

No. 631,734.

Patented Aug. 22, 1899.

A. C. BRANTINGHAM.
DUST COLLECTOR.

(Application filed Oct. 18, 1898.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.

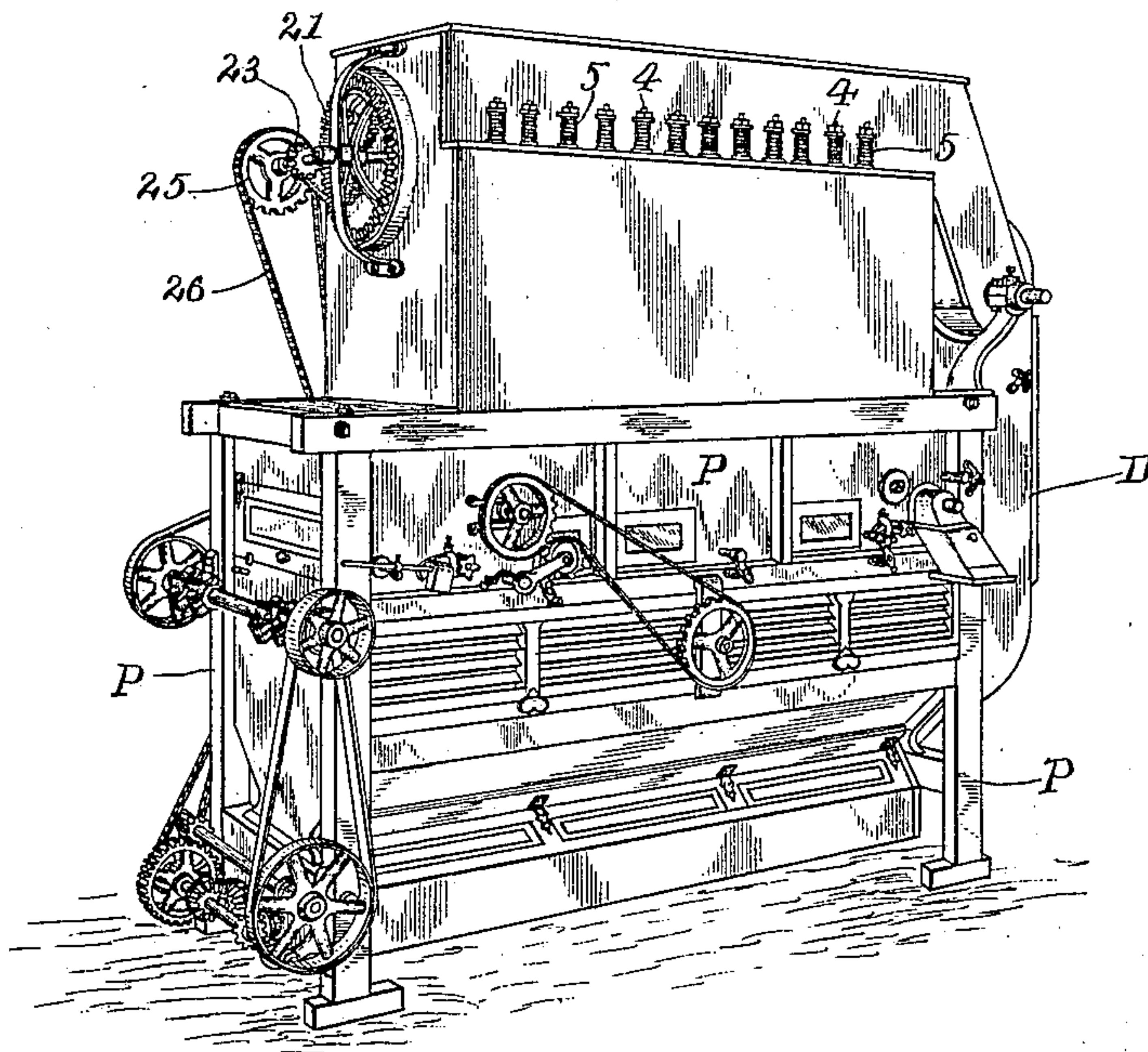


Fig. 2.

