July 22, 1924. 1,502,622

W. H. FORSYTH

PROSPECTING OR WELL DRILLING DEVICE

Filed Aug. 10, 1923 3 Sheets-Sheet 1

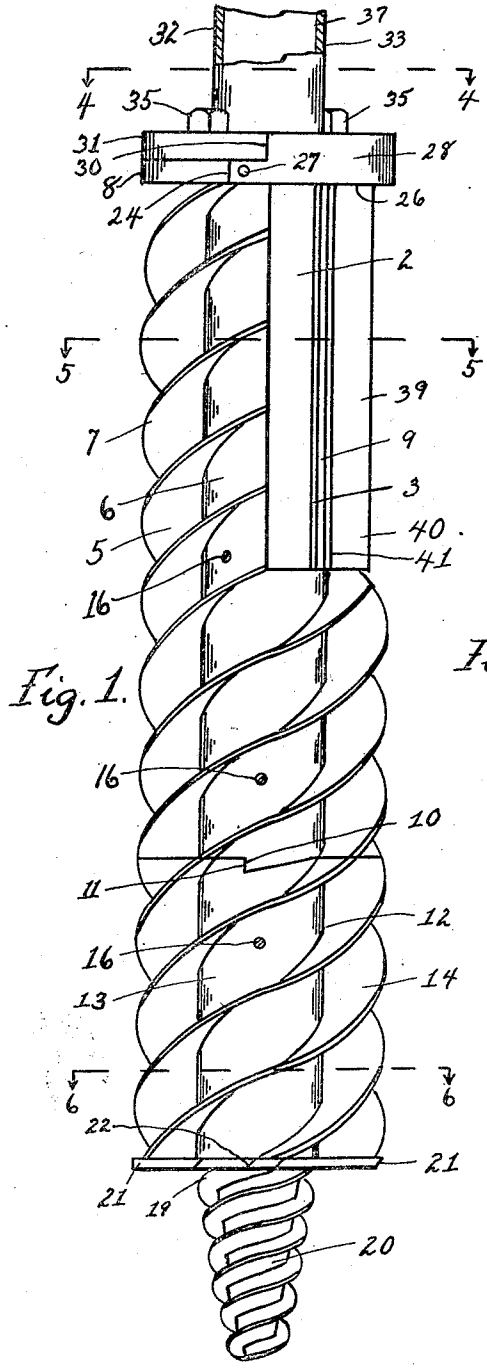


Fig. 1.

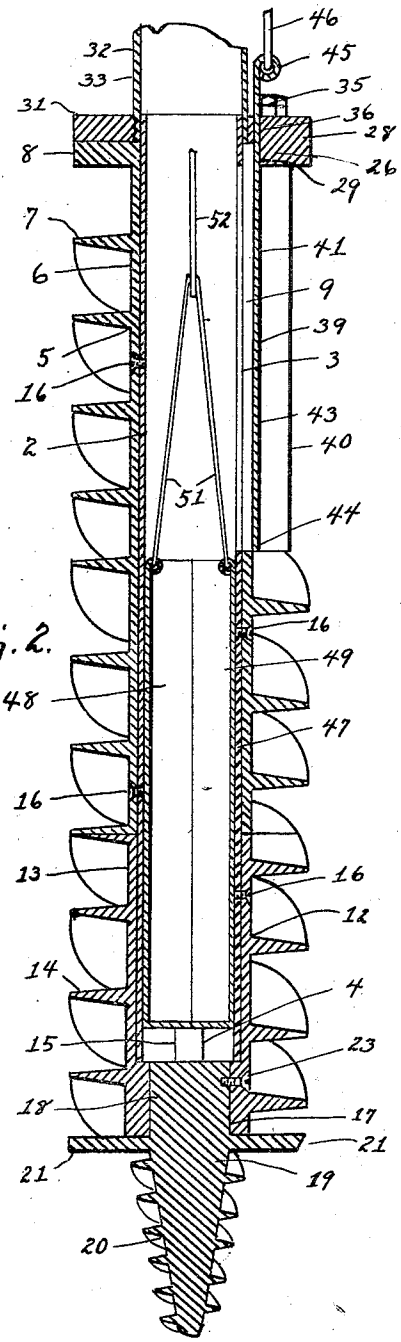


Fig. 2.

