Jan. 3, 1961 G. R. JOHANSSON 2,967,008

FEED UNIT FOR ROCK DRILLING MACHINES

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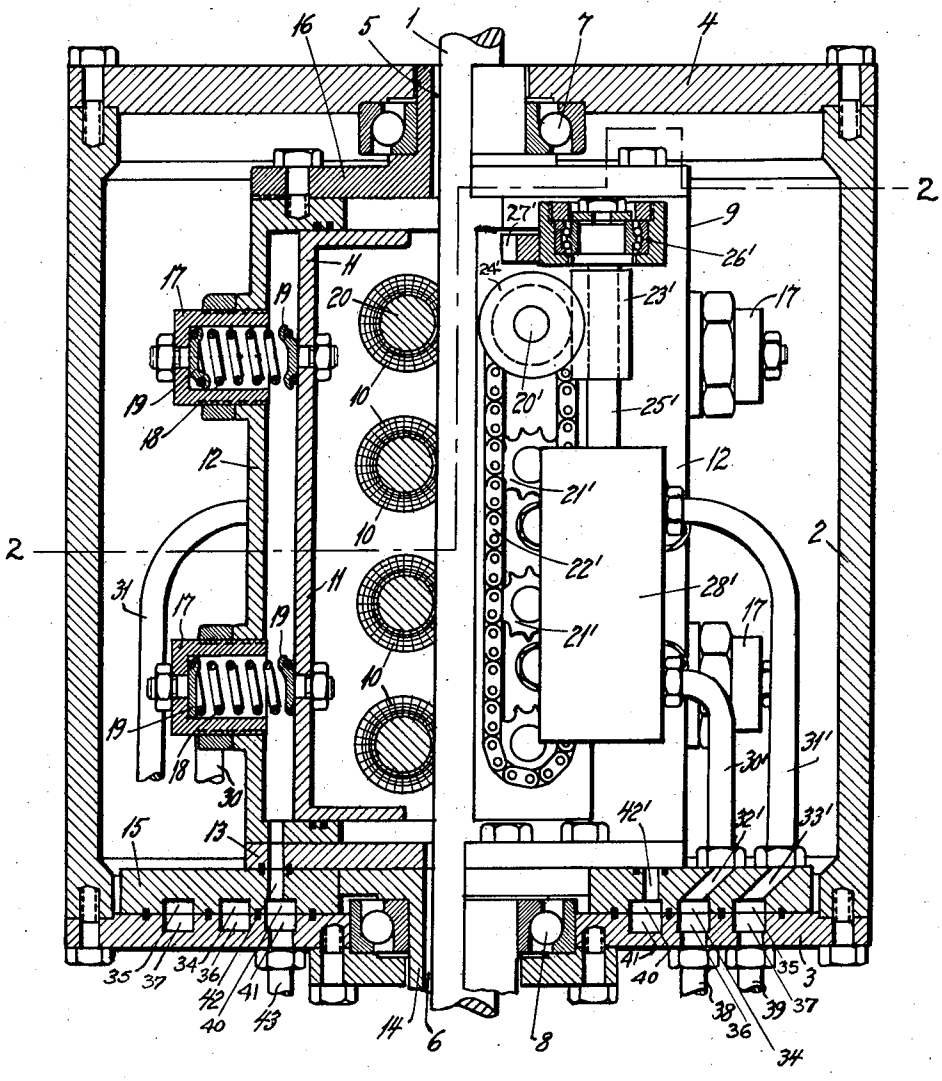



Fig. 1.

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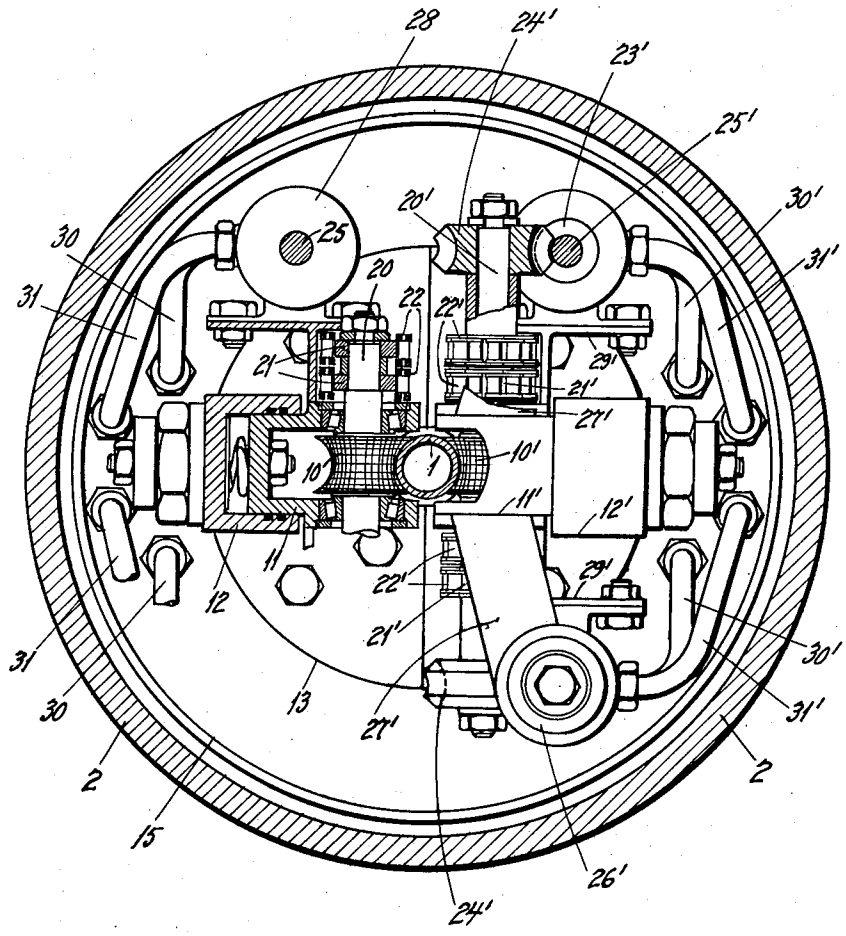



