Oct. 16, 1951 W. L. HOLLANDER 2,571,244

EARTH AUGER

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Fig-1

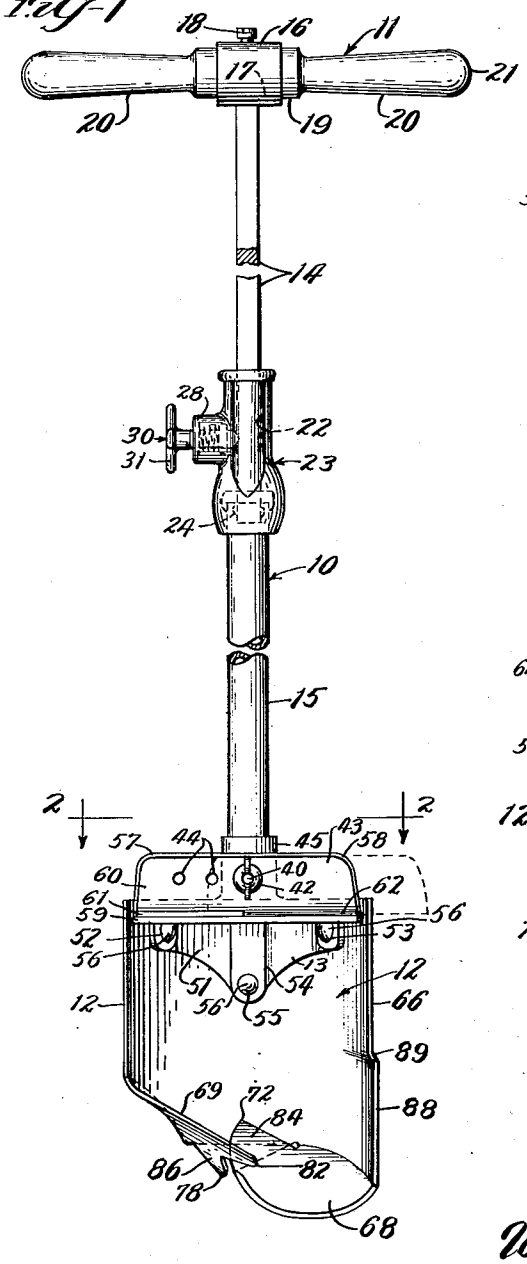


Fig-2

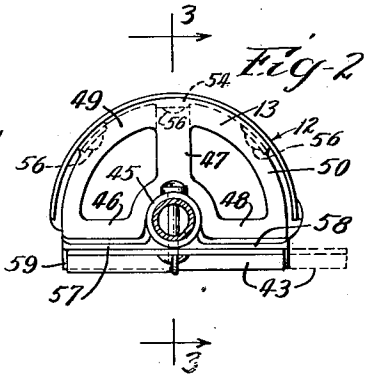
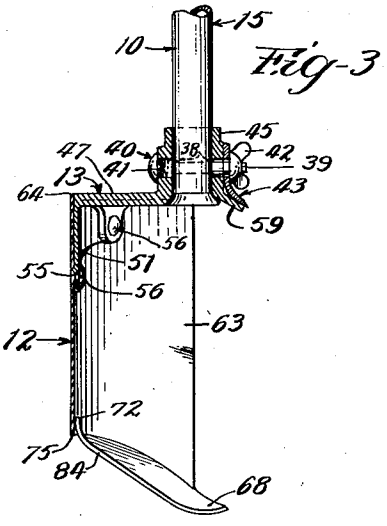


