

June 24, 1930.

L. C. HARDSOCC

1,767,883

AUGER OR DRILL

Filed July 16, 1926

Fig. 1.

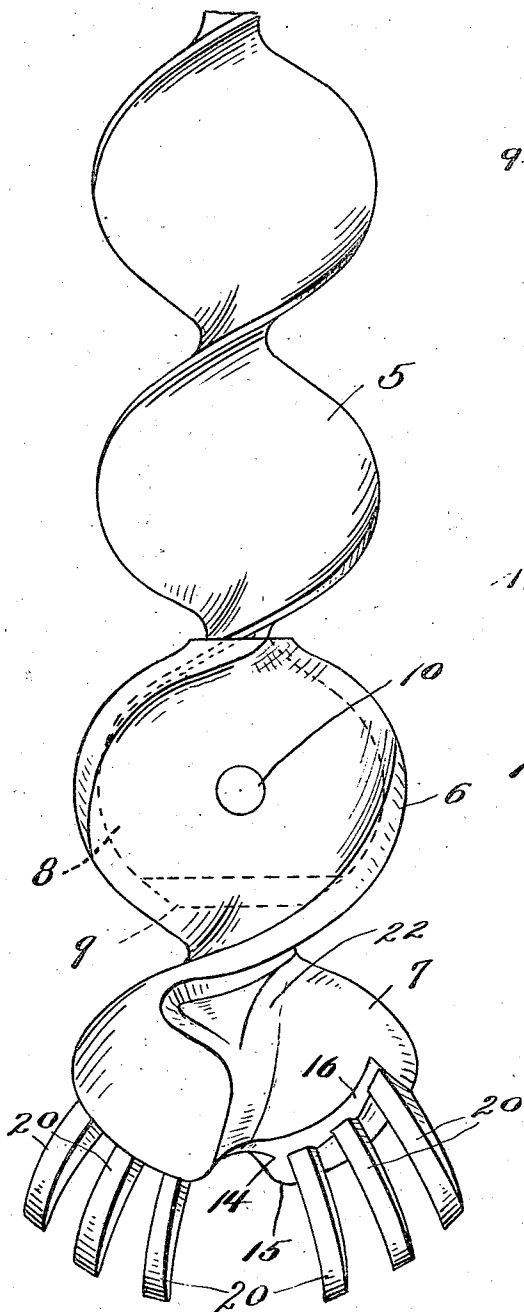


Fig. 2.

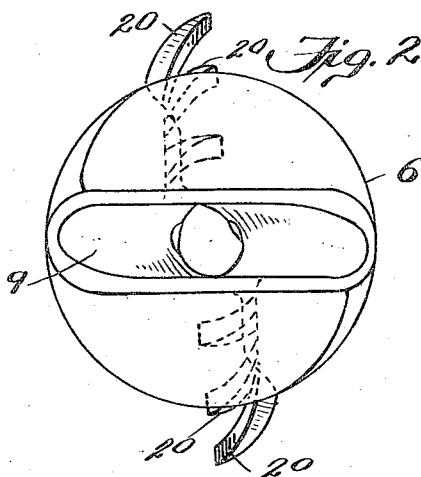


Fig. 3.

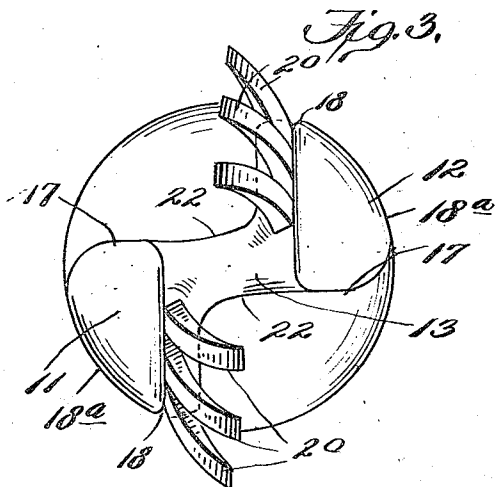
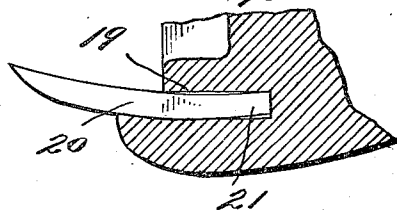


Fig. 4.



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AUGER OR DRILL

Application filed July 16, 1926. Serial No. 122,929.

This invention relates to a drill or auger particularly designed for drilling blast holes in coal mines and also for other purposes, and one object of the invention is to provide a spiral auger conveyor of the usual form having a removable head, the socket in the head being of spiral form to removably receive the spiral terminal of the auger, which is adapted to be fitted therein and secured, and whereby the joint formed between the extremity of the spiral auger and the head is reinforced against breakage and less metal required to provide for the socket, with the advantage of eliminating as much obstructive projection as possible at the joint.

A further object of the invention is to provide an auger with a removable head having a novel arrangement of removable bits and means for carrying the opposing groups of the bits in effective penetrating and cutting positions and also reinforce the bits against breakage by backing the same at a point intermediate of their lengths.

A still further object of the invention is to generally improve the construction and arrangement of the parts of an auger of the type specified.

With these and other objects and advantages in view, the invention consists in the preferred construction and arrangement of the several parts which will be more fully hereinafter described and claimed.

In the drawings:

Fig. 1 is an elevation of a portion of a spiral auger shank or conveyor with the removable head applied thereto in operative position and provided with separable bits, all of which embody the features of the invention.

Fig. 2 is a top plan view of the removable head, showing the bits at the lower extremity thereof partially in full and dotted lines.

Fig. 3 is a bottom plan view of the removable head.

Fig. 4 is a transverse section on an enlarged scale through a portion of one of the bit-holding members, showing one of the

bits therein and particularly illustrating the bracing or backing feature.

The numeral 5 designates an auger or drill shank which may be of any desired length and of spiral or twisted form, and removably associated with the lower extremity of the shank is a cutter head 6, which is also of spiral or twisted form, and continuous with the lower extremity thereof is a dual bit member 7. The lower extremity 8 of the spiral or twisted auger or drill shank is continued in the same form and dimensions as the main body of the shank above the same, and in the upper extremity of the removable head 6 is a spiral socket 9, as shown by dotted lines in Fig. 1 and in top plan view by Fig. 2, and in this socket the lower extremity 8 is fitted by giving it a screwing movement. By this means there is no reduction in dimensions of the said lower extremity 8 of the shank 5 and as a consequence there will be no weakening of this part of the shank. The spiral type of socket just explained allows the cuttings to be conveyed with little or no restriction and eliminates the necessity of adding metal to the upper end of the head and a minimized projection of the structure at the upper end of the head and a consequent reduction of resistance to the free operation of the assembled head and shank. In the spiral form of removable head and shank as heretofore adopted, the lower extremity of the shank was materially reduced and the socket in the upper portion of the head formed in an increased dimensional structure provided by adding metal to the upper extremity of the head. In this previous form of shank and removable head, considerable projection was provided at the joint, which caused the cuttings to clog the socket and obstruct the free action of the auger as a whole. The present spiral type of joint, or the spiral socket 9 in the upper portion of the removable head 6 and the continuation of the lower extremity of the shank 5 in spiral form and of a width equal to the shank above, permits attachment of the auger shank or conveyor to the head without welding a supplemental shank or tenon device

to the end of the main shank. Practical experience has shown that nearly all breakages occur just back of the ordinary form of square shank used in this type of auger comprising a main shank and removable cutter head, the break being effected where the spiral twist commences, and very seldom if ever does the spiral shank break at any other point.

10 The present improvement is therefore particularly intended to overcome the disadvantages heretofore experienced in prior similar devices during drilling operations. The lower extremity 8 of the shank 5, when
15 fitted in the socket 9 by screw action as heretofore explained, is held against loosening and displacement by a transverse pin 10 inserted through the associated parts. If found necessary, the pin may be removed
20 and the shank 5 and head 6 readily separated by a screwing movement reverse to that necessary to insert the lower extremity 8 within the socket 9. In the type of auger or drill as heretofore constructed comprising
25 a removable head, it was usually necessary to weld a slug of steel to the end of the auger and forge it down to fit the socket in the head in order to provide the supplemental shank projection or tenon, and this method often resulted in the burning of the
30 steel and creating a weak point where the spiral terminated and the supplemental reduced shank, usually of square form in cross section, began. In order to have a
35 socket of sufficient strength to withstand the strain, it is necessary to have a wall surrounding the shank at least three-sixteenths to one-fourth of an inch thick, and this increase of dimensions at the joint renders the
40 joint structure, particularly at the upper end of the head, very large with the disadvantages hereinbefore specified.

In the improved form of joint embodying the features of the present invention the
45 removable cutter head casting is cored out spirally, so that the auger screws into it, and by this means the walls of the casting forming the socket may be materially lighter and of the same general shape as the conveyor, which will lessen the liability of
50 clogging with cuttings.

A further feature of improvement in the present auger or drill is the means for supporting and reinforcing the cutter bits carried by the bit member 7. The bit member 7 comprises two oppositely positioned and reversely extending bit carriers 11 and 12 connected by a substantially transverse
55 reduced neck or web 13. Each carrier is formed with an inner cut-away portion 14, which provides a depending shoulder 15 and a curved base 16 with which the shoulder intersects at right angles. From the shoulder outwardly an increased thickness of metal is provided, and each shoulder also

tapers from a substantially straight wide terminal 17 to a blunt point 18, the outer periphery 18^a being regularly curved as shown by Fig. 3. The formation of the carriers 11 and 12 and the contour thereof is precisely the same, but the blunt point 18 of the carrier 12 and the substantially wide terminal wall 17 are in reverse positions relatively to the corresponding point and wall of the carrier 11. Straight sockets 19 are
70 formed in the base 16 of the angular shoulder 14, and in these sockets bits 20 of angular form in cross section and curved longitudinally are inserted, the enlarged extremities 21 of the bits entering the sockets 19, and owing to the formation of the sockets, which are square, and of the portions
75 21 of the bit shanks inserted in the said sockets, a frictional binding action is set up particularly in view of the longitudinal curve of the said bits 20. The outer backings or
80 shoulders 15 engage the outer sides of the bits 20 at points beyond or at a distance below the inlets of the sockets 19, and by this means the bits are reinforced and held positively against bending or fracture, all as
85 clearly shown by Fig. 4. The bits 20 will be prevented from falling out of the sockets 19 in view of the longitudinal curvature thereof and the straight formation of the said sockets, and when the said bits are arranged
90 in the sockets, they will be given the proper reversely inclined positions in the two carriers or at opposite sides of the member 7. When the bits 20 are inserted in their sockets
95 19, they are forced with considerable pressure until fully seated, and if necessity requires removal of any of the bits, they are withdrawn from their sockets by means of a suitable tool. The bit member 7 is of the
100 same diametrical extent as the spiral portion of the head 6 above and only slightly larger than the auger or drill shank 5 separably connected to the said head.

The spiral socket 9 together with the spiral formation of the lower extremity 8 of the auger 5 which is fitted into said
105 socket by a screwing action as hereinbefore explained provides an exceptionally strong joint with various points of pressure resistance owing to the spiral formation of the socket and the said lower extremity 8. This spiral formation of the socket 9 and the lower extremity 8 of the shank 5 also
110 sets up a further resistance to a straight withdrawal of the extremity 8 from the said socket, and moreover, the said spiral extremity 8 and socket 9 more evenly distribute the strain imposed upon the joint during rotation of the auger or drill in performing its function, and this distribution
115 of strain together with the increase in dimensions of the extremity 8 and the socket 9 relatively to devices of this character as heretofore constructed will materially in-
120 125 130

crease the obstruction to breakage of the said extremity and give a decided advantage in rotating the head 6 with its bit member 7 at the lower extremity of said head.

5 It will also be seen that the positions of the carriers 11 and 12 on opposite sides of the center of the lower end of the bit member 7 together with the groups of bits, consisting of three in each group in the present instance, will provide for a more effective cutting action of the bits. The bits of each group have their reduced extremities projected inwardly relatively to the bottom of the bit member 7, and in view of this reverse position of the bit groups and the neck 13 an unrestricted clearance for the borings is provided, the borings passing over the outer surface of the bit member 7 through the opposed grooves 22.

20 The shank 5 and head 6, in view of the foregoing screw association of these parts, will be sufficient under certain conditions to hold the two parts in connected relation without any other means, and as a consequence the pin 10 or analogous device may be omitted.

What is claimed as new is:

30 In an auger of the class specified, a spiral shank having its lower extremity of the same lateral extent and twist as the major portion thereof, a head having a spiral socket in its upper extremity open at the top and closed at the sides thereof, said socket being of the depth of the spiral of the shank at said lower extremity and externally of spiral form, said socket internally being of the shape of said extremity and snugly and removably engaged thereby, said lower extremity being insertible into the socket by screw action, and a transverse pin engaging the shank and head to hold them against relative rotation.

40 In testimony whereof I have hereunto set my hand.

45 LESTER C. HARDSOCH.

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