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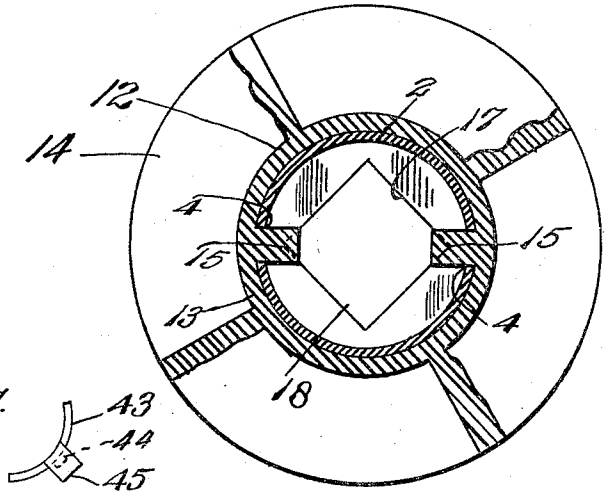


Fig. 6

Fig. 7.

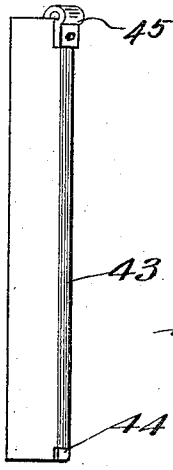


Fig. 8

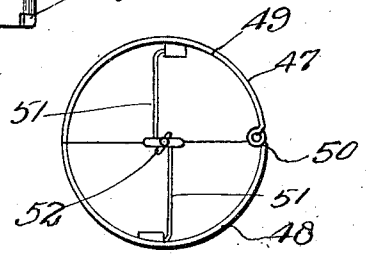


Fig 10.

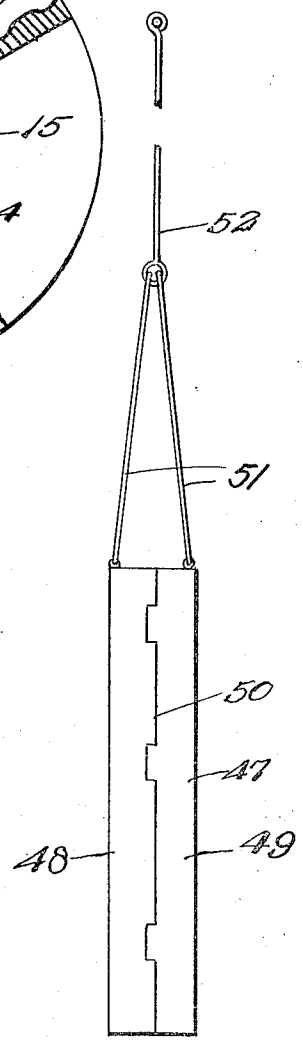


Fig. 9

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PROSPECTING OR WELL DRILLING DEVICE

