D. S. WAUGH.

ROTATING MEANS FOR DRILLS.

APPLICATION FILED JAN. 21, 1914.

1,196,052.

Patented Aug. 29, 1916.

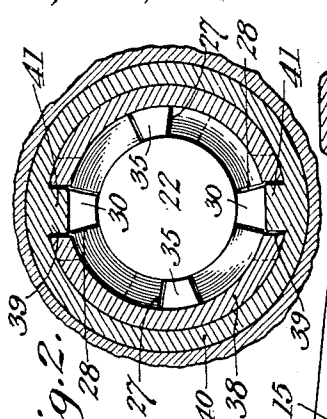


Fig. 2.

Fig. 1.

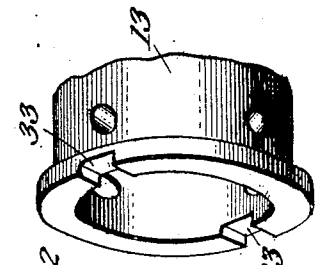


Fig. 6.

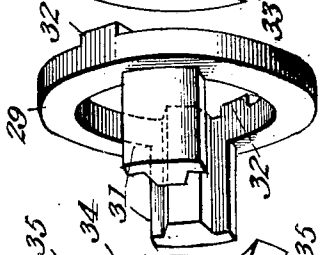


Fig. 5.

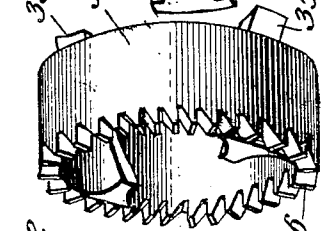


Fig. 4.

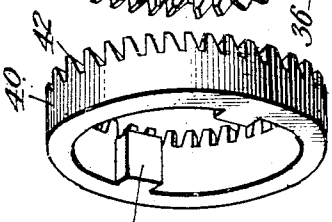


Fig. 3.

WITNESSES

E. G. McCarthy

P. H. Ross

INVENTOR,

Daniel S. Waugh.

by

Attorney

UNITED STATES PATENT OFFICE.

DANIEL S. WAUGH, OF DENVER, COLORADO, ASSIGNOR TO THE DENVER ROCK DRILL MANUFACTURING COMPANY, OF DENVER, COLORADO, A CORPORATION OF DELAWARE.

ROTATING MEANS FOR DRILLS.

1,196,052. Specification of Letters Patent. Patented Aug. 29, 1916.

Application filed January 21, 1914. Serial No. 813,522.

To all whom it may concern:

Be it known that I, DANIEL S. WAUGH, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented new and useful Improvements in Rotating Means for Drills, of which the following is a specification.

The present invention relates more particularly to means for rotating the drill bit of a drilling machine actuated by expansive motive fluid, and one of the principal objects is to provide a simple, practical mechanism that will occupy but comparatively little space, so that the machine, as a whole, is reduced to relatively small size.

The preferred embodiment of the invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a longitudinal sectional view of a machine equipped with the novel mechanism. Fig. 2 is a cross sectional view on the line 2—2 of Fig. 1. Figs. 3, 4, 5 and 6 are detail perspective views of certain of the elements for effecting a step-by-step rotation of the chuck.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

In the embodiment illustrated, a cylinder member is employed, and is designated generally by the reference numeral 7. It is provided with a bore having sections 8, 9 and 10 that are of respectively different diameters, forming internal shoulders 11 and 12.

A chuck sleeve 13 is rotatably mounted in the cylinder member, being composed of sections or portions 14 and 15 of different diameters, forming an external shoulder 16 that coöperates with the internal shoulder 12 of the cylinder member. The rear end of this sleeve has a peripheral flange 17 that is disposed in rear of the internal shoulder 11. The front of this sleeve 13 projects beyond the front end of the cylinder member, and is preferably screw threaded. This projecting end receives a chuck bushing 18 provided with a peripheral flange 19 that abuts against the end of the sleeve. Threaded on the projecting end of the said sleeve 15 is a cap 20, the rear end of which abuts against the front end of the cylinder member, thus preventing any material rearward movement of the sleeve within the cylinder member, and said cap furthermore has an overhanging flange 21 that bears against the front face of the flange 19, consequently holding the bushing 18 in place.

