

(No Model.)

3 Sheets—Sheet 1.

C. H. MORGAN.

DUST COLLECTOR.

No. 333,020.

Patented Dec. 22, 1885.

Fig. 1.

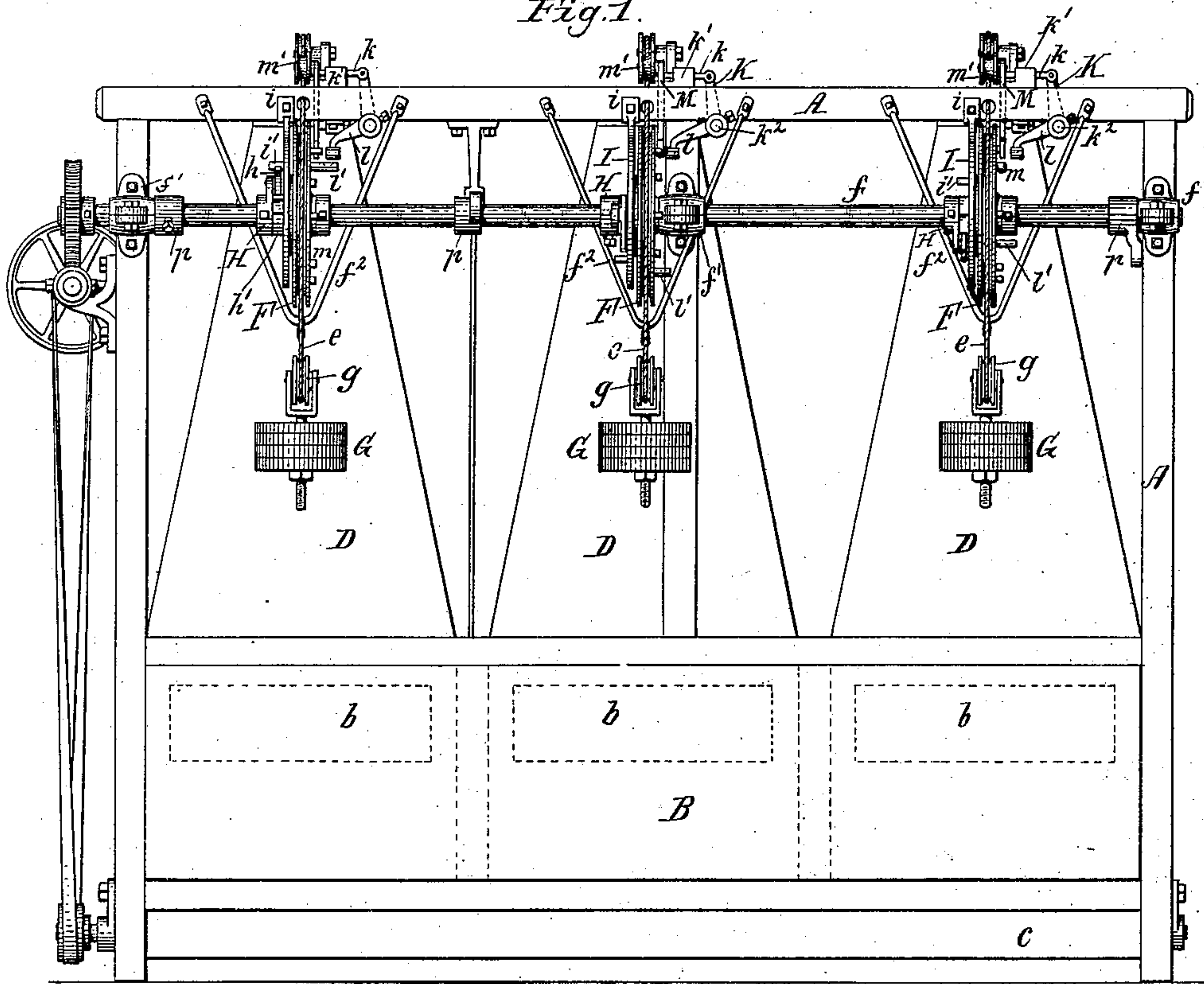
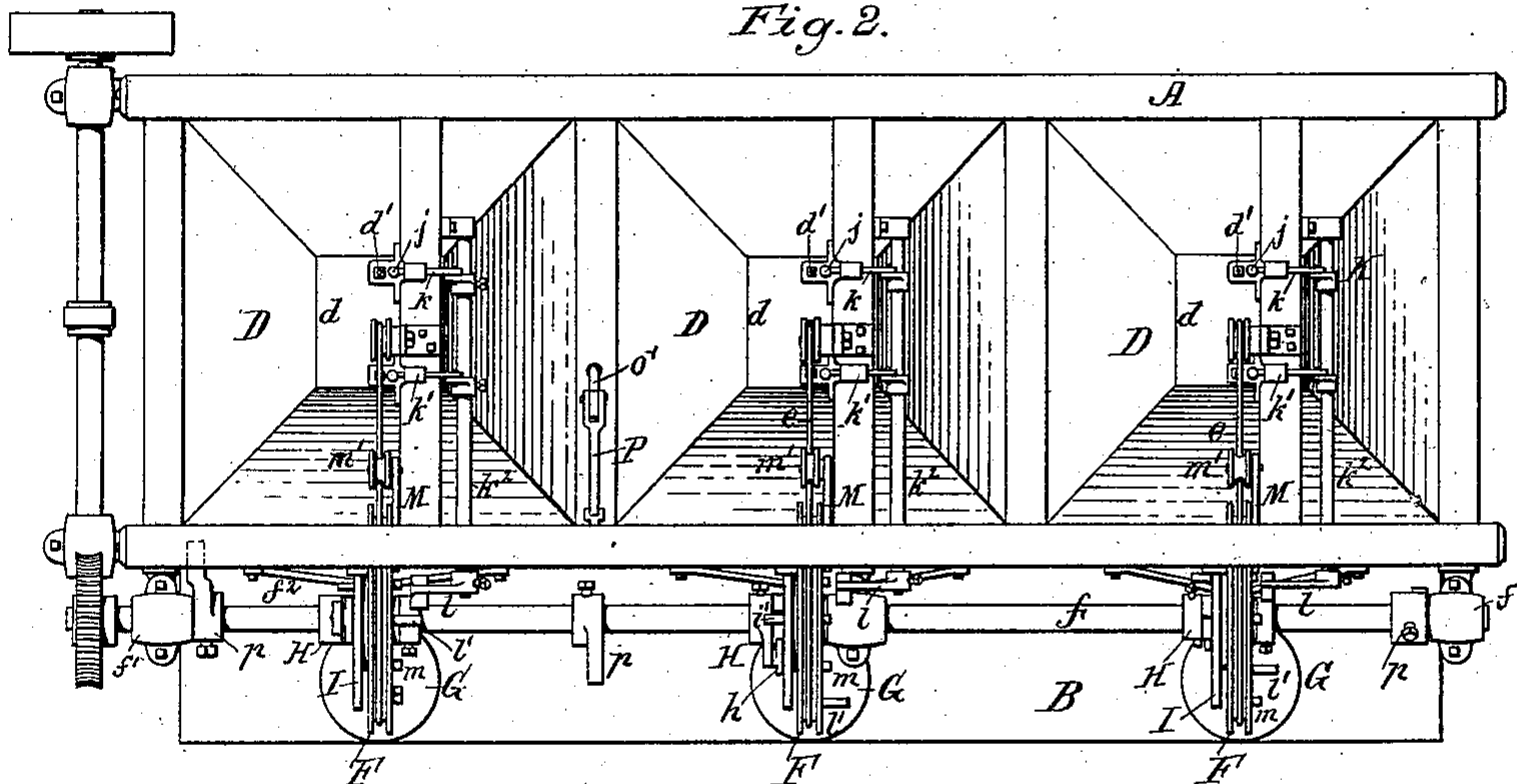


