

No. 749,778.

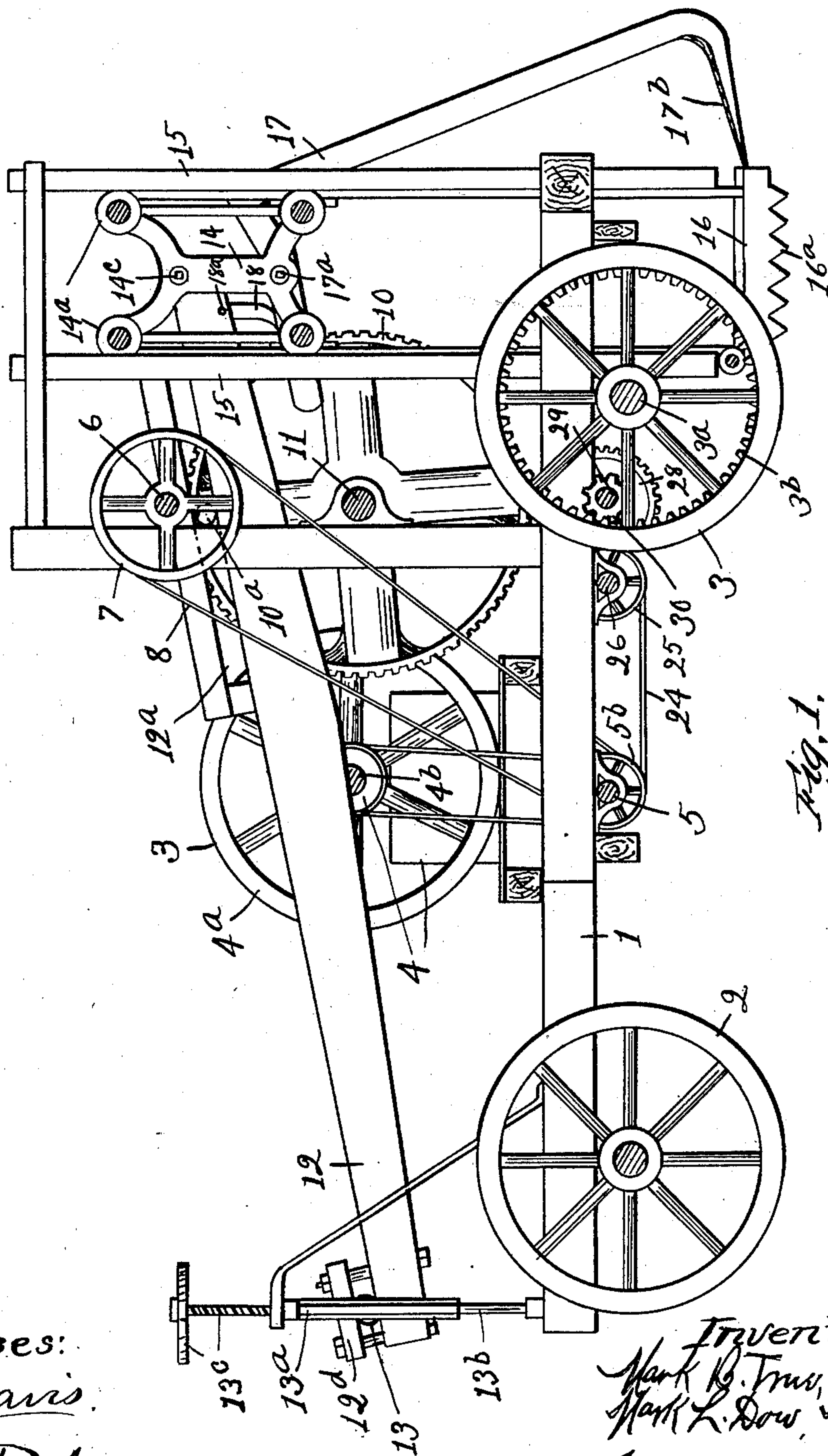
PATENTED JAN. 19, 1904.

M. B. TRUE, DEC'D.
M. L. DOW, ADMINISTRATOR.
DITCHING MACHINE.

NO MODEL.

APPLICATION FILED JULY 15, 1903.

4 SHEETS—SHEET 1.



Witnesses:
H. B. Davis.
M. M. Puffer.

Inventor:
Mark B. True, Dec'd,
Mark L. Dow, Admin.,
by David P. Page
Att'y.

