June 10, 1958 O. N. GREDELL 2,838,285

AUGER BIT

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Fig. 1.

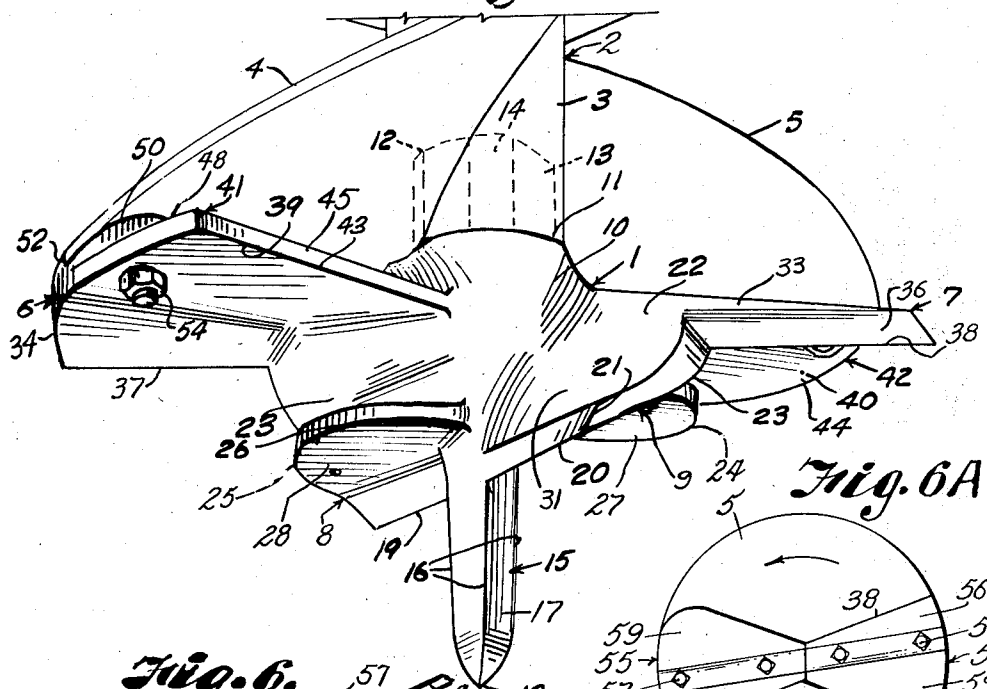


Fig. 6A

Fig. 6.

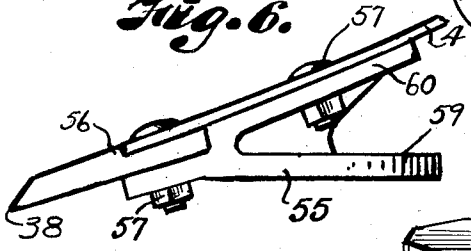
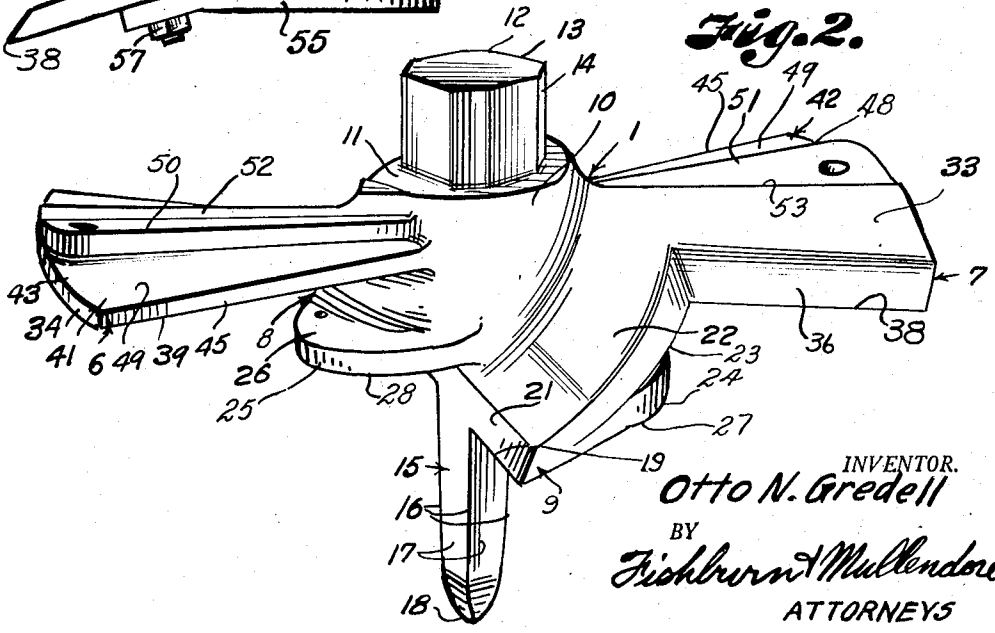


