D. J. ARNOLD.

Earth-Augers.

No. 155,402. Patented Sept. 29, 1874.

Fig: 1.

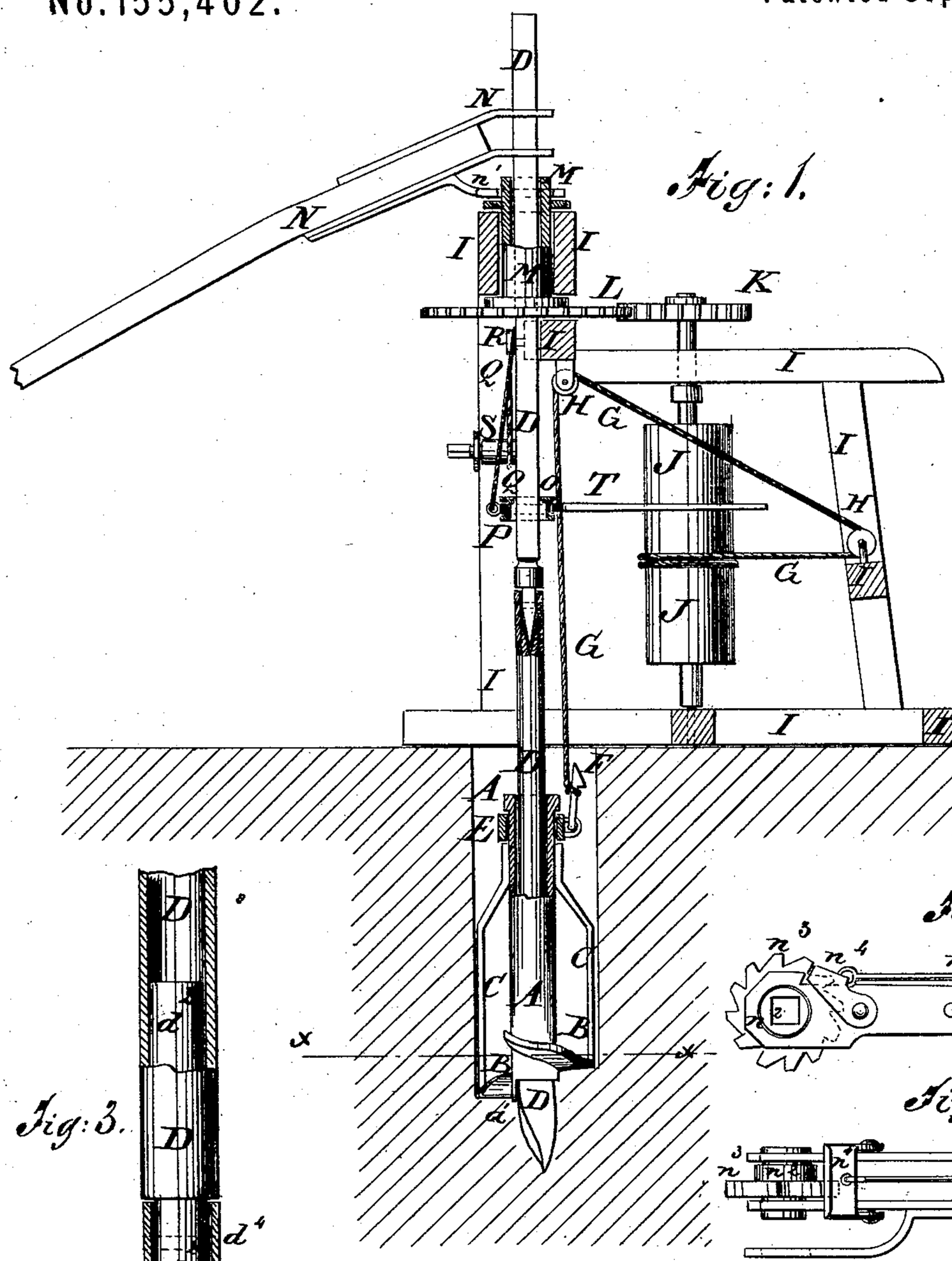


Fig: 3.

Fig: 2

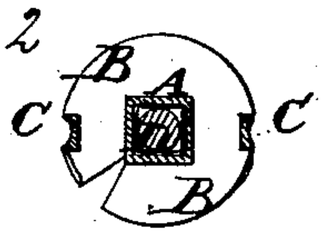


Fig: 4

Fig: 5.