Fig. 2.



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Fig. 3.

Fig. 4.

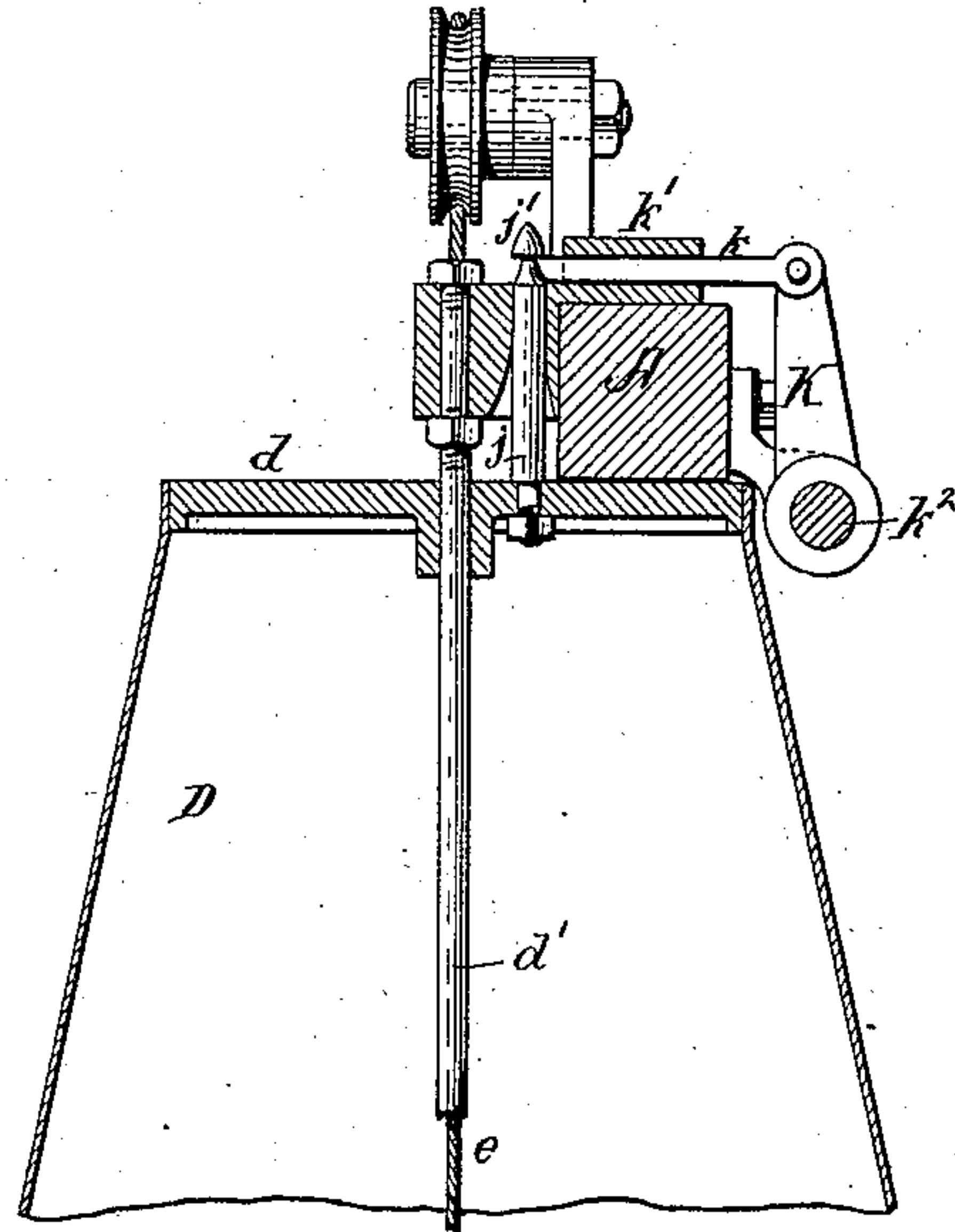
