminology is not intended to be restrictive or confining and it is to be further understood that various rearrangements of parts and modification of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. In a rock drill, a cylinder, a piston reciprocating therein, a rotation mechanism coordinated with said piston, said rotation mechanism comprising a ratchet ring rotatable within said cylinder, a rifle stem and pawls operatively connecting said ring and stem, a handle supported by said cylinder and extending therefrom and having a passage therein, a mechanically operated locking member associated with said ring and extending within said passage in said handle and a rotatable cam normal to said handle and supported thereby in rigid connection with said

member through said passage for actuating said member.

2. A stop drill comprising a casing adapted to receive a tool, a rotation mechanism within said casing for producing a relative rotation between said casing and said tool, a handle adapted to be manually held for restraining said casing against rotation, means within said casing and handle for rendering said rotation mechanism inoperative, a grip rotatably mounted on said handle, a cam associated with said grip and said means for actuating the latter when said handle revolves about the axis of the drill and said grip is held against rotation about its own axis, and further means for returning said first mentioned means in its former position.

3. A rock drill comprising a casing adapted to receive a tool, a cylinder having a piston reciprocable therein, a rotation mechanism including a ratchet ring rotatably mounted in said cylinder, a rifled stem engaged with said piston, and pawls operatively connecting said ring and said stem for producing a relative rotation between said casing and said tool, a handle adapted to be manually held for restraining said casing against rotation, a locking member mounted in said cylinder and movable into or out of engagement with said ratchet ring, a grip rotatably mounted on said handle, means within the handle and associated with said grip and said locking member for actuating the latter out of locking engagement with said ratchet ring when said handle revolves about the axis of said drill, and further means for returning said member into locking engagement with said ratchet ring.

4. A rock drill comprising a casing adapted to receive a tool, a cylinder having a piston reciprocable therein, a rotation mechanism including a ratchet ring rotatably mounted in said cylinder, a rifled stem engaged with said piston, and pawls operatively connecting said ring and said stem for producing a relative rotation between said casing and said tool, a handle adapted to be manually held for restraining said casing against rotation, a locking member mounted in said cylinder and movable into or out of engagement with said ratchet ring, a grip rotatably mounted on said handle, means within the handle and associated with said grip and rigidly connected to said locking member for actuating the latter out of engagement with said ratchet ring when said handle revolves about the axis of said drill, and spring pressed plunger in constant engagement with said locking member for returning the latter into engagement with said ratchet ring.

5. In a rock drill, a cylinder having a piston reciprocable therein and capable of rotation, a rotation mechanism coordinated with said piston, said rotation mechanism comprising a rotatable ratchet ring, a rifle stem and pawls operatively connecting said ring and stem, a handle adapted to be manually held for restraining said drill against rotation, a passage within said handle, a locking member associated with said ring and extending within said passage, means within said passage for constantly urging said locking member into locking engagement with said ring, and a rotatable member constituting a portion of said handle in rigid connection with said locking member through said passage adapted to be grasped by the operator for actuating said locking member out of locking engagement with said ring.

6. In a rock drill, a cylinder having a piston reciprocable therein and capable of rotation, a rotation mechanism coordinated with said piston, a

said rotation mechanism comprising a rotatable ratchet ring, a rifle stem and pawls operatively connecting said ring and stem, a handle supported by said cylinder and extending therefrom,	
5 a passage within said handle, a locking member associated with said ring and extending into said passage, a rod member slidable within said passage associated with said locking member, a rotatable cam capable of engagement with said rod member for moving the latter away from said	
10 cam and thereby urging said locking member out of engagement with said ratchet ring, and resilient means within said passage for urging said locking member into engagement with said	
15 ratchet ring and simultaneously returning said rod member toward said cam.	
7. In a rock drill, a cylinder having a piston reciprocable therein and capable of rotation, a rotation mechanism coordinated with said piston,	
20 said rotation mechanism comprising a rotatable ratchet ring, a rifle stem and pawls operatively connecting said ring and stem, a handle supported by said cylinder and extending therefrom,	
25 a passage within said handle, a locking member extending into said passage rotatable into or out of locking engagement with said ratchet ring, a cam connected to said locking member, said cam being rotatable in one direction for rotating said locking member in a direction common to the	
	direction of rotation of said ratchet ring, affording thereby the disengagement of said locking member with said ratchet ring, and means for returning said locking member into engagement with said ratchet ring subsequent to the rotation of said cam in its original position.
	8. In a rock drill, a cylinder having a piston reciprocable therein and capable of rotation, a rotation mechanism coordinated with said piston, said rotation mechanism comprising a rotatable ratchet ring, a rifle stem and pawls operatively connecting said ring and stem, a handle adapted to be manually held for restraining said drill against rotation, a slidable member within said handle, a locking member associated with said ring and said slidable member, a spring actuated member associated with said locking member for normally maintaining the latter in locking engagement with said ring, a rotatable member in constant engagement with said slidable member capable of rotation in one direction for actuating said locking member out of locking engagement with said ring, and rotatable in the other direction for permitting said locking engagement, and means on said rotatable member engageable with said slidable member for limiting the rotation of the former in one direction.
	ALFRED G. SLATCHER.
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