July 3, 1928. 1,675,326

F. H. BLANDING

HAMMER DRILL

Filed Nov. 9, 1923

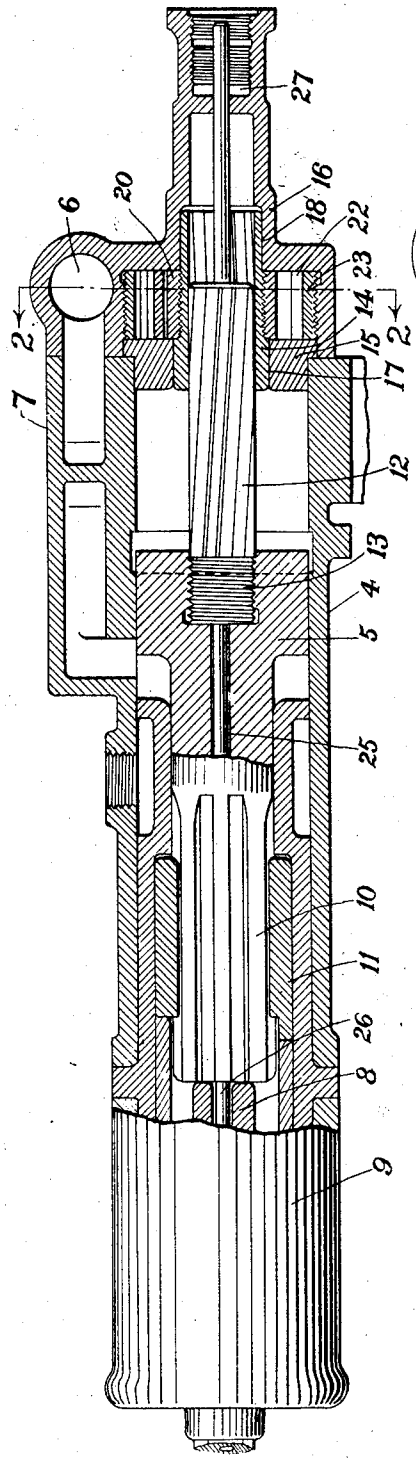


Fig. 1

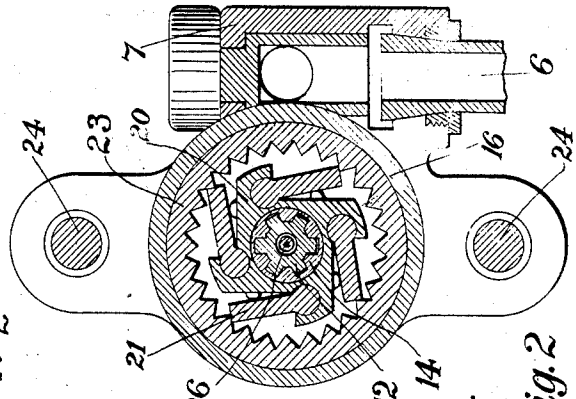


Fig. 2

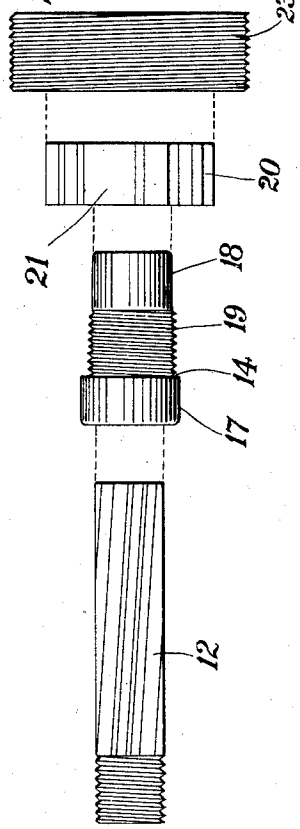


Fig. 3

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UNITED STATES PATENT OFFICE.

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HAMMER DRILL.

Application filed November 9, 1923. Serial No. 673,665.

This invention relates to drills of the impact type and in particular to mechanism for rotating the drill steel. More specifically it concerns improvements in rifle bar rotation mechanism.

Among the objects of the invention are to avoid weakening the impact member by omitting the usual deep center bore, to provide ample bearing and engaging surfaces in the rotation mechanism thereby to prevent rapid wear, and to improve the structure and the assembly of such mechanism and the parts associated therewith in order to reduce to a minimum the time, labor and expense of making repairs. With these and other objects in view, the invention will now be disclosed in detail, reference being had to the accompanying drawings wherein is shown one embodiment of the invention.

In the drawings:

Fig. 1 is a longitudinal sectional view;

Fig. 2 is a transverse sectional view on an enlarged scale taken substantially on the 2—2 of Fig. 1;

Fig. 3 is a view in elevation of the parts comprising the rotation mechanism in disassembled relation.