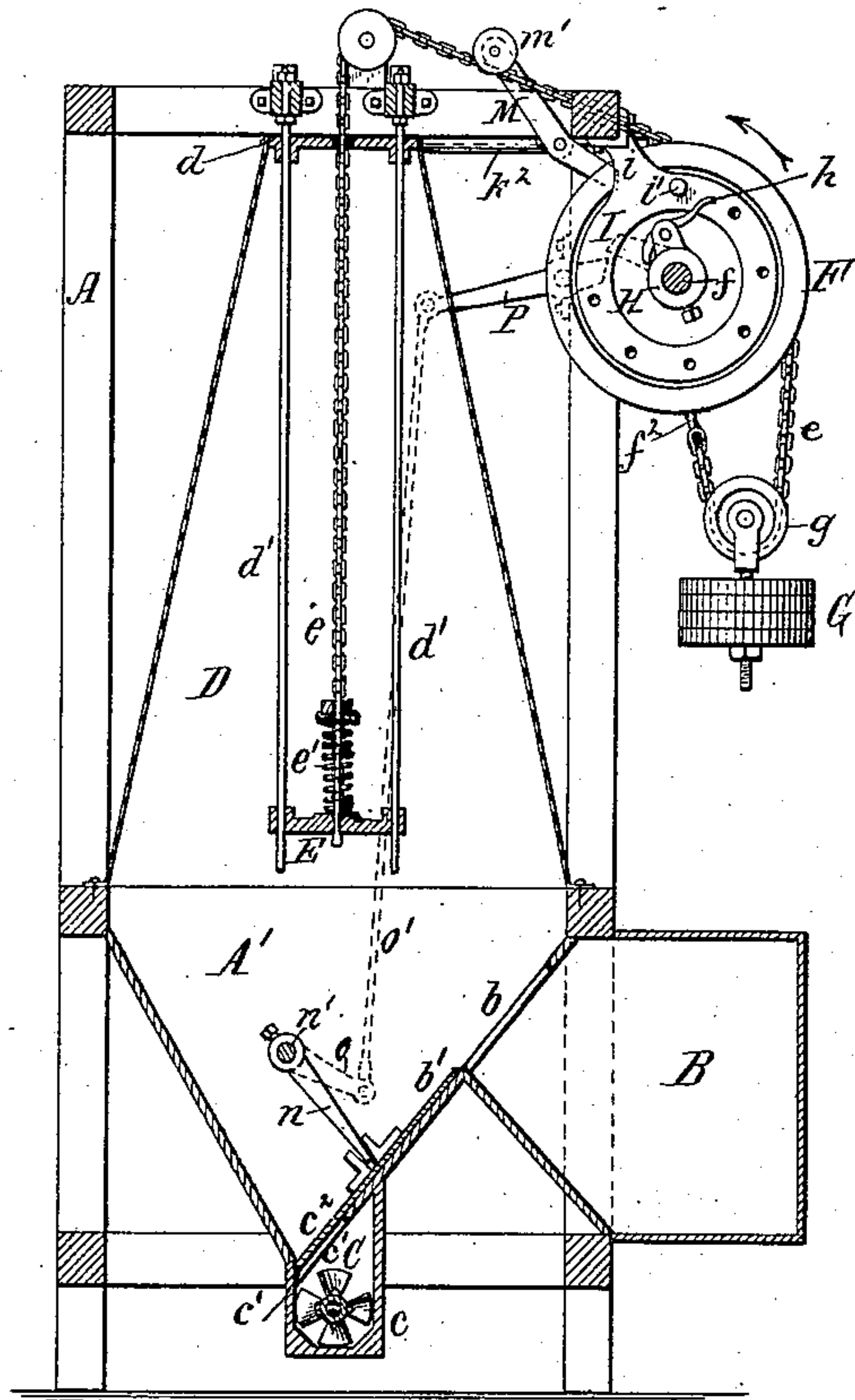
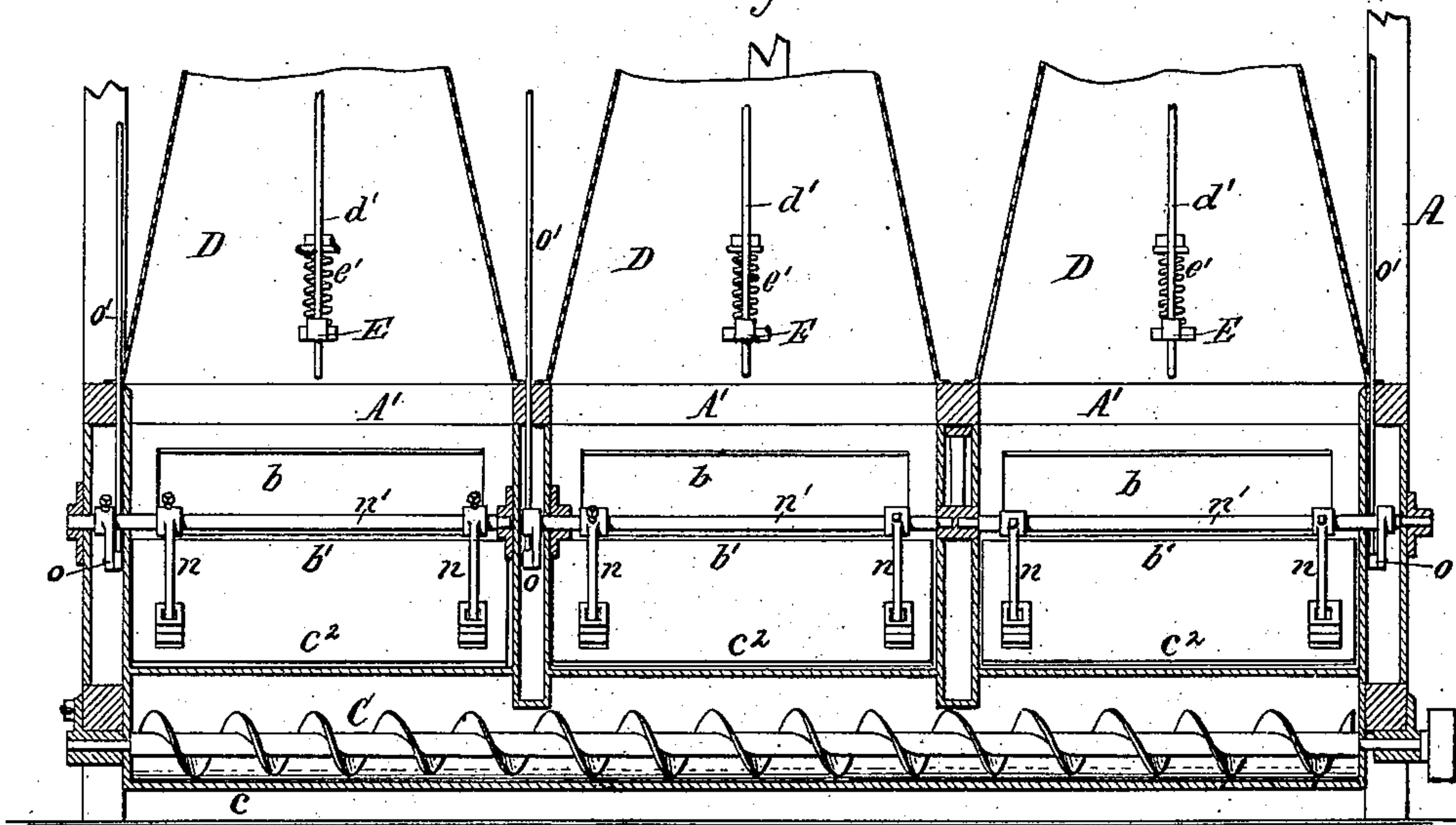


