Oct. 11, 1932. A. HOSSFELD 1,881,593

FRICTION GRIP FOR DRILLING MACHINES

Filed Jan. 25, 1932

Fig. 3

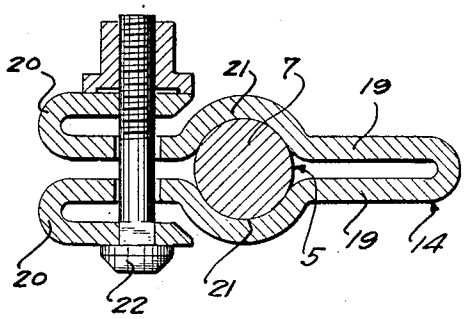


Fig. 2

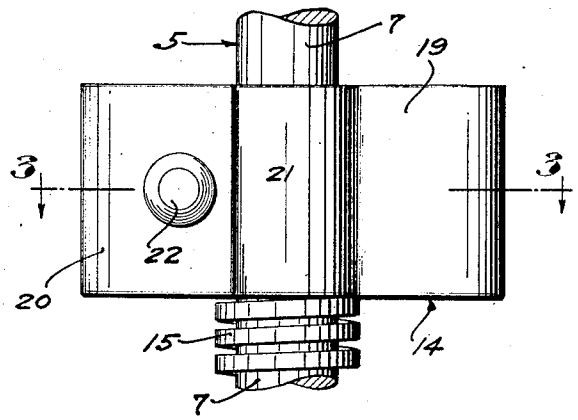


Fig. 4

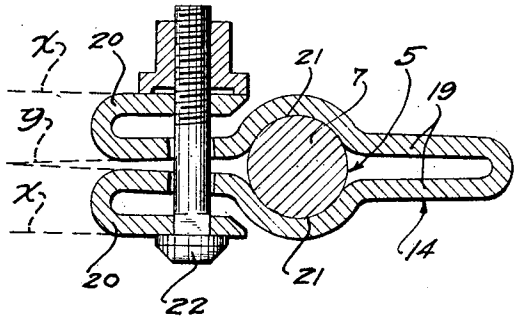
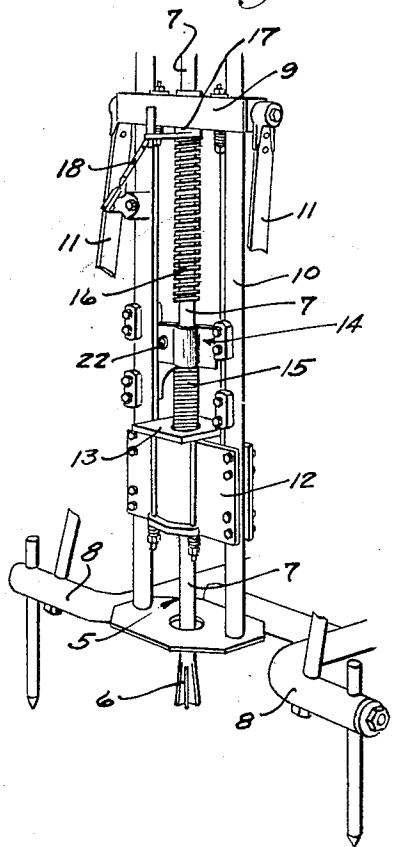


Fig. 1



Inventor
Albert Hossfeld
By his Attorneys
Marshall & Gibson

Patented Oct. 11, 1932

1,881,593

UNITED STATES PATENT OFFICE

ALBERT HOSSFELD, OF WINONA, MINNESOTA

FRICTION GRIP FOR DRILLING MACHINES

Application filed January 25, 1932. Serial No. 588,711.

My present invention has for its object the provision of an extremely simple and highly efficient friction grip intended for general use but especially well adapted for embodiment in a drilling machine of the type disclosed and broadly claimed in my United States application for Letters Patent filed December 4, 1931, under Serial Number 578,883.

To the above end, 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 fragmentary perspective view of a drilling machine having the improved friction grip embodied therein;

Fig. 2 is a side elevation of the improved friction grip and fragments of the drill body and buffer spring on an enlarged scale;

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

Fig. 4 is a view similar to Fig. 3 except that the nut on the bolt has been adjusted to increase the tension of the friction grip.

