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3,318,401

AUGER HEAD

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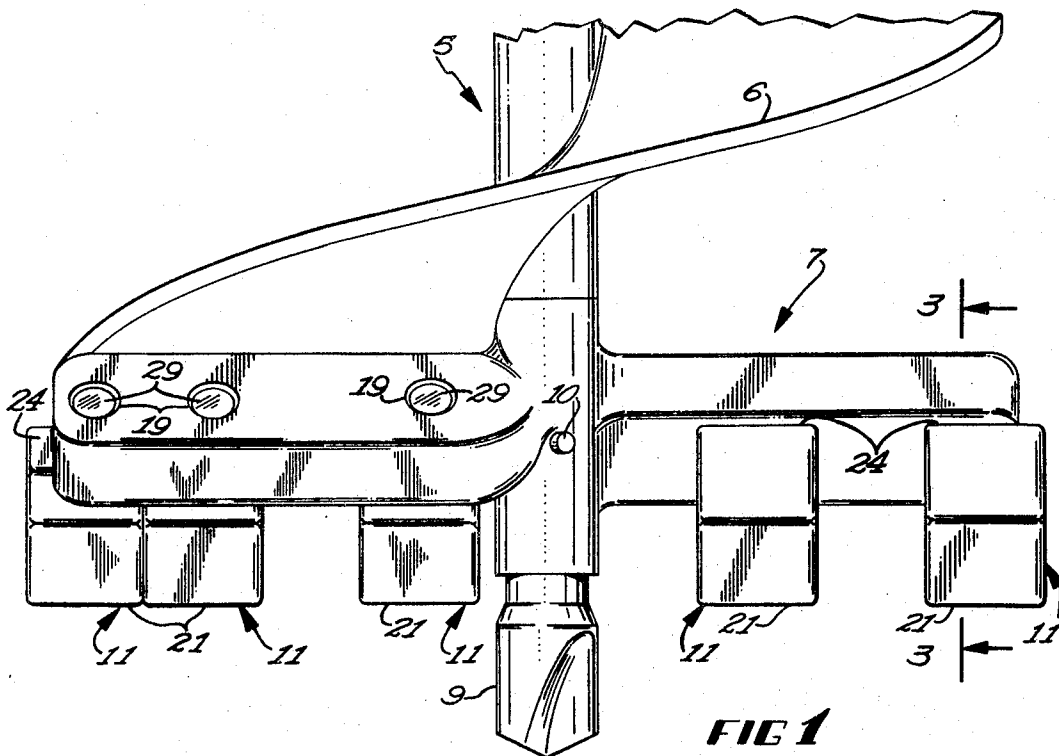


FIG 1

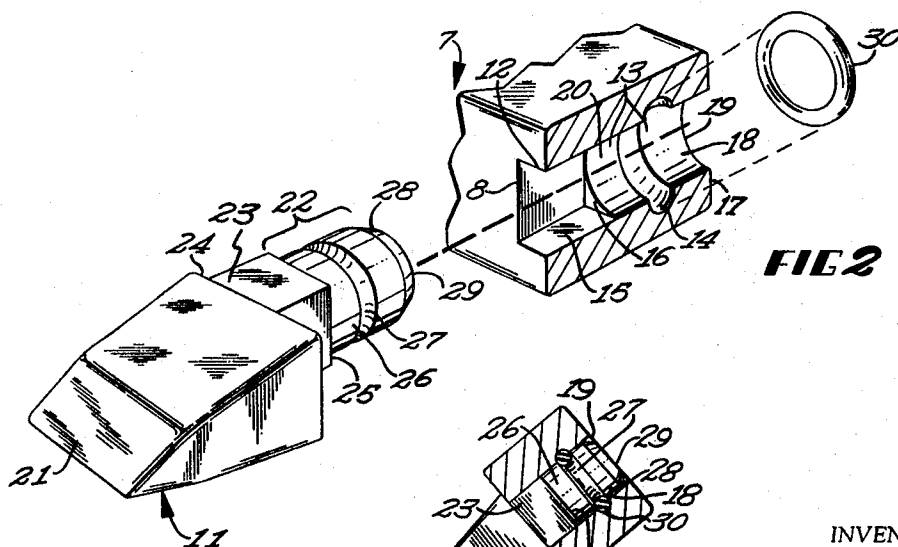


FIG 2

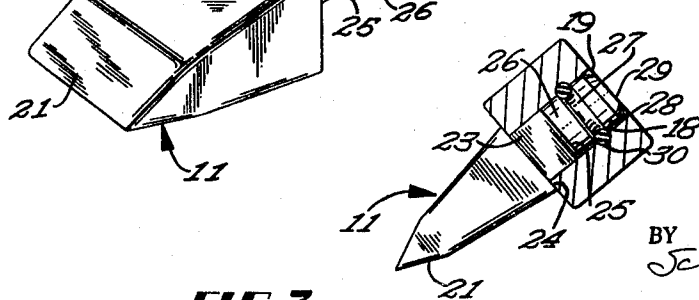


FIG 3

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AUGER HEAD

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This invention relates to earth boring equipment. More particularly, it relates to an auger head for an auger and means for releasably mounting teeth thereupon.