Fig-3



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EARTH AUGER

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Fig-4

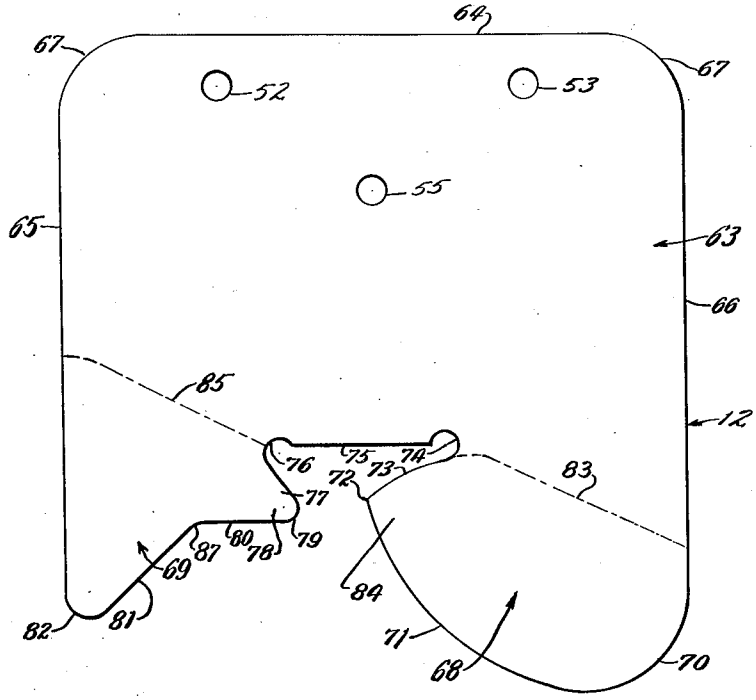


Fig-6

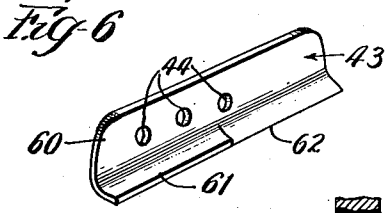


Fig-5

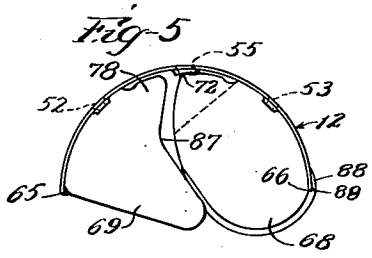
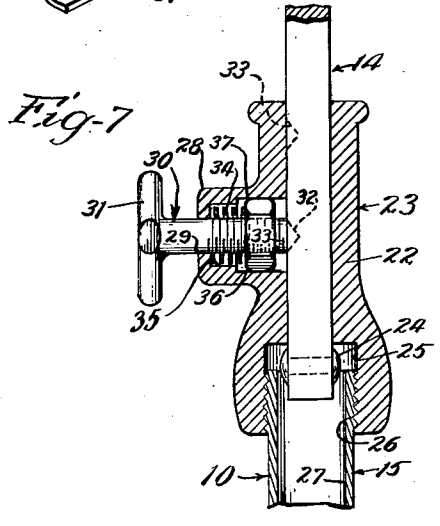


Fig-7



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UNITED STATES PATENT OFFICE

2,571,244

EARTH AUGER

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Application March 12, 1949, Serial No. 81,092

4 Claims. (Cl. 255—66)

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The present invention relates to earth augers, and is particularly concerned with the provision of an improved earth auger which is adapted to be used for making post holes for transmission line poles and the like.

One of the objects of the invention is the provision of an improved auger, the cutting body of which is adapted to be constructed of sheet metal and which is also adapted to serve as a spoon for lifting the particles of the earth from the hole after they have been accumulated in the auger by its rotation.

Another object of the invention is the provision of an improved earth auger which is sturdy in construction, efficient and easy to operate, in which the earth does not jam underneath the blades, and in which it is easier to discharge the earth from the body of the auger, because of the fact that the body comprises substantially a half cylinder with one side open.

Another object is the provision of an improved blade structure for earth augers, which may be easily shaped by a simple bending and light drawing of the stock so that there will be no wrinkling of the stock and so that the multiple blades provided lift the earth spirally upward as the blade is rotated in the formation of a hole in the earth.

Another object of the invention is the provision of an improved earth auger which is light in weight, which has no moving parts to get out of adjustment or to wear out, and the structure of which makes it easy to dump the dirt at any time regardless of the type of dirt which it contains, such as, for example, sticky, muddy clay.

