Feb. 27, 1945. R. D. ZIMMERMAN 2,370,603

METHOD OF ATTACHING A THREADED MEMBER TO A BODY

Filed Oct. 20, 1941

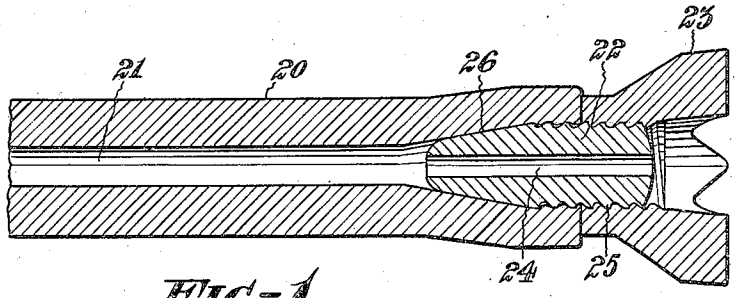


FIG.-1.

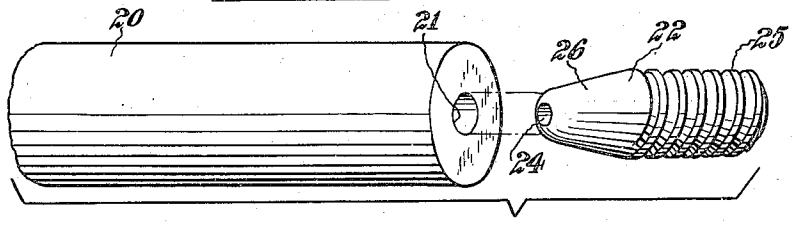


FIG.-2.

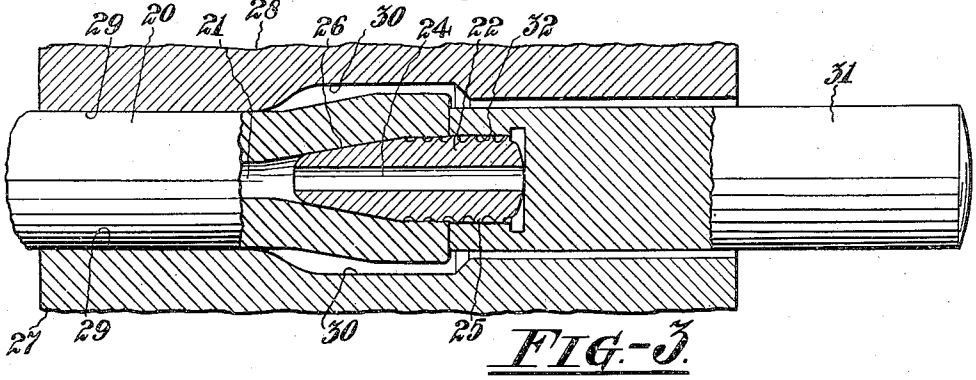


FIG.-3.

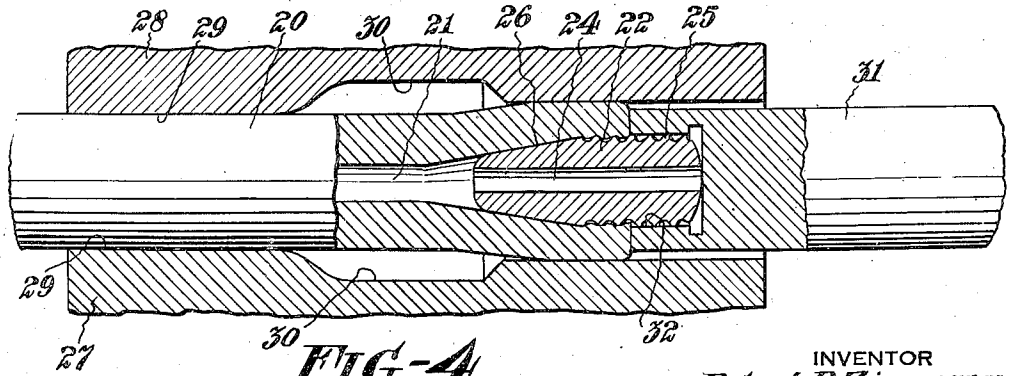


FIG.-4.

