Nov. 24, 1936. A. HOSSFELD 2,061,768

FRICTION GRIP FOR DRILLING MACHINES

Filed April 18, 1935

Fig. 1

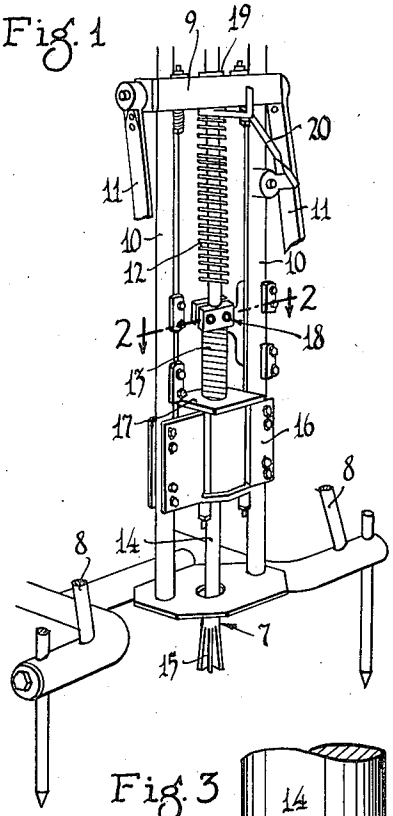


Fig. 2

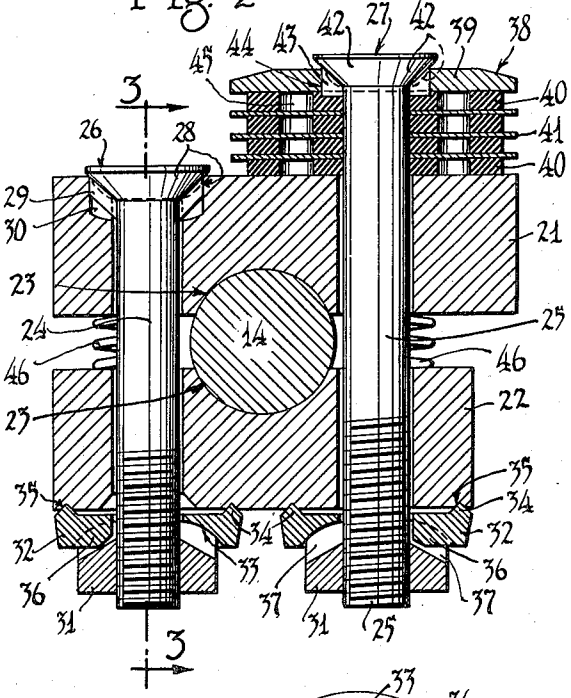


Fig. 3

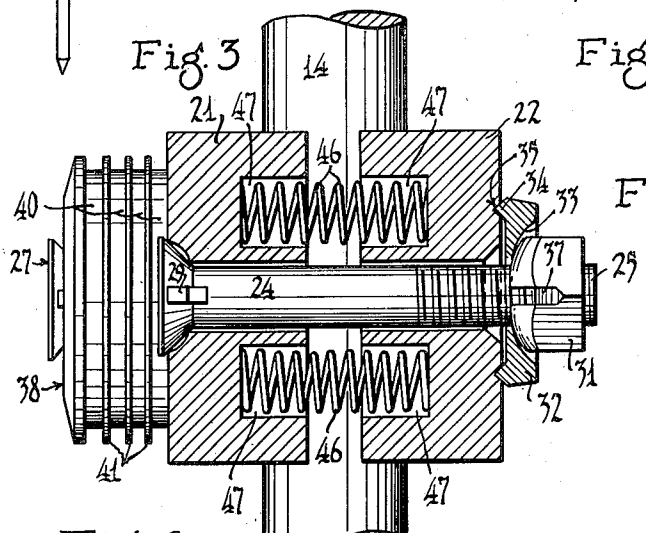


Fig. 4

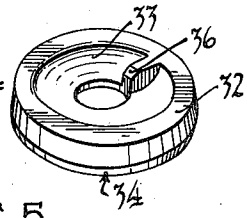


Fig. 5

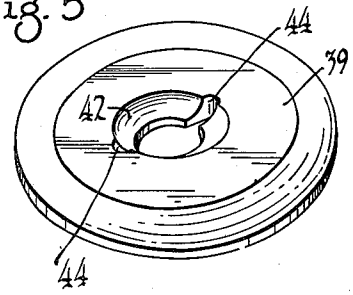
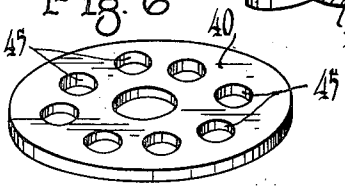


Fig. 6



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FRICTION GRIP FOR DRILLING MACHINES

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3 Claims. (Cl. 24—243)

My present invention relates to drilling machines of the type disclosed and broadly claimed in my United States Letters Patent No. 1,888,668, issued of date November 22, 1932, and more particularly the invention relates to a friction grip for such a machine.