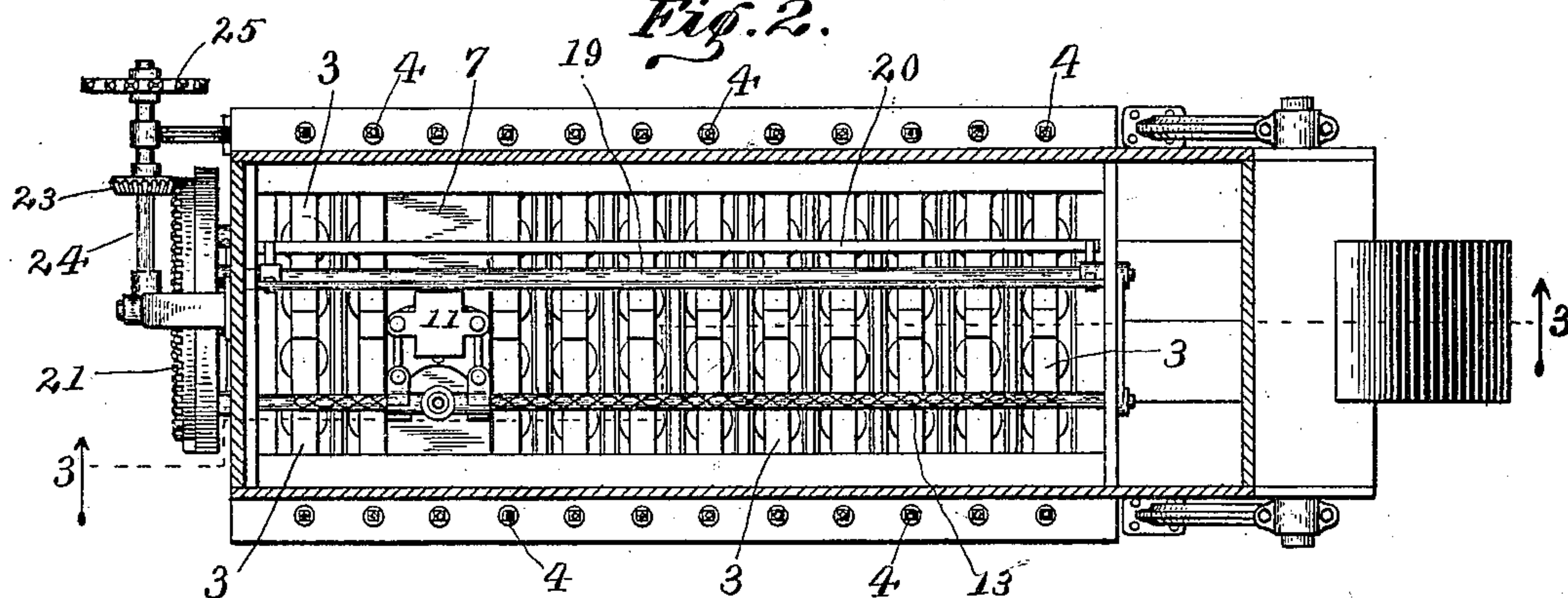
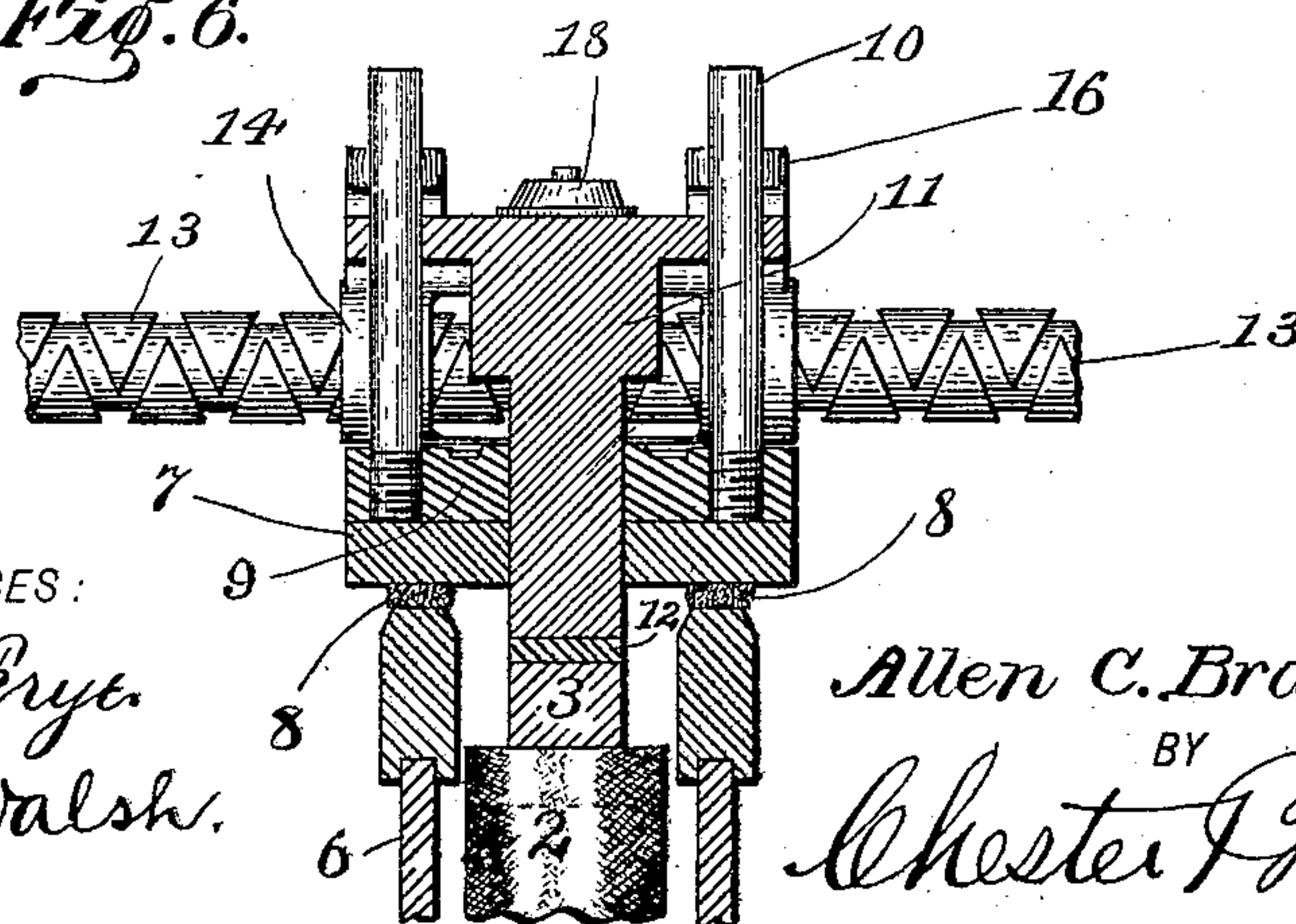


Fig. 6.



WITNESSES:

C. S. Bryant.
J. A. Walsh.

INVENTOR

Allen C. Brantingham.

BY

Chester Bradford,
ATTORNEY.

No. 631,734.