There is a definite need in the field of earth boring equipment for improved means for mounting teeth upon the head of an auger. The brunt of the wear is normally borne by the teeth of an auger and consequently, the worn out teeth must be relatively frequently replaced. Since the cost of down time of an earth boring machine has become ever increasing because of the increased investment and labor costs and size of equipment, it is important that such time and the labor involved be reduced to an absolute minimum. My invention is directed toward this end.

It is a general object of my invention to provide a novel and improved earth boring apparatus of simple and inexpensive construction and yet capable of having its teeth simply and inexpensively replaced.

A more specific object is to provide a novel and improved earth boring apparatus of simple and inexpensive construction so designed as to permit its teeth to be replaced with a minimum of time loss, effort, and expense.

Another object is to provide novel and improved earth boring apparatus which is so designed as to permit the teeth to be simply and easily removed and replaced with new teeth without removing the head of the auger.

Another object is to provide novel and improved earth boring apparatus utilizing an auger head which is so designed as to obviate the likelihood of the teeth becoming detached during usage in earth boring operations.

Another object is to provide novel and improved earth boring apparatus having an auger head which provides a mounting for teeth upon various machines which will greatly facilitate the removal and/or replacement so that such removal and/or replacement may be accomplished in a matter of seconds.

Another object is to provide novel and improved earth boring equipment having an auger head which is so constructed and designed as to hold the teeth firmly in place despite prolonged usage in operation.

These and other objects and advantages of this invention will more fully appear from the following description, made in connection with the accompanying drawings, wherein like reference characters refer to the same or similar parts throughout the several views, and in which:

FIG. 1 is a side elevational view of the lower end portion of an auger illustrating my improved auger head and removable teeth mounted thereon.

FIG. 2 is an exploded view illustrating a portion of the head with its tooth receiving recess shown in section and with the tooth and retaining ring shown at opposite sides of the head in the manner in which they are applied to the head.

FIG. 3 is a sectional view taken along approximately line 3-3 of FIG. 1.

In the embodiment shown in FIGS. 1-3, there is shown the lower end portion of an auger 5 with the usual flights 6 thereon. Welded to the lower end of the auger 5 is a rigid auger head 7 within which there is formed a plurality of tooth receiving recesses 8. These recesses 8 are angled and extend forwardly in the direction of rotation of the auger 5 and hence only the cutting portions of the teeth are shown at the right hand side of FIG. 1 and the upper ends of the recesses and teeth are shown at the left

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hand side of that figure. The central and lower portion of the auger head 7 is provided with an hexagonal recess (not shown) which receives therein the point 9, the upper end portion of which is shaped hexagonally to conform with the recess and likewise is not shown. The point 9 is fixedly secured in this recess by the bolt 10.

Each of the recesses 8 is elongated and is adapted to receive and rigidly mount therein one of the teeth 11. The head 7 has wall structure 12 which defines the individual recesses and includes structure 13 which defines a groove 14 adjacent the inner end of and around the longitudinal axis of the recess 8. The groove 14 is annular and is substantially semi-circular in cross-sectional configuration as best shown in FIG. 3.

The outer and lowermore portion 15 of the wall structure 12 which defines the recess 8 is rectangular in cross-sectional configuration, as best shown in FIG. 2 and terminates with a shoulder 16. The inner or uppermore portion 17 has cylindrically shaped walls 18 which define an opening 19 at the upper end of the recess. The intermediate portion 20 of the wall structure 12 which includes the groove defining portion 13 is circular in cross-sectional configuration.

Each of the teeth 11 is elongated as best shown in FIG. 2 and includes a cutting portion 21 and a somewhat offset elongated shank 22. The outer or lowermore portion 23 of the shank 22 is of the same size and configuration as the outer or lowermore portion 15 of the wall structure 12 so as to be received therein in complementary relation. As best shown in FIGS. 2 and 3, the rectangularly shaped lowermore portion 23 of the shank is of smaller dimensions than the cutting portion 21 so as to provide a shoulder 24 which will abut against the head, as best shown in FIG. 3. At the opposite end of the rectangular portion 23 there is a shoulder 25 which is provided as a result of the smaller dimensions of the intermediate portion 26. This shoulder 25 terminates next to the shoulder 16 of the recess when the tooth 11 is in mounted position upon the head 7 within the recess 8. The intermediate portion 26 is circular in cross-sectional configuration and is of the same size and configuration as the intermediate portion 20 of the recess 8 except that it has an annular groove 27 formed in its circumferential surface which is disposed directly opposite the groove 14. When the tooth 11 is mounted upon the head 7 as shown in FIG. 3, the groove 14 combines with the groove 27 to form a circular groove adapted to receive a retaining ring therein. The groove 27 is of semicircular configuration and is of lesser depth than the groove 14.

The outer or upper end portion of the shank 22 has an annular inwardly tapered wall 28 which extends to the opening 19. The outer or upper end 29 of the tooth 11 is flat and is accessible, when the tooth is mounted upon the head, via the opening 19 as shown in FIG. 1.

