July 4, 1939. J. E. RENFER 2,164,886

WATER TUBE FOR ROCK DRILLS

Filed Dec. 17, 1937

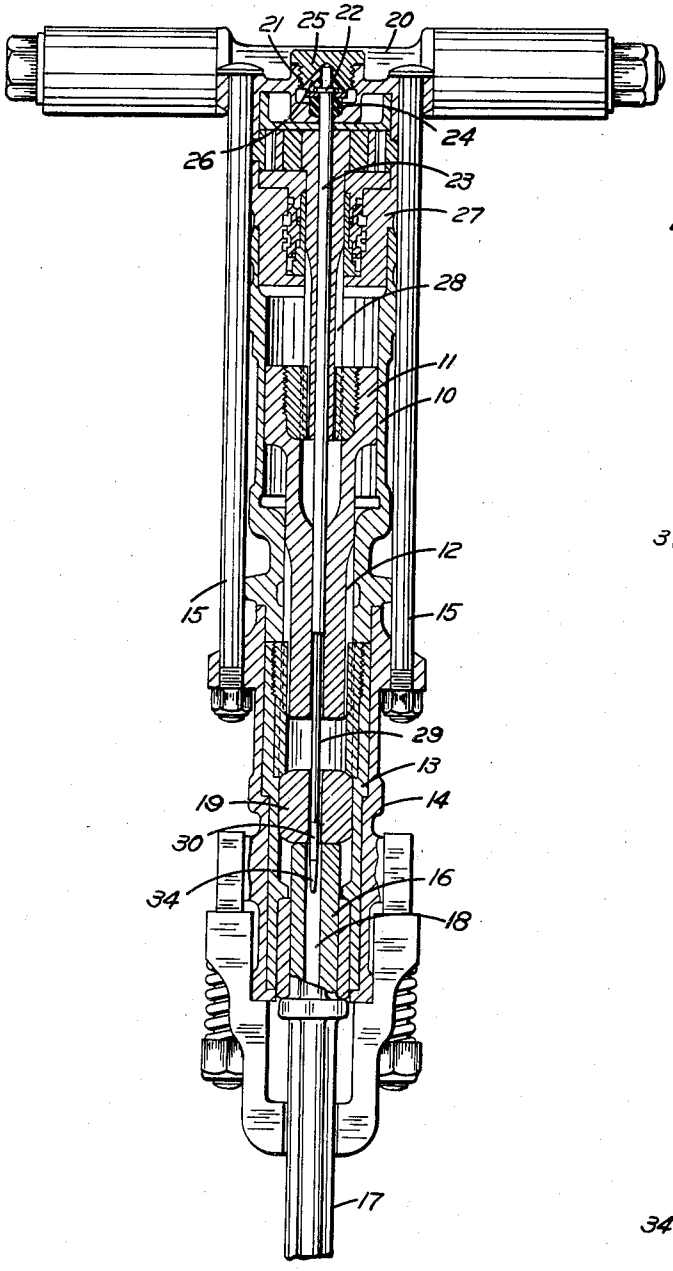


Fig. 1



Fig. 3

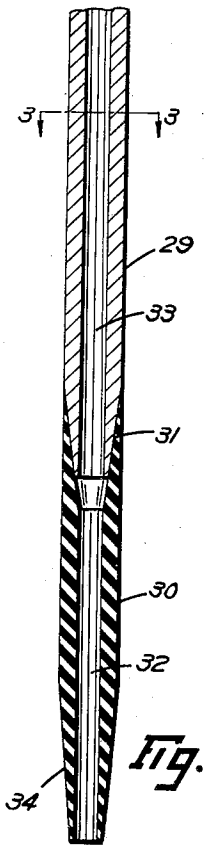


Fig. 2

INVENTOR

Patented July 4, 1939 2,164,886

UNITED STATES PATENT OFFICE

2,164,886

WATER TUBE FOR ROCK DRILLS

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Application December 17, 1937, Serial No. 180,311

8 Claims. (Cl. 121—10)

This invention relates broadly to rock drills, but more particularly to an improved cleansing fluid conveying tube construction for rock drills of the reciprocatory hammer type.

Rock drills of the fluid actuated reciprocatory hammer type are usually equipped with a tube extending longitudinally through the machine for conveying cleansing fluid such as water or compressed air into the hollow drill steel for washing or blowing clean the bottom of the drilled hole. This tube which is generally of a quarter of an inch in diameter, is of sufficient length to extend partway into the hollow shank of the drill steel, thereby preventing excessive leakage of the cleansing fluid between the tube and the shank of the drill steel irrespective of the rotary and limited longitudinal movement of the drill steel relative to the tube.

In practice however, when using drill steels formed with imperfect shanks, such as shanks having the hole therethrough eccentric relative to the tube, the end of the tube is likely to be bent by the shank, thus causing the piston or tappet delivering blows on the shank to literally upset the end of tube, thereby preventing the flow of the cleansing fluid through the tube and rendering the removal of the tube from the machine very difficult.

It is therefore one object of this invention to produce a cleansing fluid conveying tube formed with a flexible terminal adapted to fit into the drill steel shank even though the hole extending therethrough is located in eccentric relation relative to the center axis thereof.

Another object of this invention is to produce a tube of the class above mentioned with a terminal or extension penetrating partway into the drill steel shank, and adapted to be moved thereby without danger of damaging the tube.