Fig. 2.



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Fig. 3.

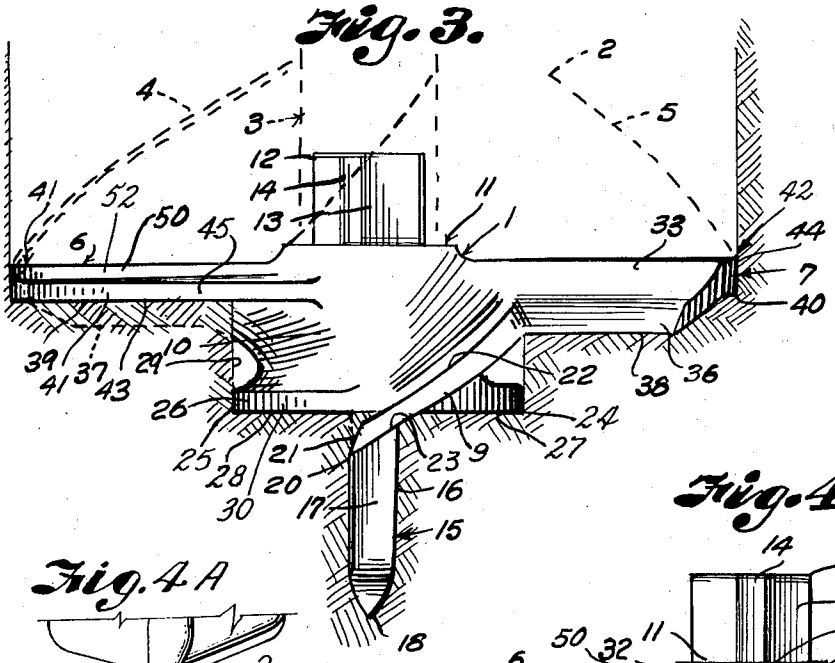


Fig. 4.

