

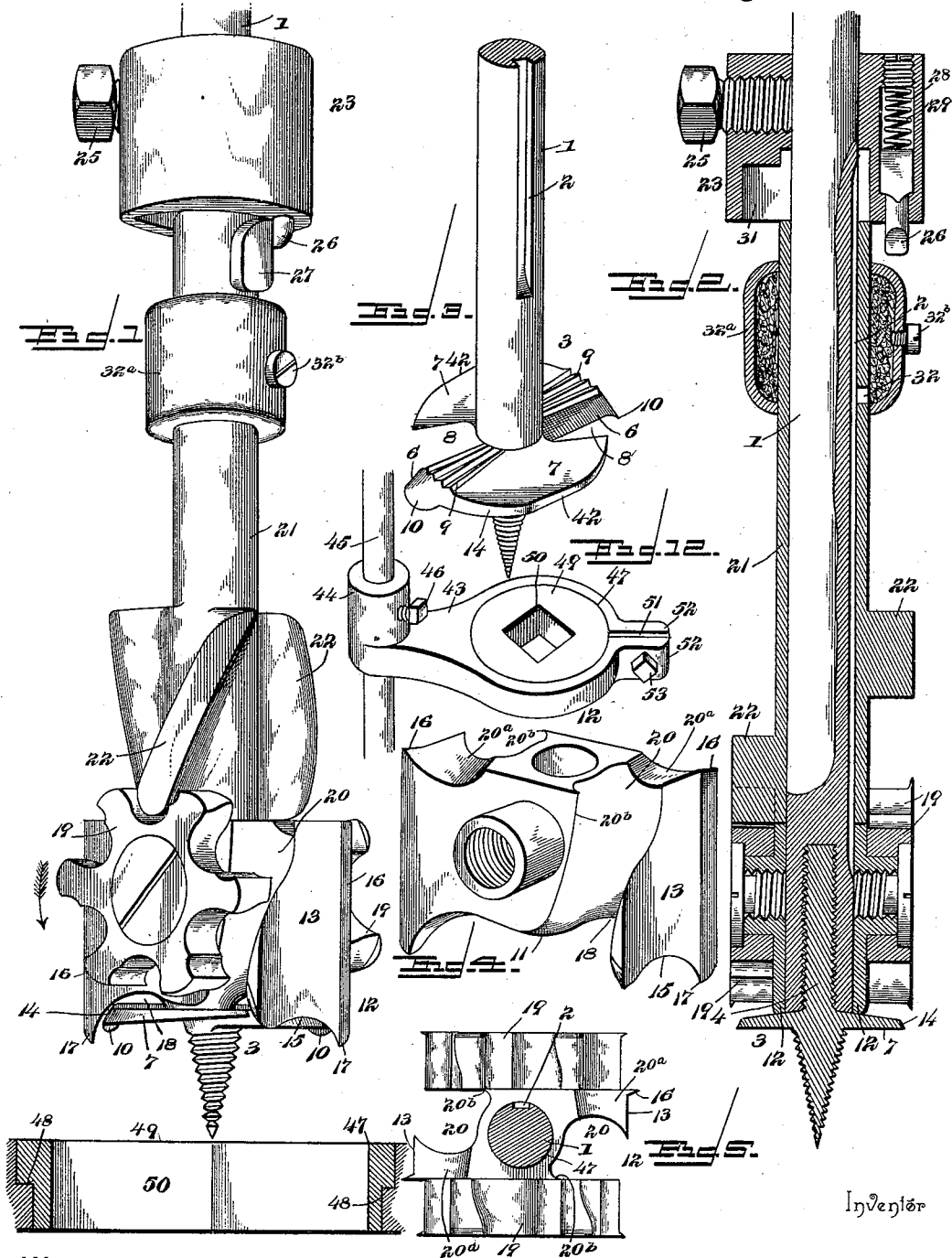
(No Model.)

2 Sheets—Sheet 1.

A. Y. PEARL.
AUGER.

No. 565,500.

Patented Aug. 11, 1896.