Another object of the invention is the provision of an improved auger structure, which is so constructed that it will not be damaged if the user should beat the auger against a plank or the like to loosen the dirt, and also which permits the hole to be enlarged by the use of an auxiliary attachment which may readily be applied to the auger.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the two sheets of drawings accompanying the specification,

Fig. 1 is a side elevational view of the complete auger and handle embodying the invention;

Fig. 2 is a sectional view taken on the plane of the line 2—2 of Figure 1, looking in the direction of the arrows;

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Fig. 3 is a fragmentary vertical, sectional view taken on the plane of the line 3—3 of Figure 2, with the shaft in elevation;

Fig. 4 is a developed plan or pattern for the body and blades of the auger:

Fig. 5 is a top plan view of the auger body and blades shown apart from its supporting casting;

Fig. 6 is a view in perspective of the reamer which may be employed for enlarging the hole made by the auger; and

Fig. 7 is a fragmentary axial, sectional view taken through a portion of the adjustable handle of Figure 1, showing the structure by means of which the length of the handle is adjusted.

Referring to Figs. 1 to 3, the complete auger preferably includes a drive shaft 10, which is adjustable in length and provided at its upper end with a handle 11, the shaft supporting at its lower end the auger body 12 by means of a supporting casting 13.

The drive shaft 10 preferably consists of a pair of sections 14 and 15, which telescope upon each other in order to provide for the adjustment of the length of the shaft as the depth of the hole increases. For example, the upper section 14 of the drive shaft may consist of a solid square metal shaft welded at its upper end to a transversely extending tubular member 16, having a transverse bore 17 and provided with a set screw 18 threaded into the side wall of said tubular member to engage the handle 11.

The handle 11 may consist of a wooden member having an enlarged centrally located cylindrical portion 19 fitting in the transverse sleeve 16, where it is secured by set screw 18. The end portions of the handle may have their minimum diameter adjacent the central portion 19, and may gradually increase in diameter out toward the rounded end portion 21.

At its lower end the solid shaft 14 is slidably received in a square hole 22 in casting 23. The solid shaft 14 may be provided with a transverse rivet 24 extending through the end of the solid shaft section 14, and located in a counterbore 25 in the casting 23. The rivet 24 is riveted over at both ends and will not pass the bore 22, so that it keeps the shaft section 14 from being entirely withdrawn from the casting 23.

The casting 23 comprises a generally cylindrical metal member provided with the through square hole 22, the counterbore 25 and a second counterbore 26 for receiving the tubular shaft section 15 which is fixedly secured in counterbore 26 by screwing it into the casting 23. The size of the bore 27 in the tubular shaft section 15 is such as

to pass the rivet 24 so that the solid shaft portion 14 may telescope into the tubular shaft portion 15.

The casting 23 has a laterally projecting cylindrical portion 28 which is formed with a bore 29 in its end for slidably receiving a cylindrical threaded plunger 30. This cylindrical plunger may have a handwheel 31, and its inner end may be frusto-conical at 32. The frusto-conical end 32 is adapted to be received in any one of a plurality of cylindrical sockets 33 in the solid shaft section 14, in such manner as to hold the telescoping shaft sections in any adjusted position and to permit the upper shaft section 14 to rotate the lower shaft section 15.

In order to hold the plunger 30 with its end in one of the sockets 33 the plunger carries a helical spring 34, one end of which engages the end of a counterbore 35 in the portion 28, and the other end of which engages a metal tapped nut 36, which is threaded on the plunger 30.

The lateral portion 28 has a larger square cavity 37 for receiving nut 36. Thus the plunger 30 is constantly urged into its engaging position, but may be withdrawn by pulling on the plunger against the spring 34, or locked tightly by turning handwheel 31 on the plunger 30 to apply locking pressure between the end of plunger 28 and cylindrical socket 33 and solid shaft 14.