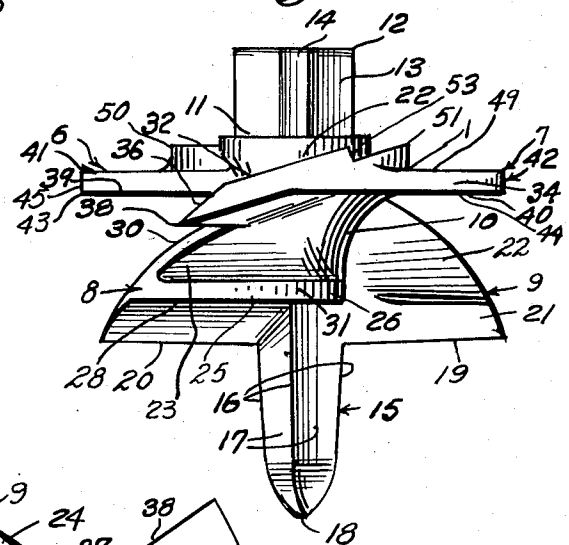


Fig. 4A

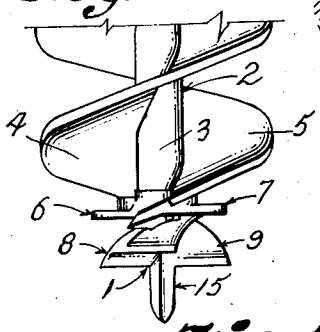
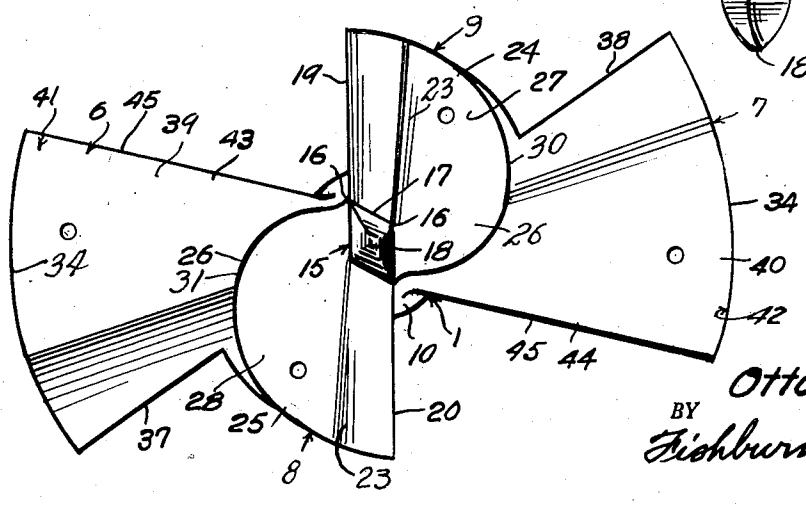


Fig. 5.



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Fig. 7.

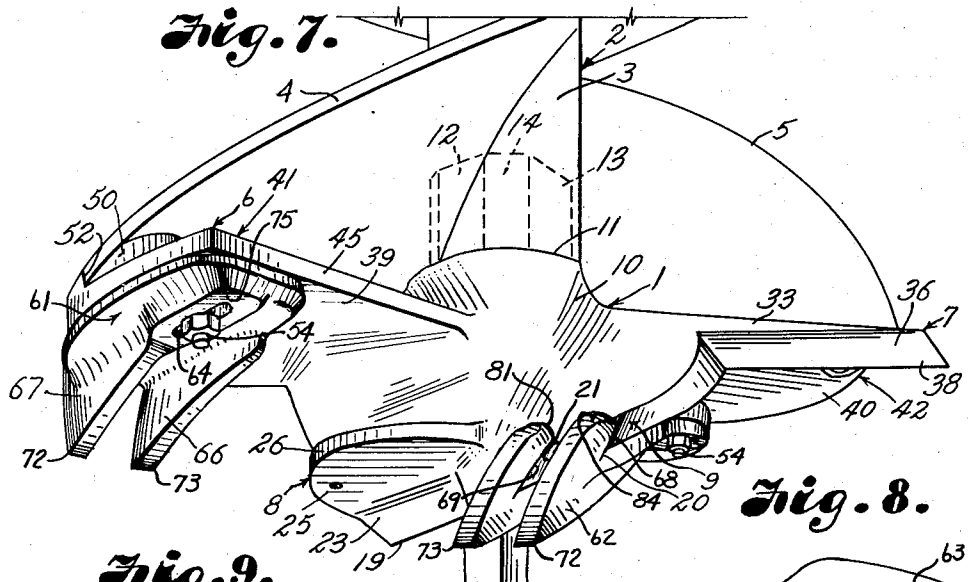


Fig. 8.

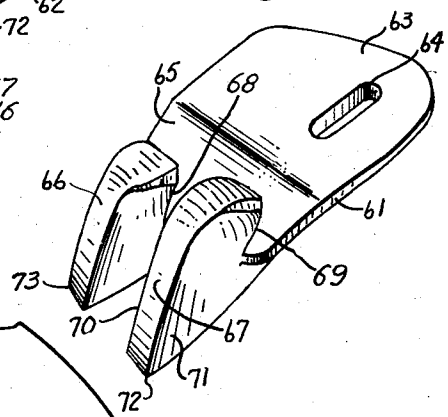


Fig. 9.

