April 27, 1965 A. H. STEWART 3,180,379

BIT ASSEMBLY AND CHIP EJECTOR MEANS THEREFOR

Filed May 22, 1961

Fig. 1.

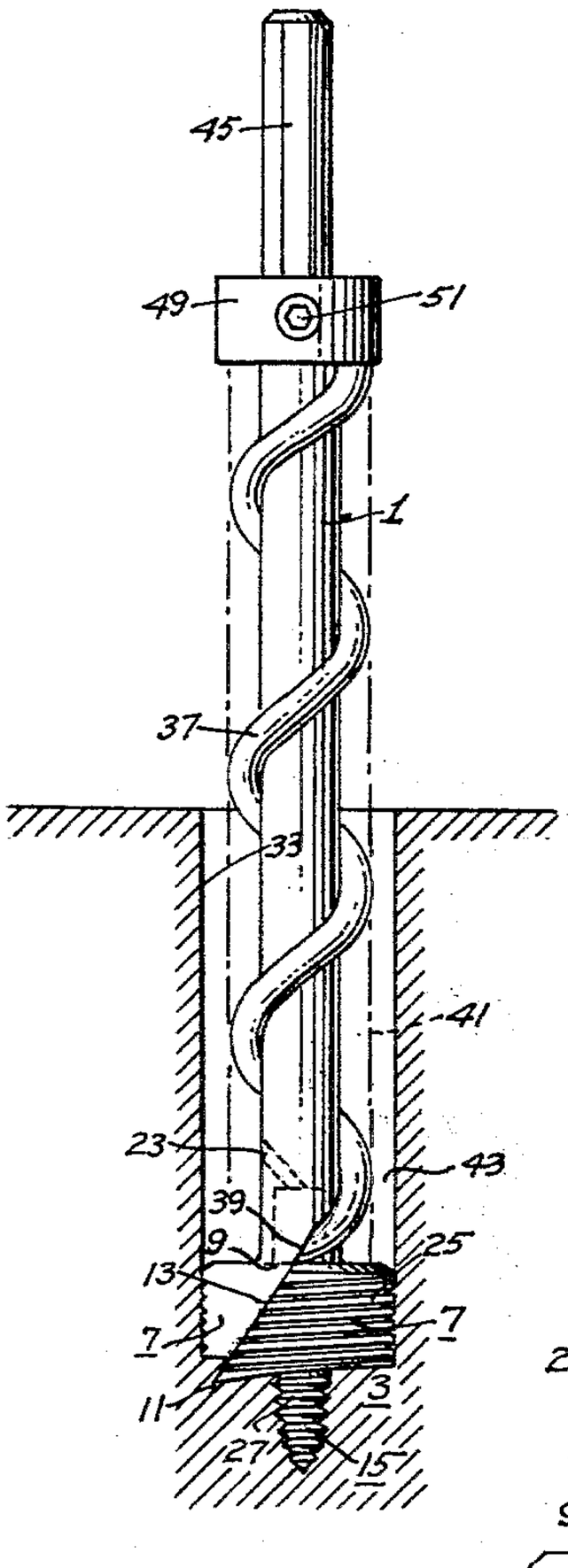


Fig. 2.

