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EARTH AUGER

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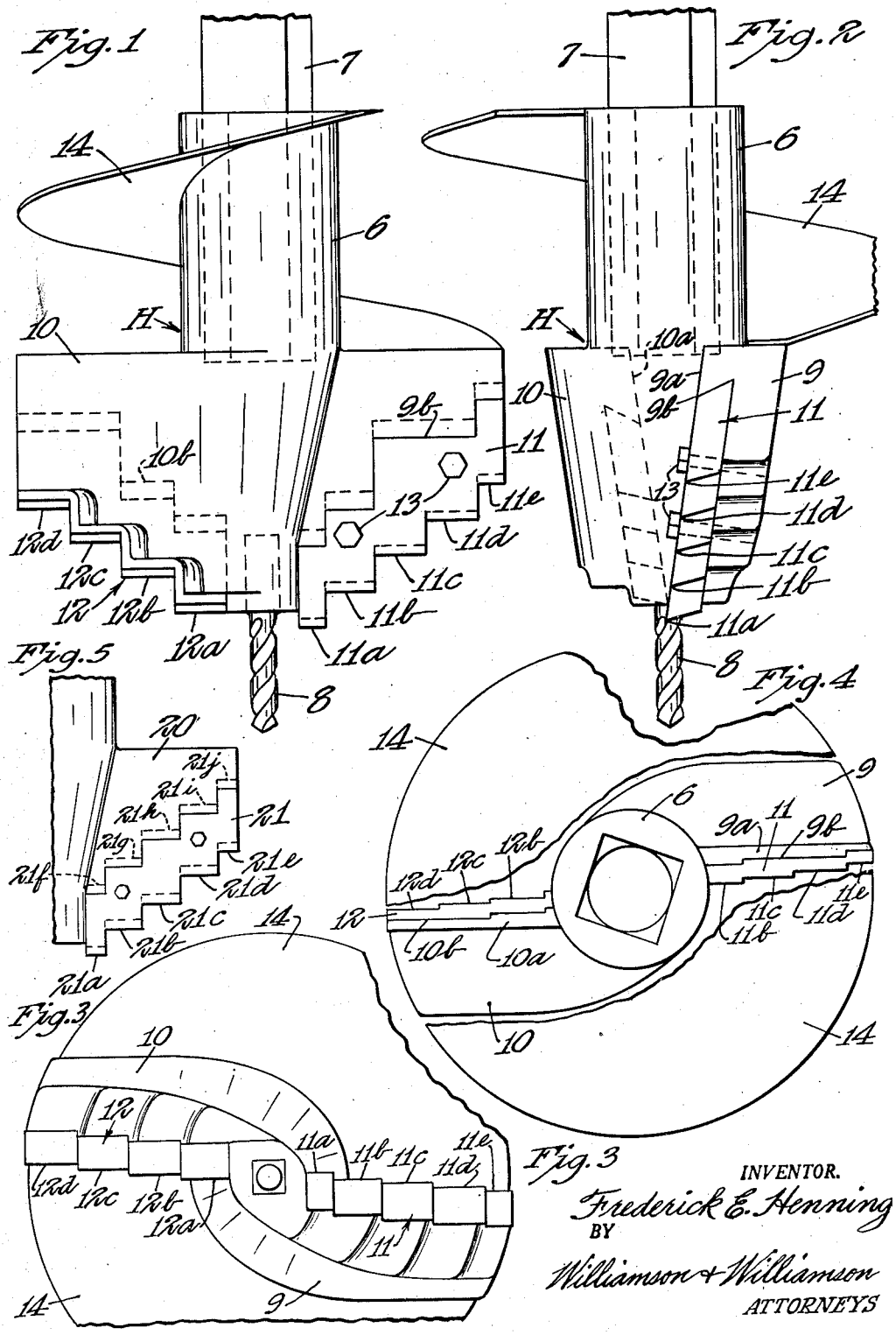

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EARTH AUGER

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6 Claims. (Cl. 255—69)

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This invention relates to a tool or auger for boring holes in the earth, for receiving heavy posts such as are used in electrical communication systems, concrete footings, fence posts and analogous upright members.

It is an object of my invention to provide a powerful and highly efficient earth auger for quickly drilling through hard earth and even rocky soil to cut and at least, partially, remove upwardly, the earth to form a socket for receiving a post, footing or analogous member.

A further object is the provision of a highly efficient rotary earth drilling tool wherein the downward thrust force and cutting torque are most efficiently applied and distributed to a multiplicity of upwardly staggered, successively operating cutting edges provided by two or more blade assemblies whereby accurate alignment is obtained in the rotary drilling with the attainment of a very high cutting efficiency relative to the downward force and torque applied.