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METHOD OF ATTACHING A THREADED MEMBER TO A BODY

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Application October 20, 1941, Serial No. 415,710

5 Claims. (Cl. 76—108)

This invention relates to connecting devices, and more particularly to a method of attaching a threaded connecting member to a body.

The invention is of particular advantage for use in constructing rock drilling implements of the detachable bit type, the cutting bit of which is attached to a drill rod by a threaded connection, the usual practice being to provide the rod with an externally threaded stem and the bit with a threaded socket to receive the stem.

These elements must be machined with care and precision to assure a tight connection between the threaded portions as well as a full and true engagement between the cooperating seating surfaces through which the driving force passes from the rod to the bit, otherwise the comparatively light bit will wabble on the rod and destroy the threads or the bit may assume an inclined position on the rod and cause breakage of the threaded stem.

These conditions may, of course, also be, and frequently are, brought about through prolonged usage of the assembly, and it is accordingly an object of this invention to enable the rod to be quickly and conveniently restored to its initial accurate form by the use of ordinary skill and with the conventional equipment commonly employed for servicing drilling implements.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawing accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a longitudinal view, in section, of a drill rod equipped with a threaded stem attached thereto in accordance with the practice of the invention and a drill bit threadedly connected to the stem,

Figure 2 is a perspective view of a drill rod and a connecting element intended to be inserted into the drill rod and attached thereto, and

Figures 3 and 4 are longitudinal views, partly broken away, illustrating different steps employed in attaching a threaded stem to a drill rod.

Referring to the drawing and at first more particularly to Figure 1, 20 designates a body shown as a drill rod having an axial passage 21 therethrough for conveying cleansing liquid into the hole being drilled. In the front end of the drill rod is a connecting element in the form of a stem 22 that is threadedly connected to a drill bit 23 seating against the end of the drill rod.

The stem 22 is hollow throughout its length having a passage 24 to form a continuation of the passage 21, and on the exterior of the stem are thr_ads 25 that extend from an end of the stem to an intermediate portion from which point the stem is tapered to provide a punch 26 adapted to pierce the end of the drill rod.

In carrying out the method of attaching the stem 22 to the rod 20, the rod is first squared off so that its end surface will be normal to the axis of the rod. The end of the rod is then heated and next placed between relatively reciprocable die members 27 and 28 which may be, respectively, the lower stationary and upper reciprocatory dies of a drill sharpening machine of any well known type commonly employed for sharpening and reconditioning drilling implements.

In the form illustrated, the die members are provided in their opposed surfaces with longitudinally extending grooves 29 that register with each other. The grooves are contoured to conform substantially to the surface of the drill rod 20, and in the intermediate portions of the grooves are enlarged recesses 30 of suitable length to receive the heated end of the drill rod.

After the drill rod 20 has been correctly positioned between the dies so that the heated end lies within the recesses 30, and assuming that the rod is clamped firmly between the dies 27 and 28, the punch portion 26 of the stem is driven into the passage 21 at the heated end of the rod preferably to such a depth that at least several of the threads 25 will lie within the drill rod. The heated end of the rod is thereby expanded to provide an adequate seating surface on the end of the rod for the shank-end of the drill bit, and during the driving of the stem into the drill rod the passage 21 is expanded by the leading end of the punch portion 26 in advance thereof to prevent the flow of metal from the rod into the passage 24.

Upon completion of the operation of driving the stem into the rod the rod is shifted between the die members to place the heated portion forwardly of the recesses 30. The reciprocable die member 28 is then actuated against the heated portion, thereby forcing some of the material of the rod between the threads 25 to form an interlocking connection between the rod and the stem. The rod is then released and given a partial turn, as for example a quarter of a revolution, and a second blow is delivered to the heated portion to force additional material of the rod between the threads 25.

Additional blows may, of course, be applied to the heated end of the rod to effect the complete filling of the spaces between the threads 25 but this is not necessary since, in practice, it

has been found that the application of two blows at radially spaced points effects a tight engagement and that the connection will remain thus indefinitely even though it is repeatedly subjected to the strains of attaching and detaching drill bits to the stem.

