

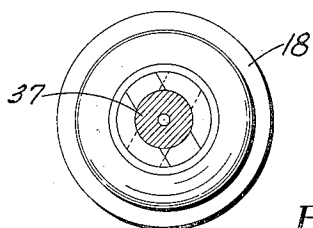
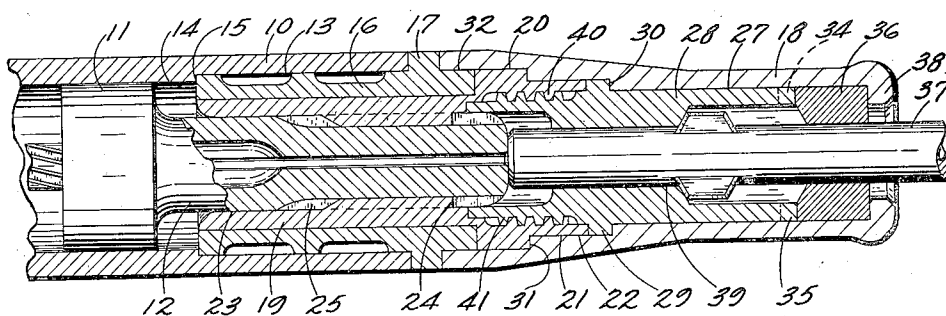
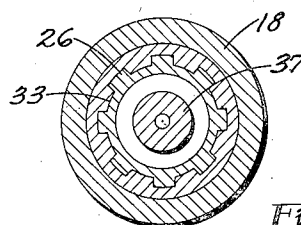
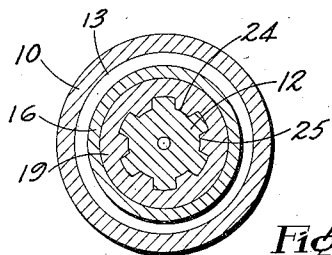
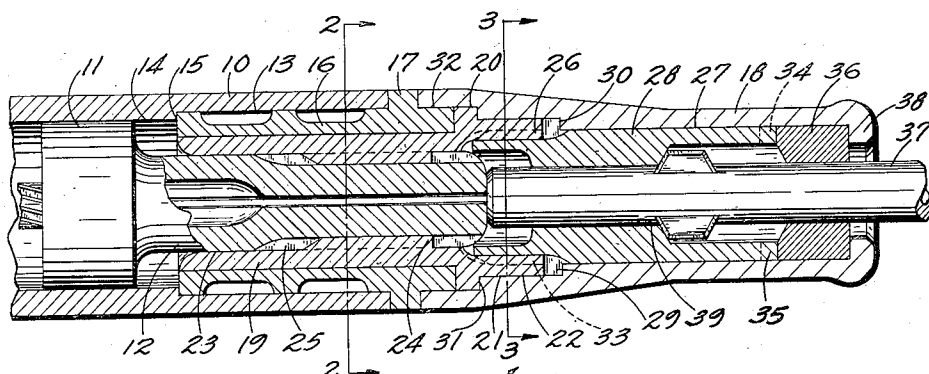
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FRONT END CONSTRUCTION FOR ROCK DRILLS

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FRONT END CONSTRUCTION FOR ROCK DRILLS

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2 Claims. (Cl. 121—32)

This invention relates to rock drills but more particularly to the front bearing construction for rock drills of the hammer type.

Considerable trouble has been experienced with rock drills having a hammer formed of differential diameters. It has been found that due to the torque applied to the hammer during its rearward stroke, the hammer stem is forced radially against its bearing. In the common practice, that bearing is usually of the stationary type affording a reciprocatory as well as a rotary bearing for the hammer stem and is necessarily of a rather short length to accommodate the other working parts of the mechanism. The torque applied on the hammer stem as well as its longitudinal displacement creates a frictional resistance which has the tendency to cause the scoring of the stem within its bearing.

It is an object of this invention to provide a rock drill with adequate bearing means for the hammer stem thus overcoming the scoring of the stem and therefore reducing the cost of operation.

Another object of this invention is to provide a rock drill with a readily removable hammer stem bearing thus overcoming the often encountered difficulty in replacing such a part which in usual construction is generally with a pressed fit engagement within the front end of the cylinder.

Other objects more or less ancillary to the foregoing and the manner in which the various objects are attained reside in the specific construction and aggroupment of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification, in the claims of which there are assembled certain specific combinations of parts and specific constructions indicative of the scope and spirit of the invention.

In the drawing which illustrates a preferred embodiment of the invention:

Fig. 1 is a longitudinal sectional view of the front end of a rock drill, illustrating the invention.

Fig. 2 is a cross sectional view taken on a plan indicated by line 2—2 in Figure 1.

Fig. 3 is a view similar to Fig. 2 but taken on a plan indicated by line 3—3 in Figure 1.

Fig. 4 is a front elevational view partly in section.

Fig. 5 is a view similar to Figure 1 illustrating a modification of the invention.