More specifically, it is an object to provide an earth auger of the class described having a revoluble cutting head provided with at least a pair of circumferentially spaced blade assemblies extending outwardly from the actual portion of the head in substantially radial relations and each having a multiplicity of progressively elevated and progressively outwardly disposed cutting edges starting from the axis of the head and substantially corresponding in number in the two or more assemblies and having the successive cutting edges of the head in their engagement with the earth, progressively elevated from the axis of the head outwardly.

Still another object is the provision of highly efficient cutting blades with a centering element and material removal means to cause a general upward movement of the material from the time it is first cut and to also facilitate precise alignment of the tool in drilling a hole.

Another object is the provision of an earth auger of high efficiency wherein the cutting and drilling elements may be readily removed and attached for replacement or sharpening.

These and other objects and advantages of my invention will be more apparent from the following description made in connection with the accompanying drawings wherein like reference characters refer to the same parts throughout the several views and in which—

Fig. 1 is a side elevation of an embodiment of my invention;

Fig. 2 is a similar side elevation with the head rotated to approximately 90°;

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Fig. 3 is a bottom plan view of the device; and

Fig. 4 is a top plan view of the head with the spiral material-removing element broken away, and Fig. 5 is a side elevation showing a somewhat different form of blade assembly and attachment seat formed in the associated wing.

In the form illustrated in the drawing, I provide a heavy cutting head designated as an entirety by the letter H having an axial hub 6 provided in its upper portion with a longitudinal, squared socket to receive the squared lower end of a torque-applying shaft 7 and as shown, tapering downwardly toward its lower end which is provided with an axially disposed squared socket for receiving a hard metal screw drill 8.

The head H includes a pair or more of circumferentially spaced, outwardly extending blade attachment wings 9 and 10 which may be integrally cast or otherwise very rigidly and strongly connected with the hub 6, said wings having flat leading faces 9*a* and 10*a* respectively (with reference to turning action) which are disposed almost radially of the hub 6 but which are declined slightly from the vertical, as clearly shown in Fig. 2. The leading faces are rabbeted or recessed planarly and along serrated or stepped, transverse lines 9*b* and 10*b* respectively, to form for each wing, a shouldered seat for receiving blade assemblies 11 and 12 respectively which as shown in the drawings, comprise for each wing an integral, multi-edge blade. It will be noted that the blade shoulders defined by the transverse, stepped lines 9*b* and 10*b* respectively, are inwardly beveled or converge with respect to the planar recessed blade-receiving cheeks, thereby serving to retain the complementary shaped shoulder engaging edges of the blade assemblies 11 and 12.

It will be noted by inspection of Fig. 1 that the two blade assemblies 11 and 12 have inverted, stepped cutting edges extending generally outwardly and successively elevated from the axial portion of the diminished lower portion of hub 6. It will further be noted that successively in turning or ground cutting relation, the successive edges of the two blade assemblies 11 and 12 are progressively spaced outwardly and radially as clearly shown in Fig. 1. Thus, referring to the relationship of the two blade assemblies, it will be noted that assembly 11 is provided with first, a relatively narrow, depending cutting edge 11*a* disposed closest of all cutting edges to the axis of the head and blade 12 is provided with an inner, horizontal cutting edge 12*a* disposed at a somewhat higher elevation than the first mentioned edge 11*a* of the assembly 11. Edge 12*a*,

it will be noted, extends radially outward some distance beyond the cutting width of edge 11a. The next successive cutting edge 11b provided by blade assembly 11 is disposed at a slightly higher elevation than the cutting edge 12a and overlaps in turning action, the radial working stroke of the blade 12a and extends in its cutting action for some distance outward thereof, radially. The next cutting edge 12b of blade assembly 12 extends at a slightly higher elevation than the edge 11b; overlaps in its rotary cutting operation the circumferential path of the blade 11b. Similarly related in accordance with the progressively elevated and progressively radially extending positioning, I provide the cutting edges 11c, 12c, 11d, 12d and 11e of the two blade assemblies. The said cutting edges are preferably defined by beveled surfaces intersecting the leading faces of the blade assemblies. Blade assemblies 11 and 12 may be retained against the cheeks and shoulders of the blade seats on wings 9 and 10 respectively, by a suitable means such as two or more transverse bolts 13, the heads of which are preferably counter-sunk in the leading faces of the blades and which extend through suitable apertures formed in the blade assemblies which when the blades are properly seated, register with extension attachment apertures formed transversely through the wings 9 and 10 of the head.

A spiral conveyor section 14 of similar external diameter to the maximum diameter of head H (including the full length of the wings 9 and 10), is rigidly affixed to and surrounds the upper portion of hub member 6 and preferably includes approximately one screw convolution receiving from the flat leading face of the blade 11 and its blade-receiving wing 9.