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Fig. 3

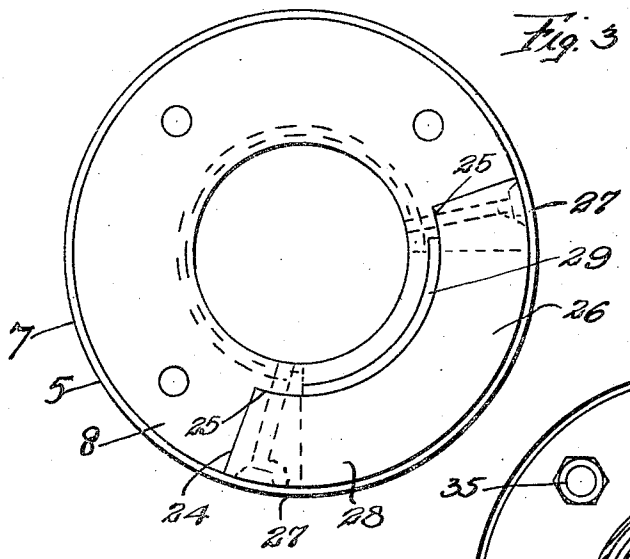
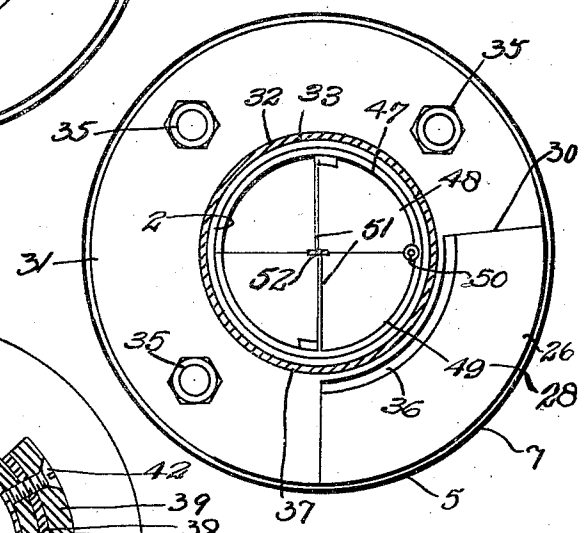


Fig. 4



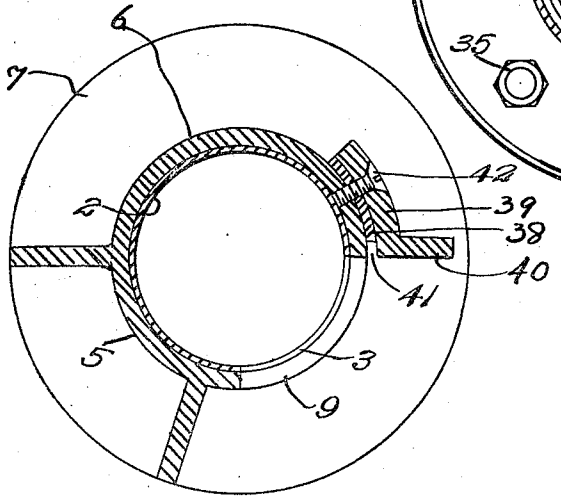


Fig. 5

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Patented July 22, 1924. 1,502,622

UNITED STATES PATENT OFFICE.

WILLIAM H. FORSYTH, OF PHILADELPHIA, PENNSYLVANIA.

PROSPECTING OR WELL-DRILLING DEVICE.

Application filed August 10, 1923. Serial No. 656,728.

To all whom it may concern:

Be it known that I, WILLIAM H. FORSYTH, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in a Prospecting or Well-Drilling Device, of which the following is a specification.

My invention relates to new and useful improvements in a prospecting or well drilling device, and has for its primary object to provide an auger of unique construction having a central bore or chamber provided with an inlet or doorway at or adjacent its upper end through which the core extracted from the hole being bored will be forced into a receptacle or bucket normally located in the auger chamber below the inlet and adapted to be withdrawn for the removal of said core.

Another object of the invention is to produce a device of this character consisting of a sectional recessed auger, a detachable sectional hollow shank the bore of which communicates with the recess or bore and a detachable combined cutter and worm or bit.

A further object of the invention is to construct a core receiving receptacle or bucket the body of which is formed of two sections hinged together so as to be readily opened for inspection of the core.

A still further object of the invention is to provide simple and effective fastening means for securing the different elements together.