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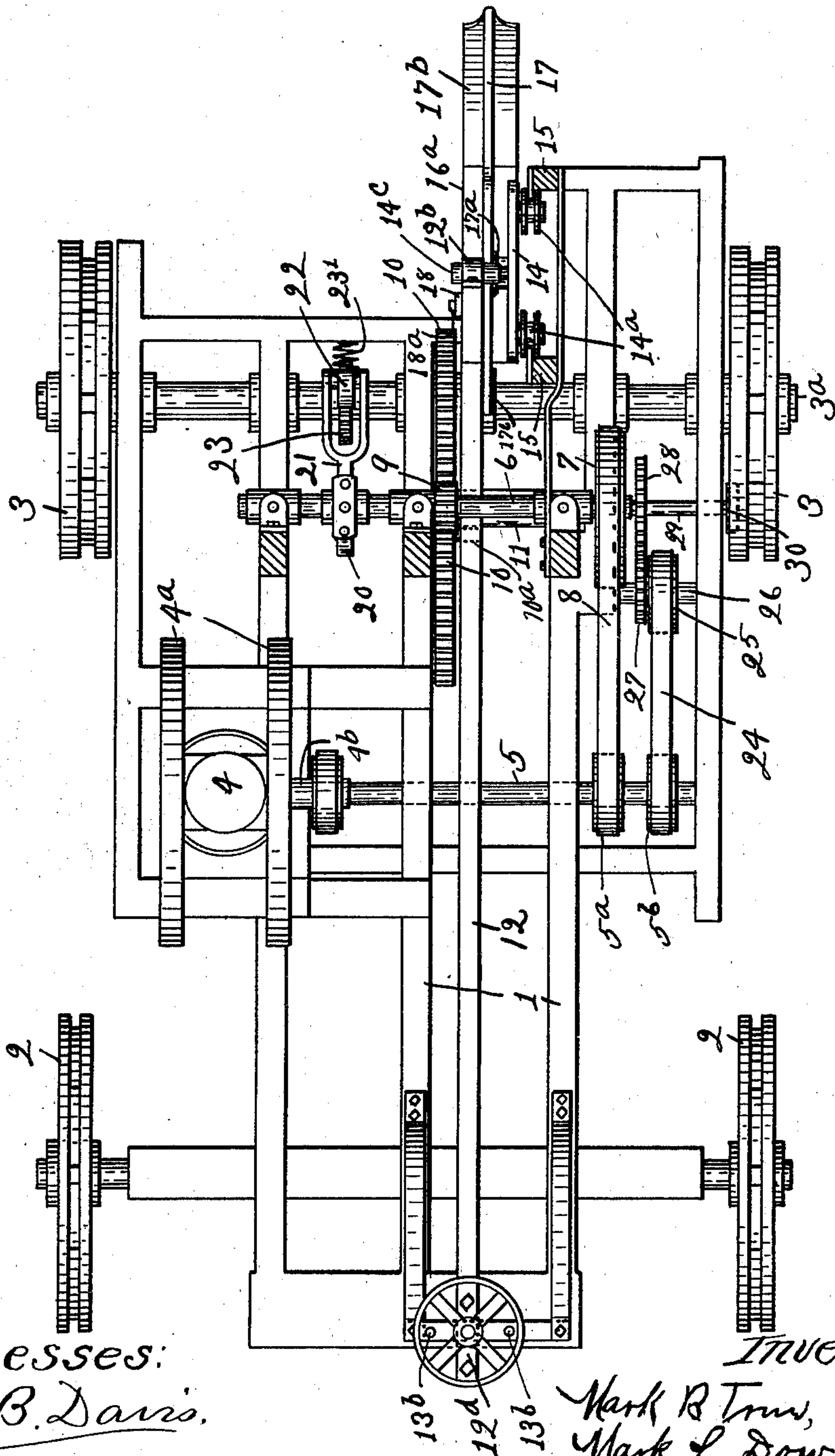


Fig. 2.