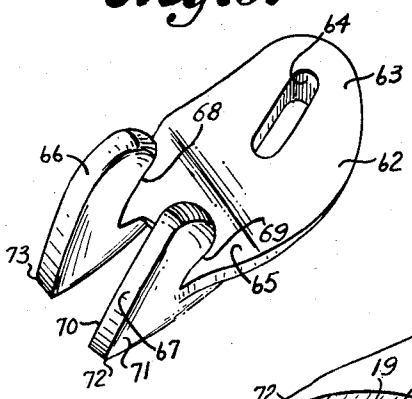
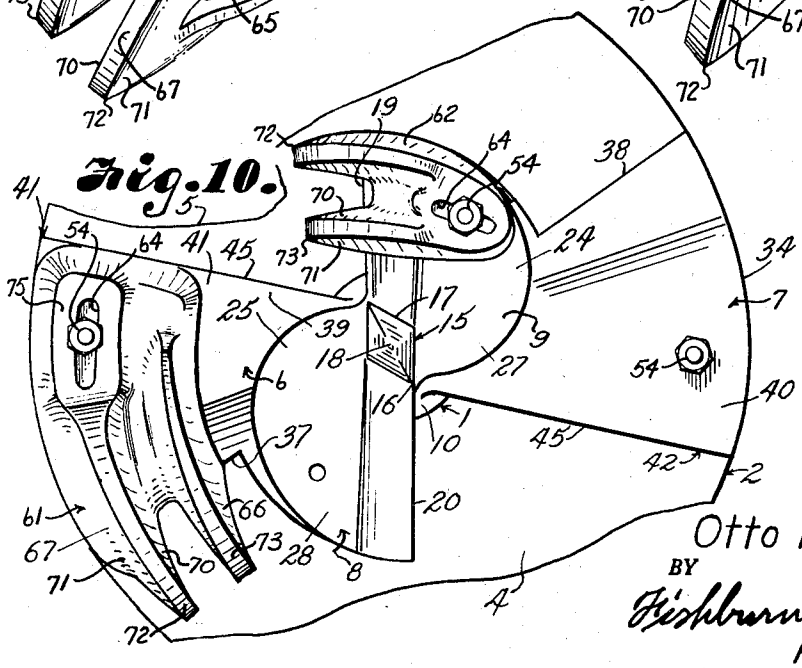


Fig. 10.



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2,838,285

AUGER BIT

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Application December 2, 1953, Serial No. 395,784

8 Claims. (Cl. 255—69)

This invention relates to auger bits for drilling holes into the earth. Bits of this character dig spirally into the soil and the cuttings are elevated by spiral flights forming upward continuations of the cutting elements of the bit. Such bits operate satisfactorily in some soils but in certain soils the cutting of the soil and the penetration of the bit is so rapid that the weight applied through the auger causes the auger to "corkscrew" until the load on the auger becomes so heavy that parts of the operating mechanism are apt to break. In other cases, the cutting rate is not properly synchronized with the rate of elevation of the soil by the spiral flights so that the soil tends to fall back into the hole and a longer period of time is required to complete a clean hole to a desired depth. It is also difficult to produce a clean straight hole without cave-ins. Also, in some soils the bits require an excessive amount of power to operate them.

It is therefore the principal object of the present invention to provide an auger bit that is adapted to all soils and which has a construction to overcome the difficulties above noted, and provide a straight clean hole in a minimum time and with less power consumption.

Other objects of the invention are to provide an auger bit with supporting means to limit the depth of the cuts made by the bit and reduce torque; to provide for regulation of the depth of the cuts made by the bit on each revolution; to provide an auger bit with blades for digging a pilot hole in combination with blades for completing the full diameter of a bore hole; to provide an auger bit with a pin type pilot having cutting edges cooperating with the cutting edges forming the pilot hole.

It is also an object of the invention to provide supporting means that may be applied as an attachment to a conventional auger.

In accomplishing these and other objects of the invention as hereinafter pointed out, I have provided improved structure the preferred form of which is illustrated in the accompanying drawings wherein:

Fig. 1 is a perspective view of an auger bit embodying the features of the present invention and viewed upwardly in the direction of the under side thereof to better illustrate the compensating means.

Fig. 2 is a similar perspective view of the auger bit as viewed from the side and slightly above the level of the blades.

Fig. 3 is a side elevational view of the auger bit.