At its lower end the tubular shaft section 15 has a through bore 38 (Fig. 3) for passing the shank 39 of a screw bolt 40. This screw bolt 40 may have a squared portion on its shank which is receivable in a noncircular bore 41 in the casting 13; and it may pass through the casting and the tubular shaft section 15 and may be provided with a wing nut 42 on its threaded end.

The bolt 40 may also pass through the reamer blade 43 at any one of the apertures 44 for a purpose further to be described. The supporting casting 13 for the auger body comprises a cast metal member which is provided with a supporting hub 45 for its attachment to the shaft 15.

The hub 45 supports a plurality of integral radially extending arms 46, 47, 48, and the arms 46 and 48 may extend oppositely to each other so that the casting 13 extends over substantially half of a circle. The arms 46, 47, 48 are joined by integral arcuate portions 49, 50, which are in the same plane as the spokes or arms 46—48 and the arcuate portions 49, 50 support a depending partially cylindrical flange 51.

This depending partially cylindrical flange may be thickened adjacent the through bores 52, 53, which are located at each of its ends; and it may also have a thicker axially extending portion 54 midway between the ends of the flange 51 around the through bore 55, which is preferably located farther down in an axial direction than the bores 52, 53. Thus the flange 51 is substantially triangular in developed elevation.

The bores 52, 53, 55 serve for receiving rivets 56, by means of which the body 12 of the auger is secured to the supporting casting 13. The casting 13 is also preferably provided on its right side in Figure 2, with a pair of axially extending flanges 57, 58 located with their outer surfaces tangential to the sleeve 45 of the hub, and these axial flanges are for the purpose of engaging the reamer 43 previously described.

In addition to the axial flanges 57, 58, the hub 45 supports an integral, angular flange 59 which extends outward and downward at an obtuse angle slightly larger than a right angle, this angle being similar to the angularity of the reamer 43. The reamer 43 is preferably used after the hole has been bored for enlarging the hole. It consists of an angular steel member having a vertical flange 60 which is provided with the holes 44.

One of the holes 44 is preferably centrally located so that the reamer, which is preferably no longer than the diameter of the auger body 12, may be constantly mounted on the hub 45 in its inoperative position as shown in Figure 1. When it is desired to extend the reamer and use it the other holes 44 are used in connection with the bolt 40.

The vertical flange 60 of the reamer 43 supports a transverse flange 61, which is at an obtuse angle corresponding to that of the flange 59. At the left end of the reamer 43 the transverse flange 61 retains its usual thickness underneath the holes 44, as it is intended to serve in increasing the strength and the firmness of the attachment of the reamer.

At its right end, Figure 6, the reamer 43 has a sharpened edge 62 on its flange 61, as this is the edge which is to cut into the earth surrounding the hole already bored to enlarge the hole.

The auger body 12 is preferably constructed of sheet steel and its developed plan is shown in Figure 4. It preferably comprises a substantially rectangular sheet 63 of metal having the straight upper edge 64, and the straight lateral edges 65, 66 which are at right angles to the upper edge 64. The edges of the sheet 63 are preferably rounded at the upper corners as indicated at 67.

The lower edge of the body 63 is irregularly formed to form the main cutting blade 68 and the auxiliary blade 69. The main cutting blade 68 extends downward beyond the auxiliary blade 69, and it is formed adjacent the edge 66 with a convexly curved edge portion 70 on a relatively small radius.

This edge portion then merges into a radial curved edge portion 71 which is curved on a larger radius so that it extends substantially radially of the finally curved body 12. The radial curved cutting edge 71 terminates at a point 72, which is located substantially midway between the lateral edges 65, 66 of the pattern. The blade is cut back toward the right at 73 and provided with a convex edge 73 which extends into the body to the cylindrical bore 74.

The body of the auger 12 then has a straight lower edge 75 extending toward the left over toward the partially cylindrical bore 76. Here the lower edge extends downward and diagonally inward at 77 to form an inwardly extending tongue 78 which is acutely triangular, and has a rounded point 79 and a straight trailing edge 80.