Witnesses:
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M. M. Piper

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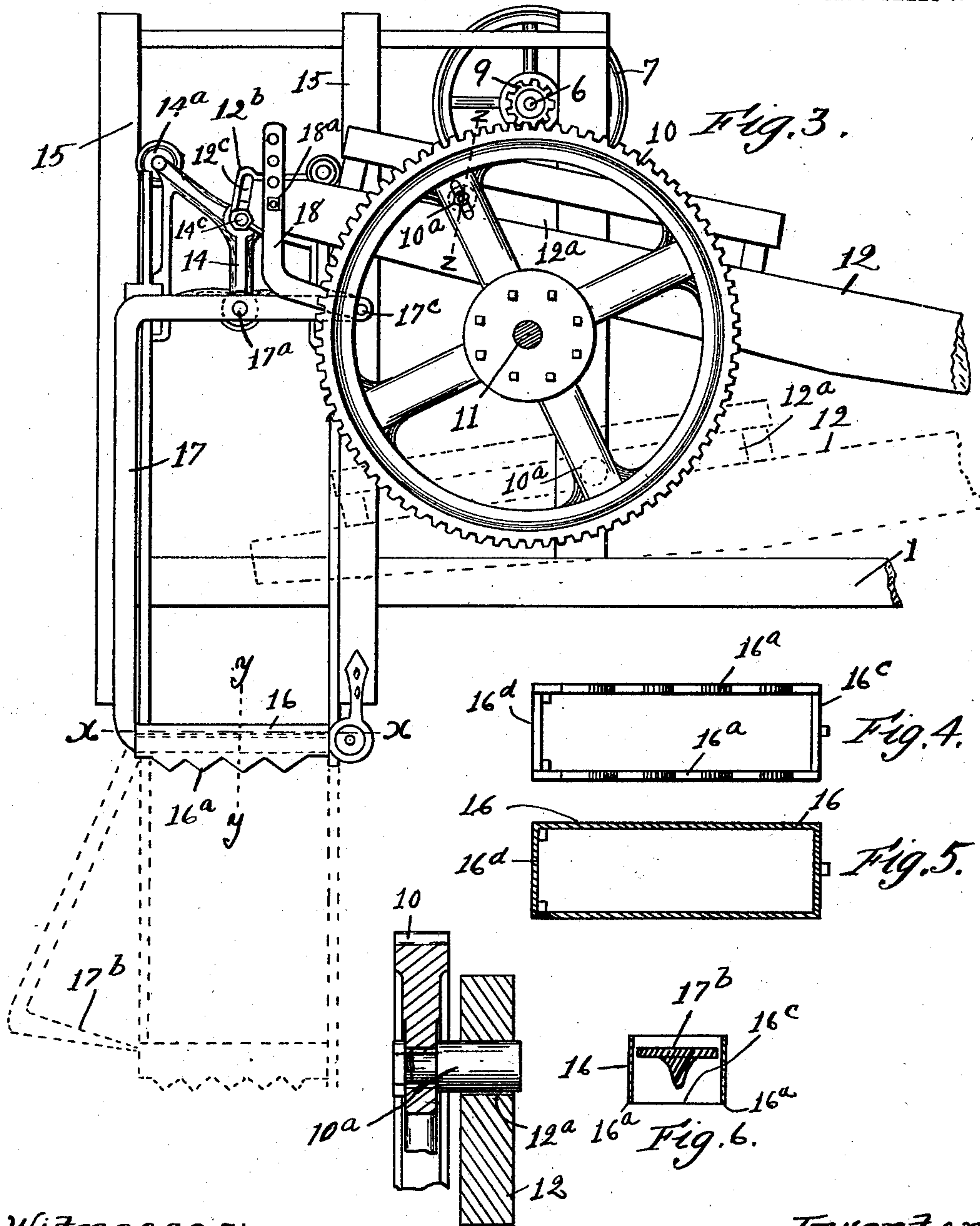
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