A piston 22 reciprocates in the cylinder member 7, its main portion operating in the rear portion of the sleeve 13. It is actuated by motive fluid supplied through a suitable throttle valve 23 to an automatic distributing valve 24, which alternately controls the passage of said motive fluid to opposite ends of the piston through passageways 25 and 26, and in like manner permits the exhaust alternately through said passageways. This distributing and controlling means is made the subject-matter of a separate application, Serial No. 807,676, and it is therefore believed to be unnecessary to describe it herein.

The piston 22 has cut in the body thereof, and extending from the rear end, diagonally disposed keyways 27 and longitudinal keyways 28. A key element, in the form of a ring 29, has keys 30 engaged in the longitudinal keyways 28, said keys 30 being partly carried by extensions 31 projecting rearwardly from the ring 29. This ring 29 has on its front face projecting lugs 32 engaged in sockets 33 formed in the rear end of the sleeve 13. It will thus be seen that the sleeve 13, the ring 29, and the piston will rotate together. Another ring 34, surrounding the extensions 31 of the ring 29, is provided with oblique or diagonal keys 35 that are engaged in the keyways 27, and this ring 34 has ratchet teeth 36 cut in its rear edge. The rear end of the cylinder member 7 is closed by a head 37, and said head has a tubular extension 38 that receives the rear end of the piston 22 on its rearward stroke, such extension being spaced from the wall of the bore portion 8 of the cylinder member, and being furthermore provided in its front portion with longitudinal slots 39. A ratchet ring 40, slidably mounted on the front portion of the tubular extension 38, has inwardly extending feathers 41 slidably engaged in the slots 39. The keys 35, it will be noted by reference to Figs. 1 and 4 extend rearwardly substantially to the outer ends of the ratchet teeth 36, and will thus bear against the inner end of the extension 38, preventing the rearward movement of the ring 34 with the ring 40. As a result, the ring 40, though capable of sliding movement, is held against rotation, and said ring is provided on its front edge with ratchet

teeth 42 that interengage with the teeth 36 of the key element 34. A coiled spring 43, surrounding the rear portion of the extension 38 and interposed between the head and the ring 40, urges the same forwardly.

Briefly described, the operation of the structure is as follows: Assuming the piston 22 in its foremost position, as shown, motive fluid under pressure will pass through the passageway 26 against the front end of said piston, thus driving it rearwardly, while the exhaust will take place in rear of the piston through the passageway 25. During this rearward movement, the ring 34 will be locked against rotation by the interfitting teeth 36 and 42, and the angular keys 35 of such ring will thus cause the piston 22 to partially rotate. As already explained, when said piston rotates, the ring 29 and the sleeve 13 must rotate with it. As a consequence, the drill chuck is given a partial rotation, and a drill bit, as 44, located therein, will in like manner be partially rotated. On the forward movement, the ring 34, tending to rotate in an opposite direction, will force back the ring 40, so that the teeth will pass each other, and the piston will thus move without rotation, being driven forwardly by motive fluid supplied to the passageway 25, while the exhaust now takes place through the passageway 26. At the completion of its forward movement, it will strike against the tappet 45, which will transmit the blow to the drill bit 44. The rapid reciprocation of the piston will therefore effect a step-by-step rotation of the chuck, and consequently of the drill bit located therein.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a structure of the character described, the combination with a cylinder member, of a sleeve having a unitary tubular wall and rotatably mounted therein, a bit holding bushing in the front portion of the sleeve, a piston body operating in the rear portion of the sleeve, and means actuated by the piston body for rotating the sleeve, and said sleeve constituting means for transmitting the rotary motion to the bit holding bushing.

2. In a structure of the character described, the combination with a cylinder member, of a sleeve rotatably mounted therein and projecting therefrom, a bit holding means located in the projecting portion of the sleeve and retaining means for the bit holding means on the projecting portion of the sleeve, a piston body operating in the rear portion of the sleeve, and means actuated by the piston body for rotating the sleeve and thereby the bit holding means.

3. In a structure of the character described, the combination with a cylinder member, of a sleeve having a unitary tubular wall and rotatably mounted therein, a bit holding bushing mounted on the front end of the sleeve, a piston operating in the rear end of the sleeve, a tappet interposed between the piston and bushing and located in the sleeve, and means for rotating the sleeve, said sleeve constituting means for transmitting the rotary motion to the bushing from the piston.