The purpose of the partially cylindrical bores 74, 76 is to form the auger body 12 at these points in such manner that the ends of the cuts will not be sharp slits but will be rounded surfaces which will not tend to tear any further.

From the lower edge 80 of the tongue 78, the lower edge 81 of the auxiliary blade 69 extends diagonally downward and to the left, and its point adjacent the side edge 65 is rounded at 82. The dotted line 83, which extends diagonally downward toward the right from the partially circular bore 74, is the line of fold along which the main blade is folded with respect to the body 63 of the auger; and this blade is bent inwardly

at substantially right angles or slightly more than a right angle, relative to the body 63 at the line 83. As the line of bend 83 extends diagonally, the blade 84 also extends downwardly and diagonally with respect to the direction of rotation, the portion 70 being the lowest part.

The diagonal line 83 causes the blade to slope downwardly toward the front, as shown in Figure 1. This slope of the blade also causes the point 72 and trailing portion 84 of the main blade to rise above the straight edge 75. The purpose of this is to lift the earth into the half-cylindrical spoon formed by the auger, and the elevation of the trailing edge 84 causes the lifted dirt to engage the body 63 and does not permit it to pass under the straight edge 75.

The dotted line 85 extending from the partly cylindrical cut-out 76, diagonally toward the left and upward in Figure 4, is the line of bend for the auxiliary blade 69 which is preferably bent up at an obtuse angle, which is slightly more than a right angle, thus causing this blade to extend over toward the main blade 68 which its point overlaps.

The auxiliary blade 69 slopes backward and downward from the front and its bottom surfaces 86 is thus visible in Figure 1. The flat sheet 63 which forms the body of the auger is bent to half-cylindrical form and this brings the auxiliary blade over with its point 82 above the main blade 68.

The obtuse angle 87 in the lower edge of the auxiliary blade 69, Figure 4, is brought almost into engagement with the curved edge 72 of the main blade, and the triangular point 78 of the auxiliary blade 69 is caused to extend downward under the trailing edge portion 84 of the main blade.

Thus the two blades correspond in a general way to a lower helical wall for the earth which they engage. The earth which is lifted by the main blade passes over on the auxiliary blade as the body of the auger is rotated, and is further lifted by the auxiliary blade which, however, tends to cause the earth to pile up and remain in the auger on account of its upward slope in a backward direction with respect to the direction of rotation.

The pointed triangular portion 78 of the auxiliary blade depends below the main blade trailing end 84, and tends also to lift earth which it may engage and to raise it on the auxiliary blade.

The edges 77 and 80 of the leading point of the auxiliary blade are preferably beveled and sharpened, the bevel being on their upper side. The curved edges 70, 71 of the main blade are also beveled on their upper side, at least down to the point where the main blade is adjacent the obtuse angle 87 in the edge of the auxiliary blade.

The leading edge portion 88 of the half cylinder is also preferably beveled on its inside and sharpened, and the edge 66 of the pattern is offset outwardly at 89 so that the sharpened edge 88 of the half cylinder may cut a bigger hole than is needed to receive the half cylinder. Thus the sharpened edge 88 provides a clearance in the hole for the rest of the auger.

The cylindrically formed body of the auger 12 is riveted or otherwise permanently secured to the casting 13 by rivets through the holes 52, 53, 55, with its upper edge preferably flush with the upper surface of the arcuate portions 49 and 50 of casting 13.

The operation of the auger is as follows:

The shaft is first adjusted to a relatively short length which may be suitable for the operator so that the handle 11 is about waist high. The main blade 68 is then rested upon the ground approximately at the point where the hole is to be bored and the shaft 10 is rotated by means of handle 11.

As the shaft rotates the downwardly and forwardly extended sharpened edges 70, 71 dig into the earth and cause the earth to slide up on this main blade into the cylindrical body. The friction and force of gravity tend to prevent the earth from passing out of the cylinder, and the earth piles up inside the cylindrical spoon formed by the body 12 at its natural angle of repose. Depending upon the kind of earth which is present, the earth may become compacted in the spoon.