Fig. 4 is a side elevational view of the bit at right angles to the side illustrated in Fig. 3.

Fig. 4–A is a side elevation of the lower portion of the auger and bit attached thereto, the figure being drawn on a reduced scale.

Fig. 5 is a bottom plan view of the bit.

Fig. 6 is a view of a modified form of the invention which involves supporting means for attachment to the blades and/or flights of an auger bit.

Fig. 6–A is a bottom plan view of an auger showing the attachment of the form of the invention illustrated in Fig. 6.

Fig. 7 is a perspective view similar to Fig. 1 but showing the bit equipped with digging fingers to facilitate boring of hard, dry soil and gravel or rocky earth.

Fig. 8 is a perspective view of the digging finger attachment to be applied to the larger of the blades.

Fig. 9 is a perspective view of the digging finger for attachment as applied to the smaller blades.

Fig. 10 is a fragmentary end view of the auger bit showing the digging finger attachments applied thereto.

Referring more in detail to the drawings:

1 designates a bit of an auger 2 and which embodies the features of the present invention. The auger 2 may be used in connection with a power driven post hole or like digger (not shown). The auger 2 includes a shaft 3 having flights 4 and 5 that extend spirally of the shaft and are fixed thereto for elevating soil cut by the bit 1.

The bit 1 is fixed to the shaft 3 and has laterally disposed blades 6 and 7 having a radial length substantially conforming to the radius of the spiral flights 4 and 5. The auger bit 1 also includes shorter blades 8 and 9 that are arranged about the axis of the bit at substantially 90° from the blades 6 and 7 and at a lower level as shown in the drawings. The blades 6—7 and 8—9 are preferably formed integrally with a hub 10. The hub 10 forms a shoulder 11 with an integral axial lug 12 by which the auger bit is connected with the shaft 3 of the auger. The lug 12 is preferably provided with a plurality of flat side faces 13 intermediate faces 14 that engage with corresponding faces of a socket at the lower end of the shaft 3 and in which the lug 12 is welded or otherwise secured to effect rotation of the auger bit when the shaft is rotated by the power mechanism.

The auger bit 1 also includes a pilot pin 15 that depends axially from the hub of the bit. The pilot pin 15 is of diamond shaped cross section to provide vertical cutting edges 16 intermediate substantially flat side faces 17. The cutting edges of the pilot pin preferably converge downwardly and curve at the terminals to a point 18 to facilitate penetration of the pilot. The blades 8 and 9 have cutting edges 19 and 20 respectively which extend laterally substantially in plane with two opposed flat faces 17 of the pilot pin 15 and forwardly of the axis of the bit as best shown in Fig. 5. The cutting edges 19 and 20 are formed by beveling the forward edges of the blades 8 and 9 as indicated at 21 to join with upper faces 22 of the blades that extend about the hub 10 while the lower faces 23 slope upwardly and carry the supporting means 24 and 25.

The supporting means comprise lugs 26 preferably integrally formed on the under side of each of the blades 8 and 9 and which have under faces 27 and 28 each positioned in the same horizontal plane for support on the bottom of the pilot hole 29 (Fig. 3) that is formed by the blades 8 and 9 and which supports the bit on the bottom of the hole with the cutting edges at a predetermined distance therefrom to control the cutting depth effected by the cutting edges 19 and 20 and the rate at which the bit penetrates the soil is such that the rate of movement of the soil by the flights of the auger does not permit filling of the entire space between the flights regardless of the soil conditions. The faces 27 and 28 of the supporting means 24 and 25 may be of any suitable contour within the circumference of the pilot hole but in the illustrated instance, the rearward sides 30 and 31 are substantially in the form of parabolic curve (Fig. 5).

The upper faces 22 of the blades 8 and 9 merge into the upper faces 32 and 33 of the blades 6 and 7 and form continuations of the upper faces of the auger flights 4 and 5. The outer edges 34 of the blades 6 and 7 curve circumferentially of the axis of the bit and join with the beveled forward edges 36 of the blades 6 and 7 to provide relatively sharp cutting edges 37 and 38 to form the full

diameter of the bore hole. The under faces, at points spaced rearwardly of the cutting edges of the blades 6 and 7, terminate in substantially horizontal faces 39 and 40 (Fig. 4) of rearwardly extending wings 41 and 42 that provide supporting means 43 and 44 for cooperation with the lower supporting means 24 and 25 in supporting the bit and controlling the cut of the bit as above pointed out.