In operation, my auger is vertically positioned in the desired location to dig a hole and rotary power is applied by power take-off or hand to the upper end of the shaft 7. The screw drill 8 first penetrates the top of the ground centering the device and determining the axis of the drilling operation. Thereafter, cutting edges 11a, 12a, 11b, 12b, 11c 12c, 11d, 12d and 11e successively engage in their rotative movement in the soil, each successive edge being progressively elevated and cutting a circumference extending radially outwardly of the circumference of the preceding cutting edge mounted on the adjacent or other wing. Thus, it will be seen that with the progressively elevated and outwardly extended cutting edges starting from the axis of the head, the downward thrust of the cutting force is very uniformly distributed thereby assuring the desired alignment and guiding of the tool during the drilling operation and furthermore, distributing both thrust and torque force to render a highly efficient cutting action.

Because of the cooperative relationship of the upwardly inclined leading planar faces of the blades 11 and 12, the material cut by all of the said cooperating edges is forced upwardly as it is cut, thereby at the top of the wings 9 and 10, being received by the revolving spiral conveyor element and being lifted and forced upwardly in the hole dug.

In Fig. 5, I illustrate a reversible type of blade assembly and blade attachment wing wherein the planarly recessed leading faces of the blade attachment wings are shouldered transversely along an inverted, stepped line complementarily to the actual cutting edges of the blade received thereby. The shoulders of the receiving seats are beveled to correspond with the beveled surfaces of the blade assemblies which terminate in the cutting edges so that the respective blade assemblies may be inverted and reversed to utilize upper and lower edges for cutting.

From the foregoing description, it will be seen that I have provided a simple and highly efficient rotary earth drilling tool adapted with great power to cut through hard earth and rock and to apply downward thrust force and cutting torque in a very efficient manner. It will further be seen that the cutting of the material is progressively applied from the axis outwardly through the successive action of the progressively elevated series of edges on the two or more blade assemblies.

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 my invention.

In Fig. 5, a somewhat different form of blade seat and a reversible blade is shown. Here the blade 21 has the progressively outwardly and upwardly disposed cutting edges 21a to 21e respectively and has its opposite and seating edge provided with similarly and oppositely formed cutting and seating edges 21f to 21j inclusive. Both sets of edges are formed by bevels in the material, the opposite faces of the blade being beveled along the two sets of edges. The supporting wing 20 is provided with a stepped set complementarily shaped to the multiple cutting edge of the blade and beveled in accordance therewith. It will be obvious that in this form when the edges 21a to 21e become worn, the blade may be inverted and reversed from the position shown to enable the edges 21f to 21j to be substituted.

What I claim is:

1. An earth auger having in combination a revoluble shaft and a cutting head attached to the lower end thereof, said head comprising at least a pair of circumferentially spaced, radially extending blade attachment wings, said wings having leading, upwardly extending faces with respect to the direction of rotation of said head, at least a pair of blade assemblies, said faces being recessed and transversely shouldered to receive in each instance, one of said blade assemblies, said blade assemblies extending from points adjacent the axis of said head outwardly to the outer ends of said wings and presenting in combination with reference to turning movement of said head, a multiplicity of successively elevated and successively, outwardly extending cutting edges.

2. The structure set forth in claim 1, and said wing faces being transversely shouldered for reception of the upper edges of said blade assemblies, said shoulders being beveled inwardly to retain the abutted attachment edges of said blades.

3. An earth auger having in combination a rotary head comprising at least a pair of circumferentially spaced radially extending blade attachment wings, said wings having leading, upwardly extending faces with respect to the direction of rotation of said head, at least a pair of blade assemblies, said faces being recessed and transversely shouldered along an inverted, stepped line to receive in each instance, one of said blade assemblies, said blade assemblies extending from points adjacent the axis of said head outwardly to the outer ends of said wings and each presenting a multiplicity of successively elevated cutting edges defined by an inverted stepped line, said blade assemblies each having an opposite end defined by an inverted, stepped line of an opposite

configuration to the line defined by said first mentioned cutting edges whereby said blade may be inverted and reversed to selectively utilize either of said edges for cutting.

4. The structure set forth in claim 3, the two sets of cutting edges being defined by beveled surfaces on opposite faces of said blade assemblies and the shouldered edges of said faces being inwardly beveled to anchor the received edges of said blade assemblies.

5. An earth auger having in combination a revoluble head with axial coupling connection for non-rotatively receiving the lower end of a revoluble shaft, said head having rigidly secured thereto at least two series of cutter blades extending generally radially of said head, the blades of each series having horizontal cutting edges vertically spaced and disposed successively at higher elevations and the blades of each series having substantially vertical cutting edges successively extending outwardly from bottom to top of said head greater distances from the axis of said head, the horizontal cutting edges of the successive and corresponding blades of said two series being succesively elevated from bottom to top and the vertical cutting edges of said two series being alternately and successively disposed greater distances

from the rotational axis of said head, and all of said blades having leading upwardly inclined faces with respect to the direction of revolution of said head to successively elevate material cut.

6. The structure set forth in claim 5 wherein said blades are all provided with beveled undersurfaces and wherein the successive leading faces of the blades of each series are offset slightly rearwardly relative to the direction of revolution.

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