Whenever considerable difficulty is presented to further twisting of the auger, the auger is pulled out of the hole and the dirt in the spoon is cleaned out either by turning the auger upside down in a horizontal position or by striking the auger against a plank.

As the rotation of the auger is continued the main blade 68 digs deeper and deeper into the ground, and the offset sharpened edge 88 tends to finish off the hole into a substantially cylindrical hole. As the auger passes down into the earth the shaft is lengthened as desired, and when a hole has been bored it may then be enlarged by using the reamer 43. This is done by moving the reamer radially outward and securing the bolt shank 39 in one of the other holes 44, so that the reamer projects toward the right with its sharpened edge 62.

Any number of holes 44 may be provided, but the three illustrated permit the formation of holes of three different sizes.

The action of the reamer is as follows:

The reamer cuts away an additional portion of the cylindrical wall around the hole, and earth which drops into the hole is then removed by means of the same auger spoon which may be caused to gather the dirt by rotating it.

It will thus be observed that I have invented an improved auger which may be made very cheaply out of sheet metal and which bores holes more easily than the devices of the prior art. The present auger is light in weight, it has no moving parts to wear out or break and it is easy to dump the earth as it is not damaged even by pounding it against a plank. It can be used with the reamer attachment for enlarging the hole, and by means of its telescoping shaft the operating handle can be maintained at a height which is most convenient for the application of force to the handle by the operator.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In an earth auger, the combination of a cast metal supporting body having a substantially half circular horizontal flange provided with an axially extending hub at its flat side, said hub being provided with an axial bore, and having a transversely extending aperture for receiving a threaded securing member, a tubular shaft fitting in said hub bore, and having a

registering transversely extending aperture, a threaded securing member passing through said hub and shaft, and a cast metal fixture carried by the end of said shaft and threaded thereon, said fixture having an axially extending tubular portion provided with a non-circular bore, a non-circular shaft in said latter bore and slidably mounted thereon to slide into said first-mentioned shaft, a handle carried by said non-circular shaft at its upper end, said first-mentioned casting having a downwardly extending partially cylindrical attaching flange, a substantially half cylindrical sheet metal auger body having a straight upper edge and secured to said attaching flange, said auger body being formed upon its leading edge with respect to the direction of rotation, with an outwardly offset lower sharpened cutting portion for cutting a cylindrical bore larger than said auger body, said auger body being formed adjacent said leading edge on its lower side with an inwardly turned earth cutting blade having a rounded cutting edge starting at said leading edge of said auger body, and being bent to extend diagonally and upward, backwardly from its cutting edge, to lift the earth into the auger body and to cause the blade to cut downwardly into the earth, said blade having a triangular tail at its highest end, and said body also having a second blade extending diagonally upward in a backward direction with respect to rotation, and bent from the opposite or trailing edge of said body to receive earth from said tail.

2. In an earth auger, the combination of a cast metal supporting body having a substantially half circular horizontal flange provided with an axially extending hub at its flat side, said hub being provided with an axial bore, and having a transversely extending aperture for receiving a threaded securing member, a tubular shaft fitting in said hub bore, and having a registering transversely extending aperture, a threaded securing member passing through said hub and shaft, and a cast metal fixture carried by the end of said shaft and threaded thereon, said fixture having an axially extending tubular portion provided with a non-circular bore, a non-circular shaft in said latter bore and slidably mounted thereon to slide into said first-mentioned shaft, a handle carried by said non-circular shaft at its upper end, said first-mentioned casting having a downwardly extending partially cylindrical attaching flange, a substantially half cylindrical sheet metal auger body having a straight upper edge and secured to said attaching flange, said auger body being formed upon its leading edge with respect to the direction of rotation, with an outwardly offset lower sharpened cutting portion for cutting a cylindrical bore larger than said auger body, said auger body being formed adjacent said leading edge on its lower side with an inwardly turned earth cutting blade having a rounded cutting edge starting at said leading edge of said auger body, and being bent to extend diagonally and upward, backwardly from its cutting edge, to lift the earth into the auger body and to cause the blade to cut downwardly into the earth, said blade having a triangular tail at its highest end, and said body also having a second blade extending diagonally upward in a backward direction with respect to rotation, and bent from the opposite or trailing edge of said body to receive earth from said tail, said second blade being formed with a triangular inward cut, forming a pair of points, one point extending forwardly under the first blade, and the other point extending forwardly above the first blade.