The rear edges 45 of the wings 41 and 42 are preferably parallel with a diameter of the bit and spaced therefrom on the trailing sides of the blades. The outer edges 34 are curved according to the radius of the bit and the upper faces 48 and 49 have transverse pads 50 and 51 provided with offsets 52 and 53 for seating the terminal ends of the spiral flights 4 and 5 which are secured thereto by suitable fastening devices such as bolts 54 or the like.

In using the apparatus, the auger 2 is supported by the power mechanism (not shown) above ground and rotated with the pilot pin 15 turning thereon with the cutting edges 16 displacing the earth to cause penetration of the pilot pin and bring the bottom faces 27 and 28 of the supporting means 24 and 25 into engagement with the ground to gauge the cuts effected by the blades 8 and 9.

The earth removed travels upwardly over the surfaces 22 of the lower blades 8 and 9 and onto the surfaces 32 and 33 of the upper blades 6 and 7 and onto the terminals of the spiral flights 4 and 5 for elevation thereby. As soon as the cutting edges 37 and 38 for the blades 6 and 7 reach the ground, circumferential cuts are made into the soil to the depth between the cutting edges 37 and 38 and the flat bottom faces 39 and 40 of the wings 41 and 42 which form the supporting means 43 and 44 for the upper blades 6 and 7. The soil cut by the cutting edges 37 and 38 of the upper blades is moved upwardly of the outer surface 32—33 and onto the spiral flights 4 and 5 to be carried upwardly thereon.

It is obvious that the hole 29 formed by the lower blades and that cut by the pilot 15 tend to support the bit in stable position for rotation about a substantially fixed axis and thereby maintain a straight hole so that the upper blades 6 and 7 enlarge the hole to the full diameter of the bit by means of a reaming operation. It is thus apparent that less power is required to rotate the bit since the soil is removed in two steps, the center portion at a lower level by the lower blades and then the surrounding area is loosened at a higher level by the cutting edges of the upper blades.

In the form of the invention shown in Figs. 6 and 6–A, the supporting means are formed of a separate part 55 attached to the under side of radial blades 56 by means of the fastening devices 57 which connect the ends of the spiral flights 4 and 5 of a conventional auger. In this form of the invention, the supporting means include substantially flat wing portions 59 which engage and support the bit on the bottom of the hole. The supporting means also have upper wings 60 which substantially conform with the curvature of the spiral flights 4 and 5 as shown in the drawings. The supporting means 55, when attached, function in substantially the same manner as the supporting means previously described. Thus the removable supporting means may be attached to the cutting blades of a conventional auger to obtain the advantage of controlled penetration of the bit.

When certain soils are very dry and hard to bore, or when gravel or rock bearing earth is encountered, the invention contemplates the use of digging finger attachments 61 and 62 on the cutting blades of the bit.

In the illustrated instance, an attachment 61 is applied to one of the larger blades, for example the blade 6, and the attachment 62 is applied to one of the smaller blades, for example the blade 8.

Each attachment includes a plate portion 63, having a slot 64 for passing the shank of a fastening device 54. The plate portions 63 of the respective attachments are of a shape to best accommodate the under side of the respective blades and to effect their attachment to the supporting means 24 and 13.

The plate portions 63 have forwardly and downwardly sloping portions 65 to accommodate the inclination of the respective blades with which they associate. Formed on the front of the inclined portion 65 are spaced fingers 66 and 67. The fingers 66 and 67 have seat portions 68 and 69 that accommodate the forward beveled edge portions of the respective blades as shown in Fig. 7.

The side faces 70 and 71 of the fingers are formed on the radii from the axis of the auger and the upper faces 79 and 80 slope downwardly toward under faces 72 and 73 which extend rearwardly under the plate portions of the attachments.