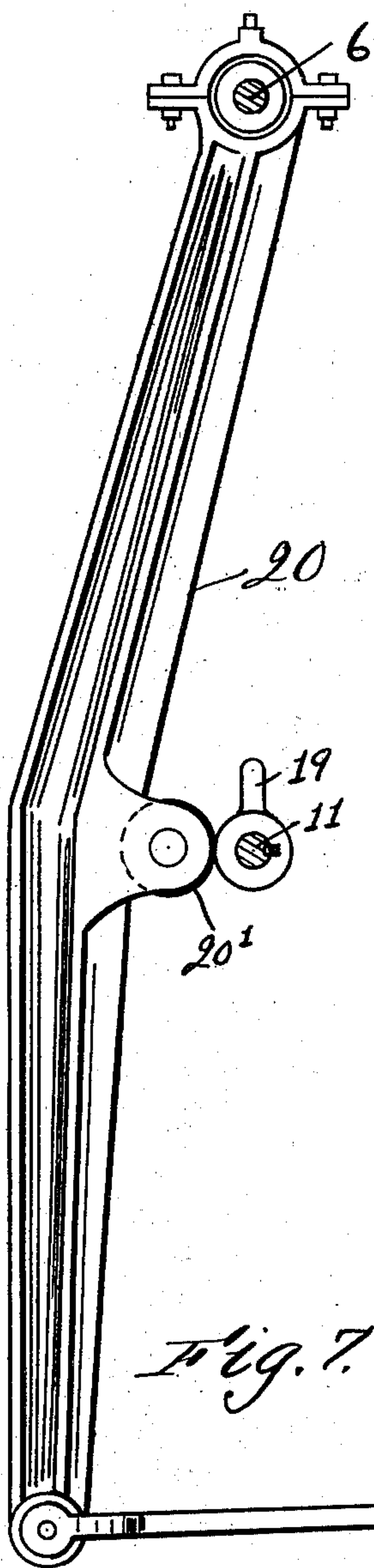


Fig. 7.

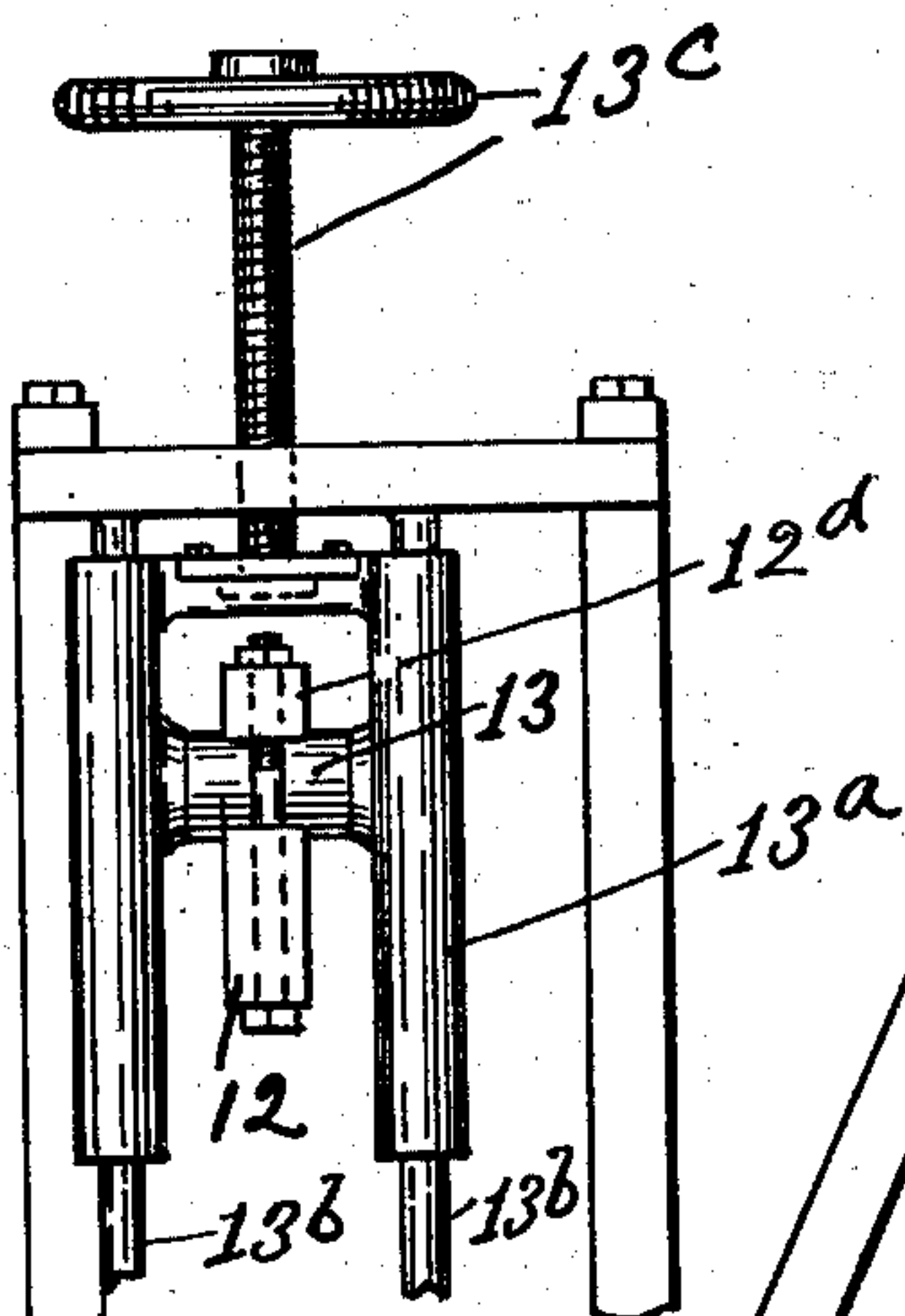


Fig. 9.