From actual experiments it has been found that a metallic friction grip, due to its weight and inertia, will shift bodily on the rod or shank of a drill during reciprocation thereof and thus produce rapid wear and almost constant friction resulting in a high degree of heat. This wear soon changes the shape of a drill rod so that it does not have a constant diameter, and hence, the friction grip will not engage the same at all points with the same pressure. Furthermore, heat produced by friction will soon roughen the contacting surfaces between the drill rod and grip to such an extent that they will freeze and thereby interfere with the feeding of the drill rod through the grip.

The object of this invention is the provision of a simple and highly efficient friction grip that may be applied to a drill rod under a variable and yielding pressure and that will not release or diminish its grip thereon during reciprocation of the drill rod. A further object of the invention is the provision of a friction grip that will not shift bodily on a drill rod due to its weight and inertia during reciprocation of said rod, thus eliminating excessive wear, heat produced by friction, crystallization and breakage.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawing, which illustrates the invention, like characters indicate like parts throughout the several views.

Referring to the drawing:

Fig. 1 is a perspective view of a drilling machine having the improved friction grip applied to the shank of its drill;

Fig. 2 is a view of the improved friction grip principally in section taken on the line 2—2 of Fig. 1, on an enlarged scale;

Fig. 3 is a view partly in elevation and partly in section taken on the line 3—3 of Fig. 2;

Fig. 4 is a perspective view of one of the centering washers;

Fig. 5 is a perspective view of the tension device washer; and

Fig. 6 is a perspective view of one of the rubber washers of the tension device.

The drilling machine fragmentarily illustrated in the drawings is fully shown, described and broadly claimed in the patent heretofore identified.

Of the parts of the drilling machine shown, it is important to note the drill 7, the main frame 8, the carriage 9, the tilting frame 10, the connecting rods 11, for reciprocating the carriage 9 on the tilting frame 10, the compression propelling spring 12, and the compression buffer spring 13. The drill 7 includes a body 14 in the form of a long round steel rod and a cutter 15 on one end of said body. This drill 7 is mounted on the carriage 9 for compound reciprocating and rotary movements.

A pair of laterally spaced cross-tie plates 16 which form a part of the tilting frame 10 support a striker plate 17. The two springs 12 and 13, which encircle the drill rod 14, engage opposite ends of the carriage 9 as bases of resistance and their inner ends are axially spaced.

The improved friction grip 18, which is the subject matter of this application, is mounted on the drill rod 14 between the springs 12 and 13, normally rests on the buffer spring 13 and supports the drill therefrom with the grip 18 above the striker plate 17 and normally out of contact therewith. The propelling spring 12 is secured to a rotatable bearing 19 on the carriage 9 and oscillated, during the reciprocatory movement of the carriage 9, by connections 20 from said bearing to the tilting frame 10.

The operation of the improved drilling machine may be briefly described as follows, to wit: The upward movement of the carriage 9 gives the drill 7 a powerful throw upward through the medium of the buffer spring 13 acting on the grip 18 and the force of this upward throw, which causes the drill 7 to travel at a faster speed than the carriage 9, is caught and absorbed by the propelling spring 12 which is compressed and placed under tension under the action of the grip 18 thereon.

Downward movement of the carriage 9 gives the drill 7 a powerful downward throw that is accelerated by the expansion of the compressed propelling spring 12 which causes the drill 7 to attain a high velocity. At or practically at the end of the downward stroke of the drill 7, the grip 18 is brought to a stop by its engagement with the striker plate 17 and as the drill 7 advances into the rock it drives itself through the grip 18 by the force of its momentum. The feeding of the drill 7 through the grip 18 takes place at a series of almost imperceptible steps of movement.

For the purpose of this case it is not thought necessary to describe in detail the rotary movement imparted to the drill 7 by the action of the propelling spring 12 on the grip 18.

Referring now in detail to the improved friction grip 18, the same includes a pair of laterally spaced blocks 21 and 22 of fibre or other non-metallic material that is lighter than iron. These blocks 21 and 22 have in their opposing faces

half seats 23 for the drill rod 14. A relatively short bolt 24 and a relatively long bolt 25 extend loosely through aligned bores in the blocks 21 and 22 with the seats 23 therebetween. These bolts 24 and 25 have heads 26 and 27, respectively, the former of which and the block 21 have co-operating ball and socket bearing surfaces 28. A pair of diametrically opposite gibs 29 on the head 26 extend into notch-like seats 30 in the block 21 and hold the bolt 24 against turning movement about its axis relative to the blocks 21 and 22.