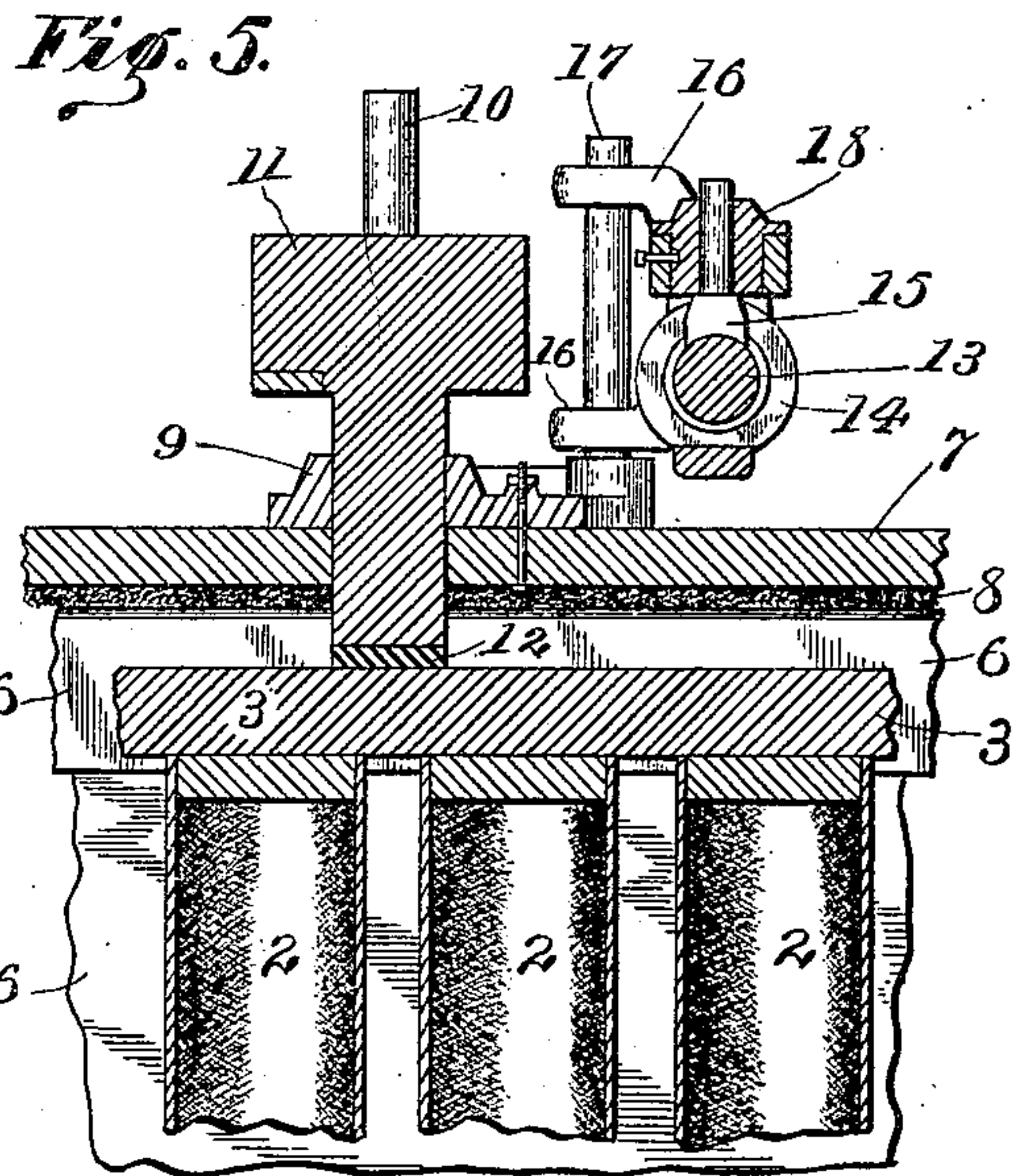
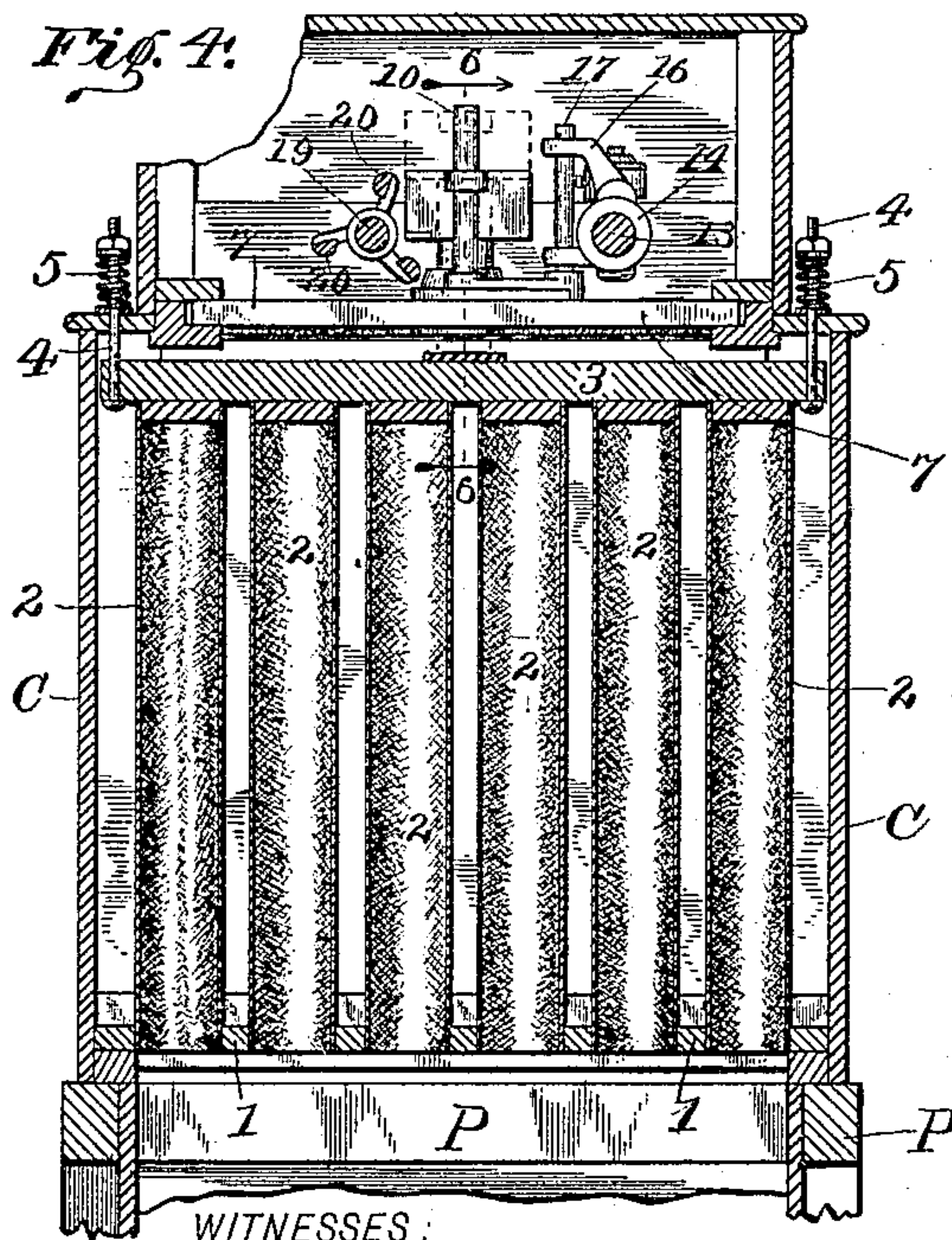
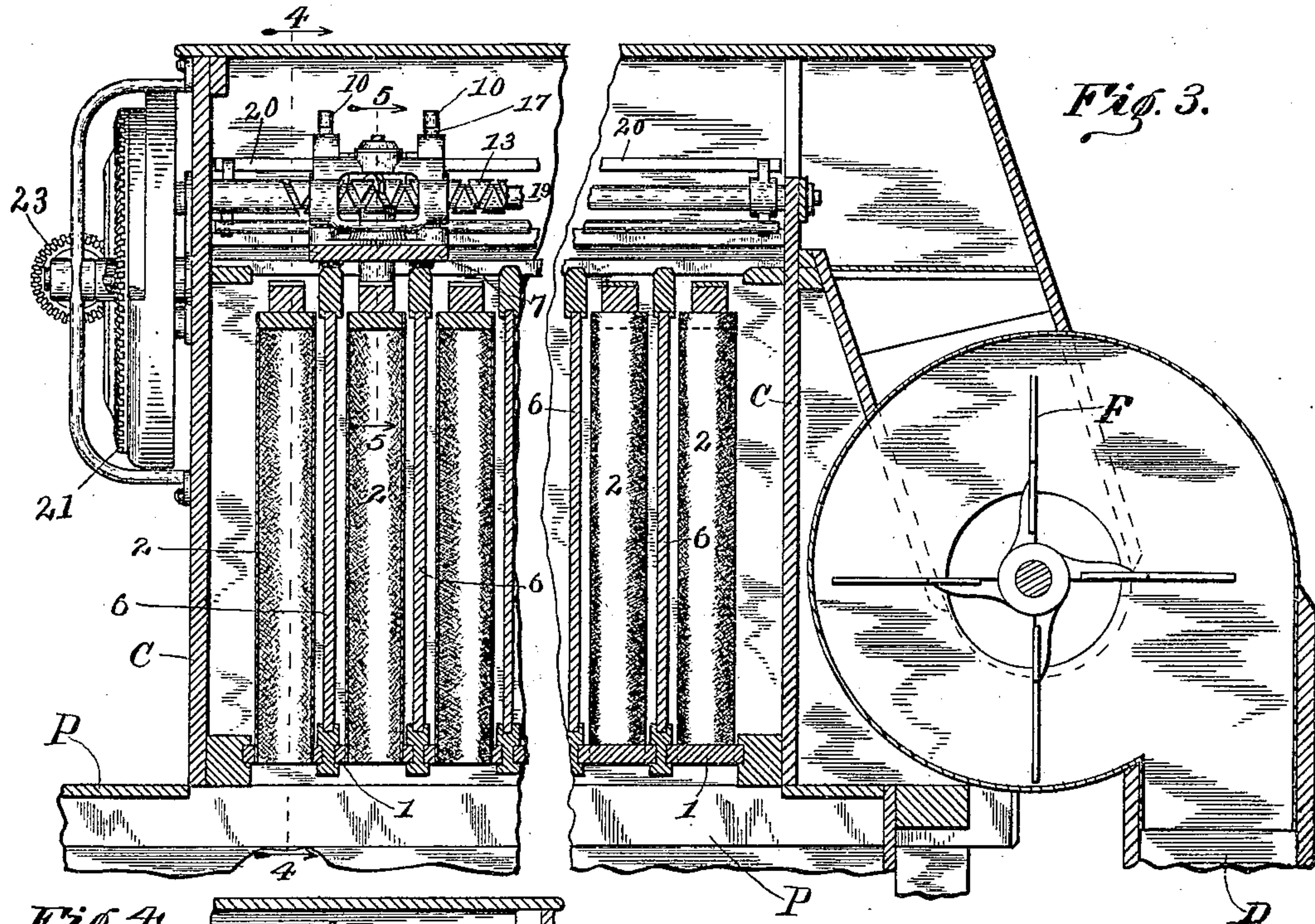
Patented Aug. 22, 1899.

