

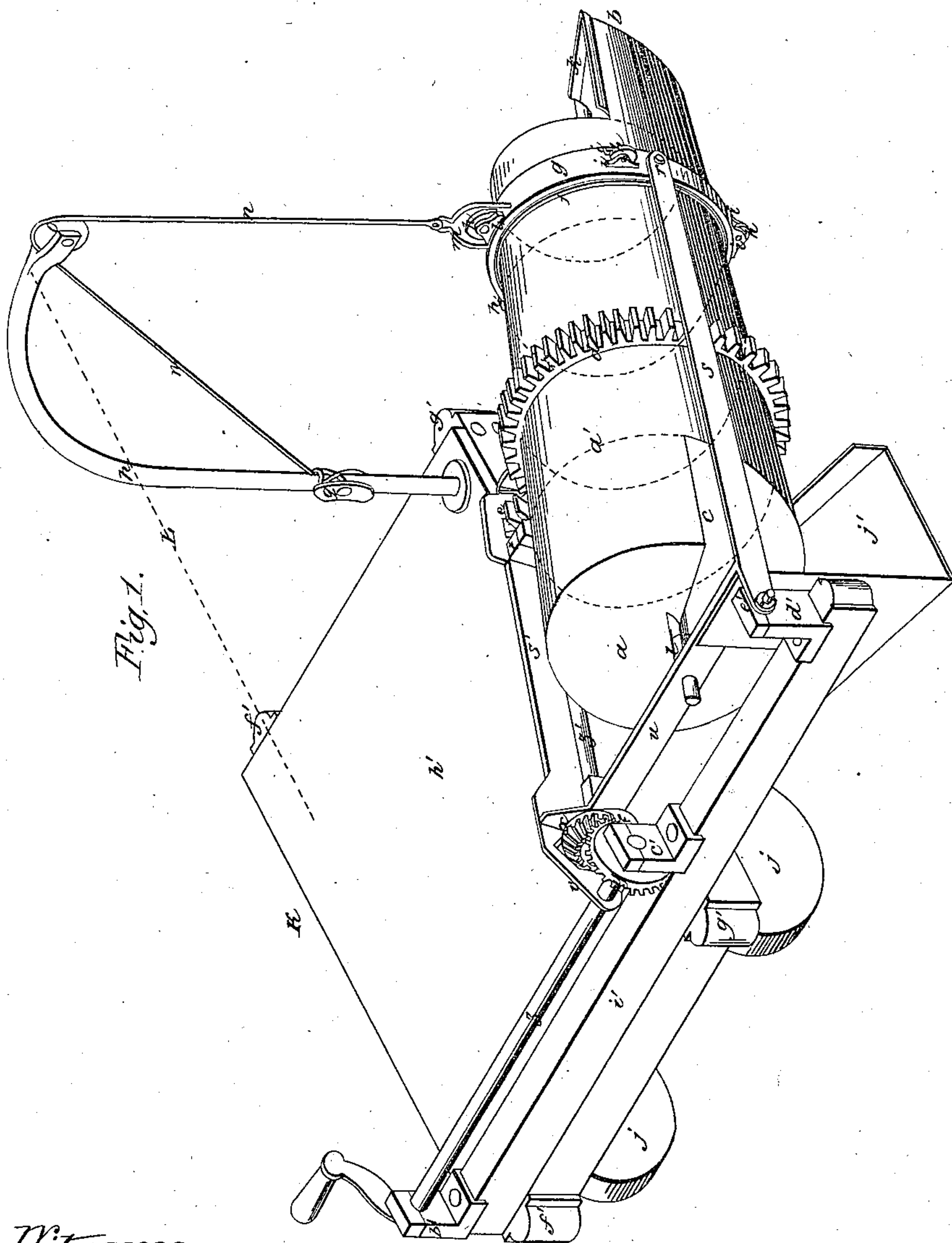
Sheet 1-2, Sheets.