The drill 5 illustrated comprises a cutter 6 on the inner end of a drill body 7 which, as shown, is a long round steel bar.

The drilling machine fragmentarily illustrated in the drawing is fully shown, described and broadly claimed in the application heretofore identified and of the parts thereof shown, including the drill 5, it is important to note the main frame 8, the carriage 9, the tilting frame 10, and the pair of connecting rods 11 for reciprocating the carriage 9 on the tilting frame 10. This tilting frame 10 includes a pair of laterally spaced cross-tie plates 12 on which is mounted a striker plate 13. The drill 5 is mounted on the carriage 9 for compound reciprocatory and rotary movements.

The improved friction grip 14, which is the subject matter of this application, is mounted on the drill body 7 within the carriage 9 and normally rests on a buffer compression spring 15 which encircles said body. This buffer spring 15 is carried by the carriage 9 which acts as a base of resistance therefor and supports the drill 5 therefrom with the grip 14 above the striker plate 13 and out of contact therewith. Also encircling the drill body 7, between the upper cross-head of the carriage 9 and the friction grip 14, is a propelling compression spring 16 secured at its upper end to a bearing 17 rotatably mounted in the upper cross-head of the frame 10 and with its lower end normally spaced from the friction grip 14. The bearings 17, and hence the connected spring 16, is oscillated by connections 18 from said bearing to the frame 10 during the reciprocatory movement of the carriage 9.

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 5 a powerful throw upward through the medium of the buffer spring 15 acting on the grip 14, and the force of this upward throw, which causes the drill 5 to travel at a faster speed than the carriage 9, is caught and absorbed by the propelling spring 16 which is compressed and placed under tension under the action of the grip 14 thereon. Downward movement of the carriage 9 gives the drill 5 a powerful downward throw that is accelerated by the expansion of the compressed propelling spring 16 which causes the drill 5 to attain a high velocity. At or practically at the end of the downward stroke of the drill 5, the grip 14 is brought to a stop by its engagement with the striker plates 13 and as the drill 5 advances into the rock it drives itself through the grip 14 by the force of its momentum. The feeding of the drill 5 through the grip 14 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 5 by the action of the propelling spring 16 on the grip 14.

Referring now in detail to the friction grip 14 the body of which, as shown, is U-shaped and made from a single flat spring steel plate folded upon itself and laterally

spaced to form main leaves 19. The outer end portions of the main leaves 19 are also U-shaped and formed by folding said leaves outward upon themselves and spacing the same laterally to form a pair of auxiliary spring leaves 20. These auxiliary leaves 20 are relatively short with respect to the main leaves 19 and said main leaves close to the free ends of said auxiliary leaves are bent laterally outward to form a pair of saddles 21 that are substantially semi-circular in cross-section and in opposing relation. The axes of the saddles 21 are parallel to the axis of the drill body 7 and are fitted circumferentially around said body at diametrically opposite sides thereof. The concave surfaces of the saddles 21 have the same contour or, in other words, the same diameter or approximately the same diameter as said body for frictional contact with the drill body 7 throughout substantially its entire circumference.

The main leaves 19 are drawn toward each other to frictionally press the saddles 21 onto the drill body 7 under a pressure that may be varied, at will, by a nut-equipped bolt 22. This draw bolt 22 extends through aligned holes in the main leaves 19 and the auxiliary leaves 20 and which holes are relatively close to the free end portions of the auxiliary leaves and to the saddles 21. The head of the bolt 22 engages the outer face of one of the auxiliary leaves 20 and the nut on said bolt engages the outer face of the other of said auxiliary leaves. It will be noted that the holes in the main leaves 19 through which the bolt 22 extends are somewhat larger than the diameter of said bolt to permit angular movements of the main leaves 19 with respect to said bolt.