Inventor

Witnesses

E. H. Stewart

[Signature]

By T. W. Peters

A. Y. Pearl

[Signature]

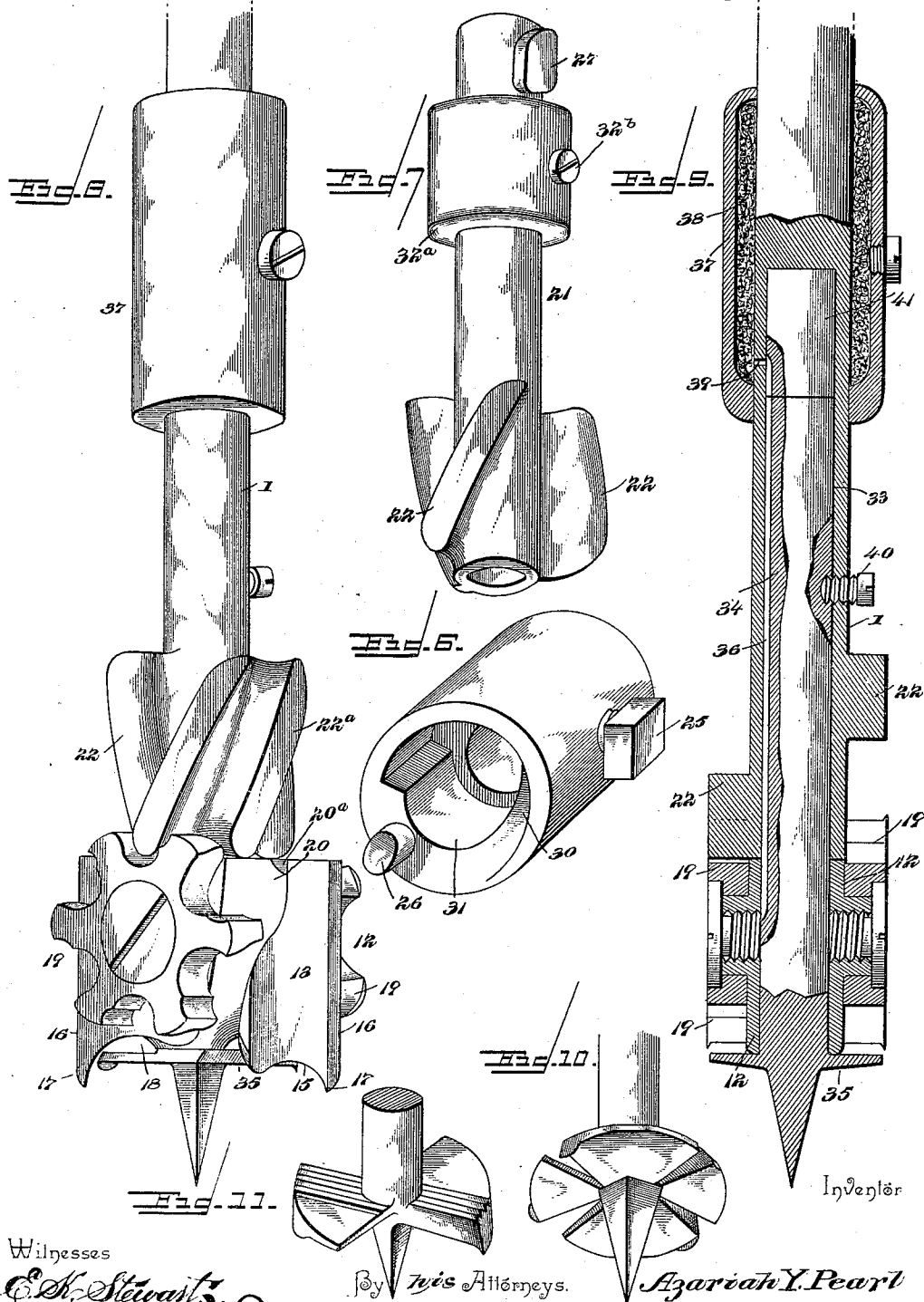
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2 Sheets—Sheet 2.