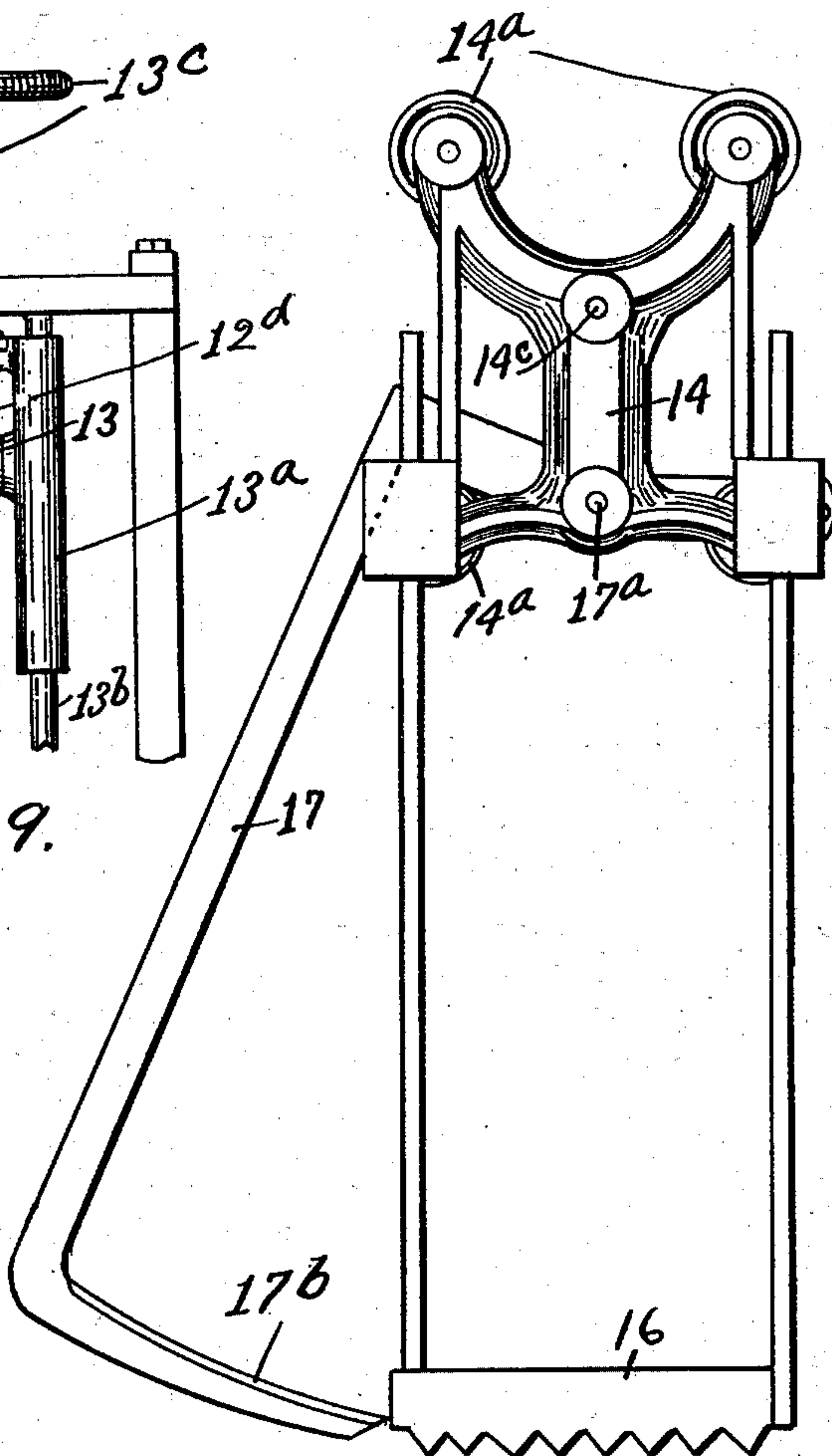