Fig. 5.



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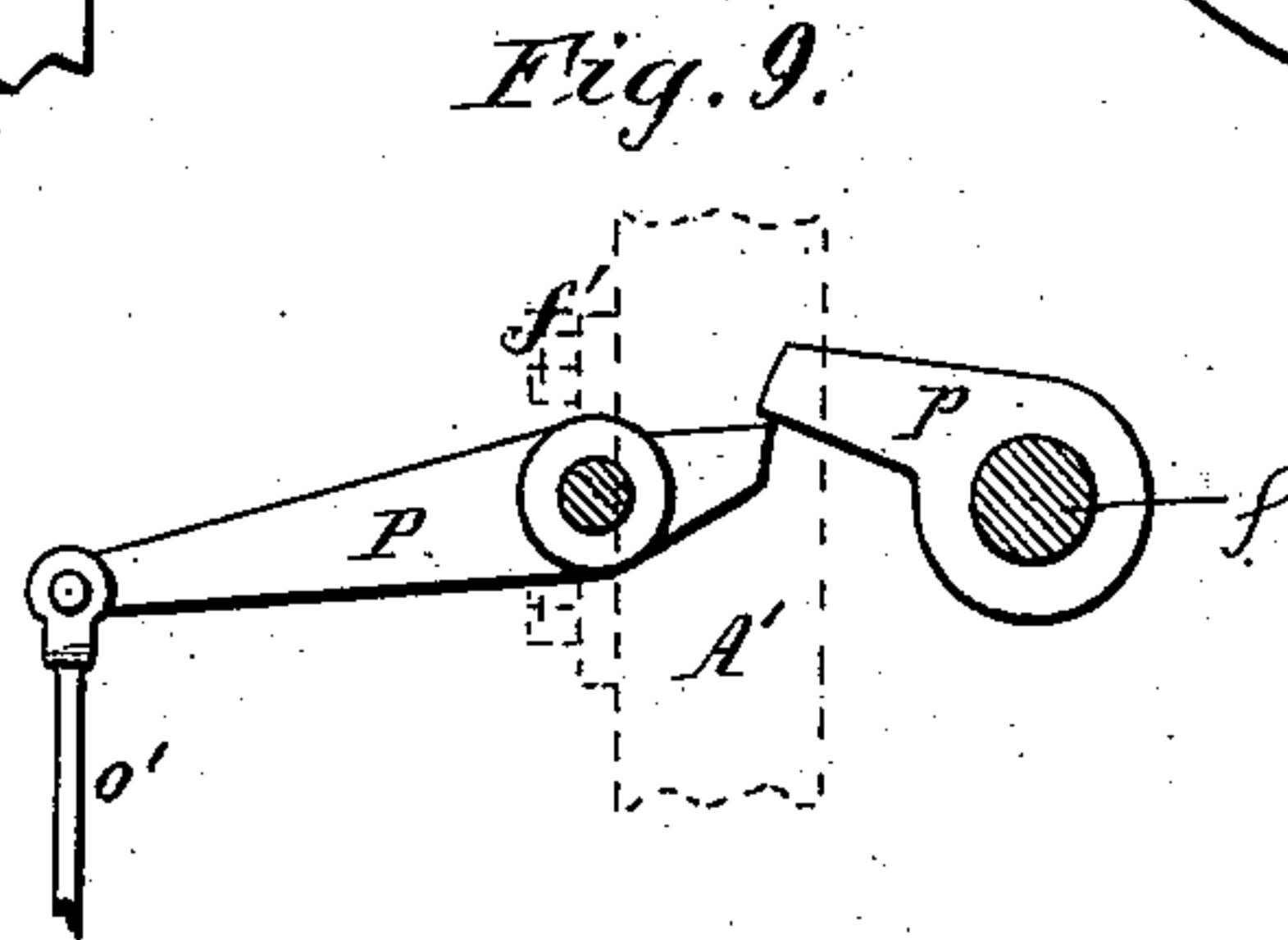