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[Signature]

By *W. H. Attorneys.*

Azariah Y. Pearl

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UNITED STATES PATENT OFFICE.

AZARIAH Y. PEARL, OF ROCHESTER, NEW HAMPSHIRE.

AUGER.

SPECIFICATION forming part of Letters Patent No. 565,500, dated August 11, 1896.

Application filed April 11, 1895. Serial No. 545,318. (No model.)

To all whom it may concern:

Be it known that I, AZARIAH Y. PEARL, a citizen of the United States, residing at Rochester, in the county of Strafford and State of New Hampshire, have invented a new and useful Auger, of which the following is a specification.

My invention relates to augers, the same consisting, essentially, in an improvement upon the device shown in Letters Patent No. 505,844, granted to me October 3, 1893; and the objects in view are to provide means for supplying a lubricating material to the boring-head to prevent overheating the tool; to provide means for conducting a lubricating material from an exposed portion of the shank of the auger to the various operating parts thereof which may be concealed in the hole which has been bored by the tool; to provide an improved boring head or disk whereby the cuttings are removed from the path of the cutting edges; to provide a cutting-head in which only the cutting edges are in contact with the bottom of the hole; to provide an improved guide-block having channels for receiving and conducting the cuttings and cutting edges which are adapted to penetrate by a shearing cut; to provide a simple and efficient construction whereby the cutting-heads are interchangeable and the guide-blocks and connected parts are removable from the shank to provide for boring a round hole; to provide means whereby the rotary bit or cutting-head may be reversed during the operation of boring without communicating motion to the side cutters, and to provide means carried by the bit or cutting-head for removing cuttings from the knives of the guide-block and the side cutters.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a perspective view of a hand-auger embodying one form of my invention, the same being shown in connection with a gage constructed to cooperate with the guide-block to arrange the latter at the desired angular adjustment. Fig. 2 is a vertical central section of the same, taken in the plane of the axes of the side cutters. Fig.

3 is a detail view in perspective of a bit or cutting-head and the contiguous portion of the shank to which the bit is attached. Fig. 4 is a similar view of the guide-block detached. Fig. 5 is a plan view of the guide-block and side cutters, the shank being shown in section. Fig. 6 is a detail view in perspective of the clutch-block detached, the same being inverted. Fig. 7 is a detail view in perspective of the rotary sleeve or barrel and feeding-webs detached. Fig. 8 is a perspective view of a power or machine auger constructed in accordance with my invention, the same showing a slightly-modified construction of lubricating device. Fig. 9 is a central vertical section of the same. Fig. 10 is a detail view in perspective of a slightly-modified form of bit provided with four wings. Fig. 11 is a similar view of another modified form of bit in which the cutting and rear edges of contiguous wings are separate. Fig. 12 is a detail view in perspective of the gage which is shown in connection with the auger in Fig. 1.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

In the construction shown in Figs. 1 to 7, inclusive, 1 indicates a shank shown as provided with a longitudinal lubricating duct or channel 2, extending from a point above the cutting-head and preferably near the center of the length of the shank to a point near the lower end thereof, whereby oil may be conducted by said duct to a suitable bit or cutting-head 3, which is shown as secured to the lower end of the shank. This bit or cutting-head is preferably made detachable from the shank 1, it being herein shown as provided with a threaded stem 4 to engage a threaded socket in the lower end of the shank, whereby the bits are made interchangeable to provide for the use upon a single shank of a plurality of bits of different sizes and adapted for different classes of boring.

The bit herein shown is provided with a plurality of cutting edges 6, shown as two in number and formed at the front or advance edges of diametrically opposite wings 7, the lower surfaces of said wings for the best results being inclined downward toward said cutting edges, whereby the cutting edges

alone come in contact with the bottom of the hole during operation. Furthermore, the throats 8, formed between the beveled cutting edges 6 and the contiguous rear portions of the wings, are herein shown as increased in width toward the upper surface of the bit to provide for the ready release of cuttings to prevent choking, and the upper surfaces of the wings contiguous to the cutting edges thereof are preferably provided with roughened or serrated clearing-surfaces 9, the function of which will be fully explained hereinafter, and depending from the wings, near the cutting edges thereof, I have provided the usual peripheral scoring-lips 10.

