Aug. 18, 1936. J. H. HOWARD 2,051,525

ROCK DRILL BIT

Filed Nov. 17, 1933

Fig. 1

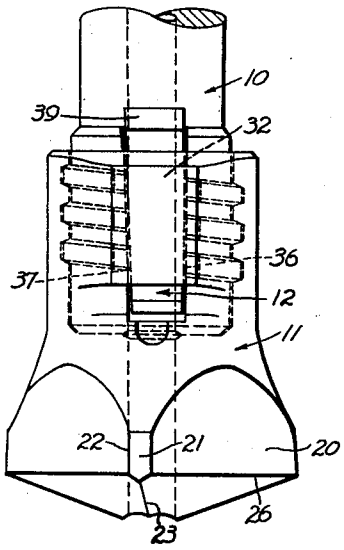


Fig. 3

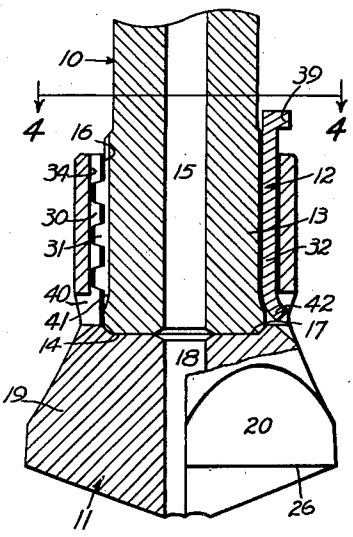


Fig. 2

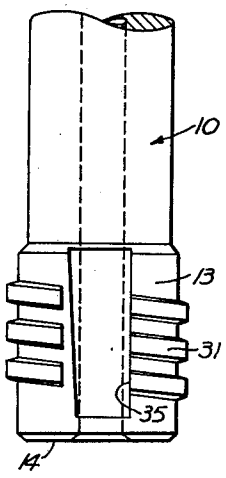


Fig. 4

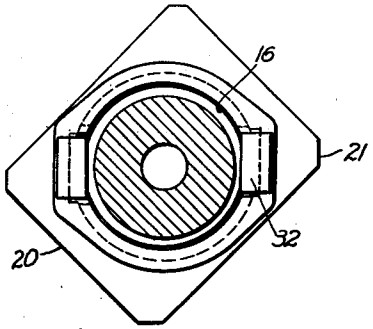
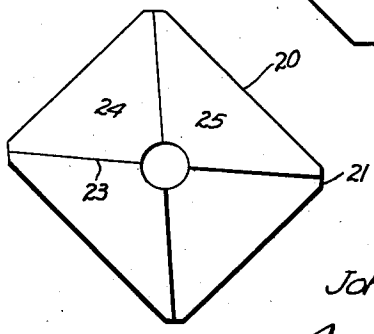


Fig. 5



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ROCK DRILL BIT

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3 Claims. (Cl. 255—64)

This invention relates to a drilling tool, and relates more particularly to a rock drill bit. It is a general object of the invention to provide an improved rock drill bit having an effective cutting head that is readily detachable from its shank.

It is another object of the invention to provide a percussive rock drill bit having a durable efficient cutting head that is self-sharpening through use.

It is another object of the invention to provide a rock drill bit including a cutting head that may be easily and quickly removed from the stem or shank for resharpening or replacement.

It is another object of the invention to provide a simple, practical and effective means for detachably connecting the cutting head of a rock drill with its shank.

It is another object of the invention to provide a rock drill bit including a detachable cutting head that is removably attached to the shank in a secure and dependable manner so that it cannot be separated from the shank in the drilled hole or bore.

It is another object of the invention to provide an improved cutting head for a rock drill bit having a plurality of effective cutting edges and plane faces or surfaces that have a crushing and pulverizing action during operation of the bit.

It is a further object of the invention to provide a rock drill bit of the character mentioned that is simple and inexpensive of manufacture, and that does not embody any parts that may become lost or detached during operation of the bit.

Other objects and features of the invention will be readily and fully understood from the following detailed description of a typical form of the invention, throughout which description reference may be had to the accompanying drawing in which:

Fig. 1 is a side elevation of the bit provided by the invention. Fig. 2 is a side elevation of the shank with the cutting removed. Fig. 3 is a longitudinal detailed sectional view of the bit with one of the wedges removed. Fig. 4 is a transverse sectional view taken as indicated by line 4—4 on Fig. 3, and Fig. 5 is a bottom elevation of the cutting head.

The improved rock drill bit provided by my invention includes generally a drill rod or shank 10, a cutting head 11, and means 12 for removably attaching the head 11 to the shank 10.