A. C. BRANTINGHAM.
DUST COLLECTOR.

(Application filed Oct. 18, 1898.)

(No Model.)

3 Sheets—Sheet 2.



WITNESSES:

C. S. Frye.
J. A. Walsh.

INVENTOR

Allen C. Brantingham,
BY
Chester Bradford,
ATTORNEY.

No. 631,734.

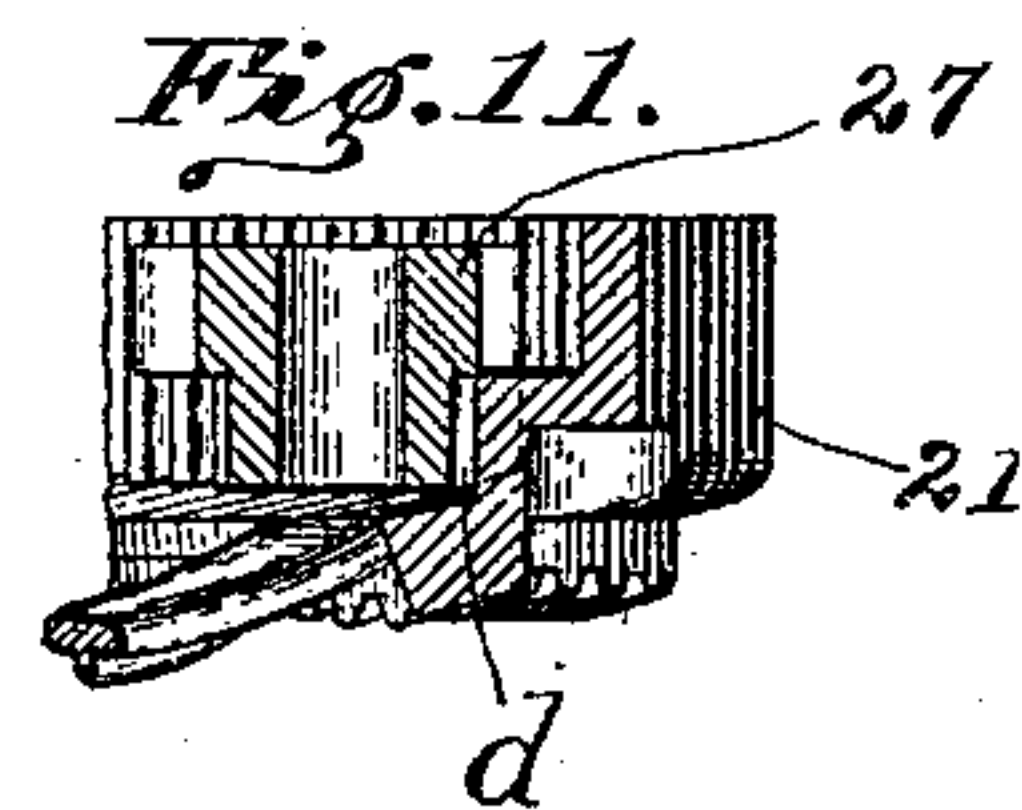
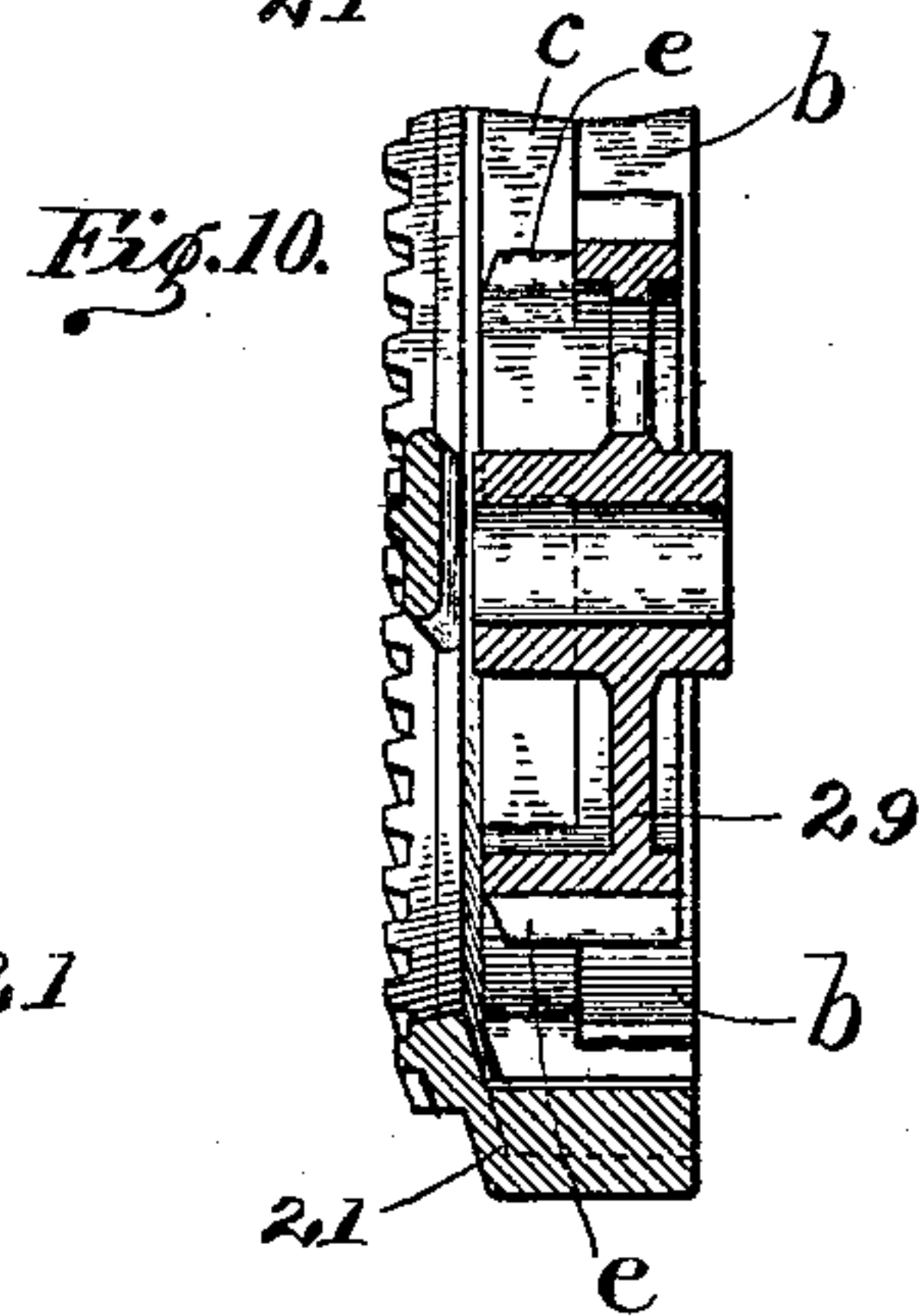
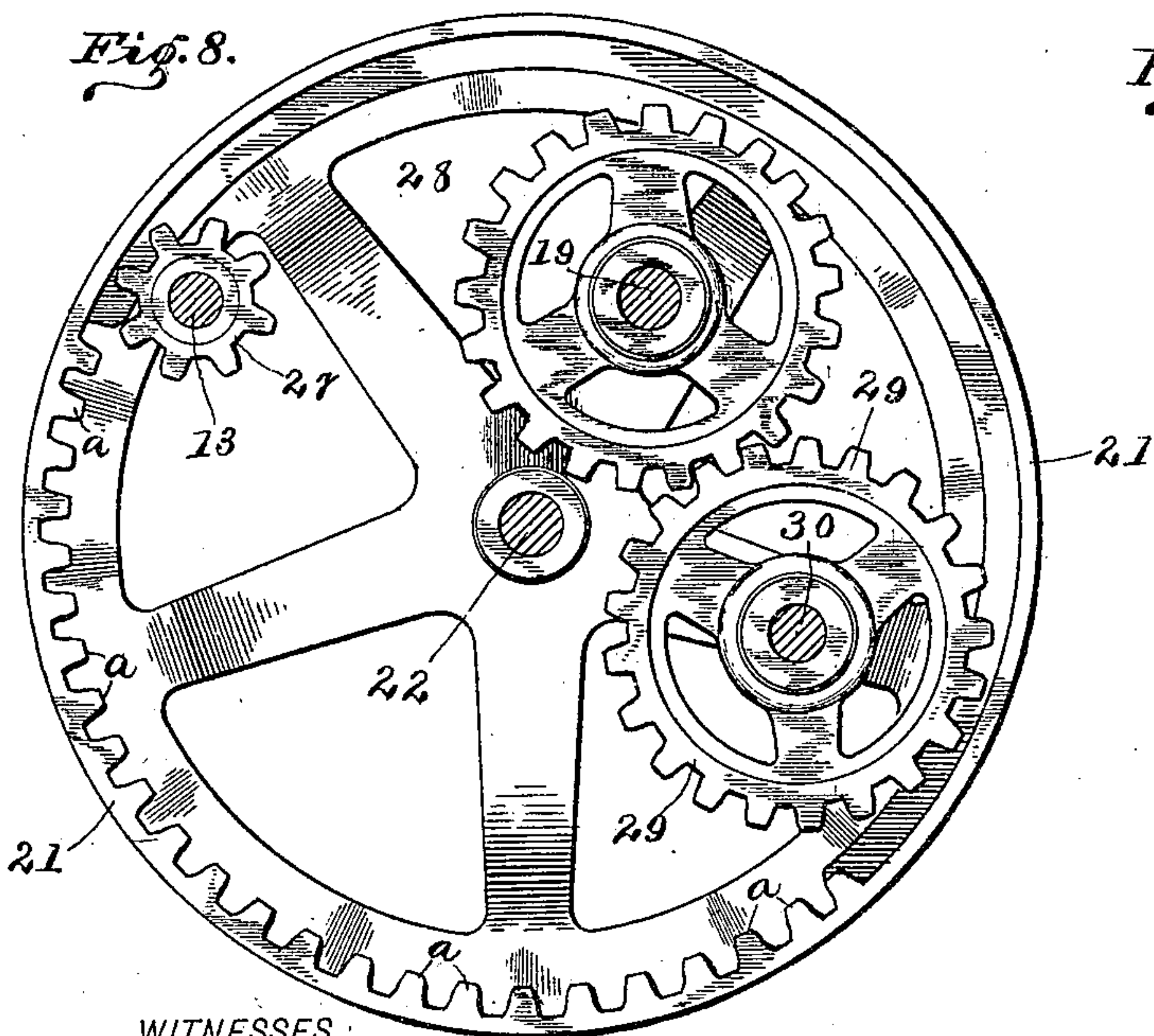
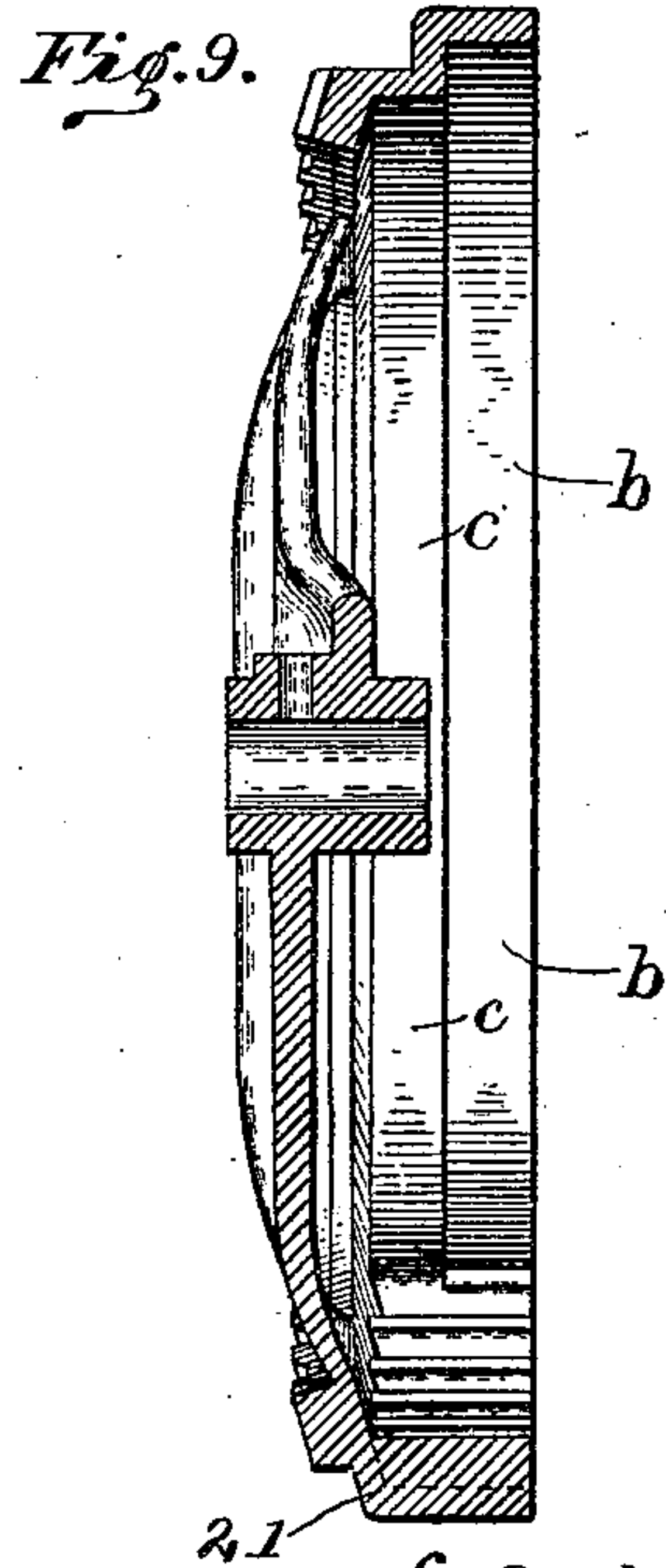
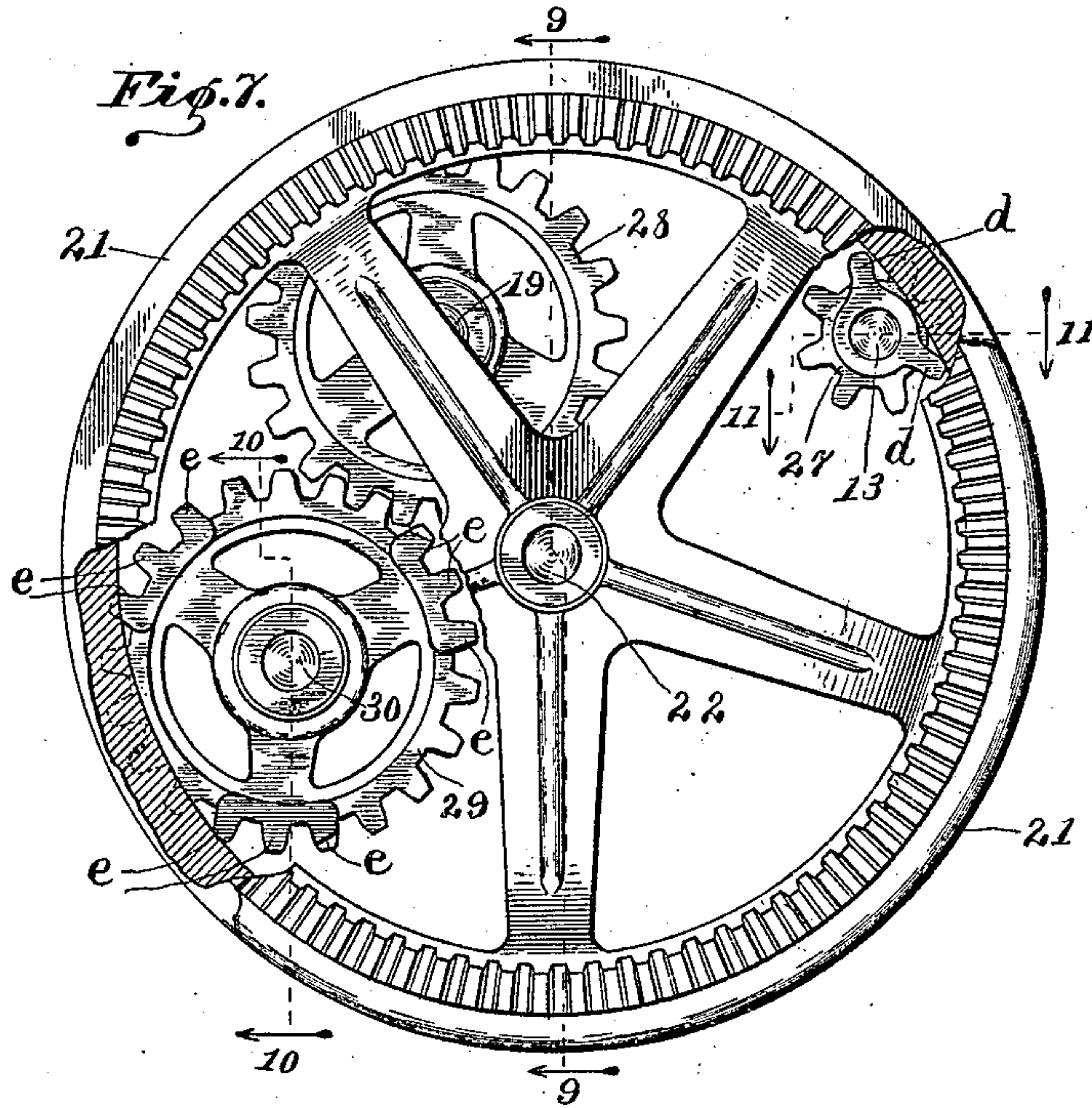
Patented Aug. 22, 1899.