Loosely mounted upon the lower end of the shank, contiguous to and preferably supported by the bit or cutting-head, is the guide-block 12, shown as provided with opposite knives 13, having beveled lower cutting edges extending downward to the plane of the cutting edges of the bit or cutting-head.

The knives on the guide-block are beveled at their inner sides, (see Fig. 4,) and the wings of the bit are beveled, as shown at 14, Fig. 2, upon the upper sides to allow the knives of the guide-block to lie exterior to the periphery of the bit and extend to the plane of the cutting edges of the same, and in order to allow the extreme outer ends of the cutting edges 6 of the bit to intersect in their rotation the outer planes or cutting-surfaces of the knives on the guide-block the cutting edges of the guide-block knives are shown as concaved at their centers, as at 15, the cutting edges of the bit working in these concaved or cut-away portions.

The knives of the guide-block are preferably provided at one edge with a vertical scoring and guiding lip 16, and the adjacent portions or corners of the cutting edges of the knives are extended slightly beyond the plane of the cutting edges of the bit to form advance spurs 17, which are adapted to penetrate the material in advance of the cutting edges of the bit to insure the proper guiding of the auger during operation, particularly when first starting and positioning the auger. These advance spurs extend to the plane of the extreme lower edges of the depending scoring-lips of the bit, and may, as shown in the drawings, project slightly beyond the same.

The guide-block at its lower end is shown as made slightly concaved, that is, grooved around the shank, as at 18, to give clearance through which the cuttings may be rolled or pushed by the roughened or serrated clearing-surfaces 9 of the bit into suitable channels to be hereinafter described, thereby preventing the cuttings from lodging or wedging between the bit or rotary cutters and guide-block to interfere with the proper operation of the auger. Also, the guide-block is provided contiguous to the advance edge of each of its knives, and hence contiguous to the upwardly-moving sides of the side ro-

tary cutters 19, (the direction of rotation of said cutters being shown by the arrow in Fig. 1,) with upwardly-extending and widening channels 20, which are preferably flared or enlarged toward the upper side of the guide-block in order to insure the free passage of cuttings and prevent the crowding or packing thereof. I have also shown channels 20^a in the top of the guide-block, beneath the ends of the spiral wings 22, and inclined toward the clearance-channels 20 to prevent chips from crowding between the block and the said wings or other superjacent member of the auger hereinafter described, and a cutting-lip 20^b is preferably formed on each side of the block close to the plane of the adjacent rotary cutter to cut or break up chips pushed against them and thereby guard against crowding and insure a clean cut. The said lips 20^b at the same time break up and prevent chips from crowding between the guide-block and the rotary cutters.

Loosely mounted upon the shank, above and herein shown with its lower end in contact with the upper end of the guide-block, is a rotating member, shown in the form of a sleeve or barrel 21, provided with the spirally-twisted wings 22, the lower extremities of which in the present construction are rounded to form projections by which motion is communicated from the sleeve or barrel to the teeth or spurs of the side cutters. In other words, while one of the side cutters is receiving motion from one of the wings the otherside cutter is at rest, whereby the power necessary to operate the auger is reduced and a uniform resistance is offered to the operation thereof. These wings are spirally disposed upon the sleeve or barrel with concaved front faces, whereby the wings perform the additional function of conveyers for the cuttings or chips. To rotate this member 21, I have provided a suitable clutch 23, shown as consisting of a clutch-block 24, secured to the shank by means of a set-screw 25, and carrying a pawl 26, acted upon by a spring, as 29, which is adapted to engage a tooth or detent 27 on the upper end of the sleeve or barrel 21, so that rotation of the shank in one direction will cause like rotation of the member or sleeve 21. One face of the pawl, or it may be of the detent 21, (or both, as shown in the drawings,) is beveled, whereby an opposite rotation of the shank will cause the pawl to ride idly over the detent without rotating the sleeve or member 21, this being useful in reversing the rotation of or unscrewing the bit from the hole, the side cutters being thus prevented from rotating. It is also desirable, under certain circumstances, to raise the sleeve member on the shank to disengage the wings from the spurs of the side cutters, and in order to provide for such an operation without altering the adjustment of the clutch-block I provide said block (see Fig. 6) in its under side with a beveled recess 30, into which the tooth or detent 27 of

