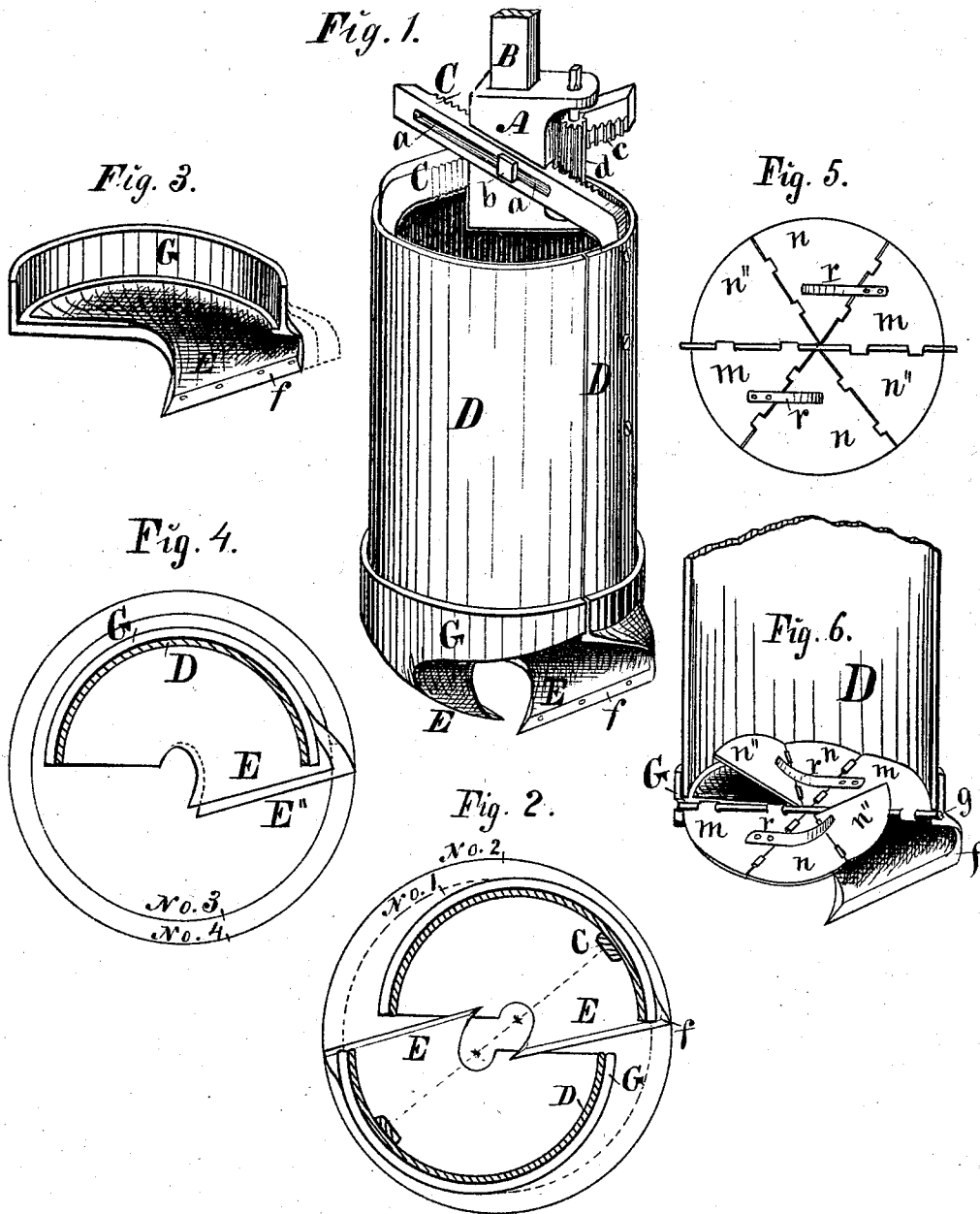


C. D. PIERCE.
EARTH-AUGER.

No. 184,019.

Patented Nov. 7, 1876.



Witnesses,
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UNITED STATES PATENT OFFICE.

CHARLES D. PIERCE, OF LA SALLE, ILLINOIS.

IMPROVEMENT IN EARTH-AUGERS.

Specification forming part of Letters Patent No. **184,019**, dated November 7, 1876; application filed March 31, 1876.

To all whom it may concern:

Be it known that I, CHARLES D. PIERCE, of La Salle, in the county of La Salle and State of Illinois, have invented an Improved Earth-Auger, of which the following is a specification:

The object of my invention is to construct an auger in such a manner that it can be readily and advantageously adjusted to cut bores of various diameters and form wells of different sizes in various kinds of ground, sand, slate, coal, and all kinds of substances softer than solid rock. It consists, first, in adjustable arms carrying fixed cutters; second, in a series of removable bottoms having graduated cutters; third, in a flexible and removable bucket-bottom that is equally well adapted for use in stony ground and in sand, all as hereinafter fully set forth.

Figure 1 of my drawing is a perspective view of my auger, illustrating the construction, application, and operation of the adjustable arms.