A. C. BRANTINGHAM.
DUST COLLECTOR.

(Application filed Oct. 18, 1898.)

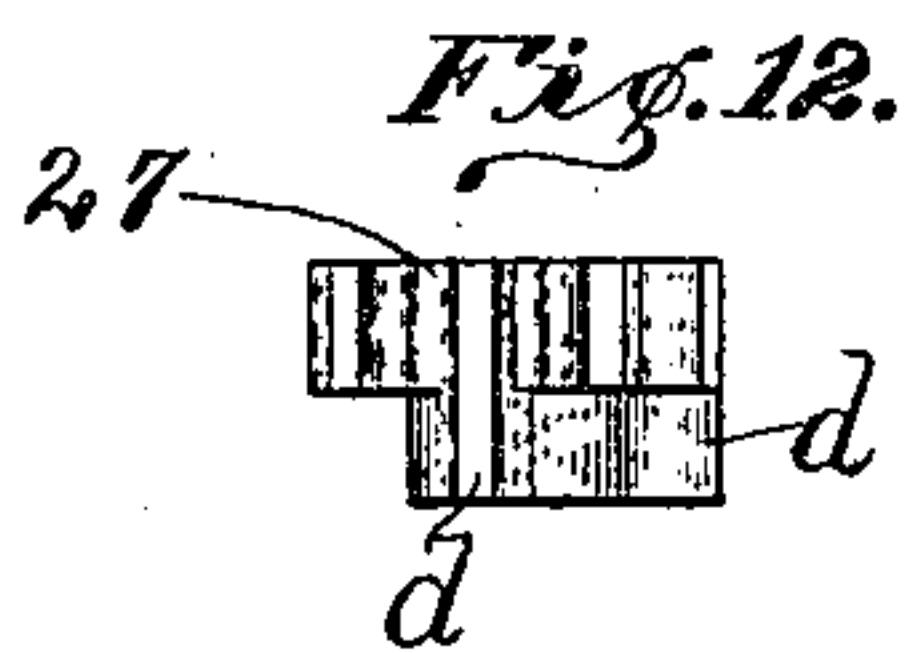
(No Model.)