*R. Montgomery.*

*Excavator.*

*N<sup>o</sup> 24,043.*

*Patented May 17, 1859.*



*Witnesses.*

*A. Hiddicomb.*

*Sp. C. Pitner.*

*Inventor.*

*R. Montgomery.*

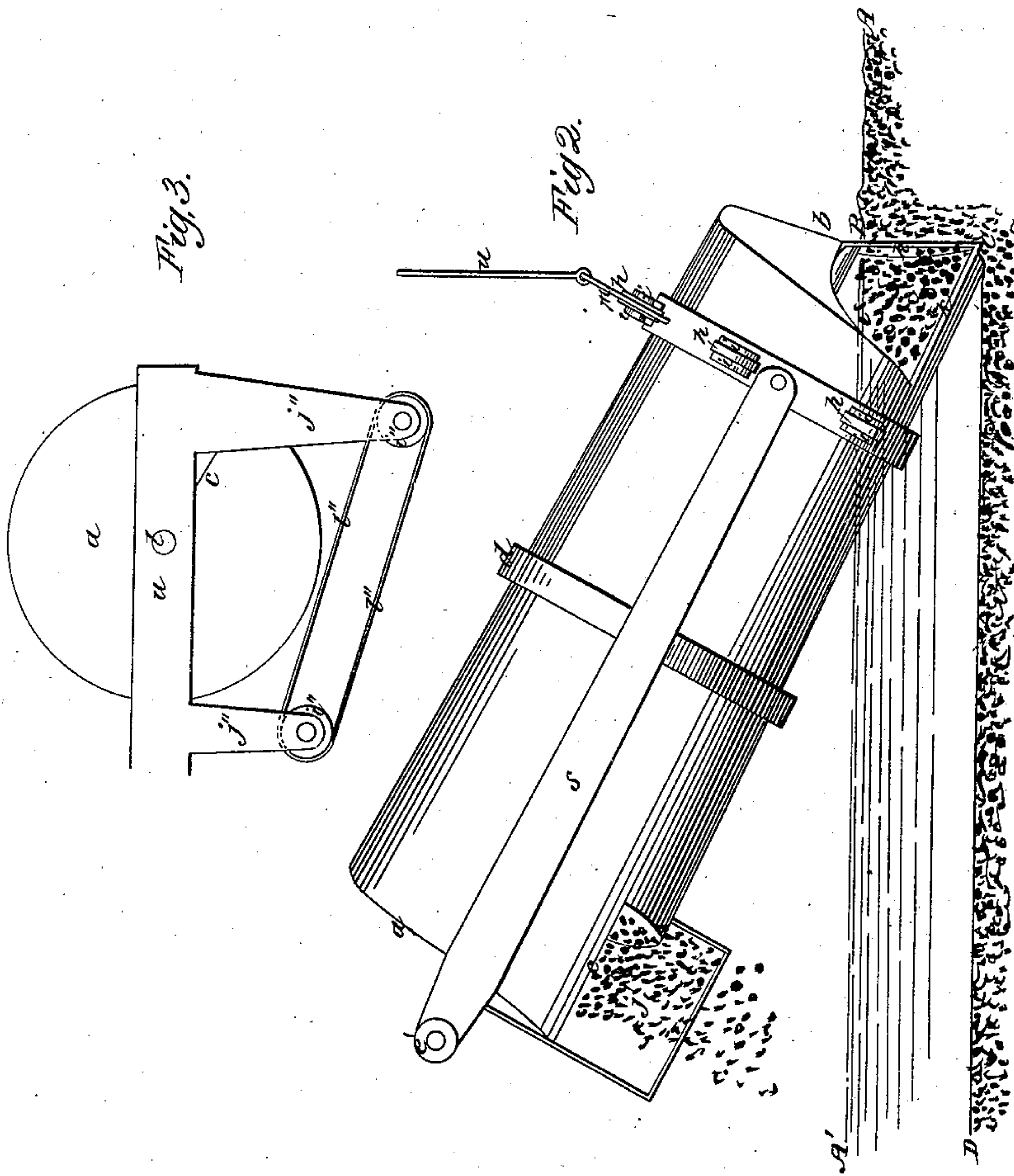
*R. Montgomery.*

*Sheet 2-2, Sheets.*

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*Witnesses.*

*A. Huddicombe*

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# UNITED STATES PATENT OFFICE.

RICHARD MONTGOMERY, OF NEW YORK, N. Y.

## SCREW EXCAVATOR.

Specification of Letters Patent No. 24,043, dated May 17, 1859.

*To all whom it may concern:*

Be it known that I, RICHARD MONTGOMERY, of the city of New York and State of New York, have invented an Improved Archimedean-Screw Excavator; and I do hereby declare that the following is a full and exact description of its construction and operation, reference being had to the accompanying drawings, and to the letters of reference marked thereon, so as to enable others skilled in the art to make and use my invention.

Figure 1, Plate I, of the drawings represents a perspective view of the machine; Fig. 2, of Plate II, is a side view of the cylinder when at work, Fig. 3, of Plate II, is an end view of the cylinder exhibiting a modification of the arrangement of parts as shown in Plate I and in Fig. 2 of Plate II.

The excavating cylinder  $a\ b$ , is made conical in form, the upper or discharging end  $a$ , being much larger than the lower end. The cylinder contains a screw thread as indicated by red lines in Plate I, and is open at both ends as seen at  $c$ , and  $b$ . The sharp cutting edges  $k, k$ , are welded or otherwise firmly attached to the open end  $b$ , which is in contact with the soil to be excavated. The other or discharging end of the cylinder is open at  $c$ , and an inclined trough  $j'$ , is arranged underneath the opening  $c$ , so as to receive the earth as it is discharged from the cylinder, and convey it out of the track of the machine. The journal  $l$ , at the rear end of the cylinder has its bearing in the cross bar  $u$ , of the frame  $s, u, s'$ .