The drill rod or shank 10 which is similar generally to the rods or shanks of typical rock bits is an elongate member adapted to be operated by a jack hammer or pneumatic drilling machine. The shank 10 is provided at its lower end with an upset portion or enlarged portion 13 for carrying the cutting head 11. The lower end 14 of the shank 10 is flat and normal to its longitudinal axis to cooperate with the cutting head 11, as will be hereinafter described. A central longitudinal fluid passage 15 extends downwardly through the shank 10 to its lower end to handle circulation fluid.

The cutting head 11 is removably mounted on or attached to the enlarged portion 13 of the shank 10, and is provided to act on or cut the rock or material being drilled. A longitudinal socket 16 extends into the upper end of the cutting head 10 for the reception of the enlarged portion 13 of the shank. The bottom wall 17 of the socket 16 is preferably flat to evenly cooperate with the lower end 14 of the shank whereby the percussive drilling action may be directly transmitted from the shank 10 to the cutting head. A central longitudinal fluid passage or port 18 is provided in the cutting head 11 to register with the lower end of the passage 15, and to discharge from the lower end of the head.

In accordance with the invention the active lower portion 19 of the cutting head 11 is substantially rectangular in horizontal cross section, and is of increased width and of substantial thickness. The enlarged lower portion 19 of the cutting head 11 has four flat sides 20. The corners 21 of the enlarged portion 19 of the cutting head are flattened or bevelled, as illustrated throughout the drawing, providing reaming edges 22. The flattened corners 21 may be inclined upwardly and inwardly to have cutting clearance. The lower end of the cutting head 11 is provided with four cutting edges 23 which extend radially outward from the lower end of the passage 18 to the bevelled corners 21. Two pairs of pitched or downwardly and inwardly inclined flat faces 24 and 25 are presented at the lower end of the cutting head. The faces 24 and 25 are presented at the lower end of the cutting head. The faces 24 and 25 are substantially triangular and join at the radial cutting edges 23. The pairs of faces 24 and 25 join the sides 20 of the head 11 at edges 26. The upper or outer edges 26 of the several faces 24 and 25 all lie in a common plane normal to the longitudinal axis of the bit. As the enlarged por-

tion 19 of the head 11 is rectangular, the faces 24 are pitched at a greater angle to the longitudinal axis of the bit than the faces 25. This relationship between the pitch or inclination of the pairs of faces 24 and 25 provides for the self-sharpening of the cutting edges 23 during operation of the bit. The flat plane surfaces or faces 24 and 25 have an effective crushing and pulverizing action on the rock or material drilled.

The means 12 for removably attaching the cutting head 11 to the shank 10 is a feature of the invention, and is such that the head 11 may be easily and quickly detached from the shank 10 for replacement, resharpening, etc. The detachable connecting means 12 includes a thread 30 on the wall of the socket 16, and a thread 31 on the enlarged portion 13 of the shank for meshing with or cooperating with the thread 30. The threads 30 and 31 are preferably comparatively heavy, and in accordance with the invention are of substantial pitch so as to be easily unthreaded. In the particular case illustrated in the drawing, the threads 30 and 31 are left hand threads. It will be apparent how the cutting head 11 may be easily and quickly threaded onto the enlarged portion 13 of the shank to have the bottom 17 of the socket 16 bear against the lower end 14 of the shank. The means 12 includes one or more wedges 32 for positively preventing detachment or unthreading of the head 11 from the shank 10 during use of the bit. In the typical form of the invention illustrated in the drawing, there are two like wedges 32 provided for locking the head 11 on the shank. The threads 30 and 31 are broken or cut away to provide two diametrically opposite longitudinal openings or channels 34 for receiving the wedges 32. The shank portion 13 and the wall of the socket 16 may be flattened where the threads are cut away. Each wedge 32 has a straight or vertical side 36 for cooperating with the ends 35 of the thread 31 of the shank, and a longitudinal side 37 that is inclined downwardly and rearwardly relative to the direction of pitch of the threads for cooperating with the ends 35 of the thread 30 on the wall of the socket 16. The ends of the thread 30 engaged by the inclined sides of the wedges are preferably pitched in the same manner as the said sides of the wedge. The wedges 32 are proportioned and related to the channels 34 to cooperate with the ends 35 of the thread 30 when driven into the channels 34 so as to urge or tend to further thread the cutting head 11 onto the shank. This function or operation of the wedges 32 assures a tight dependable connection between the cutting head 11 and the shank. The wedges 30 are adapted to be forced or driven downwardly into the channels 34 from the upper end of the cutting head 11. Outwardly projecting heads 39 are provided on the wedges to facilitate the removal of the wedges, as will be subsequently described.