the sleeve or member 21 may pass when the shank has been reversed sufficiently to bring it in alinement therewith, the lower portion of the bore of the clutch-block being enlarged, as shown at 31, to receive the upper end of the sleeve or barrel.

From the above description the operation of the improved auger will be readily understood, and it will be obvious that oil or other lubricating material introduced into the duct or channel in the shank above the cutting-head, as through a lateral opening 32, as shown in the sleeve or barrel, will be fed by the duct or channel to a point contiguous to the bit or cutting-head, whereby it is supplied at the point of cutting to prevent heating the cutters and at the same time lubricate the operating parts to prevent unnecessary friction. This duct or channel, as shown, is covered or concealed throughout, and it may be fed from a point exterior to the hole which is being bored by the tool and extends to the point of cutting, its adoption thereby obviating the necessity of withdrawing the auger in order to lubricate its parts or supply a cooling fluid, and at the same time avoiding the contact of the lubricant with the cuttings, which ordinarily interfere with the downward progress of the oil and thus prevent the same from being applied effectively to the working parts. Communicating with the perforation 32 and secured to and carried by the sleeve or barrel is a reservoir 32^a, having a screw-plug 32^b.

In the form of my invention which is illustrated in Figs. 8 and 9 and which is more particularly adapted to be driven by mechanical power the construction of the cutters and operating parts is substantially the same as that hereinbefore described, but instead of arranging the wings by which motion is communicated from the shank to the side cutters upon a sleeve or barrel, as in the previously-described form of my invention, I have fixed them to the shank, the latter being centrally bored, as shown at 33, for the reception of the stem 34 of the bit or cutting-head 35, a set-screw 40 clamping the shank and stem together as one piece, and the guide-block is mounted upon the said stem. The stem, as shown, is longitudinally channeled, as at 36, to convey a lubricating material from a reservoir 37, affixed to and surrounding the shank, said reservoir being filled with tow or waste, as shown at 38, and provided with a suitable screw-plug when used horizontally. A radial perforation 39 connects the reservoir with the bore of the shank, whereby the lubricant is fed continuously to the operating parts of the auger, as described hereinbefore.

A removable spacing or bearing block 41 is shown arranged in the upper end of the bore of the shank to prevent the lower end of the shank from bearing forcibly upon the upper surface of the guide-block and crowding the same between the lower end of the shank

and the upper surface of the bit, interfering with the operation of the parts.

When the auger is used for drilling round holes and the guide-block and connected parts are detached, this bearing or spacing block in the upper end of the bore is removed in order to allow the stem of the bit to pass entirely into the bore and thus bring the lower ends of the wings on the spiral holder down to the plane of the upper surface of the bit.

In the form of my improved auger which is illustrated in Figs. 1 to 7 the guide-block may be disconnected to allow the lower ends of the wings on the spiral holder to be lowered to the plane of the upper side of the bit when it is desired to adapt the auger for drilling round holes, and in order to facilitate the disengagement of the bit from the lower end of the shank the wings of the bit are provided at diametrically opposite points with flattened surfaces 42 for engagement by a wrench.