4. In a structure of the character described, the combination with a cylinder member, of a sleeve rotatable in the cylinder member and having a reduced front portion projecting therefrom, a bit holding bushing fixed in the front end of the sleeve, means mounted on the projecting end of the sleeve for securing the bushing in place, a piston operating in the rear portion of the sleeve, a tappet located in the sleeve and interposed between the piston and bushing, said tappet being mounted in the reduced portion of the sleeve and projecting into the enlarged portion thereof, and means engaged by the piston for automatically rotating the sleeve and thereby the bushing.

5. In a structure of the character described, the combination with a cylinder member, of a piston operating therein and having angularly disposed keyways in its rear portion, relatively rotatable rings having key elements engaged in said keyways, and a connection between one of the rings and the chuck.

6. In a structure of the character described, the combination with a cylinder member, of a piston operating therein and having angularly disposed keyways in the rear portion of its body, relatively rotatable rings through which the rear portion of the piston operates, said rings having keys engaged in the keyways, and a connection between one of the rings and the chuck.

7. In a structure of the character described, the combination with a cylinder member, of a piston operating therein and having angularly disposed keyways in the rear portion of its body, relatively rotatable rings through which the rear portion of the piston operates, said rings having keys engaged in the keyways, a connection between one of the rings and the chuck, and a ratchet mechanism engaged with one of the rings to effect its step-by-step rotation in one direction.

8. In a structure of the character described, the combination with a cylinder member, of a piston operating therein and having angularly disposed keyways in its rear portion, a chuck sleeve, a key element rotatable with the chuck sleeve and engaged in certain of the keyways of the piston, another key element engaged in the other keyways, and a ratchet mechanism engaged with one of the key elements to effect its step-by-step rotation in one direction.

9. In a structure of the character described, the combination with a cylinder member, of a piston operating therein and having angularly disposed keyways in its rear portion, a chuck sleeve, a key element rotatable with the chuck sleeve and engaged in certain of the keyways of the piston, another key element engaged in the other keyways, and a ratchet mechanism coöperating with the latter element to effect a step-by-step rotation of the sleeve.

10. In a structure of the character described, the combination with a cylinder member, of a rotatable chuck sleeve located therein, a piston reciprocating in the sleeve and having longitudinal and angular keyways in its body, a ring interlocked with the rear end of the sleeve and having keys engaged in one set of keyways, a ratchet ring having keys engaged in the other set of keyways, and a second ratchet ring coacting with the first ring and disposed in rear of the same.

11. In a structure of the character described, the combination with a cylinder member, of a rotatable chuck sleeve therein, a piston having keyways, a rear head for the cylinder member, a key element carried by the sleeve and interposed between the same and the head, said key element being engaged in certain of the keyways, another key element surrounding the first key element and engaged in certain of the keyways of the piston, and ratchet mechanism mounted on the head and engaging the last key element.

12. In a structure of the character described, the combination with a cylinder member, of a rotatable chuck sleeve located therein, a piston operating in the sleeve and having angularly disposed keyways in its body, a rear head in the cylinder member having a projecting portion extending into the cylinder member in spaced relation to the walls thereof, a key element carried by the sleeve and engaged in certain of the keyways, another key element surrounding the first mentioned element and engaged in the other keyways, said latter key element having ratchet teeth on its rear end, a ratchet ring surrounding the extension and having teeth coöperating with the teeth of the key element, and a spring mounted on the head and bearing against the ratchet ring to urge the same forwardly.

13. In a structure of the character described, the combination with a cylinder member having a longitudinal bore, of a sleeve journaled in the cylinder member and projecting therefrom, a bushing in the sleeve, and common means mounted on the projecting portion of the sleeve and engaging the bushing for holding the sleeve in position on the cylinder member and holding the bushing in position on the sleeve.

14. In a structure of the character described, the combination with a cylinder member having a longitudinal bore provided with an internal shoulder, of a chuck sleeve journaled in the cylinder member and having an external shoulder coöperating with the internal shoulder of the cylinder member, said sleeve projecting beyond the cylinder member, a bushing located in the front end of the sleeve and having a flange abutting against the same, and a cap mounted on the projecting end of the sleeve and cooperating with the front end of the cylinder member, said cap overhanging the flange of the bushing.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

DANIEL S. WAUGH.

Witnesses:
JAS. R. ELMENDORF,
C. E. FISKE.