With these ends in view, this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains, may understand how to make and use the same, I will describe its construction in detail, referring by numerals to the accompanying drawings forming a part of this application, in which:—

Fig. 1, is a side elevation of the prospecting or well drilling device constructed in accordance with my invention, a portion of one shank piece being partially broken away and illustrated in section with the inlet closure removed.

Fig. 2, is a longitudinal sectional view thereof.

Fig. 3, is an enlarged upper end view of the main part of the auger.

Fig. 4, is a section at the line 4—4 of Fig. 1, with the inlet closure removed.

Fig. 5, is a section of the main part of the auger at the line 5—5 of Fig. 1.

Fig. 6, is a section at the line 6—6 of Fig. 1.

Fig. 7, is an end view on a reduced scale, of the inlet closure or door.

Fig. 8, is a detail elevation thereof.

Fig. 9, is a side elevation of the core receiving receptacle or bucket.

Fig. 10, is an enlarged upper end view thereof.

In carrying out my invention as here embodied, 2 represents a barrel of tubular cross section having a relatively long and narrow aperture or slot 3 adjacent its upper end and provided at its lower end with notches 4, preferably two in number, and arranged diametrically opposite each other. On the upper portion of this barrel is mounted the upper section 5 of the auger comprising a hollow body 6 and a helix or thread 7. Said upper section is so located on the barrel that its upper end which is provided with a flange 8 terminates short of the upper end of the barrel and therefore said upper end of the barrel projects beyond this main portion of the auger. A portion of the thread as well as of the body is cut out to provide an inlet 9 corresponding in shape and size to the slot or aperture 3 with which it coincides so as to provide an inlet to the interior of the barrel.

The lower edge of the hollow body 6 of the main auger section is provided with a tooth or projection 10 for coaction with a complementary tooth or projection 11 on the secondary auger section 12 which like the main auger section comprises a hollow body 13 and a helix or thread 14 which is mounted upon the lower end of the barrel and has ribs or keys 15 formed therewith for registration with the notches or keyways 4. Both of these sections are secured to the barrel by means of suitable fastening devices such as screws 16 or their equivalent threaded through the body portions and into the barrel.

The lower end of the secondary auger member 12 projects beyond the lower end of the barrel 2 and has a restricted polygonal opening 17 with which registers a similarly shaped neck 18 of the combined worm and cutter 19. This member comprises a hardened worm or bit 20 the

threads of which are preferably tapered and the hardened cutting elements or knives 21 which are substantially radially arranged and provided with beveled or sharpened cutting edges 22 in order to cut, grind or crush the earth and stone through which it passes. In order to prevent accidental displacement of the worm or bit it may be secured to the secondary auger section by suitable fastening means 23 such as a screw or its equivalent.

As shown in Fig. 3, the flange 8 of the main auger section is recessed as at 24, said recess preferably being formed by cutting a portion of the flange throughout two different arcs thereby forming shoulders 25 against which rests a filler 26 mounted in the larger portion of the recess and held in place by suitable fastening devices 27 such as stud screws and said filler is of greater thickness throughout a portion thereof than the flange 8 so as to form a projection 28 extending above the flange 8. The filler 26 being of a width equal to the depth of the larger portion of the recess 24 and fitting in said larger portion of the recess forms with the remaining portion of the flange in the region of the smaller part of the recess an arcuate slot 29 for insertion of the inlet closure or door to be later described.

The projection 28 of the filler 26 is adapted to register with a recess or slot 30 formed in the flange 31 of the detachable sectional shank 32 consisting of one or more sections 33. One of the shank sections is detachably connected to the auger element by bringing its flange into contact with the flange of the auger which will cause the shank section to telescope over the projecting upper end of the barrel 2, as plainly shown in Fig. 2, after which said flanges may be fastened together by suitable securing means 35 such as stud bolts or their equivalent. As the recess 30 in the flange 31 is of greater depth than the width of the filler 26 and its projection 28 an arcuate slot 36 is formed which coincides with the similar slot 29.