The invention includes means for releasably locking the wedges 32 against movement and displacement. Lateral openings 40 are provided in the wall of the cutting head 11 to communicate with the lower ends of the channels 34. Downwardly and outwardly inclined shoulders 41 are provided on the shank 10 opposite or directly opposing the openings 40. When the wedges 32 are forced or driven downwardly through the channels 34, their lower ends engage the shoulders 41, and their lower end portions are diverted or bent outwardly into the openings 40. These outwardly bent lower portions 42 of the wedges 32 cooperate with the openings 40 to dependably lock the keys 32 against upward movement out of the channels 34. The portions of the wedge 42 while they do not project from the cutting head 11, are accessible for engagement by a drift or punch whereby the wedges 32 may readily be driven out of the channels 34 when detaching the cutting head 11 from the shank.

It is believed that the utility and practicability of the rock drill bit of the present invention will be readily apparent from the foregoing detailed description. In applying or attaching the cutting head 11 to the shank 10, the head is first threaded onto the enlarged portion 13 of the shank so that the bottom wall 17 of the socket 16 comes into bearing engagement with the lower end 14 of the shank. With the faces 14 and 17 in engagement, the openings 40 are in alignment with the shoulders 41 at the lower ends of the channels 34. The wedges 32 may be readily driven or forced downwardly into the channels 34, and when their lower ends engage the shoulders 41, their lower portions 42 are deflected or bent outwardly into the openings 40. This, of course, dependably retains or locks the wedges 32 in position. The inclined edges or sides 37 of the wedges 32 engage or contact with the ends 35 of the thread 30 to urge or tighten the cutting head 11 on to the pin, and to dependably prevent loosening of the head from the shank during the drilling operation. The cutting head 11 is particularly rapid and efficient in its cutting action. The inclinations or pitches of the pairs of faces 24 and 25 provide for a self-sharpening of the cutting edges 23. The flat faces 24 and 25 operate to crush or pulverize the rock.

When it is desired to detach the cutting head 11 from the shank 10, the wedges 32 are first driven upwardly out of the channels 34. The wedges 32 may be readily driven out by engaging their lower ends through the opening 40 with a suitable driving tool, or by driving upwardly under the heads 39. Driving or forcing the wedges outwardly in this manner, of course, straightens their bent portions 42, and allows the wedges to be readily withdrawn from the channels 34. After the wedges 32 have been removed, the cutting head 11 may be easily unthreaded from the enlarged portion 13 of the shank. The rock drill bit provided by my invention is simple and inexpensive of manufacture, and embodies an improved cutting head that may be easily and quickly detached from the shank when desired or necessary.

Having described only a typical form or embodiment of the invention, I do not wish to limit myself to the specific details set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or that fall within the scope of the following claims.

Having described my invention, I claim:

1. A rock drill bit including a shank, a cutting head having a socket for receiving an end portion of the shank, a thread on said portion of the shank, a thread on the wall of the socket for cooperating with the first mentioned thread to removably attach the head to the shank, the threads having registering cut-away portions leaving an opening, there being a lateral opening in the head communicating with the first

named opening, the ends of the threads at the corresponding sides of the cut away portions being inclined, a wedge in the opening engaging said ends of the threads to urge the head in the thread-tightening direction, and a part on the inner end of the wedge projecting into said lateral opening to hold the wedge in position.

2. A rock drill bit including a shank, a cutting head having a socket for receiving an end portion of the shank, a thread on said portion of the shank, a thread on the wall of the socket for cooperating with the first mentioned thread to removably attach the head to the shank, the threads having registering cut-away portions leaving an opening, there being a lateral opening in the head communicating with the first mentioned opening, and a wedge in the first mentioned opening having wedging cooperation with the threads to prevent unthreading of the head and having a bent end part cooperating with the lateral opening whereby it is held in position.

3. A drilling bit including, a shank, a thread on the lower portion of the shank having a longitudinal cut-away part, the ends of the thread at one side of the cut away part being inclined with respect to the longitudinal axis of the shank, a cutting head having a socket for receiving the lower portion of the shank, a thread on the wall of the socket for cooperating with the first mentioned thread and having a longitudinal cut-away part, the ends of the socket thread at one side of the cut away part being inclined with respect to the longitudinal axis of the socket, said cut-away parts of the threads being related to register and form an opening, the head having a lateral opening communicating with the inner end portion of the first named opening, a wedge in said first named opening preventing unthreading of the head from the shank and having a tapered side cooperating with the inclined ends of the threads to urge the head in the thread-tightening direction and an end portion on the wedge projecting into said lateral opening to prevent loss of the wedge.

JOHN H. HOWARD.