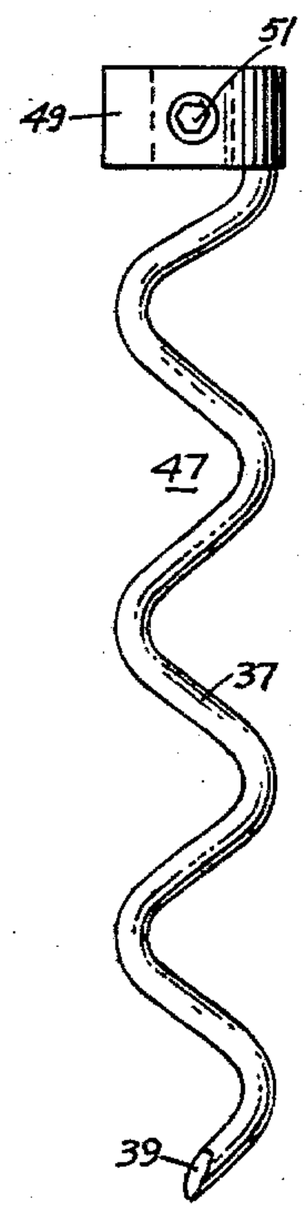
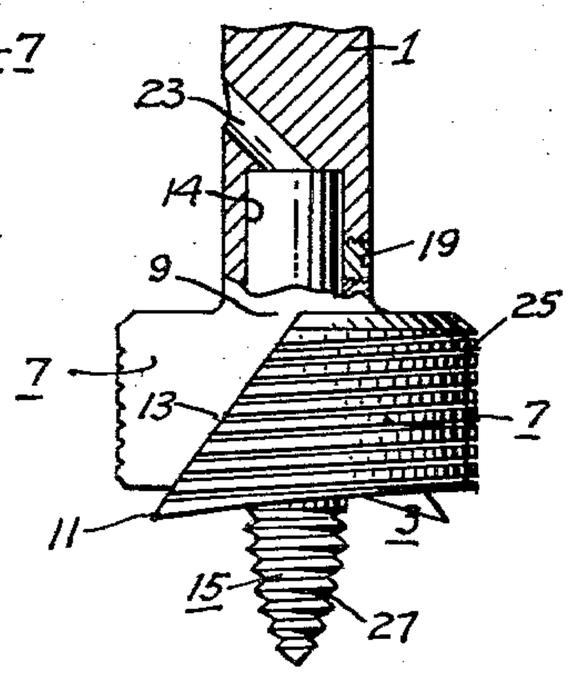


Fig. 3.



INVENTOR.
ARTHUR H. STEWART
BY
Bruce & Brosler
HIS ATTORNEY

United States Patent Office

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BIT ASSEMBLY AND CHIP EJECTOR MEANS THEREFOR

Arthur H. Stewart, 335 Willow Ave., Hayward, Calif.

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My invention relates to hole boring tools and more particularly to a bit assembly of the type involving a shank having a cutter head assembly at one end thereof, and including a lead screw or tip.

One of the problems connected with the use of such a bit assembly is the removal of chips as they are created during use of the tool, the chips normally accumulating for the most part in the hole being drilled, to be lifted out upon removal of the tool, or dropped through the hole upon passing of the cutting head completely through the work, when the hole to be drilled is not a blind hole.

Another difficulty experienced with such bits, is in the withdrawal of the cutter head assembly from the drilled hole, the wall surface of the hole often resisting such withdrawal.

Further, in many bits of this type, particularly in the smaller sizes, the cutter head is integral with the shank, and accordingly should the lead screw or tip break or freeze in the tool, due to rust or other cause, considerable difficulty will be experienced in removing such tip.

Among the objects of the present invention are:

(1) To provide a novel and improved bit assembly of the type referred to;

(2) To provide in a bit assembly of the type referred to, means for facilitating the removal of chips as they are formed during use of such tool;

(3) To provide a novel and improved bit assembly of the type referred to, in which means is provided for facilitating the removal of the lead screw or tip conventionally employed in such a tool;

(4) To provide a novel and improved bit assembly of the type referred to, adapted to provide a smooth wall surface in the hole being drilled;

(5) To provide a novel and improved chip ejector adapted for attachment to a bit assembly of the type referred to.

Additional objects of my invention will be brought out in the following description of a preferred embodiment of the same, taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is an assembly view depicting the invention in its preferred form;

FIG. 2 is a view depicting chip ejecting means included in the assembly illustrated in FIG. 1;

FIG. 3 is a view, partly in section, of the cutter head assembly of the tool of FIG. 1, and depicting a feature of the invention relating to the means for facilitating the removal of a damaged or frozen lead screw or tip from such tool.

Referring to the drawings for details of my invention in its preferred form, the bit assembly illustrated in FIG. 1, comprises a shank 1 having at one end thereof, a cutter head assembly 3.

The cutter head assembly includes a cutter head having oppositely directed cutting sections 7 extending laterally from a hub 9 to a reach beyond the longitudinal boundary of the shank, with each cutting section having a cutting edge 11 and an inclined lift surface 13 extending upwardly therefrom.