At the far side of the inlet opening formed by the slots 3 and 9, when considered in connection with the direction of rotation of the auger, is located a spacer strip 38 the edge of which is slightly set back from the adjacent edge of the hollow auger body in the region of the inlet and on the outside of this spacer and superimposed on this spacer is one of the webs of the angle iron 39 the other web of said angle iron projecting outward radially with relation to the auger and forming a fin 40 which latter extends over the edge of the spacer 38 and aligns with the adjacent edge of the hollow body of the auger in the region of the inlet thereby forming a guideway 41. The angle iron and its spacer are secured in place by suitable fastening devices 42 such as screws or their equivalent it being understood that said angle iron spacer extends the full length of the inlet.

The inlet closure or door 43 shown in detail in Figs. 7 and 8 is arcuate in cross section and is slidably mounted in the guideway 41 with its upper end projecting through the slots 29 and 36 so that said closure or door may be readily moved up and down as occasion requires and if found desirable means may be associated therewith to limit the upward or outward movement of said door, such a means, for convenience or illustration, being here shown as a stop 44 located at the inner or lower end thereof for contact with the lower face of the filler 26 when the door is opened. At the upper end of the closure or door is located an ear 45 which may be formed integral with the upper edge thereof or produced in any other convenient manner. To this ear is adapted to be connected a suitable actuating device or rod 46, Fig. 2, and this lifting device or rod should be and preferably is of sectional formation in order that it may be extended as the auger is sunk into the ground.

Within the auger element of the device is located a removable core receiving receptacle or bucket 47 which is adapted to be inserted through the upper end of the sectional shank and lowered into the position illustrated in Fig. 2, at which time the upper open end of said bucket is below the lower end of the inlet. Said bucket is preferably formed of two semi-cylindrical sections 48 and 49 hinged along two longitudinal meeting edges as at 50. To the upper end of the bucket are hinged the bail rods 51, one to each bucket section, and are also loosely connected with a lifting rod 52 or its equivalent, said lifting rod also being of sectional formation whereby the upper end will project beyond the upper end of the uppermost shank section when the bucket is in place thereby permitting ready access to the lifting rod for the removal of the bucket.

In actual practice a suitable supporting frame may be provided and said frame may be of any desirable or preferred construction but must be of sufficient height to permit the ready insertion of new sections of the shank as they are needed due to the entrance of the auger element into the ground. The device may be revolved in any suitable manner as by man power or horse power after the manner of a windlass or it may be revolved by a suitable motor such as an electric, gas or steam engine and when operated by a motor the

same may be connected by suitable power transmitting mechanism with one of the shank sections.

In starting the operations of the device the auger element is connected to a shank section 33 and operated through said shank section until the auger element has been screwed into the ground a sufficient distance to permit the insertion of another shank element. After this has been done the operations may be continued until the shank section connected directly to the auger element has almost completely entered the hole being produced at which time another section may be added and the operations again proceeded with. The adding of shank sections may be continued from time to time until a hole is produced of the desired depth and as each shank section is added another section is added to each of the lift rods 46 and 52.

During the operations the bit 20 will worm its way into the ground causing the cutters 21 and the auger to follow thereafter and any hard soil or stones and rock encountered will be loosened up, broken or crushed by the cutters 21 and then elevated by the helix or thread of the auger until the soil cutaway reaches the region of the inlet where it will leave the helix and be forced by the fin 40 into said inlet thence dropping into the core receptacle or bucket 47. As soon as the bucket is filled, which is determined by the distance the drilling device is sunk into the ground, the inlet closure or door 43 is closed by forcing down on the closure actuating rod 46. When the inlet is closed the core receiving receptacle or bucket 47 may be withdrawn through the medium of the lift rod 52 and the soil which makes up the core of the hole can then be dumped out and examined or the bucket may be opened and the core examined while remaining in one section of the bucket. An examination of the latter kind will disclose the contents of the core in the exact relation that it held before removal thereby indicating the condition of the different earth strata.