3. In an earth auger, the combination of a cast metal supporting body having a substantially half circular horizontal flange provided with an axially extending hub at its flat side, said hub being provided with an axial bore, and having a transversely extending aperture for receiving a threaded securing member, a tubular shaft fitting in said hub bore, and having a registering transversely extending aperture, a threaded securing member passing through said hub and shaft, and a cast metal fixture carried by the end of said shaft and threaded thereon, said fixture having an axially extending tubular portion provided with a non-circular bore, a non-circular shaft in said latter bore and slidably mounted thereon to slide into said first-mentioned shaft, a handle carried by said non-circular shaft at its upper end, said first-mentioned casting having a downwardly extending partially cylindrical attaching flange, a substantially half cylindrical sheet metal auger body having a straight upper edge and secured to said attaching flange, said auger body being formed upon its leading edge with respect to the direction of rotation, with an outwardly offset lower sharpened cutting portion for cutting a cylindrical bore larger than said auger body, said auger body being formed adjacent said leading edge on its lower side with an inwardly turned earth cutting blade having a rounded cutting edge starting at said leading edge of said auger body, and being bent to extend diagonally upward in a backward direction with respect to rotation, and bent from the opposite or trailing edge of said body to receive earth from said tail, the said hub being formed on one of its sides with an axial transverse flange having an outwardly and downwardly extending flange at an obtuse angle and an auxiliary cutting blade shaped to fit against said axial flange and obtuse flange, and having a plurality of apertures to receive the same threaded securing member, said blade having its forward lower edge sharpened at one end to protrude beyond the auger body and cut a hole larger than the auger body.

4. In an earth auger, the combination of a cast metal supporting body having a substantially half circular horizontal flange provided with an axially extending hub at its flat side, said hub being provided with an axial bore, and having a transversely extending aperture for receiving a threaded securing member, a tubular shaft fitting in said hub bore, and having a registering transversely extending aperture, a threaded securing member passing through said hub and shaft, and a cast metal fixture carried by the end of said shaft and threaded thereon, said fixture having an axially extending tubular portion provided with a non-circular bore, a non-circular shaft in said latter bore and slidably mounted thereon to slide into said first-mentioned shaft, a handle carried by said non-circular shaft at its upper end, said first-mentioned casting having a downwardly extending partially cylindrical attaching flange, a substantially half cylindrical sheet metal auger body having a straight upper edge and secured to said attaching flange, said auger body being formed upon its leading edge with respect

to the direction of rotation, with an outwardly offset lower sharpened cutting portion for cutting a cylindrical bore larger than said auger body, said auger body being formed adjacent said leading edge on its lower side with an inwardly turned earth cutting blade having a rounded cutting edge starting at said leading edge of said auger body, and being bent to extend diagonally and upward, backwardly from its cutting edge, to lift the earth into the auger body and to cause the blade to cut downwardly into the earth, said blade having a triangular tail at its highest end, and said body also having a second blade extending diagonally upward in a backward direction with respect to rotation, and bent from the opposite or trailing edge of said body to receive earth from said tail, said fixture being provided with a transversely extending, non-circular bore, a threaded plunger in said non-circular bore, and having an external handle, said non-circular shaft having a plurality of sockets for receiving the end of said threaded plunger, said plunger having a nut in said non-circular bore, and a

spring engaging said nut, said spring extending into engagement with an inwardly extending flange surrounding a counter-bore, slidably mounting said plunger, the plunger being spring pressed into said sockets and being rotatable in said nut for firm engagement in said sockets.

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