The cutter head may be formed independently of the shank, for attachment to the shank in the manner illustrated in my patent for Boring Tool and Method for Making Same, Patent No. 2,883,888 of April 28, 1959, or it may be formed integral with the shank; in either

case, the cutter head being provided with an axial passage through its hub, in alignment with an axial recess 14 in the proximate end of the shank, for the reception of a suitable lead screw or tip 15.

Such screw 15 will be retained in this passageway by a set screw 19 threadedly assembled in the tool shank 1 for engagement with the screw.

Such manner of retaining the lead screw in position permits of adjustment of the same within a range permitted by the length thereof.

Where such cutter head is independently formed, for removable attachment to the shank, as in the manner indicated in my aforementioned patent, removal of the lead screw, should it become rusted to the walls of the passageway or broken in use, becomes a relatively simple matter, for the removal of the cutter head from the shank, will expose the tail end of the lead screw, thereby enabling the same to be knocked out without much difficulty.

On the other hand, with the cutter head formed integral with the shank, as clearly depicted in FIG. 3 of the drawings, such access to the lead screw is not available. To facilitate the removal of the lead screw under these conditions, I provide an angularly drilled hole or passageway 23 through the side of the shank, to terminate in the shank recess 14 to expose the tail end of the lead screw, the angular passageway being of sufficient diameter to receive a punch or the equivalent, adapted to engage the tail end of a lead screw, which can then be loosened and knocked out of its position by a few well directed hammer blows against the exposed end of the punch.

The outer surface of the cutter sections of the head are provided with relatively shallow threads 25 which in prior art bits of this type, corresponded in number of threads per inch, to those 27 of the lead screw, and cooperated with the lead screw in causing the bit assembly to advance itself into the material being drilled, while, in the process, leaving a very shallow thread on the wall 33 of the hole, which was sufficient to interfere with the smooth withdrawal of the tool from the hole.

I have found that this condition can be alleviated by deviating from such conventional practice, to the extent of slightly reducing the number of threads per inch in the cutter head, say of the order of two threads per inch. This causes the cutter head to tend to advance at a slightly faster rate than the lead screw will tolerate, with the result that the cutter head, while driving forward, will, at the same time tend to shear off thread markings on the wall of the hole being formed. Thus, the tool may be withdrawn from the hole without the resistance to withdrawal previously experienced with this type of tool.

A further problem encountered with a tool of this character is the disposal of chips as they are produced by the cutter head. Such chips normally ride up the incline surfaces 13 of the cutter head and accumulate around the shank 1 within the hole being bored. As a prime feature of the bit assembly of the present invention, I provide a chip ejector means, which during rotation of the tool is adapted to remove the chips from the region of the cutter head, as they are formed, and cause the same to be ejected from the entrance to the hole being drilled.

Such ejector means may take the form of a spiral ridge 37 about the shank 1 and terminating at one end adjacent the cutter head, preferably in a sloping end surface 39. The spiral ridge defines a longitudinal boundary 41 well within that of the outer surface boundary of the cutter head, to provide space 43 between the spiral ridge 37 and the wall 33 of the hole being drilled.

The spiral ridge preferably extends up the shank to a point adjacent the chuck end 45 thereof, and while the

ridge may be formed integral with the shank of the tool, I prefer to fabricate the same as an attachment in the form of an ejector assembly 47, which may be removably secured about the shank 1 of the bit assembly and become an operating part thereof. When constructed as an independent attachment, the spiral ridge may be formed of heavy wire terminating at one end in the sloping end surface 39, while at its other end, the spiral ridge may be anchored to a collar or ring 49 adapted to fit snugly over the shank and be removably affixed thereto by one or more set screws 51.

Chips formed by the advancing cutter head will have a dimension determined by the length of the cutting edges 11 which will be equal to or greater than the space distance between the shank 1 and the wall 33 of the hole being drilled, but due to the fact that the spiral ridge 37 does not span this distance, the chips will not bind or jam, or otherwise offer resistance to movement thereof along the shank, but will be free to roll and twist along the guiding surface of the spiral ridge, whereby they will travel along the shank and out of the hole with a minimum of resistance.