As soon as the soil in the bucket is removed said bucket is again inserted in the upper open end of the shank and permitted to drop into the chamber within the auger element and after the bucket is in place the inlet closure or door is again opened for the next step in the boring operation.

From the foregoing description it will be seen that I have provided a simple, strong and durable device which will be effective in its operations and enable an operator to examine the core of the hole to ascertain the condition and contents of the soil through which the device is passing.

Of course I do not wish to be limited to the exact details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

Having thus fully described my invention, what I claim as new and useful is:—

1. In a device of the character stated, a drill member comprising a tubular barrel open at both ends and having a slot adjacent its upper end, a sectional auger removably mounted upon said barrel, a portion of said auger having an opening therethrough to coincide with the opening in the barrel, and a combined bit and cutter detachably mounted in the lower end of the auger member.

2. In a device of the character stated, a drill member comprising a tubular barrel open at both ends and having a slot adjacent its upper end, a sectional auger removably mounted upon said barrel, a portion of said auger having an opening therethrough to coincide with the opening in the barrel, a combined bit and cutter detachably mounted in the lower end of the auger member, a bucket removably mounted within the barrel and adapted to be disposed below the opening in the latter, and means for closing the openings through the auger member and barrel.

3. In a prospecting or well drilling device, the combination of a barrel open at each end and having a slot located adjacent its upper end, a main auger section comprising a hollow body, an exterior thread and a flange at its upper end, said auger section having portions of its threads cutaway, and a slot in its body for registration with the slot in the barrel to form an inlet opening, said main auger section being so positioned on the barrel that the upper end of the former terminates short of the latter, means to secure said main auger section to the barrel, a secondary auger section comprising a hollow tubular body, and an exterior thread, said secondary auger section being mounted upon the lower end of the barrel and interlocking with the main auger section, means to detachably secure the secondary auger section on the barrel, lugs projecting from the interior of the secondary auger section for registration with notches in the lower end of the barrel, the lower end of said secondary auger section having a polygonal opening, a combined bit and cutter member comprising a tapered worm, radiating cutters and a polygonal shank, the latter adapted to register with the polygonal opening in the lower end of the secondary auger section, means to fasten said combined bit and cutting member in place, a bucket removably mounted in the barrel through the upper open end thereof, said bucket when in place lying below the inlet opening, and means to close said inlet opening.

4. The combination with a drilling device including a hollow auger member with an inlet leading through one side adjacent its upper end, a combined bit and cutting member at the lower end of the auger member, a flange at the upper end of said auger member, said flange having a recess formed therein by removing a portion of said flange, of a filler of greater thickness and less width than said flange, said filler being mounted in the flange recess to provide a slot and form a projection, means for securing said filler in place, a spacing strip disposed across the outside of the body of the auger member beyond the far edge of the inlet opening, an angle iron having one web disposed over the spacing strip with the other web projecting beyond an edge of said spacing strip to form a guideway with the body of the auger member, said other web projecting radially to provide a fin, a closure slidably mounted in said guideway and projecting through the slot formed by the mounting of the filler in the flange recess, means for actuating said closure, a bucket formed of two members hinged together longitudinally, bail members pivoted to the bucket members, means loosely connected with said bail members for manipulating the bucket, and a shank provided with a flange recessed for the reception of a portion of the filler.

5. In a device of the character stated, the combination of a hollow boring member having an inlet adjacent its upper end, the threads of said boring member being cut-away in the region of the inlet, means for forcing earth into the inlet which has been elevated by the threads, means for closing said inlet, sectional actuating means connected with said inlet closing means, a bucket for insertion in the hollow body of the boring member, sectional lifting means connected with said bucket, and a sectional shank detachably connected with the boring member, said shank adapted to have suitable power applied thereto for revolving the complete device.

In testimony whereof, I have hereunto affixed my signature.

WILLIAM H. FORSYTH.