The means employed for holding the stem 22 in the correct position for entrance into the rod 20 is shown as being in the form of a bar 31 having a recess 32 in one end to accommodate the threaded end of the stem 22. The recess 32 is of plain cylindrical shape and of only sufficiently larger diameter than the threads to afford an easy sliding fit between the two. The recess should be of such length that when the stem enters the rod to a distance permitting the end of the holder to engage the rod a suitable number of threads 25 will remain exposed for engagement with the drill bit. The end surface of the holder adjacent the recess 32 is perpendicular to the axis of said holder and is driven against the heated end of the drill rod during the driving of the punch 26 thereinto to form a suitable seating surface on the drill rod for the rearward end surface of the drill bit 23.

In addition to its function as a holder the bar 31 also serves as a transmission member for transmitting driving force to the stem 22. Such force may be applied to the bar in any well known manner, as for example by a punching mechanism (not shown) of the type usually constituting an adjunct of a drill bit sharpening machine.

This method is a modification of that disclosed in my co-pending application, Serial No. 370,011, filed December 13, 1940.

I claim:

1. The method of attaching an externally threaded hollow stem to a drill rod having a hole therein which consists in forming a punch portion on the stem, heating an end of the drill rod, holding the drill rod stationary in a supporting device with the heated end extending into an enlarged recess in the supporting device, then driving the punch portion of the stem coaxially into the hole at the heated end of the drill rod to form a recess therein for the accommodation of the punch and simultaneously expanding the heated end of the drill rod and the hole with the punch portion accordingly as the punch portion moves into the hole to prevent the flow of metal from the drill rod into the punch portion, forming a seating surface on the end of the drill rod, and forcing the heated end portion of the rod into gripping engagement with the punch portion.

2. The method of attaching an externally threaded hollow stem to a drill rod having a hole therein which consists in forming a punch on the stem, heating an end of the drill rod, gripping the unheated portion of the drill rod between a pair of dies, driving the punch into the hole at the heated end of the drill rod and thereby expand the hole in advance of the punch to prevent the flow of metal from the drill rod into the threaded stem and form a recess in the drill rod for the accommodation of the punch, moving the heated end and the punch to another position in the dies, and then applying force with the dies to the surface of the drill rod to force the heated end into firm gripping engagement with the punch.

3. The method of attaching an externally threaded hollow stem to a drill rod having a hole therein which consists in forming a tapered punch on the stem, heating an end of the drill rod, gripping the unheated portion of the drill rod between a pair of dies, driving the tapered punch entirely into the hole at the heated end of the drill rod to expand the hole in advance of the punch to prevent the flow of metal from the drill rod into the threaded stem and to form a recess in the drill rod for the accommodation of the punch, moving the heated end and the punch to another position in the dies, and actuate one of the dies to compress the drill rod into firm engagement with the portion of the stem lying therein.

4. The method of attaching an externally threaded hollow stem to a drill rod having a hole therein which consists in forming a tapered punch on the stem, heating an end of the drill rod, gripping the unheated portion of the drill rod between a pair of dies, driving the tapered punch into the hole at the heated end of the drill rod to expand the hole in advance of the punch for preventing the flow of metal from the drill rod into the threaded stem and to form a recess therein for the accommodation of the punch and a part of the threaded portion of the stem, moving the heated end and the punch to another position in the dies, and then actuate one of the dies to compress the heated end of the drill rod to form an interlocking engagement between the drill rod and the portion of the stem lying therein.

5. The method of attaching an externally threaded hollow stem to a drill rod having a hole therein which consists in forming a punch portion on the stem, heating an end of the drill rod, holding the drill rod stationary, then driving the punch portion coaxially into the hole at the heated end of the drill rod and simultaneously expanding the heated end and the hole with the punch portion for preventing the flow of metal from the rod into the hollow stem and to form a recess in the drill rod for the accommodation of the punch portion, forming a seating surface on the end of the drill rod, and forcing the heated end portion of the rod into gripping engagement with the punch portion.

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