In the case of the attachment 61, the outer finger terminates in a pad 75 through which the slot 64 extends, but in the case of the finger attachment 62, the slot 64 is provided between the respective ribs, Fig. 10.

When the attachments are applied to the blades of the bit, as shown, they are firmly retained in position and protect the cutting edges of the bit when operating in rocky or gravel containing earth, so that the forward ends or points of the teeth or fingers dig into the ground progressively of the cutting edges to assist in boring the hole and ripping up the soil for easy cutting by the forward edges of the blades that are exposed between the fingers and by the forward edges of the trailing blades when the attachments are used as illustrated in the drawing.

It is also obvious that a finger attachment might be applied to all of the blades or to the upper or lower blades only, to accommodate the bit to the particular soil encountered.

When the forward edges of the blades wear away or are resharpened, the slots 64 permit the attachments to be moved retractively to retain the seat portion 68 of the fingers in engagement with the forward edges of the blades.

From the foregoing, it is obvious that the supporting means form a bearing support which limits the cut and holds back the drawing in of the auger, thereby limiting the torque to the capacity of the auger operating mechanism.

If the soil is more difficult to penetrate, as is the case of hard dry soils, the cuts made by the bit are naturally less than the cuts gauged by the compensating means and the compensating means do not retard the cutting action.

It is also obvious that the stepped arrangement of the cutting edges makes digging easier so that less power is required.

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

1. An auger for boring holes into the ground including, a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite sides of the shaft, an auger bit having a hub fixed coaxially to the lower end of the shaft and having a position below the terminals of said flights, diametrically opposed blades having cutting edges extending substantially radially with respect to the axis of said hub and having upper and lower faces sloping upwardly in a circumferential direction toward said terminals of the flights for forming a pilot hole of less diameter than the diameter of said flights, and complementary blades extending radially from outer sides of the first named blades and connected with the terminals of said flights, said complementary blades having cutting edges for removing soil circumferentially of the pilot hole to the full diameter of said flights and having upper faces forming continuations of the corresponding faces of the first named blades, said upper faces of said blades forming means for conveying the soil onto said flights when the auger is in use, and said blades having supporting means spaced above the levels of the respective cutting edges and extending rearwardly from said lower faces of the blades to support the auger and limit cuts made by the respective blades.

2. An auger for boring holes into the ground including,

a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite sides of the shaft, an auger bit having a hub fixed coaxially to the lower end of the shaft and having a position below the terminals of said flights, diametrically opposed blades having cutting edges extending substantially radially with respect to the axis of said hub and having upper and lower faces sloping upwardly in a circumferential direction toward said terminals of the flights for forming a pilot hole of less diameter than the diameter of said flights, complementary blades extending radially from outer sides of the first named blades and connected with the terminals of said flights, said complementary blades having cutting edges for removing soil circumferentially of the pilot hole to the full diameter of said flights and having upper and lower faces forming continuations of the corresponding faces of the first named blades, said upper faces of said blades forming means for conveying the soil removed by the respective cutting edges to said flights for elevation to the top of the bore hole when the auger is in operation, said blades having supporting means spaced above the levels of the respective cutting edges and extending rearwardly from said lower faces of the blades to support the auger and limit cuts made by the respective blades, and a pilot extending coaxially from the lower end of the hub to form a centering hole for keeping the bit in coaxial relation with the hole produced by the cutting edges of the blades.

3. An auger for boring holes into the ground including, a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite sides of the shaft, an auger bit having a hub fixed coaxially to the lower end of the shaft and having a position below the terminals of said flights, diametrically opposed blades having cutting edges extending substantially radially with respect to the axis of said hub and having upper and lower faces sloping upwardly in a circumferential direction with the upper faces joining with upper faces of the flights, and said blades having supporting means spaced above the level of the cutting edges and extending rearwardly from said lower faces of the blades to support the auger and limit cuts made by said blades.

4. An auger for boring holes into the ground including, a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite sides of the shaft, an auger bit having a hub fixed coaxially to the lower end of the shaft and having a position below the terminals of said flights, diametrically opposed blades having cutting edges extending substantially radially with respect to the axis of said hub and having upper and lower faces sloping upwardly in a circumferential direction with the upper faces joining with upper faces of the flights, said blades having supporting means spaced above the level of the cutting edges and extending rearwardly from said lower faces of the blades to support the auger and limit cuts made by said blades, and a pilot extending coaxially from the lower end of the hub to form a centering hole for keeping the bit in coaxial relation with the hole produced by the cutting edges of the blades.