Referring to the drawing, in which like symbols designate corresponding parts throughout

the several views, the rock drill comprises a cylinder 10 having reciprocable therein a hammer 11 being formed with an extension or stem 12. The front cylinder is provided with an enlarged counterbore 13 disposed in axial alignment with the main cylinder bore 14. Within the enlarged counterbore 13 and with a pressed fit engagement therein, there is a sleeve or spacer 16 provided intermediate its ends with an external flange 17 held in abutting relation with the outer end of the cylinder 10 and the outer end of the chuck housing 18. Rotatably mounted within the spacer 16, there is a bushing or chuck 19 having its penetration therein limited by an external flange 20 abutting against the outer end of the spacer 16 and being formed with a projection 21 rotatably mounted within a bore 22 of the chuck housing 18. The rearward end 23 of the chuck 19 is adequately machined to slidably receive and guide the hammer stem 12 and has its front end provided with a plurality of inwardly projecting ribs or flutes 24 capable of engagement with the splines 25 which are provided on the hammer stem 12, preventing thereby a relative rotation of the chuck with the hammer. Internally disposed within the projection 21, there is a plurality of flutes 26, similar to the flutes 24. Within the chuck housing bore 27, there is rotatably mounted therein a chuck jaw 28 formed with an external flange 29 having one of its sides in abutting relation with a shoulder 30 formed at the intersection of the bore 21 with the bore 27. The other side of the flange 29 is capable of engagement with the outer end of the chuck 19. The bore 21 is of sufficient depth to allow an adequate clearance between the outer end of the chuck 19 and the adjacent side of the chuck jaw flange 29, allowing thereby the rotation of the chuck 19 and chuck jaw 28 without being clamped by either the shoulder 31 or 30.

Circumferentially disposed on the end of the chuck jaw 28, there is a plurality of splines 33 capable of engagement with the flutes 26 of the chuck 19 to prevent the rotation of the chuck 19 with respect to the chuck jaw 28. The forward end of the chuck jaw 28 is provided with a plurality of jaws 34 engageable with the corresponding jaws 35 of the chuck key 36 rotatably disposed within the front portion of the chuck housing bore 27 and maintained therein by the inwardly projecting flange 38. The key 36 is manufactured to allow the passage of the lug steel or tool 37 which is slidably but non-rotatably mounted within the chuck jaw bore 39 in axial alignment with the cylinder bore 14.

In the modification of the invention, (Fig. 5) the locking means for the chuck 19 and chuck jaw 28 is attained with a screw threaded socket 40 formed in the chuck 19 and a corresponding screw threaded plug 41 formed at the rearward end of the chuck jaw 28. It is obvious that a locking means similar to the jaws 34 and 35 could be used without departing from the spirit of the invention.

10 In the operation of the rock drill, the hammer 11 is reciprocated within the cylinder 10 by fluid pressure controlled by a valve mechanism of any suitable type. Toward the end of its rearward stroke, the hammer is delivering a blow to the steel or tool 38 driving consequently the tool into the substance being drilled. During its rearward stroke, the hammer 11 is subjected to a rotative movement impelled thereto by any suitable ratchet mechanism as commonly used in machines of this type. Obviously this rotative movement will be transmitted to the chuck 19 by the engagement of the hammer splines 25 with the flutes 24 and to the drill steel 38 by the engagement of the flutes 26 with the splines 33.

25 Heretofore in devices of this character, the piston stem 12 was reciprocally mounted within a short stationary bushing which had the difficulty of maintaining an exact axial alignment of the stem 12 with the cylinder bore 14 and consequently increasing the frictional resistance within said bushing and consequently scoring the stem 12. In this improved construction, the guiding bushing for the hammer stem 12 is rotatably mounted within a long and efficient spacer 16. The torque imparted to the hammer is distributed on the full exterior surface of the chuck 19 which can be made of softer material than the spacer 16. The chuck 19 may for instance be manufactured of brass, thus preventing any noticeable wear within the spacer 16 and overcoming thereby the difficult replacement of that spacer from its pressed fitted engagement with the cylinder.

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, the combination with a cylinder having a fluid actuated hammer reciprocable therein and capable of rotation responsive to its reciprocation, said piston being formed with a head and a stem, external splines on the

front end portion of said stem, of a stationary removable bushing within said cylinder, of a sleeved member rotatable within the entire length of said bushing through which said piston stem is free to slide, of a front housing, of a chuck member rotatable within said housing formed with external splines disposed on the rear end portion thereof, a duality of sets of internal splines within said sleeved member, one of said sets of splines being capable of interengagement with the splines of said piston stem and the other of said sets of splines being capable of interengagement with the splines of said chuck member for transmitting the rotation of said piston to said sleeved and chuck members, an internal portion of said sleeved member being engageable with the unsplined portion of said piston stem for guiding the latter in axial alignment with said cylinder and taking the wear resulting therefrom, the external circumferential wall of said sleeved member cooperating with the external wall of said bushing for taking the wear resulting from the rotation of said piston.

2. In a rock drill, the combination with a cylinder having a fluid actuated hammer reciprocable therein and capable of rotation responsive to its reciprocation, said piston being formed with a head and stem, of a stationary removable bushing within said cylinder, of a sleeved member rotatable within the entire length of said bushings through which said piston stem is free to slide, external splines disposed within the front end portion of said piston stem, internal splines disposed within the middle portion of said sleeve member capable of interengagement with the splines of said piston stem for transmitting the rotation of the latter to the former, a rotatable chuck member formed with external splines engageable with other internal splines provided within the front end portion of said sleeved member for transmitting the rotation of the latter to said chuck member, the rearward internal portion of said sleeved member being engageable with the corresponding portion of said piston stem for guiding the latter in axial alignment with said cylinder and taking the wear resulting therefrom, the external circumferential wall of said sleeved member cooperating with the internal wall of said bushing for taking the wear resulting from the rotation of said piston, the rear end of said sleeved member being exposed to the pressure fluid admitted on the front end of said piston head during the actuation of the latter, the area of the exposed end of said sleeved member being less than that of the front of said piston head.

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