Fig. 2.

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# FEED UNIT FOR ROCK DRILLING MACHINES

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3 Claims. (Cl. 226—108)

The present invention relates to a feed unit for rock drilling machines which, in practical use, involves certain advantages over feed arrangements as hitherto known.

In the past, the feeding of the drill tube or drill string of diamond rock drills has usually been effected by the means of a drill spindle having a chuck which is clamped about the drill tube and which has to be moved each time when the end of the advancing stroke allowed by the drill spindle has been reached.

The invention avoids this and other drawbacks.

According to the present invention the feed unit comprises at least two rows of driven feed rollers mounted in carriers which are displaceable towards and away from each other to force the feed rollers into frictional engagement with the drill tube or drill string, and which are mounted on a member which is rotatable together with the drill tube or drill string.

To elucidate the invention, reference is had to a preferred embodiment of a pressure liquid operated plant illustrated in the accompanying drawing. Fig. 1 shows a part-axial section through the feed unit. Fig. 2 shows a partial cross-section through the same along a line 2—2 of Fig. 1.

Numeral 1 designates the drill tube or drill string which is rotated from a motor, not shown, preferably a hydraulic motor, and to the lower end of which the drill bit is secured in a conventional manner.

The feed unit is enclosed in a housing 2 having a bottom plate 3 and a top member 4, as well as openings 5 and 6 for the drill tube 1. In the bottom plate 3 and the top member 4, adjacent the openings 5 and 6, ball bearings 7 and 8 are disposed for supporting the feed unit generally designated by 9, this unit being thus rotatable within the housing 2.

The feed arrangement comprises two rows of rollers 10, 10' cooperating with the drill tube 1 on diametrically opposite sides thereof and having a profile corresponding to the drill tube so as to engage this tube along lines which together constitute a substantial portion of the circumference thereof. The rollers 10, 10 are preferably serrated, and the roller sets are mounted in individual box-like members 11, 11' which, in turn, are slidably guided with a tight fit in individual box-like outer members 12, 12'. These box-like outer members 12, 12' are attached to a plate 13 which, in turn, is connected to the flange of a sleeve-shaped member 14 mounted in the lower ball bearing 8, and also to a ring 15 surrounding said sleeve-shaped member. At their upper ends, the outer box-like members 12, 12' are connected to the flange 16 of a sleeve-shaped member which is rotatably mounted in the upper ball bearing 7.

Within the outer box-like members there are disposed in separate spring casings 17 coil springs 18 the ends of which are connected by hooks or the like 19, 19' to the respective inner box-like member 11, 11', on one hand, and to the end of the corresponding spring casing, on the other hand. The springs tend to move the inner box-like members 11, 11' apart so as to urge the feed rollers 10, 10' away from the drill tube 1.



Keyed to the shafts 20, 20' of the feed rollers 10, 10' are chain sprockets 21, 21' which are interconnected by chains 22, 22'.

Arranged on either sides of each inner box-like member 11, 11' at the upper end thereof, is a worm gearing comprising a worm 23' and a worm wheel 24', the last-mentioned wheels being keyed to the shaft 20, 20' of the uppermost feed rollers 10, 10' in the corresponding row of rollers. Each worm shaft 25' is rotatably mounted in an upper ball bearing 26' which is supported from the corresponding box-like member 11' by an arm 27' and is coupled to a hydraulic motor 28, 28' which is likewise attached to the inner box-like member 11, 11' by an angle 29'.

The hydraulic motors 28, 28' may be of any known construction, for instance of the screw pump type, and communicate through hoses 30, 31 and 30', 31', respectively, and ports 32', 33' in the rotatable ring 15 with annular channels 34 and 35, respectively, formed in this ring and which, in turn, are aligned with annular channels 36 and 37, respectively, in the bottom plate 3 of the housing 2. Hoses 30, 31 and 30', 31' are flexible in order to allow movement of the motors 28, 28' in relation to the rotatable ring 15. The last-mentioned annular channels 36 and 37, respectively, can be supplied with liquid under pressure from a pressure liquid source through either one of a pair of hoses 38 and 39, respectively, the other channel and hose, respectively, then serving as outlet means. The connection of the hoses 30, 31 and 30', 31', respectively, to the fluid motors 28, 28' is so devised that a supply of liquid under pressure through one hose will rotate the motor in one direction, and a supply of liquid under pressure through the other hose will cause the motor to rotate in the reverse direction.