Other objects of this invention will be apparent from the following detailed description wherein characters of reference designate corresponding parts and wherein:

Fig. 1 is a longitudinal sectional view of a rock drill embodying the invention.

Fig. 2 is an enlarged longitudinal view of the end of a cleansing fluid conveying tube constructed in accordance with the invention.

Fig. 3 is a cross sectional view taken in a plane indicated by line 3—3 in Fig. 2.

Referring to the drawing, 10 represents a rock drill cylinder having a fluid actuated hammer 11 reciprocable therein and formed with a splined stem 12 operatively associated with a chuck sleeve 13, which sleeve is rotatably mounted within a front housing 14 secured to the cylinder 10 by side bolts 15. Slidably mounted within the front end of the sleeve 13, there is the shank 16 of a drill steel 17 having a hole 18 extending longitudinally therethrough. In practice the rock drill front end construction may also include a tappet 19 interposed between the end of the hammer stem 12 and the shank 16 for delivering the impacts of the hammer to the drill steel, or that tappet may be eliminated to permit the direct delivery of impacts from the hammer to the drill steel.

Secured to the upper end of the cylinder 10 by the bolts 15, there is a back head 20 formed with a screw threaded bore 21 accommodating the head 22 of a tube 23, which head is clamped against a packing 24 by a removable plug 25 screwed within the bore 21. Formed within the plug 25 there are passages 26 for admitting cleansing fluid from the bore 21 into the tube 23.

Also located within the upper end of the cylinder 10, there is a valve block 27 and a rotation mechanism including a stem 28 operatively associated with the hammer 11 for imparting rotation thereto, which rotation is transmitted to the drill steel 17 through the chuck sleeve 13.

The tube 23 is preferably made of metal and extends longitudinally into the machine through the stem 28, the cylinder 10, the hammer 11 and the tappet 19, for limited penetration into the shank 16 of the drill steel 17. With the stem 28 and at least one portion of the hammer 11, the tube 23 is in close fit engagement to prevent escape of the motive fluid therebetween, while the front end portion 29 of the tube is preferably slightly reduced in diameter to provide a clearance between the tube and the outer end portion of the hammer stem 12, thereby preventing any slight burr or the like which may be formed on the striking force of the hammer and around the tube, from scoring and damaging the tube.

Referring now more particularly to the invention, 30 represents the terminal or extension of the tube 23, which is preferably made of flexible rubber rigidly attached to the metal tube. To this end, the metal tube 23 is formed with a tapered end 31 affording a relatively large surface on which is glued or vulcanized the rubber terminal 30, which is mounted coaxially thereon and of a diameter equal to that of the metal tube portion adjacent thereto. The terminal 30 is also provided with a hole 32 extending longitudinally therethrough as a continuation of the hole 33 formed through the tube 23. To assure

and facilitate the insertion of the terminal **30** into the drill steel shank **16**, its outer end portion is preferably tapered as at **34**.

In practice, the length of the rubber terminal **30** is about one inch and a half, and the length of the metal tube **23** is calculated to limit the penetration of the terminal **30** into the drill steel shank **16** to about three quarters of an inch, thereby allowing variations in the length of the shank **16** without affecting the flow of the cleansing fluid from the tube **23** into the drill steel **17**.

In operation, when the tube is used with an imperfect shank or with a shank allowed to move laterally relative to the tube due to an imperfect fit between the shank **16** and the chuck sleeve **13**, the portion of the rubber terminal within the shank will move with the shank, while the other portion thereof between the end of the shank **16** and the end **31** of the metal tube **23** will bend or flex without damaging the tube nor affecting the flow of the cleansing fluid from the tube into the drill steel **17**.

I claim:

1. A device of the character described including a metal tube formed with a flexible terminal of a diameter equal to the portion of said tube adjacent thereto.

2. A device of the character described including a metal tube formed with a flexible rubber terminal integrally attached thereto and of a diameter equal to the portion of said tube adjacent to said terminal.

3. A device of the character described including a metal tube formed with a tapered end portion, and a terminal made of flexible material integrally attached to the tapered end portion of said tube.

4. In a rock drill the combination of a cylinder, of a hammer reciprocating therein, of a front housing and a hollow drill steel shank slidable within said housing, and a cleansing fluid conveying tube extending through said cylinder and hammer, said tube being made of metal and formed with a flexible rubber terminal extending partway into said drill steel shank.

5. In a rock drill the combination of a cylinder, of a hammer reciprocating therein, of a front housing and a hollow drill steel shank slidable within said housing, of a cleansing fluid conveying tube made of metal extending through said cylinder and hammer with one end located within said housing falling short of said shank, and an extension for said tube carried by the aforesaid end thereof, said extension being made of flexible material and extending into said shank.

6. A cleansing fluid conveying tube for rock drills formed with a front end portion of uniform diameter including a terminal made of resilient material.

7. In a rock drill the combination with a cylinder, of a front housing and a hollow drill steel shank slidable within said housing, and a rigid tube extending through said cylinder formed with a terminal made of flexible material extending partway into said drill steel shank.

8. In a rock drill the combination of a cylinder with a front housing having a hollow drill steel shank slidable therein; a rigid tube within said cylinder falling short of said shank, and a flexible terminal for said tube extending from one end thereof into said shank.

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