There is a projection  $f$ , around the cylinder near its end  $b$ . This projection bears against friction rollers  $h$ , which project through slots in a ring  $g$  (the slots are not seen in the figures) and have their bearings in staples  $i$  projecting from the outside of the ring. The ring is also provided with a stirrup  $m$ , to which a rope or chain  $n$ , is fastened, which passes over a pulley  $o$ , at the outer end of a standard  $p$ , and is also fastened to this standard at  $q$ .

The pivot at the lower end of the standard or derrick  $p$ , has its bearing in a socket in the table  $h'$ , so as to allow the derrick to be swung round.

The lower ends of the frame  $s', s$ , are pivoted to the ring  $g$ , at  $r$ , while the upper end of  $s$ , is pivoted to a block  $d'$ , at  $e'$ , and the upper end of  $s'$ , has a bearing on shaft  $z$ , at  $v$ . The shaft  $z$ , is the driving shaft

and motion may be communicated to it in any suitable manner. The shaft  $z$ , has its bearings in blocks  $b', c'$ , and carries near its inner end a bevel wheel  $y$ , which takes into another bevel wheel  $x$ , upon the end of a shaft  $z'$ , which shaft  $z'$ , has its bearings in blocks projecting from frame  $s'$ , and carries a cogwheel  $e$ , at its other end.

The cogwheel  $e$ , takes into cogs  $d$ , arranged around the cylinder. Thus it will be seen the cylinder will be caused to revolve as soon as the driving shaft  $z$ , is set in motion, and at the same time the excavating end of the cylinder can be lifted or lowered by means of chain  $n$ , the whole system which supports the cylinder and which consists of frame  $s, u, s'$ , and ring  $g$ , being fulcrumed at  $v, e'$ .

The earth as it is dug up by the edges  $k, k$ , is worked up through the cylinder by means of the screw thread, inside of the cylinder, and is finally discharged at  $c$ .

An endless band  $l'', l''$ , passing over rollers  $i'', i''$ , pivoted to arms  $j'', j''$ , extending from frame  $u$ , might be substituted for the inclined trough  $j'$ . This modification is represented in Fig. 3, of Plate II.

The blocks  $b', c'$ , and  $d'$ , are arranged on a beam  $i'$ , extending from table  $h'$ . The latter is supported on four wheels two of which are shown at  $j, j$ , Plate I, for the purpose of moving the whole machine along as the excavation proceeds.

Fig. 2, Plate II, represents the cylinder in the act of excavating; A, B, C, representing the soil to be excavated and B, C, D, A', representing the semicylindric space that has been dug out by the machine.

At  $k, k$ , the earth is seen as it enters the cylinder and at  $c$ , as it is discharged over the incline  $j'$ . The cylinder is made larger at the upper end as above set forth, in order to ease the progress of the earth as it is worked up toward the discharge opening  $c$ .

In harmony with the principle of mechanics that the driving power ought to be applied as near the point of resistance as possible, the cog gearing  $e, d$ , is arranged as near the excavating end  $b$ , of the cylinder as may be done without exposing the cogs  $d$ , to come too close to and eventually in contact with the soil, whereby the action of the machine would be seriously impeded. Another object in arranging the cog gearing  $e, d$ , as near the excavating end of the cylinder as possible, is to prevent an undue



twist of the cylinder, as the tendency to twist the cylinder will be the more active the greater the distance is between the point of resistance at *b*, and the point where the power is applied, to wit the point where the cogs *e*, and *d*, meet.

A rope *L*, (represented in Plate I, by a dotted red line) is attached to the outer end of the derrick *p*, so that a person on the table or platform *h'*, of the carriage *K*, may take hold of the other end of said rope *L*, and by pulling it, cause the derrick to swing round and thereby raise the excavating end of the cylinder when desirable without unhitching the rope or chain *n*. The cutting edges *k*, *k*, also serve to cut up stumps embedded in the ground.

When using an endless belt *l''*, *l''*, the weight of the earth falling upon it will help to move the belt forward and around the rollers *i''*, *i''*.

It will be understood that more than one screw thread *a'*, could be inserted in the cylinder, so as to facilitate still more the removal of the earth from the excavating end of the cylinder to the discharge end.

Having described my improved Archimedean screw excavator what I claim there-

in as new and desire to secure by Letters Patent, is:

1. Making the cylinder *a b*, which incloses the screw *a'*, in a conical form, for the purpose of rendering the ascent and discharge of the earth more free and perfect as set forth.

2. Supporting the cylinder and screw by means of the hinged frame *u*, *s*, *s'*, substantially as and for the purposes set forth.

3. Driving the cylinder *a b*, and screw *a'*, by means of the gearing *y*, *x*, *e*, *d*, arranged and combined as described.

4. Supporting and adjusting the front of the excavator by means of the friction ring *g*, and chain or rope *n*, as above described.

5. The curved, swinging standard or derrick *p*, for elevating the front end of the excavator without unfastening the chain *n*, when desired, as described.

6. The combination of the cylinder *a b*, and screw *a'*, with the swinging frame *u*, *s*, *s'*, derrick *p*, and carriage *K*, substantially as herein set forth.

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Witnesses:

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