A is a combined socket and hub, to which the auger-shaft B is attached, and in which the auger-arms are fixed and moved, as desired. C C are the auger-arms, of elbow form, carrying the pods D and the combined movable bottoms and cutters E G. The horizontal part of the elbow-form arms may stand at any angle desired. The combined socket and hub A may be cast complete in one piece. It has mortises or grooves corresponding in size and angle with the arms C, in which those arms are adjusted and locked. This casting A may vary in size and configuration, as desired. *a a* are longitudinal slots in the arms C. *b* is a screw-bolt, passed through the slots *a* and a transverse hole of corresponding form through the center of the hub A. By means of a nut on the end of the bolt *b* the arms C are clamped and rigidly fixed to the hub. The inside of the arms may be serrated or ratchet-faced, to engage a corresponding surface in the grooves or mortises in the hub in which the arms move, for the purpose of gripping and holding the arms more securely, and to distribute any strain that might endanger the breaking of the clamping-bolt *b*. *c* represents a rack formed on the arms C. *d* is a pinion, mounted in suitable bearings formed

in or attached to the hub A. This pinion may be operated by means of a wrench or crank, to engage and move the arms C in opposite directions simultaneously, and to equal distances, as required in adjusting the auger to bore holes of various diameters.

A scale may be formed or attached to the arms, to indicate the diameter of the bore. The pinion may be concealed and protected in a cavity fixed in the hub, or by a suitable cover attached to the hub.

Fig. 2 is a top plan view, showing the relative positions of the pods D and combined bottoms and cutters G E, when the arms C are adjusted to increase the diameter of a bore. The No. 1 circle shows the smallest size of bore, formed when the arms are close together and the pods connected to form a tight bucket. No. 2 circle shows the size of the bore when the arms are spread. A bore or well of any size desired may be thus formed by adjusting the arms carrying the cutters.

Fig. 3 is a perspective view, illustrating the construction of my movable bottoms having a graduated series of cutters. G is a perforated rim, corresponding in size and form with the bottom of the pod or arm, to which it is to be attached by means of screw-bolts, or in any suitable way. E is an inclined hollowed-out base, terminating in a cutter, having its inner corner the lowest and in advance of the center, and its outer corner farther from the center than any other portion of the auger. This hollowed-out base E forms a mole-shaped and twisted passage-way for the earth to pass upward with less friction than when the passage-way is angular. *f* is a vertical and curved extension on the top of the outside corner of the cutter. By making a series of movable bottoms having extensions *f* varying and graduated in size, as indicated by broken lines, I can use the same auger without adjusting the arms to make bores of different diameters by simply changing the movable bottoms E G. *f'* is a movable steel-cutting blade, conforming in shape with the cutter E *f*, and may readily be removed to be sharpened when worn, or replaced by a new one.

Fig. 4 is a top-plan view, illustrating my manner of making bores of different diameters with one and the same auger by using mova-

ble bottoms having a graduated series of cutters. No. 3 circle represents the wall of the bore made by the cutter E. No. 4 shows the increased size of the bore made by one of my series of enlarged and graduated cutters, E''.

Fig. 5 is a top plan view of my movable and flexible bucket-bottom. *g* is a shaft, designed to rest in suitable bearings formed in the lower ends of the pods D or rims G, forming a cylinder or bucket adapted for elevating sand and earth and water when necessary. *m m* are segments of plate hinged to the opposite sides and ends of the shaft *g*. *n n* are segments hinged to the free edges of the hinged segments *m*. *n'' n''* are segments hinged to the free sides of the segments *n*, making each half-bottom consist of three pieces. *r r* are stops, rigidly fixed on the top sides of the segments *m* to restrict the movements of the segments *n*.

Fig. 6 is a perspective view, illustrating the application and operation of my flexible bucket-bottom.

I am aware that bucket-bottoms for augers have had hinged sections; but I claim that my manner of forming a bottom in flexible halves, each half consisting of three pieces, *m n n''*, and then hinging the two halves at the opposite ends and on the opposite sides of the shaft *g*, to allow different sizes of stones and all kinds of substances to pass upward to be retained and elevated in the bucket, is novel and greatly advantageous.

I am aware that augers have been formed in halves, and hinged to an auger-shaft in such a manner that they could be spread apart to stand at various angles relative to each other and the auger-shaft, for the purpose of discharging their contents and to excavate around boulders. I am also aware that adjustable bits and reamers have been used on augers to form bores of different diameters; but I claim that

my manner of forming an auger in two parts, and combining them with an auger-shaft in such a way that they can be spread apart and yet remain parallel to each other, and in parallel line with the auger-shaft and the wall of the bore, for the purpose of making complete bores and wells of different diameters with one and the same auger, is novel and greatly advantageous.

I claim as my invention—

1. In an earth-auger the adjustable arms C C, carrying independent half-augers parallel to each other, in combination with an auger-shaft, substantially as and for the purposes set forth.

2. The combined shaft-socket and hub A carrying the pinion *d*, in combination with the adjustable arms C having racks *c*, substantially as and for the purposes shown and described.

3. The elbow-form arms C having slots *a*, in combination with the clamping-bolt *b* and grooved or mortised hub A, substantially as and for the purposes shown and described.

4. A removable bottom formed in two sections, each half or section having a rim, G, and an inclined hollowed-out base terminating in cutters standing crosswise to each other, substantially as shown and described.

5. The removable bottom sections G E, having a mole-shaped and twisted passage-way for the elevation of earth, substantially as shown and specified.

6. The bisected and flexible bucket-bottom *m n n''*, having stops *r* when hinged to the opposite sides and ends of the shaft *g*, substantially as and for the purpose shown and described.

CHARLES D. PIERCE.

Witnesses:

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W. H. FARRALL.