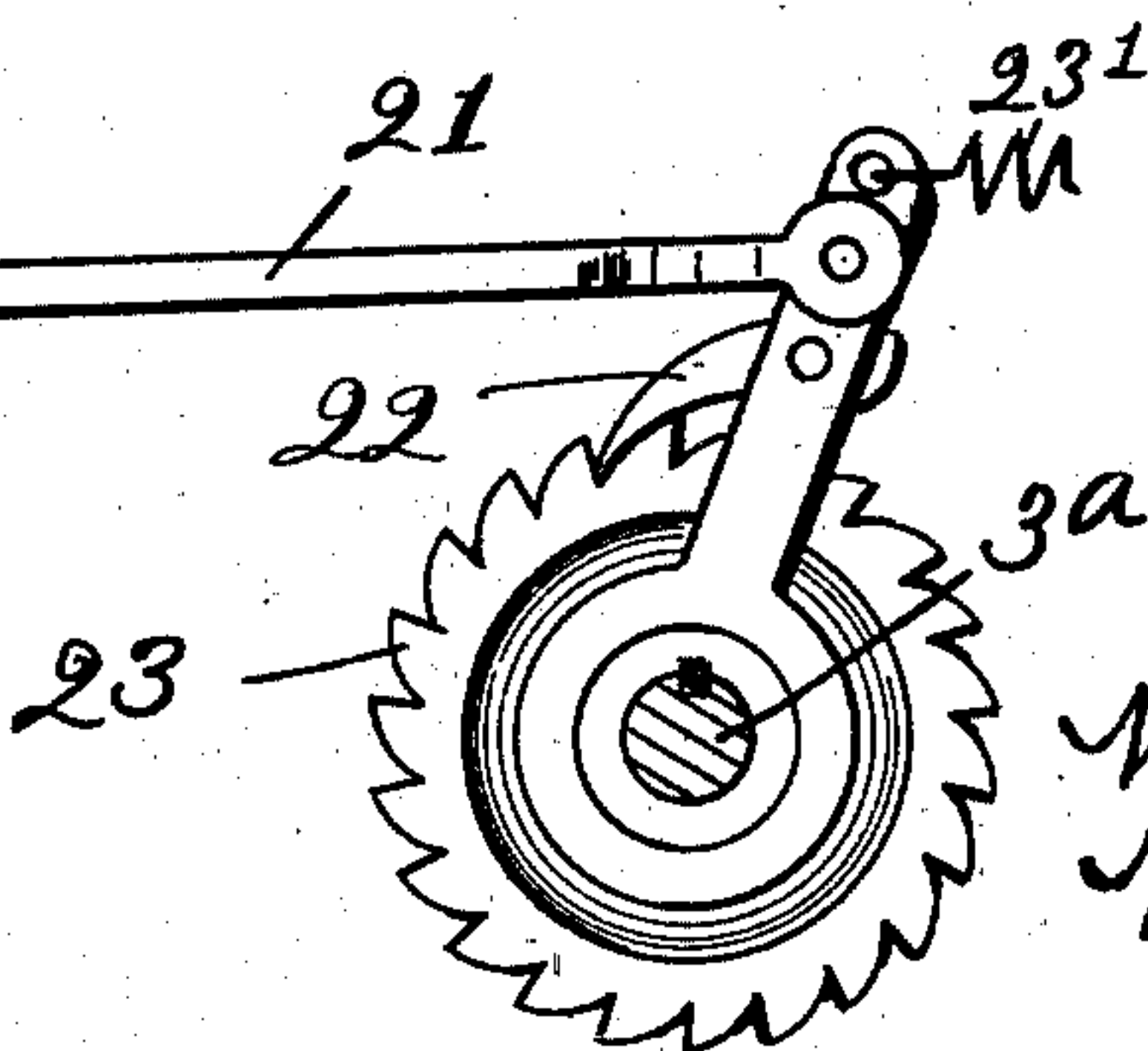