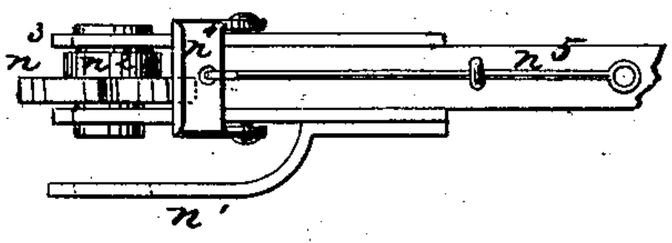
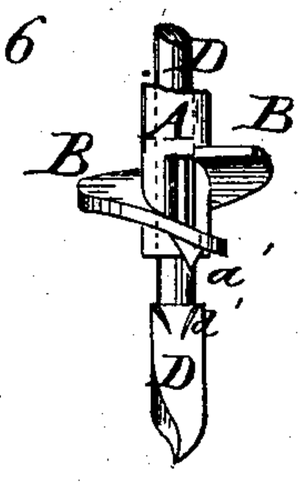


Fig: 6



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UNITED STATES PATENT OFFICE.

DON JUAN ARNOLD, OF BROWNVILLE, NEBRASKA.

IMPROVEMENT IN EARTH-AUGERS.

Specification forming part of Letters Patent No. **155,402**, dated September 29, 1874; application filed July 25, 1874.

To all whom it may concern:

Be it known that I, DON J. ARNOLD, of Brownville, in the county of Nemaha and State of Nebraska, have invented a new and useful Improvement in Well-Auger, of which the following is a specification:

Figure 1 is a side view of my improved well-auger, partly in section, to show the construction. Fig. 2 is a detail cross-section of the auger or bit, taken through the line *x*·*x*, Fig. 1. Fig. 3 is a detail section of a shaft-joint, showing the coupling. Figs. 4 and 5 are, respectively, top and side views of the head of a sweep, provided with a ratchet attachment. Fig. 6 is a detail side view of the lower part of the bit and shaft.

Similar letters of reference indicate corresponding parts.

My invention has for its object to improve the construction of well-augers, so as to make them more convenient in use, more effective in operation, and less liable to get out of order. The improvements consist, first, in the relative construction of the revolving shaft and the boring-bit; second, in the construction of devices for guiding the bit into proper position when lowered on the shaft; third, to the provision of a socket-arm on the sweep which connects with the windlass-gearing and causes the bit to be raised when a certain predetermined depth has been reached; fourth, to the improved means for coupling the shaft-sections.

A represents the sleeve or hollow shaft of the bit, to the lower end of which is attached a spiral flange, B, making a single turn or a little more than a single turn. The lower end of the flange B is made sharp, to enable it to enter the ground readily. To the outer edge of the flange B, upon the opposite sides of the sleeve A, are attached the lower ends of two supports, C, the upper ends of which are bent inward, and are attached to the opposite sides of the upper part of the sleeve A. The outer side of the vertical parts of the supports C are channeled longitudinally, to form passages for the air to pass down between them and the sides of the hole being bored, to enter beneath the flange B and enable the bit and its load to be readily raised when desired. The outer side of the supports C may be covered, if desired, to prevent them from being filled with dirt. The lower part of the opening through the sleeve A is made square, to fit upon the square lower part of the shaft D, so that the bit A B C may be carried around by and with the shaft D as it is turned. Upon one side of the lower end of the sleeve A is formed a point, *a'*, which, as the bit A B C is lowered upon the shaft D, enters one or the other of the V-shaped recesses *d'* formed in the upper part of the four sides of the square lower part of the shaft D, so as to bring the bit surely to its seat when lowered. The projecting lower end of the shaft D is so formed that it may readily force its way into the ground. To the upper end of the sleeve A is swiveled a ring, E, to one side of which is pivoted or hinged an arm or link, F, to which is attached the end of the hoisting-rope G, and the free end of which, when the auger is boring, rests against the side of the hole, and holds the ring E from turning, and thus prevents the hoisting-rope from being wound around the shaft D. When power is applied to the hoisting-rope G the first effect is to raise the end of the arm F away from the side of the hole, and the bit and its load is then easily raised. The rope G passes over guide-pulleys H attached to the frame I, and its other end is attached to a drum, J, the journals of which work in bearings in the said frame I. To the upper journal of the drum J is attached a gear-wheel, K, the teeth of which mesh into the teeth of a larger gear-wheel, L, attached to the lower end of the sleeve M, which works in bearings in the front cross-bar of the frame I, and through which the upper part of the shaft D passes. The upper length of the shaft D is made square to pass through a square hole in the end of the sweep N, so that the said shaft may be turned by the movement of the said sweep. To the lower side of the inner part of the sweep N is attached an arm, *n'*, having a square hole formed through it to receive and fit upon the squared upper end of the sleeve M. The hole in the arm *n'* should be in line with the hole in the end of the sweep, so that the shaft D can pass through the hole in the arm *n'* without touching said arm. In the hole in the end of the sweep N is swiveled a sleeve,