Applied to each bolt 24 and 25 is a nut 31 and a co-operating washer 32, and which nut and washer have co-operating ball and socket bearing surfaces 33. On the back of each washer 32 is an annular head 34 that is V-shaped in cross-section and which bead extends into an annular V-shaped seat 35 in the outer face of the block 22. The seats 35 are concentric with the bores in the blocks 21 and 22 and hold the washers 32, and hence the bolts 24 and 25, centered relative to said bores. A gib 36 extends into either one of a pair of diametrically opposite notch-like seats 37 in the back of the respective nut 31 and separably connects said washer and nut for common rotation.

A tension device 38 is interposed between the bolt head 27 and the block 21 and comprises a large metal washer 39, a plurality of rubber disks 40 between the washer 39 and the face of the block 21, and a plurality of disk-like metal spacers 41 interposed between the rubber disk 40. The washer 39, disks 40, and spacers 41 have aligned bores through which the bolt 25 extends. The bolt 27 and the washer 39 have co-operating ball and socket bearing surfaces 42 and a pair of diametrically opposite gibs 43 on the bolt head 27 extend into notch-like seats 44 in the washer 39 and connect the bolt 25 and washer 39 for common rotation.

Formed in each rubber disk 40 is a multiplicity of holes 45 to permit the body of said disk to float therein during compression. Obviously, the tension device 38 may be placed under a variable tension by manipulating the nut 31 on the bolt 25.

Four coiled springs 46 interposed between the blocks 21 and 22 are under strain to separate said blocks and which springs are mounted in seats 47 in the opposing faces of the blocks 21 and 22. The bolts 24 and 25 clamp the blocks 21 and 22 onto the drill rod 14 with sufficient friction to hold the grip 18 against bodily movement on said rod under the action of the propelling spring 12 and the buffer spring 13.

As the bores in the blocks 21 and 22 for the bolts 24 and 25 are somewhat larger than the diameter of said bolts, the ball and socket surfaces between the several parts of the improved grip and the springs 46 will permit universal movement of the blocks 21 and 22 relative to the drill rod 14.

The beads 34 and their co-operating seats 35 positively hold the washers 32 from shifting on the block 22 during the operation of the drill 7.

Obviously, the tension device 18 will always keep the blocks 21 and 22 pressed onto the drill rod 14 and compensate for any slight variation of the diameter of said rod. This frictional contact between the grip 18 and the drill rod 14 is sufficient to overcome the inertia and the weight of the grip 18 and prevent the grip 18 from shifting longitudinally on the drill rod 14 during the reciprocatory movement of the drill 7. It will thus be seen that the grip 18 will not move on the drill rod 14 except as said grip is stopped by the striker plate 17 during the operative stroke of the drill 7 and at which time the drill rod 14 moves through the stopped grip by its momentum and at which time the cutter 15 performs its work.

It often happens that a step of rotary movement of the drill 7 will position its cutter 15 on a high spot on the stone being cut, and hence, the grip 18 will not engage the striker plate 17, during this stroke of the drill 7, and hence, there will be no movement of the drill rod 14 through the grip 18. Neither will the force produced by the stopping of the drill 7, by its contact with the work, cause the grip 18 to move on the drill rod 14 and thus prevent wear between the contacting parts.

From the above description it is evident that the drill rod 7 and grip 18 have no relative movement except the step by step movement of the drill rod 14 through the grip 18 produced by the movement of the drill rod 14 through the grip 18 at the time said grip is stopped by the striker plate 17, thus eliminating all excessive wear which at present takes place between a metallic grip and drill rod and produced by the almost continuous shifting of the grip on the drill rod caused by the weight and inertia of the grip at the time the reciprocating carriage reverses its direction of travel. By forming the blocks 21 and 22 of fibre or other non-metallic metal wear between said blocks and the drill rod 14 will be very slight.

What I claim is:

1. The combination with a member, of a friction grip on the member comprising a pair of blocks having in their opposing faces half seats in which the member is held, said blocks being held spaced apart by the member, unyielding means connecting the blocks on one side of their seats, and a yielding variable tension device connecting the blocks on the other side of their seats.

2. The structure defined in claim 1 in which the blocks are non-metallic and in which the unyielding means includes a headed nut-equipped bolt loosely extending through aligned bores in the blocks, the head of the bolt being rockably mounted in a socket formed directly in the adjacent block, said means also including a washer on the bolt between its nut and the adjacent block, said nut being rockably mounted in a socket in the washer, said washer having an annular V-shaped bead resting in a correspondingly shaped seat formed directly in the adjacent block.

3. The structure defined in claim 1 in which the blocks are non-metallic and in which the tension device includes a plurality of disk-like rubber members and interposed metallic spacers and a bolt extending through aligned holes in the rubber members and spacers and also loosely extending through aligned holes in the blocks, a washer on the bolt between its head and the outermost rubber member, the head of the bolt being rockably mounted in a socket in the washer, and a second washer on the bolt between its nut and the adjacent block, said nut being rockably mounted in a socket in the second washer, said washer having an annular V-shaped bead resting in a correspondingly shaped seat formed directly in the adjacent block.

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