5. An auger for boring holes in the ground including a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite sides of the shaft, an auger bit having a hub fixed on the lower end of the shaft and having a position below the terminals of the flights, diametrically opposed blades extending substantially radially from the hub and having cutting edges, said blades having upper faces sloping upwardly in a circumferential direction to connect with said terminals of the flights, supporting means on under sides of the blades and spaced upwardly from the cutting edges to control normally the cuts made by said edges, digging fingers carried by at least one of said blades and projecting forwardly from the cutting edge thereof in the direction of rotation, said digging fingers including a plate seated against the under side of said supporting means and having portions engaging over portions of the cutting edge of the blade, and fastening devices extending through said supporting means and plate and cooperating with the blade engaging portions to secure the digging fingers to the blade.

6. An auger for boring holes into the ground including a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite sides of the shaft, an auger bit having a hub fixed coaxially to the lower end of the shaft and having a position below the terminals of the flights, blades extending radially from opposite diametrical sides of the hub and having upper faces sloping upwardly to join with the flights, shorter blades extending radially from opposite diametrical sides of the hub intermediate the first-named blades and spaced therebelow, said shorter blades having cutting edges for cutting a pilot hole ahead of the first-named blades and having upper faces joining with the upper faces of said first named blades, digging fingers carried by and projecting forwardly from one of the shorter blades and adapted to cooperate with the opposite shorter blade in forming the pilot hole, and similar digging fingers carried by and projecting forwardly from one of the first-named blades and offset outwardly and radially from the rotational path of the digging fingers on said shorter blade to cooperate with the cutting edge of the opposite of the first-named blades in enlarging the pilot hole.

7. An auger for boring holes into the ground including a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite diametrical sides of the shaft, an auger bit having a hub fixed coaxially to the lower end of the shaft and having a position below the terminals of the flights, blades extending radially from opposite diametrical sides of the hub and having upper faces sloping upwardly to join with the flights, shorter blades extending radially from opposite diametrical sides of the hub intermediate the first-named blades and spaced therebelow, said shorter blades having cutting edges for cutting a pilot hole ahead of the first-named blades and having upper faces joining with the upper faces of the said first named blades, digging fingers carried by and projecting forwardly from one of the shorter blades and adapted to cooperate with the opposite shorter blade in forming the pilot hole, similar digging fingers carried by and projecting forwardly from one of the first-named blades and offset outwardly and radially from the rotational path of the digging fingers on said shorter blade to cooperate with the cutting edge of the opposite of the first-named blades in enlarging the pilot hole, said digging fingers having plate portions engaging under said blades and having portions engaging over the cutting edges, and fastening devices securing the plate portions to the blades.

8. An auger for boring holes into the ground including a shaft, spiral flights extending about the shaft and having lower ends terminating on opposite sides of the shaft, an auger bit having a hub fixed coaxially to the lower end of the shaft below the terminals of the flights, blades extending radially from opposite diametrical sides of the hub and having upper faces sloping upwardly to join with the flights, shorter blades extending radially from opposite diametrical sides of the hub intermediate the first-named blades and spaced therebelow, said shorter blades having cutting edges for cutting a pilot hole ahead of the first-named blades and having upwardly sloping faces joining with the upwardly sloping faces of said first named blades, digging fingers carried by and projecting forwardly from one of the shorter blades and adapted to cooperate with the opposite shorter blade in forming the pilot hole, similar digging fingers carried by and projecting forwardly from one of the first-named blades and offset outwardly and radially from the rotational path of the digging fingers on said shorter blade to cooperate with the cutting edge of the opposite of

the first-named blades in enlarging the pilot hole, said digging fingers having plate portions engaging under said blades and having portions engaging over the cutting edges, said fingers curving forwardly from said blades in the direction of the rotation of the bit, and fastening devices securing the plate portions to the blades.

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