Finally, there is formed in the rotatable ring 15 an annular channel 40 which is aligned with an annular channel 41 in the bottom plate 3 of the housing 2. The annular space 40, 41 communicates through passageways 42, 42' with the spaces between the box-like members 11, 11' and 12, 12', respectively, and is also connected to the source of liquid under pressure through a hose 43 so as to enable pressure liquid to be introduced into said space to displace, against the action of the springs 18, the inner box-like members 11, 11' and thus force the feed rollers 10, 10' into engagement with the drill tube 1.

The hose conduits 38, 39, 43, of course, will have arranged therein suitable manually actuatable valve devices (reversing valves).

The mode of operation is as follows.

When downfeed of the drill tube 1 is to take place, pressure liquid is admitted into the spaces between the box-like members 11, 11' and 12, 12' so as to cause the feed rollers 10, 10' to engage the drill tube and to grip the same. Furthermore, pressure liquid is supplied to the fluid motors 28, 28' in a direction such as to cause the worm gearings 23', 24', to rotate the feed rollers in the desired direction through the chain transmissions. As opposed to the case of using a conventional drill spindle and chuck, the feeding can take place continuously and without any interruption. The arrangement described can be used also for lifting the drill tube when taking bottom samples, in that the direction of rotation of the fluid motors 28, 28' is then reversed. This will avoid the necessity of using capstan arrangements with derrick blocks and wire as well as heavy rod lifting equipment which are frequently disposed at a level of 7 to 8 meters above the ground. The drill tube can be lifted either while rotating or non-rotating.

As, by actuating the corresponding valve, pressure liquid is discharged from the spaces between the box-like members 11, 11' and 12, 12', the feed rollers 10, 10' are automatically moved out of engagement with the drill tube 1 by the springs 18.

Pressure liquid for the hydraulic motors, as well as for the spaces between the box-like members 11, 11' and 12, 12' is suitably tapped from a central source which will furnish pressure liquid also for a hydraulic motor, not shown, for rotating the drill tube 1, as well as for a hydraulic motor for driving the water pump necessary in rock drilling work. This will cause the machinery to operate silently, and drive belts as well as gear cases will be unnecessary. No other rotating parts than the drill tube will be visible exteriorly of the machine. The machine will be very low as compared to other types, thus being readily transported. Finally, it involves a very important advantage when drilling in mines in that it avoids the use of compressed air which is known to stir up dust injurious to health.

However, the arrangement must not be considered to be restricted to the embodiment specifically illustrated and described, as the same may be modified in various ways within the scope of the claims.

What I claim is:

1. A feed unit for a drill tube for rock drilling machines, comprising at least two rows of driven feed rollers, carriers for mounting said rollers, a support supporting said carriers displaceably toward and away from each other so as to force said feed rollers into frictional engagement with the drill tube, a frame rotatably supporting said support, hydraulic driving means transforming fluid pressure into rotational movement for driving said rollers, an outer pressure fluid supply conduit, and hose means for conducting pressure fluid to said driving means, said support having a surface sliding in tight engagement along a corresponding surface of said frame during rotation so as to confine between said surfaces at least one fluid chamber, said chamber being in connection on one hand with said hose means and on the other hand with said outer pressure fluid supply conduit.

2. A feed unit for a drill tube for rock drilling machines, comprising at least two rows of driven feed rollers, carriers for mounting said rollers, a support supporting said carriers displaceably toward and away from each other so as to force said feed rollers into frictional engagement with the drill tube, a frame rotatably supporting said support, hydraulic driving means on said support for transforming the energy of a pressure fluid current into rotational movement for driving said rollers, the direction of rotation being dependent on the direction of said pressure fluid current, other pressure fluid conduits, hydraulically operated means on said support for displacing said carriers, said support having a surface sliding in tight engagement along a corresponding surface of the frame, and said surfaces having concentrical grooves located oppositely in the respective surfaces so as to define pressure fluid channels connecting said hydraulically operated means and said hydraulic driving means with said outer pressure fluid conduits.

3. A feed unit for a drill tube for rock drilling machines, comprising at least two rows of driven feed rollers, carriers for mounting said rollers, a support supporting said carriers displaceably toward and away from each other so as to force said feed rollers into frictional engagement with the drill tube, a frame rotatably supporitng said support, hydraulic driving means mounted on said carriers for transforming the energy of a pressure fluid current into rotational movement for driving said rollers, outer pressure fluid conduits, flexible inner conduits, worm gearing means drivingly connecting said hydraulic driving means with said rollers, and at least one circular pressure fluid channel confined between circular surfaces of said support, sliding against corresponding surfaces of said frame, said channels being connected to said outer pressure fluid conduits and through said flexible inner conduits to said hydraulic driving means.




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