In connection with the above-described mechanism I employ a gage (shown in Fig. 1 full size and in Fig. 12 on a reduced scale) for holding the guide-block in the desired angular position during the starting of the auger, said gage consisting of a block 43, provided with a sleeve 44, which is mounted to slide and rotate upon a guide-rod 45, which may be supported in any suitable manner. (Not shown.) This sleeve carries a set-screw 46, whereby the block is secured at the desired vertical and angular adjustment. The body portion of the block is provided with an opening 47, counterbored, as shown at 48, and in the counterbore is arranged a rotary disk 49, having a central angular guide-opening 50 for the reception of the guide-block of the auger. The outer end of the block forming the body portion of the gage is split or cut away, as shown at 51, and is provided with parallel ears 52, connected by a set-screw 53, whereby the disk may be locked in any position to insure the desired disposition of the guide-block of the auger.

This device, with immaterial alteration of construction, can be used in boring metal as well as wood, as will be understood by those skilled in the art.

So far as known to me, I am the first to apply a closed lubricating-duct to and rotatable with an auger or other equivalent boring or drilling tool or device, the same extending from the boring or drilling head or point rearwardly to some point on the drill or its shank which is accessible during as well as prior to the use of the tool. By the term "closed" I mean a duct which is covered in to prevent escape of the oil from and at the sides of the duct into the hole bored, and also to prevent entrance of the chips from the hole into the duct.

In other respects my invention herein disclosed is not limited to the particular construction or embodiment shown, for it is evi-

dent that the same may be varied without departing from the spirit and scope of the invention.

I have herein shown and described a novel gage for use in connection with my novel bit or equivalent bits, yet I have not herein claimed said gage, reserving the same for the subject-matter of a future application.

Having described my invention, what I claim is—

1. An auger having a bit-carrying shank provided with a longitudinal groove or channel, a sleeve or barrel inclosing the shank and covering the groove or channel, and an oil-reservoir secured to the sleeve or barrel and communicating by means of a perforation, covered by the reservoir, with said groove or channel in the shank, substantially as specified.

2. An auger having a bit-carrying shank provided with a longitudinal groove or channel, a sleeve or barrel inclosing the shank and covering the groove or channel, an oil-reservoir arranged upon the sleeve or barrel and having closed upper and lower ends, a perforation being formed in the sleeve or barrel in communication with the reservoir and the groove or channel, and a plug removably fitted in an opening in the reservoir, substantially as specified.

3. In an auger, the combination with a rotatable shank, of a bit secured to the lower end of the shank, and a non-rotatable guide-block mounted upon said shank and having one or more knives arranged parallel with the axis of the shank and with their cutting edges projecting beyond the end faces of the block and extended to or below the plane of the cutting edges of the bit, one or more side cutters, and means for communicating motion to the side cutter or cutters, substantially as specified.

4. In an auger, the combination with a rotatable shank carrying at its lower end a bit, of a non-rotatable block mounted upon the shank above the bit, one or more knives carried by and projecting perpendicularly beyond the ends of the block and provided with terminal spurs extending below the cutting edges of the bit, one or more rotary side cutters the peripheries of which terminate short of the edges of said knives, and means for communicating motion from the auger to said side cutters, substantially as specified.

5. In an auger, the combination with a rotatable shank, of a bit secured to the lower end of the shank and having one or more wings provided with cutting edges and with roughened or serrated upper clearing-surfaces, a non-rotatable block mounted upon the auger above the bit and provided with one or more knives having lower cutting edges, and suitable clearance-passages in its lower side, side cutters rotatably mounted upon the block, and means for communicating motion from the auger to the side cutters, substantially as specified.

6. In combination with a rotary bit, a guide-block having a shearing edge 20^b, a rotary cutter arranged parallel and in operative relation with said edge, and means for operating the rotary cutter, substantially as specified.

7. In an auger, a bit, a guide-block having parallel side surfaces and provided in the planes thereof with cutting edges extending from the upper to the lower surfaces thereof, rotary side cutters arranged with their inner surfaces in contact with said cutting edges, and means for communicating motion to the side cutters, substantially as specified.

8. In an auger, a bit, a guide-block carrying one or more side cutters and having upwardly-flared channels, the edges of said block adjacent to the planes of the inner ends of said cutter or cutters being extended to form cutting edges 20^b to crumble and thereby prevent chips from interfering with proper operation of said auger, substantially as specified.