n^2, having a square hole through it, which fits upon the square upper length of the shaft D. To the sleeve n^2 is rigidly attached a ratchet-wheel, n^3, upon the teeth of which a pawl, n^4, takes hold. The pawl n^4 is pivoted to the sweep N, and is provided with a wire, n^5, extending along the said sweep N into such a position that it may be conveniently reached and operated to withdraw the pawl n^4 from the ratchet-wheel n^3 when desired.

With this construction the sweep N will sustain itself, at any desired height, upon the square upper length of the shaft D, so that, when it is desired to force the bit to any desired depth in the earth before raising it—as, for instance, two feet—the sweep N is raised to that height above the square upper end of the sleeve M. As the bit descends the arm n^1 of the sweep N comes in contact with and slips upon the square upper end of the sleeve M, which sets in motion the gearing, winds up the hoisting-rope, and raises the bit with its load of dirt. When the ratchet mechanism is used, as the arm n^1 drops into place upon the square upper end of the sleeve M the pawl n^4 is drawn away from the ratchet wheel n^3 by pulling upon the wire n^5. This allows the shaft D to stand still while the bit and its load are being raised, it being always difficult, and in some kinds of soil impossible, to raise the bit while the shaft is revolving, owing to the increased friction between it and the shaft.

The shaft D is made in lengths, which are coupled together at their ends. The intermediate sections are designed to be made of gas-pipe of suitable size, in one end of each section or length of which is secured, by rivets or other convenient means, one end of a short iron rod, d^2, the other end of which projects to fit into the end of the next section, and has a slot formed in said end to receive a cross-bar, d^3, the ends of which are inserted and riveted in short slots in said pipe at a suitable distance from its end. The rod d^2 and cross-bar d^3 are designed to sustain the entire torsion strain upon the shaft D. The coupling is completed by passing a small screw-bolt, d^4, through the pipe and through the rod d^2, to enable the shaft to be raised from the well-hole when desired.

The hole through the pipe, through which the screw-bolt d^4 passes, should be made somewhat larger than the said bolt to relieve the bolt from having to support any of the torsion strain.

If desired, the outer end of the rod d^2 may be made wedge-shaped, and may fit into a wedge-shaped socket secured in the adjacent end of the next length of pipe.

O is a ring, having a square hole formed through it to receive and fit upon the square upper length of the shaft D, and to it is swiveled a ring, P. To one side of the ring P is attached the end of a cord, Q, which passes over a guide-pulley, R, pivoted to the upper part of the frame I; and its other end is attached to a drum or shaft, S, pivoted to a post of the frame I, and which should be provided with a crank for operating it, and with a ratchet-wheel and pawl for holding it from being turned back when its crank is released. To the swiveled ring P is rigidly attached an arm, T, which, by striking against the frame I, prevents the cord Q from being wound around the shaft D.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The square lower end of the lower section of the shaft D and the square lower end of the bit-sleeve A, for connecting the bit A B C to the shaft D in such a way that the said bit may be operated by turning the said shaft, substantially as herein shown and described.

2. The point a^1, formed upon the lower end of the bit-sleeve A, and the V-notches d^1, formed upon the upper parts of the sides of the square lower end of the lower length of the shaft D, in connection with each other, for guiding the bit A B C into position when lowered, substantially as herein shown and described.

3. The combination of the socket-arm n^1 with the sweep N, for coupling the said sweep automatically with the hoisting-gearing when lowered upon the upper end of the sleeve M, substantially as herein shown and described.

4. The combination, with the tubular sections of the boring-shaft, of the rod d^2, having an open slot in one end, the cross-bar d^3, and fastening screw-bolt d^4, said rod being adapted for insertion in the meeting ends of the shaft-sections, all as shown and described, to operate as specified.

5. The combination of the swiveled socket n^2, the ratchet-wheel n^3, the pawl n^4, and the wire or rod n^5 with the sweep N and square upper length of the shaft D, substantially as herein shown and described.

DON JUAN ARNOLD.

Witnesses:

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HANER JOHNSON.