Fig. 8.

Witnesses:
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UNITED STATES PATENT OFFICE.

MARK L. DOW, OF SALISBURY, MASSACHUSETTS, ADMINISTRATOR OF
MARK B. TRUE, DECEASED, ASSIGNOR, BY DIRECT AND MESNE ASSIGN-
MENTS, TO JOHN F. SMITH AND MARK L. DOW, OF SALISBURY, MAS-
SACHUSETTS.

DITCHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 749,778, dated January 19, 1904.

Application filed July 15, 1903. Serial No. 165,697. (No model.)

To all whom it may concern:

Be it known that MARK B. TRUE, deceased, late a citizen of Newburyport, county of Essex, State of Massachusetts, invented certain new and useful Improvements in Ditching-Machines, of which the following is a specification.

This invention relates to machines which are adapted to excavate ditches through marsh land or other earth of soft nature, and has for its object to provide a machine of the above character which will rapidly and automatically excavate a ditch of uniform width and depth.

In the accompanying drawings, Figure 1 is a side elevation of a ditching-machine embodying the invention. Fig. 2 is a plan view thereof. Fig. 3 is an enlarged side elevation of the cutting and excavating apparatus. Fig. 4 is an enlarged bottom plan view of the cutting-knife, and Fig. 5 is a similar view taken on the line *xx* of Fig. 3. Fig. 6 is a sectional view taken on the line *yy* of Fig. 3. Fig. 7 is a detail view of a part of the automatic driving apparatus. Fig. 8 is a detail view of the cutting apparatus, showing the parts in a different position. Fig. 9 is a detail front view of the operating-lever fulcrum-adjusting means, and Fig. 10 is an enlarged section on line *zz* of Fig. 3.

The frame 1 of the machine is mounted upon two pairs of wheels 2 and 3, and an engine 4, preferably of the explosive type, is mounted on the frame, said engine being provided with a pair of fly-wheels 4^a. The main-shaft 4^b of the engine is belted to a shaft 5 and said shaft is provided with a pair of pulleys 5^a 5^b, about which belts may be passed. A shaft 6 is journaled in the frame and provided with a driving-pulley 7, and a belt 8 passes over said pulley 7 and the pulley 5^a. The shaft 6 is provided with a small gear 9, which meshes with a large gear 10, mounted on the shaft 11, journaled in the frame. A projecting pin 10^a is connected to gear 10 and is radially adjustable therein, said pin being adapted to be moved back and forth in a longitudinally-extending slot 12^a, formed in the main operating-lever 12. Said lever 12 is provided with

a bearing-clamp 12^d at its front end, which surrounds a pivot-bar 13, the latter being mounted on a frame 13^a, which may be vertically adjusted upon ways 13^b by a hand-screw 13^c. It will be observed that the lever 12 will be oscillated upon rotation of gear 10.

A knife-frame 14 is provided with a series of guide-rolls 14^a, which are adapted to travel upon vertical ways 15 15, secured to the frame, said guide-pulleys being grooved and adapted to hold the knife-frame from cross-wise movement, but permitting free vertical movement thereof and sufficient back-and-forth movement to prevent binding in the ways. A bolt 14^c passes through a slot 12^c, which extends transversely of lever 12 at its rear end, said slot being formed by means of a stirrup 12^b, secured about the end of said lever, so that as the lever is swung up and down upon the rotation of the large gear 10 the knife-frame will be reciprocated vertically. The knife-frame extends downwardly from a point at which it is attached to the lever 12 and is provided with a rectangular-shaped knife 16 at its lower end. Said knife comprises two parallel longitudinally-extending side portions 16^a, which preferably are provided with teeth, as shown, and a transversely-extending front portion 16^c, which connects the front ends of said side portions. The rear ends of said side portions are braced by a cross-piece 16^e, as indicated in Figs. 4 and 5.

A bottom-cutter is arranged in the rear of the knife-frame, said cutter comprising a bell-crank-lever arm 17, pivoted to the knife-frame at 17^a, and a transversely-extending knife 17^b at the lower end of said arm, which is of slightly-less width than the distance between the longitudinal portions 16^a of the knife 16 and is of approximately the same length as said longitudinal portions, the parts being arranged so that said knife 17^b may swing therebetween from the rear ends thereof. The knife 17^b is made sharp at its front edge and may be made straight, as shown in Figs. 1 and 3, or curved on an arc having its center at 17^a, as shown in Fig. 8. The horizontal upper portion of

the lever 17 has a link 18, pivoted at 17^c to its front end, said link being also pivotally connected to the main lever 12 at 18^a.