From the foregoing description of my invention in its preferred form, it will be apparent that the same is subject to alteration and modification without departing from the underlying principles involved, and I, accordingly, do not desire to be limited in my protection to the specific details illustrated and described, except as may be necessitated by the appended claims.

I claim:

1. A bit assembly comprising a shank; a cutter head assembly at an end of said shank, said cutter head assembly including oppositely directed cutting sections extending laterally beyond the longitudinal boundary of said shank and each having a cutting edge and an inclined lift surface extending upwardly therefrom; independent means surrounding said shank and terminating adjacent said cutter head assembly for guiding work chips from said cutter head assembly up said shank as such chips are created by said cutting edges during use, said means including a spiral ridge about said shank and terminating in a free end adjacent said cutter head assembly; and means for removably securing said spiral ridge to said shank.

2. A bit assembly comprising a shank; a cutter head assembly at an end of said shank, said cutter head assembly including a hub and oppositely directed cutting sections extending laterally beyond the longitudinal boundary of said shank, and each cutting section having a cutting edge and an inclined lift surface extending upwardly therefrom, a lead screw installed axially of said hub and into said shank; and means for facilitating the withdrawal of said cutter head assembly from a hole being drilled, said means including a spiral thread about the outer surface of said cutter head assembly having a number of threads per inch slightly less than the number of threads per inch on said lead screw.

3. A bit assembly comprising a shank; a cutter head assembly at an end of said shank, said cutter head assembly including a hub and oppositely directed cutting sections integral with said shank and extending laterally beyond the longitudinal boundary of said shank, and each cutting section having a cutting edge and an inclined lift surface extending upwardly therefrom, a lead screw slidably installed axially of said hub and into said shank; and means providing access to the shank end of said lead screw, said means including a passageway into the side of said shank and exposing said end of the lead screw.

4. A bit assembly comprising a shank; a cutter head assembly at an end of said shank, said cutter head assembly including oppositely directed cutting sections extending laterally beyond the longitudinal boundary of said shank and each having a cutting edge and an inclined lift surface extending upwardly therefrom, and an axially disposed lead tip; means surrounding said shank and terminating adjacent said cutter head assembly for guiding work chips from said cutter head assembly up said shank as such chips are created by said cutting edges during use, said means including a spiral ridge about said shank and terminating at one end adjacent said cutter head assembly; threads on the outermost surfaces of said cutting sections differing slightly in number per inch from those on said lead tip; and said shank having an angularly disposed passageway into the side thereof and exposing the tail end of said lead tip.

5. A bit assembly comprising a shank; a cutter head assembly at an end of said shank, said cutter head assembly including a hub and oppositely directed cutting sections integral with said shank and extending laterally beyond the longitudinal boundary of said shank, and each cutting section having a cutting edge and an inclined lift surface extending upwardly therefrom, a lead screw slidably installed axially of said hub and into said shank; means providing access to the shank end of said lead screw, said means including a passageway into the side of said shank and exposing said end of the lead screw; and means for facilitating the withdrawal of said cutter head assembly from a hole being drilled, said means including a spiral thread about the outermost surfaces of said cutting sections, said spiral thread having a number of threads per inch slightly less than the number of threads per inch on said lead screw.

6. A bit assembly comprising a shank; a cutter head assembly at an end of said shank, said cutter head assembly including a hub and oppositely directed cutting sections integral with said shank and extending laterally beyond the longitudinal boundary of said shank, and each cutting section having a cutting edge and an inclined lift surface extending upwardly therefrom, a lead screw slidably installed axially of said hub and into said shank; means providing access to the shank end of said lead screw, said means including a passageway into the side of said shank and exposing said end of the lead screw; means for facilitating the withdrawal of said cutter head assembly from a hole being drilled, said means including a spiral thread about the outer surfaces of said cutting sections, said spiral thread having a number of threads per inch slightly less than the number of threads per inch on said lead screw; and means extending along said shank for guiding work chips from said cutter head assembly up said shank as such chips are created by said cutting sections during use, said means including a spiral ridge about said shank and terminating at one end adjacent said cutter head assembly; and means for removably securing said spiral ridge about said shank.

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ANDREW R. JUHASZ, *Primary Examiner.*

FRANK E. BAILEY, FRANK H. BRONAUGH, *Examiners.*