The embodiment of the invention chosen for the purpose of illustration is a rock drill having a casing or cylinder 4 within which a hammer piston 5 reciprocates by fluid pressure admitted through an intake 6 (Fig. 2) and controlled by a suitable valve (not shown) mounted in an extension 7 of the casing to impart blows to and effect rotation of a working tool 8 supported in the front head 9 of the casing. The rotative impulse imparted to the piston 5 by the rotation mechanism, presently to be described, is transmitted to the tool in the usual manner as by ribs 10 on the forward end of the piston cooperating with grooves in a sleeve 11 which forms part of or cooperates with the working tool chuck.

The piston 5 has rigidly but removably secured thereto in any suitable manner a rifle bar 12. In the form shown, the end of the rifle bar is threaded into a shallow recess 13 in the rear end of the piston. The ribs of the rifle bar cooperate with the grooves in an elongate rifle nut 14 rotatively mounted in an axial extension of the piston chamber formed by the cylinder ring 15 and back head 16 of the casing. As shown, the nut 14 has differential bearings 17 and 18 journalled respectively in the ring 15 and back head 16, the ring thus serving as an aligning member for the nut. Upon the portion 19 of the nut 14 intermediate these bearings a pawl carrier 20 in the form of a ring having pawls 21 is securely but removably fastened as by a threaded connection. The pawl carrier 20 fits in a counter bore 22 in the back head 16, the pawls 21 coacting with a ratchet ring 23 removably secured in the counter bore, the method of attachment illustrated being by threaded connection. The front head 9 and back head 16 are clamped to the casing 4 in the usual manner as by through bolts 24 (Fig. 2). If a hollow drill steel is to be used, the piston and rifle bar may be provided with the usual axial bore 25 for receiving the water tube 26, the rear end of which is secured and packed against leakage in a socket 27 therefor in the extreme rear of the back head 16.

When the drill is in operation, the rifle bar 12 reciprocates in the extension of the piston chamber in an obvious manner, the rifle nut being held against rotation by its pawls 21 on one stroke of the piston, preferably the rearward stroke, so that the assembled piston and rifle bar is forced to rotate, as the rifle bar is forced through the nut under fluid pressure. On the reverse or forward stroke, the pawls 21 release the nut which then rotates with the bar and piston, permitting the piston to strike a free and forceful blow on the working tool.

From the above it will be apparent that the attachment of the rifle bar to the piston without requiring a deep bore therein as is customary in devices of this kind avoids the weakness in this member heretofore experienced which frequently resulted in breakage due to the strains and shocks to which this member is subjected. By the use of a rifle nut of substantial length, provision is made for ample bearing surface for the same in the extension of the piston chamber, as well as an increased area of contact between the ribs of the bar and nut respectively, thereby decreasing the wear and prolonging the life of these parts. By making the rotation mechanism in comparatively small, separable units readily assembled and removed in case of breakage, the time lost and expense involved in repairs is reduced to a minimum. In addition this construction permits economies in production.

While what is now considered to be the preferred form of the invention has been herein illustrated and described, it is to be understood that the invention is not limited to the specific form and arrangement of parts shown but is capable of all changes and modifications coming within the scope of the appended claims.

Having now described my invention, what I claim and desire to secure by Letters Patent is:

1. In a percussive drill, a cylinder forming a piston chamber, a substantially solid piston reciprocable therein for striking upon and for transmitting rotation to a working tool, a rifle bar rigidly but detachably secured to said piston, a back head secured to said cylinder and having an axial cavity into which said rifle bar extends, a rifle nut received and rotatably supported in a counterbore in the outer end of said cavity for cooperation with said bar, an intermediate aligning member between said back head and cylinder forming a bearing for said nut, a pawl carrier detachably secured to said nut, and a ratchet ring on said back head engaged by the pawls of said carrier whereby said nut is held against rotation in one direction to force the combined piston and rifle bar to rotate during movement of the latter in one direction.

2. In a percussive drill, a cylinder forming a piston chamber, a substantially solid piston reciprocable therein for striking upon and transmitting rotation to a working tool, said piston having a recess in its rearward end, a rifle bar having screw threaded engagement in said recess, a back head in engagement with said cylinder and having an axial cavity into which said rifle bar extends, an elongate rifle nut rotatably supported in a counterbore in the outer end of said cavity for cooperation with said bar, a cylinder ring between said head and said cylinder providing a bearing for said nut, a pawl carrier in screw threaded engagement with said nut rearwardly of said bearing, and a ratchet ring rigidly but detachably mounted in said back head and engaged by the pawls of said carrier to prevent rotation of said nut in one direction.

Signed by me at Detroit, Michigan, this 5th day of November, 1923.

FORREST H. BLANDING.