The manner in which the machine operates and in which it is used is as follows: Before starting to dig the ditch a hole of suitable size is dug to the depth of the ditch which is to be excavated, and the machine is set so that the cross-piece 16^d of the knife 16 will be in line with the front side of this hole and the longitudinal portion 16^a will extend forward over the sod to be excavated. As the engine is driven the lever 12 will be swung downwardly, and as soon as the knife 16 strikes against the sod the bolt 14^c will pass into the upper end of the slot 12^c. This downward movement of the lever 12 with relation to the knife-frame 14 will force the link 18 and also the front end of the cutter-arm 17 downwardly and cause the latter to swing on its pivot 17^a and the knife 17^b to be thrown outwardly to the dotted position shown in Fig. 3 and full-line position shown in Fig. 8. As the downward movement continues the knife 16 will be forced down through the sod, cutting out a rectangular-shaped section, and the knife 17^b will pass down into the hole which has previously been dug, or the front end of the ditch previously excavated, as the case may be. When the knife 16 reaches the lower limit of its stroke, the lever 12 will be moved upwardly. At the beginning of this upward movement the whole action of lever 12 will be upon the link 18, which will in turn draw up the front end of arm 17 and swing the knife 17^b forward between the parallel portions 16^a of knife 16 until the edge of knife 17^b reaches the transverse portion 16^c of knife 16, (see full-line position in Fig. 3,) at which time the lever 12 will have moved so that bolt 14^c will be located in the lower end of slot 12^c. This transverse movement of the knife 17^c will cut horizontally through the section of sod which has been cut already on three sides by the knife 16, severing this section from the portion below. As the knife-frame is drawn up, the section thus cut out will be prevented from slipping past the knife 16 by the knife 17^b, so that said section will be lifted to the surface, where it may be freed from the knives by pushing it to one side. In order that the whole machine may then be moved forward for the next cut, a finger 19 is provided on the shaft 11 and a lever 20 is pivoted at its upper end to the shaft 6, the lower end of said lever being connected by a link 21 to a pawl 22, which is adapted to engage a ratchet 23, said ratchet being secured to the shaft 3^a of the rear wheels 3. The finger 19 is so arranged that as the knife-frame reaches its upper limit the finger will engage a friction-roll 20' on the lever 20 and swing it forwardly, drawing forward the pawl 22, rotating the ratchet 23 in turn, thus giving the main wheels 3 a part of a rotation and moving forward the whole machine to a new position.

On the downward movement of the knife the pawl will be swung rearwardly by any suitable means, as a spring 23'. In this manner the machine will be automatically advanced as each section of sod is lifted to the surface and then the knife 16 will again be forced down to make another cut, so that the operation will be continuous.

When it is desired to propel the machine from one place to another without having the cutting mechanism operate, the belt 8 is removed and a belt 24 is placed on the pulley 5^d and on a pulley 25 mounted on the shaft 26. Said shaft 26 is provided with a gear 27, which meshes with a gear 28 on a shaft 29, journaled in the frame of a machine, said shaft 29 having a gear 30 at its outer end which meshes with a gear 3^b formed on the inner side of the rim of the wheel 3. The engine may thus drive the rear wheels 3 and propel the whole device.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. A ditching-machine comprising a carriage, a vertically-movable cutting-knife having longitudinally-extending side portions and a transverse portion connecting the front ends of said side portions, means for reciprocating said knife, a bottom cutter and means for moving the same transversely of said knife and adjacent thereto when the knife finishes its downward movement, substantially as described.

2. A ditching-machine comprising a carriage, a vertically-movable cutting-knife having longitudinally-extending side portions and a transverse portion connecting the front ends of said side portions, an oscillating lever, a loose connection between said knife and lever, a bottom cutter pivotally connected with said knife and having its cutting portion adapted and arranged to swing transversely of the path of said knife, adjacent thereto, and between the longitudinal portions thereof, a link connection between said lever and said cutter whereby said cutter is swung at the beginning of each oscillation of the lever, substantially as described.

3. A ditching-machine comprising a carriage having vertically-extending ways, a knife-frame reciprocally mounted therein, a knife connected to the lower end thereof having two parallel side portions and a transverse portion connecting the front end of said side portions, a bottom cutter comprising an arm pivoted to said frame and having a knife extending transversely from the lower end thereof and arranged to swing between said parallel portions of said knife, a lever, a loose connection between said lever and knife-frame, a link pivotally connected to said lever and to the opposite end of said arm from its cutter, and means for oscillating said lever, substantially as described.

4. A ditching-machine comprising a carriage having vertically-extending ways, a knife-frame reciprocally mounted therein, a knife connected to the lower end thereof having two parallel side portions and a transverse portion connecting the front end of said side portions, a bottom cutter comprising an arm pivoted to said frame and having a knife extending transversely from the lower end thereof and arranged to swing between said parallel portions of said knife, a knife-actuator loosely connected to said knife-frame, a link pivotally connected to said actuator and to the opposite end of said arm from said cutter, a

lever, a loose connection between said lever and knife-frame, a link pivotally connected to said lever and to the opposite end of said arm from its cutter, and means for oscillating said lever, substantially as described.

In testimony whereof I have affixed my signature in presence of two witnesses.

MARK L. DOW,
Administrator of the estate of Mark B. True,
deceased.

Witnesses:

SAMUEL R. OGDEN,
JULIA ROSS.