The body of the bolt 22 adjacent to its head is square in cross-section and is fitted in a like hole in the adjacent auxiliary leaf 20 to prevent said bolt from turning about its longitudinal axis during the turning of the nut thereon. Before the nut is turned onto the bolt 22 sufficiently to spring the leaves 19 and 20 the main leaves 19 are substantially parallel to each other and the auxiliary leaves 20 are also parallel to each other and to the main leaves 19, see Fig. 3.

When turning the nut on the bolt 22, to increase the frictional contact between the saddles 21 and the drill body 7, the auxiliary leaves 20 always remain parallel to each other due in part to the distance the bolt 22 at its axis is spaced from the connected ends of the auxiliary leaves 20, as indicated by broken lines X in Fig. 4.

While the adjustment of the grip 14 to increase its frictional contact with the drill body 7 does not move its auxiliary leaves 20 out of parallel arrangement with each other the main leaves 19 are sprung during this adjustment about the axis of the drill body 7 into positions in which they converge in opposite directions from said axis, as shown by broken lines Y in Fig. 4. This springing of the main leaves 19, however, does not change the contour of the saddles 21 so that they always have a constant frictional engagement with the drill body 7 throughout their entire circumference.

In case the drill body 7 wears, so that it has a varying diameter at different longitudinally spaced points thereon, the friction grip 14 will automatically adjust itself thereto and the frictional contact between the saddles 21 and the drill body 7 may be varied, at will, simply by adjusting the nut on the bolt 22.

From the above description it is evident that the friction grip 14 affords an abutment on the drill body 7 for the springs 15 and 16 during the reciprocatory movement of the carriage 9 to operate the drill 5 and that said grip is automatically moved on the drill body 7 by its engagement with the striker plate 13 during the operative stroke of the drill 5. This adjustment of the friction grip 14 corresponds to the steps of movement of the drill 5 as its cutter 6 wears or cuts away the rock or other material in which a hole is being drilled. It will thus be seen that the frictional contact between the grip 14 and the drill body 7 must be sufficient to hold the grip 14 from moving on the drill body 7 under the action of the springs 15 and 16 but at the same time must not interfere with the automatic feeding of the drill body 7 therethrough.

The co-action of the leaves 19 and 20 of the grip is such as to produce the required frictional contact between the saddles 21 and the drill body 7 which is substantially the same over the entire frictional surfaces of said saddles. This even contact between the saddles 21 and the drill body 7 not only produces a maximum amount of friction therebetween but produces an even wear between the saddles 21 and the drill body 7 and hence reduces wear to a minimum.

What I claim is:

1. A friction grip comprising a U-shaped resilient member, a pair of auxiliary spring members on the main leaves of said member and overlapping the same, said main leaves having a pair of half seats in their opposing faces and intermediate of their ends, and means operative on the auxiliary spring member to press the main leaves toward each other.

2. A friction grip comprising a U-shaped resilient member, the main leaves of which are folded outward upon themselves and laterally spaced to afford a pair of auxiliary leaves which, together with the connected portions of the main leaves, are also U-shaped, the space between the auxiliary leaves being open and unobstructed, and

means operative on the auxiliary leaves to press the main leaves toward each other.

3. A friction grip comprising a U-shaped resilient member, the main leaves of which are folded outward upon themselves and laterally spaced to afford a pair of auxiliary leaves which, together with the connected portions of the main leaves, are also U-shaped, the space between the auxiliary leaves being open and unobstructed, and a nut-equipped bolt extending through aligned holes in the main and auxiliary leaves with its head and nut held by the auxiliary leaves as basis of resistance and operable when the nut is turned inward thereon to press the main leaves toward each other.

4. The structure defined in claim 3 in which the holes in the main leaves are larger than the diameter of the bolt to permit angular movements of the main leaves with respect to the bolt.

5. The structure defined in claim 2 in which the main leaves have in their opposing faces saddles.

6. The structure defined in claim 2 in which the main leaves have in their opposing faces substantially semi-circular saddles that extend axially transversely thereof.

7. The structure defined in claim 2 in which the main leaves have in their opposing faces saddles that extend transversely thereof and in which the free ends of the auxiliary leaves terminate close to the saddles and the bolt is relatively close to said ends of said auxiliary leaves.

In testimony whereof I affix my signature.

ALBERT HOSSFELD.