3 Sheets—Sheet 3.



WITNESSES:

G. S. Frye.
J. A. Walsh.



INVENTOR

Allen C. Brantingham,
BY
Chester Bradford,
ATTORNEY.

UNITED STATES PATENT OFFICE.

ALLEN C. BRANTINGHAM, OF TOLEDO, OHIO, ASSIGNOR TO THE NORDYKE & MARMON COMPANY, OF INDIANAPOLIS, INDIANA.

DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 631,734, dated August 22, 1899.

Application filed October 18, 1898. Serial No. 693,856. (No model.)

To all whom it may concern:

Be it known that I, ALLEN C. BRANTINGHAM, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Dust-Collectors, of which the following is a specification.

My present invention relates to that class of dust-collectors in which the separation of the dust from the air is effected by straining the air through cloth tubes under pressure and in which the tubes are agitated or jarred to dislodge the dust by means of a hammer traveling longitudinally thereof.

Said invention consists in various improvements in the construction and arrangement of parts of such dust-collectors for the purpose of making the same more simple, durable, and efficient, as will be hereinafter more fully described and claimed.

Referring to the accompanying drawings, which are made a part hereof, and on which similar reference characters indicate similar parts, Figure 1 is a perspective view of a dust-collector embodying my present invention arranged in position for use upon a middlings-purifier—such, for instance, as that shown and described in Letters Patent of the United States No. 582,411, granted upon my application filed May 11, 1897; but obviously it may be used in any situation where such a dust-collector is useful, and is shown in this connection merely to illustrate an appropriate use; Fig. 2, a top or plan view of the dust-collector separately, with the top removed to show the interior; Fig. 3, a vertical sectional view of the same, on an enlarged scale, as seen from the dotted line 3 3 in Fig. 2, the central portion thereof being broken away to avoid needless repetition of parts; Fig. 4, a transverse sectional view as seen from the dotted line 4 4 in Fig. 3; Fig. 5, a detail sectional view, on a still further enlarged scale, as seen from the dotted line 5 5 in Fig. 3; Fig. 6, a view on the same scale as Fig. 5, as seen from the dotted line 6 6 in Fig. 4; Fig. 7, a view of the train of cog-gearing constituting a part of the hammer-actuating mechanism, as seen from the outside as when looking at the end of the machine, the driving-pinion and its shaft being removed; Fig. 8, an under side view of the

same as seen when looking outwardly from the end of the casing of the machine; Fig. 9, a central vertical sectional view of the main wheel of said train as seen from the dotted line 9 9 in Fig. 7, the smaller wheels being omitted; Fig. 10, a detail sectional view through one of the smaller wheels or pinions as seen from the dotted line 10 10 in Fig. 7; Fig. 11, a detail sectional view through another of the smaller wheels or pinions as seen from the dotted line 11 11 in Fig. 7, and Fig. 12 a plan view of the pinion shown in Fig. 11.

As above stated, I have illustrated my dust-collector as mounted upon a purifier P, which is shown complete in Fig. 1 and fragments of which are shown in Figs. 3 and 4. I have also shown it as provided with a fan F, by which the air is drawn from the dust-collector and driven through the purifier, thus constituting what is known as an "air-belt" machine, in which the air is continuously reused, the fan and the body of the purifier being connected by an air-duct D.

The casing C of the dust-collector is an appropriate one to contain the series of dust-collecting tubes and the operating parts in connection therewith. It has a floor 1, suitably constructed and containing as many perforations as there are tubes employed in the machine. I have illustrated a machine containing seventy-two tubes—that is, twelve groups of six tubes each. Each of these tubes 2 is secured in one of these perforations at its lower end, which is open, and at its upper end, which is closed, it is secured to a bar 3, and each of said bars is yieldingly supported by means of bolts 4 and springs 5, as best shown in Fig. 4. As best shown in Fig. 3, these rows of dust-collecting tubes are separated by partitions 6, so that each row of tubes may, by means presently to be described, be inclosed in a chamber by which it is entirely cut off, except at the bottom, from the rest of the machine.

Mounted in grooves or slideways in the upper portion of the machine just above the cross-bars 3 and the upper edges of the partitions 6 is a gate 7, which is long enough to extend across the machine and wide enough to cover the space between two of the partitions 6 and which is adapted as it is moved

from point to point to successively form a top for each of the tube-chambers. In order that when situated above two such partitions it may more completely cut off any passage of the air from the chamber between them, it is provided with strips of soft material 8, such as lamb's-wool, as best shown in Figs. 5 and 6. Mounted upon and traveling with this gate 7 is a hammer-frame 9, upon the two uprights 10 of which is carried a hammer 11, the lower end of which passes through a perforation in said plate and is adapted to come in contact successively with each of the bars 3 as the structure travels from end to end of the machine, and the hammer is actuated by the means presently to be described. A piece of leather or other suitable material 12 is preferably secured to each bar 3 at the point where the hammer comes in contact therewith and serves to protect the bar from becoming battered and to give greater elasticity to the blow, as will be readily understood. This structure, including the gate 7, the hammer-frame thereon, and the hammer, is adapted to be driven from end to end of the machine continuously by the double-threaded screw-shaft 13, acting upon the nut 14, which nut has a pivoted part 15, which engages with the threads of the screw-shaft and is adapted to be automatically reversed at each end of the travel in a manner which is well understood. The nut 14 is connected by means of wings 16 to uprights 17 on the hammer-frame 9. As will be readily observed, the connection between the parts 16 and 17 is such that one may move freely vertically in relation to the other while they are held in a fixed relation in other directions, so that there is no binding upon the screw as the structure travels from end to end because of the jarring and vibration of the parts under the blows of the hammer or otherwise. In order to provide for wear of the engaging part 15, I provide an adjustable socket-piece 18, in which said part 15 is immediately mounted, and which is in turn carried by the nut 14 and when the machine is in operation is rigid therewith.

As best shown in Fig. 4, the hammer is actuated from the shaft 19 by means of its wings 20. This shaft is shown as having three of these wings, so that a single revolution of the shaft gives three blows of the hammer; but manifestly the number of wings may be varied within reasonable limits and may be either more or less than the number shown.

The screw-shaft 13 and hammer-shaft 19 are both actuated from the train of gearing which will now be described. A main gear-wheel 21 is mounted idly upon a stud-shaft 22, carried by suitable supports secured upon the end of the casing of the dust-collector. The outer face of this main gear-wheel 21 is so formed that so far as this face is concerned it is an ordinary bevel gear-wheel, which is adapted to be driven by a bevel-pinion 23, as shown in Figs. 1, 2, and 3. Said bevel-pin-

ion 23 is mounted on a short shaft 24 and is shown as being driven by means of a sprocket-wheel 25 thereon and a chain belt 26, running therefrom to any convenient source of power; but obviously the means of driving the wheel 21 may be varied as desired without departing from my invention.

As best shown in Fig. 8, a portion of that side of the wheel 21 which is next the casing of the machine is in the form of an internal gear, having teeth *a*, while the other portion is in the form of two offsets, one of which, *b*, continues in line with the roots of the internal gear-teeth, while the other, *c*, continues in a line somewhat above their points and forms a bench-like slideway for projections on the pinions, as will be presently described.