An annular retaining ring 30 is provided for holding the tooth 11 within the recess 8. This retaining ring 30 is formed of a firm, compressible, resilient, elastomeric material such as is conventionally utilized in the manufacture of sealing rings. In fact, the ring 30 is of the type of sealing ring commonly referred to as an "O-ring" because of its circular cross-sectional configuration. This ring 30 is of a diameter equal to the diameter of the combined groove defined by the grooves 14 and 27 and, since it is resilient, it resiliently holds the tooth 11 within the recess 8.

In use, the tooth 11 is mounted within the recess 8 by merely slipping the elongated shank portion 22 upwardly into the recess 8 at the lowermore portion thereof so that the rectangular portion 23 will be inserted into the rectangular wall structure 15 and the shoulder 25 will terminate near the shoulder 16 while the shoulder 24 bears

against the outer surface of the head 7. Prior to inserting the tooth, however, the O-ring 30 is slipped into the groove 14 from the upper end through the opening 19 and is positioned within the groove so that as the tapered walls 28 engage the same, they expand the ring 30 and this expanding action together with the holding function performed by the groove 14 causes the ring to remain in place while the circular area adjacent the walls 29 will slip through the ring until the ring slips into the groove 27. This latter positioning of the ring 30 within the groove 27 takes place simultaneously with the arrest of the shoulder 25 by the shoulder 16 and the shoulder 24 by the outer surface of the head member 7. Thereafter the ring 30 holds the tooth member 11 in operating position with the shank portion 22 in close fitting relation with the recess defining walls of the head member. The cooperation of the rectangularly shaped portion 23 of the tooth and the rectangularly shaped wall structure 15 preclude rotation of the tooth member 11 about its longitudinal axis and consequently, the tooth member will be held firmly and positively in cutting position throughout the earth boring operation.

When a particular tooth 11 becomes worn and needs to be replaced, it is an extremely simple operation to remove the tooth and insert a new one. To do so the operator merely holds a punch against the upper end 29 of the tooth 11 which is accessible via the opening 19 and strikes the punch with a hammer which will cause the worn tooth to be ejected from the lower end portion of the recess. A new tooth may then be slipped into place in the manner hereinbefore described. Such a replacement may be accomplished within a matter of seconds and consequently, cuts down very substantially on the down time. It will be noted that all of the teeth 11 are of the same construction and are interchangeable.

From the above it can be seen that I have provided a novel and improved auger head which includes a novel mounting for auger teeth which greatly reduces the time loss, effort, and expense involved in replacing worn out teeth. Moreover, the replacement can be accomplished without reference to the specific tooth and it precludes the likelihood of the teeth becoming detached during usage in earth boring operations as frequently takes place when such teeth are mechanically connected by bolts, pins, or the like. In addition, because of the resilient nature of the ring 30, the tooth will always be held in snug-fitting relation and thereby prevent lateral movement or shifting of the teeth relative to the head.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts without departing from the scope of this invention which consists of the matter shown and described herein and set forth in the appended claims.

What is claimed is:

1. Earth-boring apparatus for use in conjunction with an auger comprising:

- (a) a rigid head member adapted to be mounted in supported relation upon such an auger,
- (b) said head member having an elongated recess formed therein and extending inwardly from the outer surface thereof to receive and rigidly support a tooth member therein,

- (c) said head member including wall structure defining said recess and having a groove formed in said wall structure intermediate the ends of said recess extending transversely of the longitudinal axis of said recess,
- (d) a tooth removably mounted on said head member and having an engaging portion at one of its ends and having an elongated shank portion received within said head member recess and supporting said engaging portion exteriorly upon said head member,
- (e) said shank portion being of substantially the same size and configuration as the portion of said recess into which said shank portion is received and being received therein in close-fitting relation,
- (f) said shank portion having a cooperating groove formed in its exterior surface and extending transversely of the longitudinal axis of said shank portion and directly opposite said groove in said head member wall structure,
- (g) a continuous annular retaining member made of firm compressible material disposed between said shank portion and said wall structure and within said grooves and retaining in cooperation with said grooves said shank member within said head member recess to thereby cooperatively support said tooth upon said head member, and
- (h) one of said grooves being of a depth less than the radial cross-sectional dimensions of said retaining member but of sufficient depth to receive and retain said compressible retaining member therewithin without damage thereto as said shank portion is inserted within said recess to being said grooves into juxtaposition and to thereafter confine said retaining member in cooperation with the other of said groove in uncompressed but interlocking relation to said tooth and said head member,
- (i) means carried by said head member and engaging said tooth and preventing said tooth from rotation about a longitudinal axis thereof.

2. The earth-boring apparatus as defined in and by claim 1, wherein one of said grooves is in said shank and is of less depth than the said groove in said wall structure defining said recess.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,318,401

May 9, 1967

Ralph E. Carbert

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 33, for "being" read -- bring --.

Signed and sealed this 21st day of November 1967.

(SEAL)

Attest:

Edward M. Fletcher, Jr.

Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents