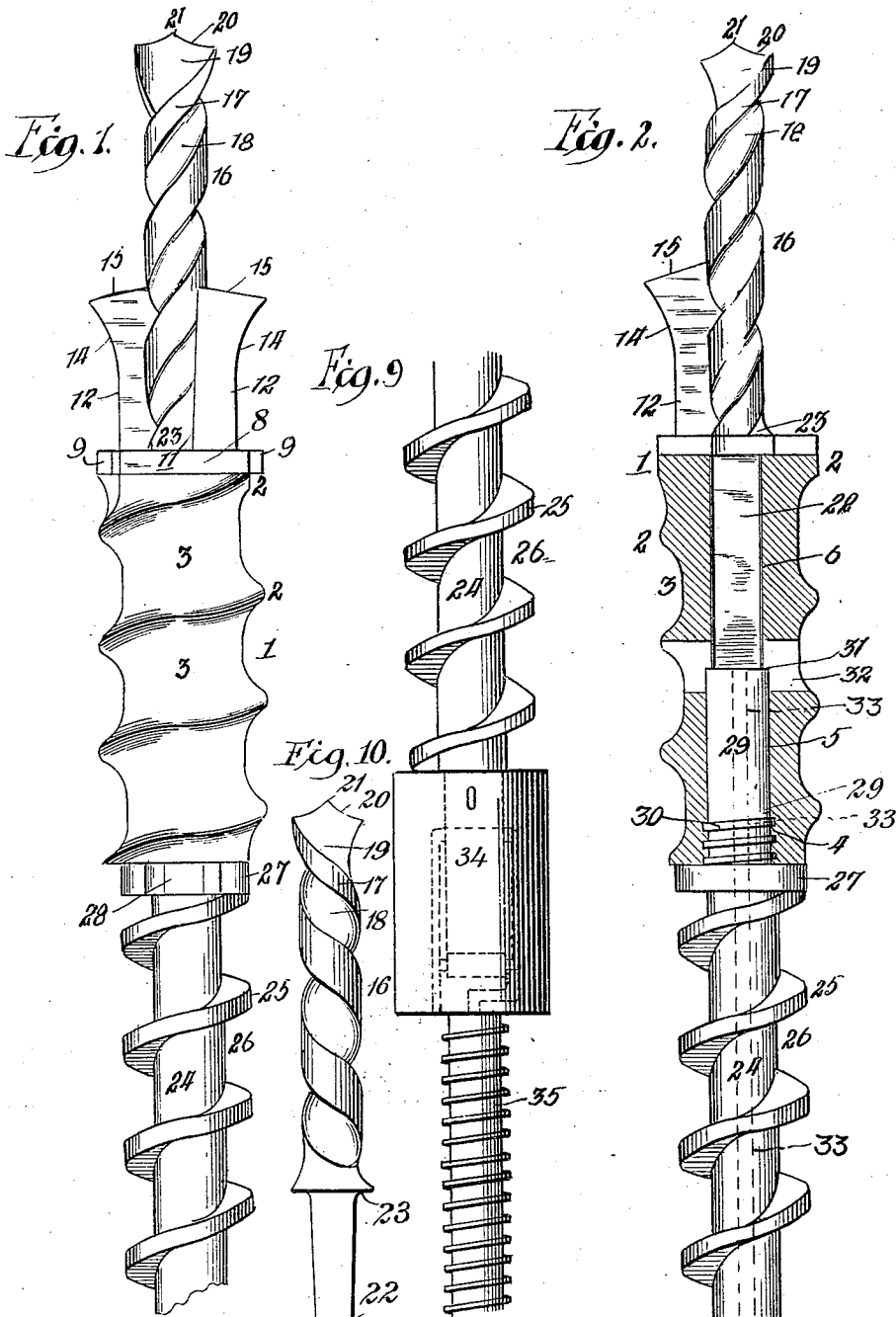


968,471.

Patented Aug. 23, 1910.

2 SHEETS—SHEET 1.



Witnesses:  
*W. P. Bond*  
*Prison W. Ganning.*

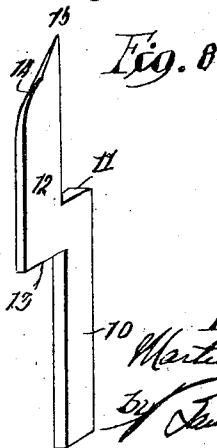
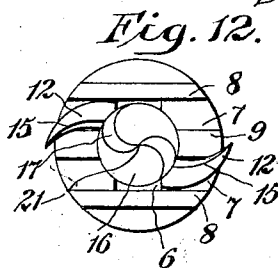
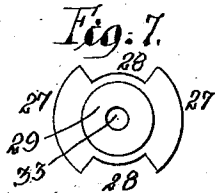
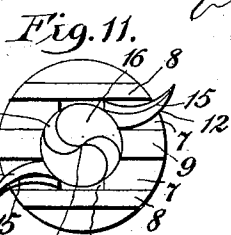
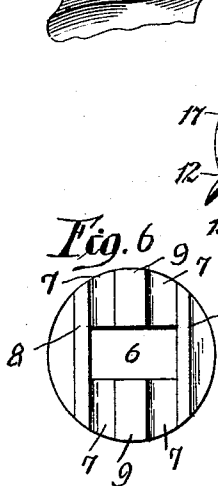
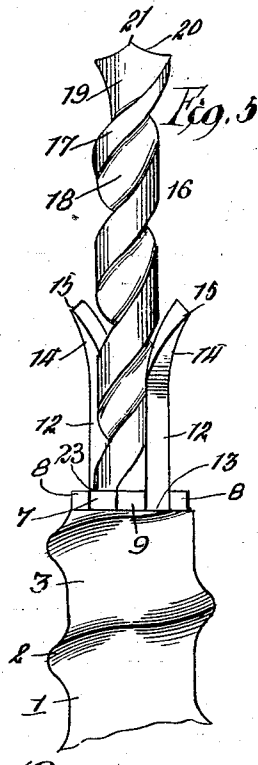
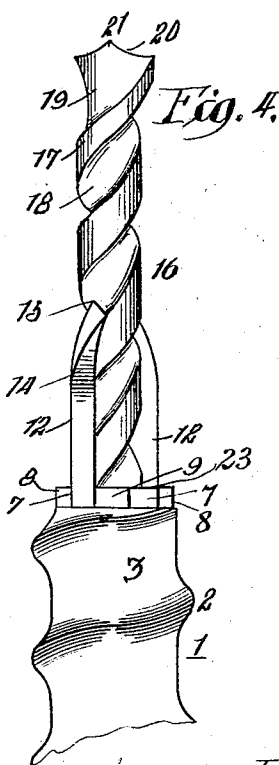
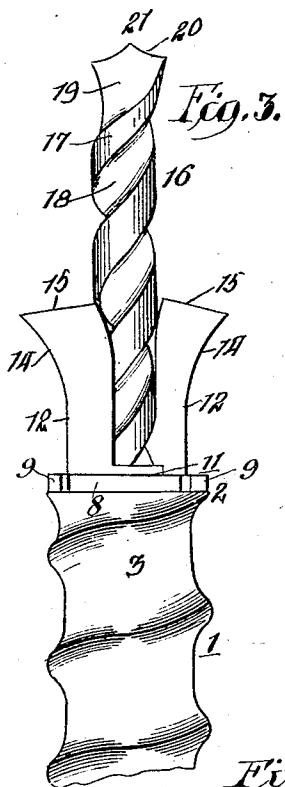
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*Att'y.*

M. HARDSOCC.  
 EARTH AUGER.  
 APPLICATION FILED MAY 19, 1908.

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Patented Aug. 23, 1910.

2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

MARTIN HARDSOCC, OF OTTUMWA, IOWA.

EARTH-AUGER.

968,471.

Specification of Letters Patent. Patented Aug. 23, 1910.

Application filed May 19, 1908. Serial No. 433,670.

To all whom it may concern:

Be it known that I, MARTIN HARDSOCC, a citizen of the United States, residing at Ottumwa, in the county of Wapello and State of Iowa, have invented certain new and useful Improvements in Earth-Augers, of which the following is a specification.

This invention relates more particularly to an auger adapted for earth boring, as in mining and sinking holes generally, and is specially adapted for use in the mining of coal; and has for its objects to construct an earth auger by means of which holes of different diameters in cross section can be bored by simply reversing the cutters or blades; to enable the main cutters or blades to be maintained in a direct line of cut by a center or lead auger or bit, so that the main cutters or blades can be utilized in making overlapping holes, if so desired; to furnish a main auger head having a spiral exterior for withdrawing the cuttings, and adapted to receive and retain a pair of cutters or blades; to furnish an interlock for the two cutters or blades of the main auger head by means of the stem of a twist auger or bit, which latter also serves as a center or lead auger or bit for the main cutters or blades; to attach the main auger head to a rod by means of a cross flange on the auger rod and a threaded end entered into a threaded hole in the main auger head, and furnishing a bearing for the main auger head on the cross flange, and at the end of the auger rod entered into the main auger head; and to improve generally the construction and arrangement of the several elements entering into the formation of the auger as a whole.

The invention consists in the features of construction and combinations of parts hereinafter described and pointed out in the claims as new.

In the drawings Figure 1 is an elevation of the auger as a whole, showing the auger rod broken off; Fig. 2 a sectional elevation of the main auger head with the twist auger or bit and the rod in full elevation; Fig. 3 an elevation with the main auger head broken off, and showing the main cutters or blades reversed from the position shown in Fig. 1 to cut a hole of greater cross diameter than the hole cut with the arrangement of Fig. 1; Fig. 4 a side elevation with the main auger head broken off, and showing the edge of the main cutters or blades as

in Fig. 1; Fig. 5 a similar view to Fig. 3, showing the arrangement of the main cutters or blades in edge elevation as in Fig. 3; Fig. 6 an end elevation of the main auger head; Fig. 7 an end elevation of the auger rod, showing the construction of the cross flange; Fig. 8 a detail in perspective of one of the main cutters or blades for the main auger; Fig. 9 an elevation of the auger rod broken off, with a pneumatic hammer connected with its outer or upper end for driving forward the auger; Fig. 10, an elevation of the lead auger; and Figs. 11 and 12, plan views of the auger head and lead auger, showing the cutting bits in different positions of adjustment.

The main auger head 1 is made of steel, or other suitable material, and has an exterior formed of spirals 2, running longitudinally of the head from end to end, with spiral passages or channels 3 between the spirals or flanges 2, as shown in Fig. 1. The main auger head 1 has a central threaded hole 4, which is continued as a plain hole 5; and leading from the inner or forward end of the hole 5 is a rectangular hole or passage 6, which terminates at the front or forward end of the auger head. The front or forward end face of the auger head has cross grooves or recesses 7, with an outer wall 8 for each groove or recess and an intermediate wall 9, separating the two grooves or recesses 7, one from the other; and the cross walls 8 extend entirely across the end face of the auger head, while the intermediate wall 9 is cut by the rectangular hole or passage 6, as shown in Fig. 6.

The main auger head carries, in the construction shown, two cutters or blades, and each cutter or blade has a stem or shank terminating in an end face or shoulder 11 at the forward or front end; and connected integrally with each shank or stem 10 is the cutter or blade 12 having, at the bottom, a shoulder 13, and having a curved end 14 terminating in a cutting edge 15, as shown in Figs. 4, 5 and 8. The acting or curved end 14 of each cutter or blade of the main auger has a curvature laterally, and also an edge curvature, as shown, for instance, in Figs. 3 and 4.

The double curvature enables the cutters or blades to be set, as shown in Figs. 1 and 4, so as to have a less width of cut crosswise, and thus bore a hole of a less diameter in cross section than when the cutters or blades

are set as shown in Figs. 3 and 5, by which a hole is bored having a greater diameter in cross section. This difference in the diameter of the holes bored is obtained by simply changing the set of the bits or cutters, as with the bits or cutters set as in Figs. 1 and 4, the lateral curvature is toward the center or lead auger or bit, and the end curvature is just projected beyond the side of the main auger head; but by setting the main cutters or blades so that the lateral curvature of the cutting or acting end is away from the center or lead auger or bit, as shown in Figs. 3 and 5, the edge curvature of the cutting or acting end of each main bit or cutter overhangs the main auger head, as shown in Fig. 3, thereby giving an increase in the diameter of the hole bored, over the diameter of the hole bored with the cutters or blades arranged as in Figs. 1 and 4.

The shanks or stems 10 of the two cutters or blades 12 are entered into the hole or socket 6 of the main auger head, and when entered are held in place by the center or lead auger or bit, in the construction shown. The center or lead auger or bit 16 is a twist one, as shown, having a spiral flange or rib 17 with a spiral groove or channel 18, as usual in twist augers or bits. The acting or cutting end 19 of the twist auger or bit has, on each side, a curved cutting edge 20 with a central point 21, as usual, so as to furnish a bearing point and a cutting edge for the auger or bit. The auger or bit, in the construction shown, has a rectangular stem 22, which enters the slot or hole 6, between the stems 10 of the cutters or blades of the main auger, so as to engage the stems and hold the cutters or blades against lateral movement; and at the base or inner end of the auger or bit are shoulders 23 arranged to engage the end face of the shoulder 11 of each cutter or blade, so as to hold the cutters or blades 12 against outward movement, inward movement being prevented by the engagement of the shoulders 13 with the end face of the main auger head in the slots or recesses, when the main cutters or blades are in position. It will thus be seen that in addition to furnishing a center or lead auger or bit, which is followed by the main cutters or blades the twist auger or bit also furnishes a locking means for holding the main cutters or blades firmly in position, and at the same time the lock is one which permits of the easy removal of the main cutters or blades for sharpening, when dull, or replacing, when worn out, which removal is attained by withdrawing the center or lead auger or bit, freeing the stems of the main cutters or blades so that such cutters or blades can be removed for sharpening or replacement, or can be removed for reversing to cut holes of different diameters.

65 The main auger head, in the construction

shown, is attached to the forward end of an auger rod, and the rod shown has a center or body 24, around which is a spiral flange or rib 25, forming a spiral channel or passage 26 between the walls of the ribs for removing the cuttings, particles, dust and dirt created in the operation of the augers. The auger rod, at its forward end, has a cross flange or head 27 with openings 28 on opposite sides to allow the cuttings, particles, dust and dirt to pass from the spiral of the main auger head to the spiral of the rod in the operation of the auger. The auger rod has an extension or end 29 forwardly extending from the cross head or flange 27, 80 and having thereon a screw thread 30, which engages the screw thread 4 of the main auger head, so that the main auger head can be threaded onto the extension or end 29 of the auger rod, and when in place the end 85 face or bottom of the auger head abuts firmly against the end face of the cross head or flange 27 and the front face of the extension or end 29 abuts against the face of a shoulder 31, formed at the juncture of the hole 5 with the hole 6, as shown in Fig. 2. This arrangement places all of the strain and resistance, in the operation of the auger between the auger head and the rod on the cross head or flange 27 and the shoulder 31, 95 relieving the screw thread of the extension or end 29 and the main auger of any strain in operating the auger, thus preventing any breaking down or impairment of the connection between the rod and the main auger head. The main auger head, in the construction shown, has a cross slot 32 for discharging a medium under pressure, which medium under pressure flows through a longitudinal hole 33 extending the entire length of the rod and assists in carrying away the cuttings.

In use, as the main auger head, with the center or lead auger or bit in position is advanced, the center or lead auger or bit will act first to bore a hole, so that a guide and bearing for the main auger to follow in a direct line is provided, thus enabling the main auger cutters or blades to be maintained in an effective operative position and guided by the center or lead auger or bit to go in a direct line of cut. The center or lead auger not only performs a boring operation, but serves as a bearing and retaining point for the main auger head and its cutters or blades by which the main auger cutters or blades can be utilized to bore overlapping holes, in a straight or circular line, to cut out a block or section of the material, and this without the use of any other tool than the auger itself. The utility of the lateral and edgewise curved main auger cutters or blades is apparent in that the same cutters or blades can be used for boring holes of different cross section diameters, 13

which is a desirable feature in the operation of the auger in many places and for many purposes.

It sometimes happens, in boring, that a hard material is met, which the auger will not readily penetrate, or which will prevent the auger from operating, and when this occurs a pneumatic hammer of any usual and well known construction can be provided for driving forward the auger and auger rod. A pneumatic hammer 34 is shown in Fig. 9 applied to the outer or upper end of the auger rod; and, as shown, a screw feed or stem 35 is connected with the pneumatic hammer for feeding forward the hammer, the auger rod, and the auger after each advance or blow of the pneumatic hammer. It will be understood that when a pneumatic hammer is used the auger, in addition to serving as a means for boring a hole, acts as a cutter for cutting the hard material to allow the auger to pass through and complete the boring.

What I claim as new and desire to secure by Letters Patent is:

1. In an earth auger, the combination of an auger head having around its exterior from end to end a spiral flange and provided with a recess, a pair of reversible cutters, each cutter having a stem entered into the recess formed in the head, each cutter having a cutting end formed with a lateral and edge curvature, and each cutter having a shoulder adapted to bear against the forward end of the auger head, a center or lead auger entered into the recess formed in the auger head between the stems of the cutter and locking and holding the pair of cutters in place, a shoulder on each of the cutters, shoulders on the lead auger adapted to be contacted by the shoulders on the cutters, the cutters being so positioned with respect to the lead auger that when they are in one position the lateral curvature of the cutting end will be away from the lead auger, and when reversed the lateral curvature of the cutting end will be toward the lead auger, thus adapting the bits to produce cuts of different diameters when reversed with respect to the lead auger, substantially as described.

2. In an earth auger, the combination of an auger head having around its exterior from end to end a spiral flange, the head having in its forward end a central rectangular hole, a pair of reversible cutters, each cutter having a rectangular stem entered into the rectangular hole in the head, each cutter having a cutting end with a lateral and edge curvature, each cutter having a shoulder adapted to bear against the forward end of the auger head, a center or lead auger having a rectangular stem adapted to be entered into the rectangular hole in the auger head, between the rectangular stems of the cutters, for locking and holding the

cutters in place, and a shoulder on each of the cutters, shoulders on the lead auger adapted to be contacted by the shoulders on the cutters, the cutters being so positioned with respect to the lead auger that when they are in one position the lateral curvature of the cutting end will be away from the lead auger, and when reversed the lateral curvature of the cutting end will be toward the lead auger, thus adapting the bits to produce cuts of different diameters when reversed with respect to the lead auger, substantially as described.

3. In an earth auger, the combination of an auger head having around its exterior from end to end a spiral flange, the head having in its forward end a rectangular hole, horizontal grooves terminating in said hole, a pair of reversible cutters, each cutter having a rectangular stem entered into the rectangular hole in the head, each cutter having a cutting end with a lateral and edge curvature, each cutter having a shoulder adapted to rest in the grooves formed in the forward end of the head, a center or lead auger having a rectangular stem adapted to be entered into the rectangular hole in the auger head, between the rectangular stems of the cutters, for locking and holding the cutters in place, and a shoulder on each of the cutters, shoulders on the lead auger adapted to be contacted by the shoulders on the cutters, the cutters being so positioned with respect to the lead auger that when they are in one position the lateral curvature of the cutting end will be away from the lead auger, and when reversed the lateral curvature of the cutting end will be toward the lead auger, thus adapting the bits to produce cuts of different diameters when reversed with respect to the lead auger, substantially as described.

4. In an earth auger, the combination of an auger head having around its exterior from end to end a spiral flange, the head having in its forward end a rectangular hole, horizontal grooves terminating in said hole, a pair of reversible cutters, each cutter having a rectangular stem entered into the rectangular hole in the head, each cutter having a cutting end with a lateral and edge curvature, the cutting end being offset with respect to the stem, producing two shoulders, the lower shoulder being adapted to rest in the grooves formed in the forward end of the auger head, shoulders on the lead auger contacting the upper shoulders on the cutters, the center or lead auger having a rectangular stem adapted to be entered into the rectangular hole in the auger head, between the rectangular stems of the cutter, for locking and holding the cutters in place, the cutters being so positioned with respect to the lead auger that when they are in one position the lateral curvature of the cutting

end will be away from the lead auger, and when reversed the lateral curvature of the cutting end will be toward the lead auger, thus adapting the bits to produce cuts of  
5 different diameters when reversed with respect to the lead auger, substantially as described.

5. In an earth auger, the combination of an auger head having a central hole in its  
10 rear end, threaded for a portion of its way, and terminating at its forward end in a shoulder, said auger head having also a hole in its forward end, adapted to receive a lead

auger, the two holes communicating, an auger rod, a cross head or flange at the forward end of the rod, and a stem forwardly  
15 extending from the cross head or flange, screw-threaded for a portion of its way, the forward end of the stem contacting the lower end of the lead auger, relieving the  
20 lead auger of any strain during the drilling operation, substantially as described.

MARTIN HARDSOCC.

Witnesses:

W. A. WORK,  
EMMET A. WORK.