It is essential to the operation of this machine that the screw-shaft by which the hammer structure is propelled along the machine shall be at rest while the hammer-operating shaft is in motion and that the hammer-operating shaft shall be at rest while the screw-shaft is in motion. It is further desirable that the screw-shaft should travel with greater rapidity than the hammer-operating shaft. I have therefore arranged the gearing so that the internal gear-teeth *a* shall operate upon the pinions which drive said shaft alternatively, and as exactness of relation of movement is essential I have provided a locking means for each pinion, by means of which inopportune movement is effectually prevented.

The pinion 27 upon the screw-shaft 13 is of comparatively small diameter, and its teeth are adapted to engage with the internal gear-teeth *a* at the proper time and be driven thereby, and the period of engagement is so timed and spaced as that during its continuance the gate 7 shall travel just far enough to be shifted from one set of partitions to the next, thus shutting off the air from each chamber containing a row of tubes successively. As best shown in Fig. 7, two of the teeth of the pinion 27 are extended in width, so that when the portion of the wheel 21 which contains the teeth *a* has traveled past this pinion the extended portions *d* of said teeth will run onto the bench or raised portion *c* of said wheel 21, and thus during the time the smooth portion of said wheel is passing effectually lock said pinion 27 from rotation, while the offset at *b*, being as deep as the roots of the teeth *a*, will permit the ordinary teeth of the pinion 27 to pass freely until said teeth *a* are reached again, when the teeth of the pinion 27 will promptly engage therewith and be propelled thereby, while said teeth *a* as they occupy the combined space of the offset *b* and *c* permit the passage of the extended teeth on the pinion 27 as well as the others.

The pinion 28 on the hammer-operating shaft 19 is an ordinary spur-pinion. It is driven by the intermediate pinion 29, which is mounted on a stud-shaft 30, carried by the frame or casing of the dust-collector. As

best shown in Fig. 7, this pinion 29 has three sets of three teeth each, which are extended correspondingly to the two extended teeth on the pinion 27, and the operation is much the same. All the teeth engage with the internal gear-teeth *a* on the wheel 21, and through it the pinion 28 and shaft 19 are driven thereby. When the proper point is reached, however, the extended portion *e* of these teeth pass onto the bench *c*, thus locking the wheel from further rotation, while the ordinary teeth pass freely along within the offset *b*. The number of sets of locking-teeth on pinion 29 may be varied according to the size, proportion, and arrangement of the parts or, as desired, from a mechanical standpoint. In the special arrangement shown the hammer will be given four strokes at each stop, and as there are three wings on the shaft 19 this requires one and one-third revolutions thereof, and the locking-teeth on pinion 29 are therefore arranged to divide the wheel into thirds and the gear made to secure the desired result, as will be readily understood. Each one of these pinions, and consequently the shafts which they operate, is not only driven at the exact times required, but they are each efficiently and certainly locked from rotation just at the time when the other begins to move, and each continues locked until said other is free to move again.

Usually dust-collectors of this general character containing cloth dust-collecting tubes have had gates or closing devices arranged at the lower ends of the tubes, so that when the tubes were to be cleaned the air was shut off at that point and the deposits of dust fell upon the gates or closing devices, so that as said gates passed along the accumulated dust would again fall into the draft of air and much of it be raised over again. In my present improved machine the lower ends of the dust-collecting tubes are always open, and the quiescent state of air necessary for the operation of dislodging the dust is secured by closing the chambers within which the tubes are situated at the upper end, so that no draft or air-current can exist up, through, or around the tubes, thus permitting the dust to fall freely when dislodged and to reach a point completely beyond and out of the way of the air-current. This arrangement obviously saves much of the work heretofore required, as the dislodged dust falls completely out of the path of the air-current, and none of it is carried back when the draft or air-current is restored.

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

1. The combination, in a dust-collector, of a casing divided into several chambers, a group of dust-collecting tubes within each chamber at the bottom and secured at the lower end in perforations in the floor of the dust-collector and having tops by which they are respectively closed, bars supporting each group of

tubes within its chamber, a gate adapted to travel longitudinally above the chambers containing the tubes and to close each chamber successively, a hammer supported upon said gate, means for intermittently propelling said gate-and-hammer structure, means for intermittently operating the hammer to strike when the gate-and-hammer structure is at rest, and a fan connected with the body of the dust-collector, whereby the dust-laden air may be forced upwardly, and the accumulated dust dislodged from each group of tubes separately, while the lower ends of the tubes remain open at all times, substantially as set forth.

2. The combination, in a dust-collector, of a suitable casing having partitions therein whereby it is divided into chambers, groups of open-bottomed dust-collecting tubes situated within the chambers, a gate whereby the upper ends of the chambers are successively closed, a double-threaded screw-shaft whereby the gate is propelled back and forth over the chambers, a hammer carried by the same structure as the gate, and a gearing for propelling said two shafts, said gearing being arranged to operate each shaft alternately, whereby the hammer is actuated while the gate is at rest, substantially as set forth.

3. The combination, in a dust-collector, of the hammer mounted to slide on vertical ways freely, and also connected to intermittently-operated gearing for moving it from position to position back and forth across the dust-collecting tubes, and an intermittently-operated shaft running parallel with the course of the hammer structure having radial wings which are adapted when said shaft revolves to engage with and raise said hammer and permit it to fall to operate successively upon the different groups of dust-collecting tubes, substantially as set forth.

4. The combination, with the gate-propelling and hammer-actuating shafts of a dust-collector, of a train of gearing for operating the same, composed of a main wheel having an internal gear or rack extending around a portion of its circumference, the remainder of said internal circumference being smooth but divided into two portions, one continuing at substantially the level of the roots of the teeth and the other near the tops of the teeth, and pinions for driving said shafts having extended teeth or projections adapted to engage with and ride upon the upper smooth portion or bench in the wheel, while the regular teeth pass freely in the larger space, the whole being adapted to engage with and be driven by the internal gear or rack portion, and arranged as described to be alternately driven and held at rest, substantially as set forth.

5. The combination, in a train of gearing for operating the gate-propelling and hammer-actuating shafts of a dust-collector; of a main wheel having an internal gear or rack which extends around a portion of its circum-

ference, and a bench-like offset or slideway narrower than the teeth and approximately the same distance from the axis of the wheel as the points of the teeth and which extends
5 around the remainder of its circumference; pinions for driving said shafts adapted to engage with and be driven by said internal gear or rack, and provided with projections or extended portions on or alongside certain of
10 their teeth at appropriate points and which are adapted to engage with and ride upon said bench-like offset or slideway, while the ordinary teeth thereof after passing out of engagement with said rack-bar or pinion will

pass alongside said offset or slideway, where- 15
by said pinions are caused to rotate during a portion of the revolution of said main wheel and are locked from rotation during another portion of the rotation of said main wheel; and said gate-propelling and hammer-actuat- 20
ing shafts.

In witness whereof I have hereunto set my hand and seal at Toledo, Ohio, this 8th day of October, A. D. 1898.

ALLEN C. BRANTINGHAM. [L. S.]

Witnesses:

EUGENE KANE,

WILLIAM BONIFIELD.