9. In an auger, a bit, a guide-block having cutting-lips 16 and 20^b, a clearance-channel 20 and upper and lower channels 20^a and 18, rotary side cutters having their inner surfaces parallel and in contact with the lips 20^b, and means for imparting rotary motion to the side cutters, substantially as specified.

10. In an auger, the combination with a rotary shank carrying a bit at its lower end, of a non-rotatable block mounted upon said shank and having channels extended from its lower to its upper end, rotary side cutters, and projections carried by said shank and adapted to engage and rotate said cutters, clearance-passages being formed in the upper end of said block in communication with said channels and adjacent to the lower ends of said projections to prevent clogging by chips, substantially as specified.

11. In an auger, the combination with a rotary shank carrying a bit at its lower end, of a non-rotatable block mounted upon the shank above the bit, one or more rotary cutters mounted upon the said block and means including clutch mechanism whereby motion is communicated from the shank to said rotary cutters when the shank is rotated in one direction, only, substantially as specified.

12. In an auger, the combination with a shank carrying a bit at its lower end, of a block mounted upon the shank, rotary cutters mounted upon the block, a sleeve or barrel rotatably fitted upon the shank above said block and provided with radial projections adapted to engage and rotate the said cutters, and means for communicating rotary motion from the shank to said sleeve or barrel when the shank is turned in one direction only, substantially as specified.

13. In an auger, the combination with a shank terminating at its lower end in a bit, of a block mounted upon the shank and having opposite knives or stationary cutters, spurred rotary cutters mounted upon the remaining sides of the block, wings loosely

mounted upon the shank and adapted to engage at their lower ends with the spurs of the rotary cutters, said wings and rotary cutters being arranged in such relative positions that the latter are engaged alternately by the former and receive an alternate intermittent movement therefrom, a pawl-and-ratchet clutch mechanism for communicating motion in one direction only from the shank to the wings, substantially as specified.

14. In an auger, the combination with a shank terminating at its lower end in a bit, of a block mounted upon the shank above the bit and having stationary guiding and cutting lips upon opposite ends, rotary cutters mounted upon the remaining opposite sides of said block, a plurality of wings or projections arranged in position to engage spurs carried by said rotary cutters, and means including clutch mechanism for communicating motion from the shank to said wings or projections when the shank is rotated in one direction, and for releasing the same when the shank is reversed, substantially as specified.

15. In an auger, the combination with a shank terminating at its lower end in a bit, of a block mounted upon the shank and having fixed knives or cutters, rotary cutters mounted upon opposite sides of the block, a sleeve or barrel rotatably fitted upon the shank above said block and provided with radial spirally-disposed wings, arranged at their extremities in position to engage spurs on the rotary cutters, and means for communicating motion from the shank to said sleeve or barrel when the shank is turned in one direction, only, substantially as specified.

16. In an auger, the combination with a shank terminating at its lower end in a bit,

a block mounted upon the shank above said bit and having fixed knives, and opposite rotary cutters mounted upon the block, of a sleeve or barrel mounted revolvably upon the shank above the block and provided with radial spirally-disposed wings to engage and communicate motion to the rotary cutters, a clutch-block fitted upon the shank, means for securing said block at the desired adjustment, and a spring-actuated pawl carried by the clutch-block to engage a tooth or detent on the sleeve or barrel when the shank is rotated in one direction, substantially as specified.

17. In an auger, the combination with a shank terminating at its lower end in a bit, a block mounted upon the shank and having fixed knives, and rotary cutters mounted upon the block, of a sleeve or barrel mounted revolvably upon the shank above the block and provided with wings to engage and communicate motion to said rotary cutters, a clutch-block fitted upon the shank above the upper end of the sleeve or barrel and provided in its under side with a recess, means for securing said clutch-block at the desired adjustment upon the shank, a beveled spring-actuated pawl carried by the clutch-block, and a beveled tooth or detent on the sleeve or barrel in the path of the lower end of said pawl when the latter is extended, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

AZARIAH Y. PEARL.

Witnesses:

JOHN L. COPP,
CHAS. S. BUCK.