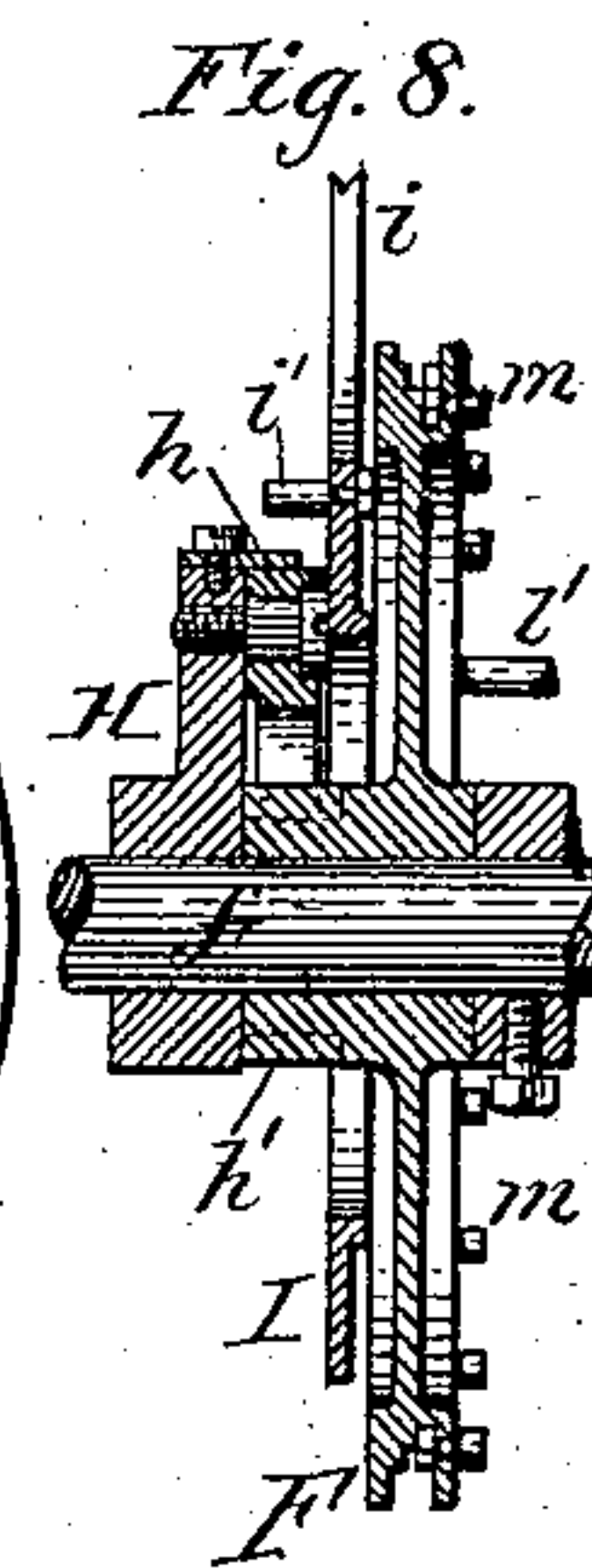
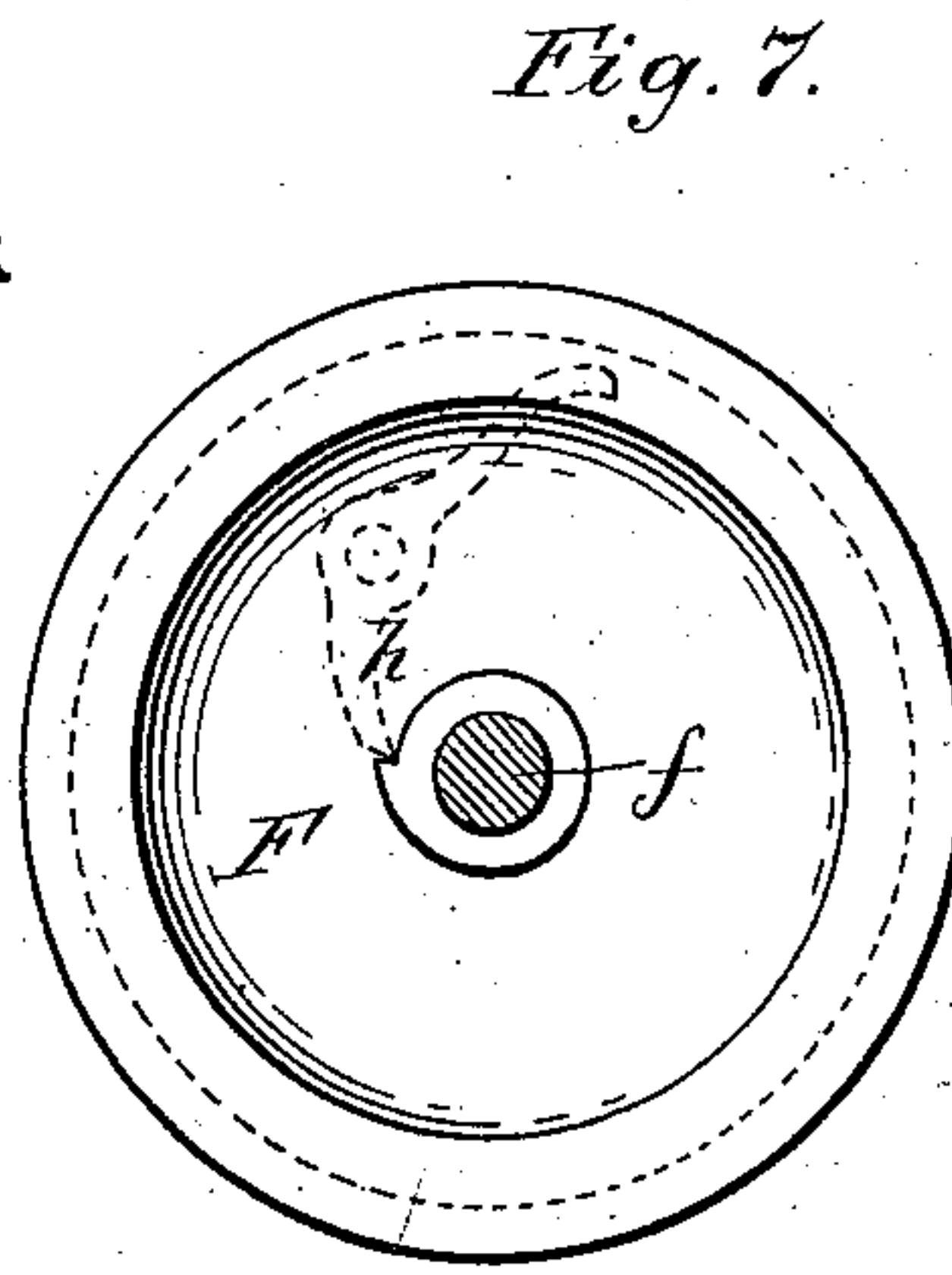
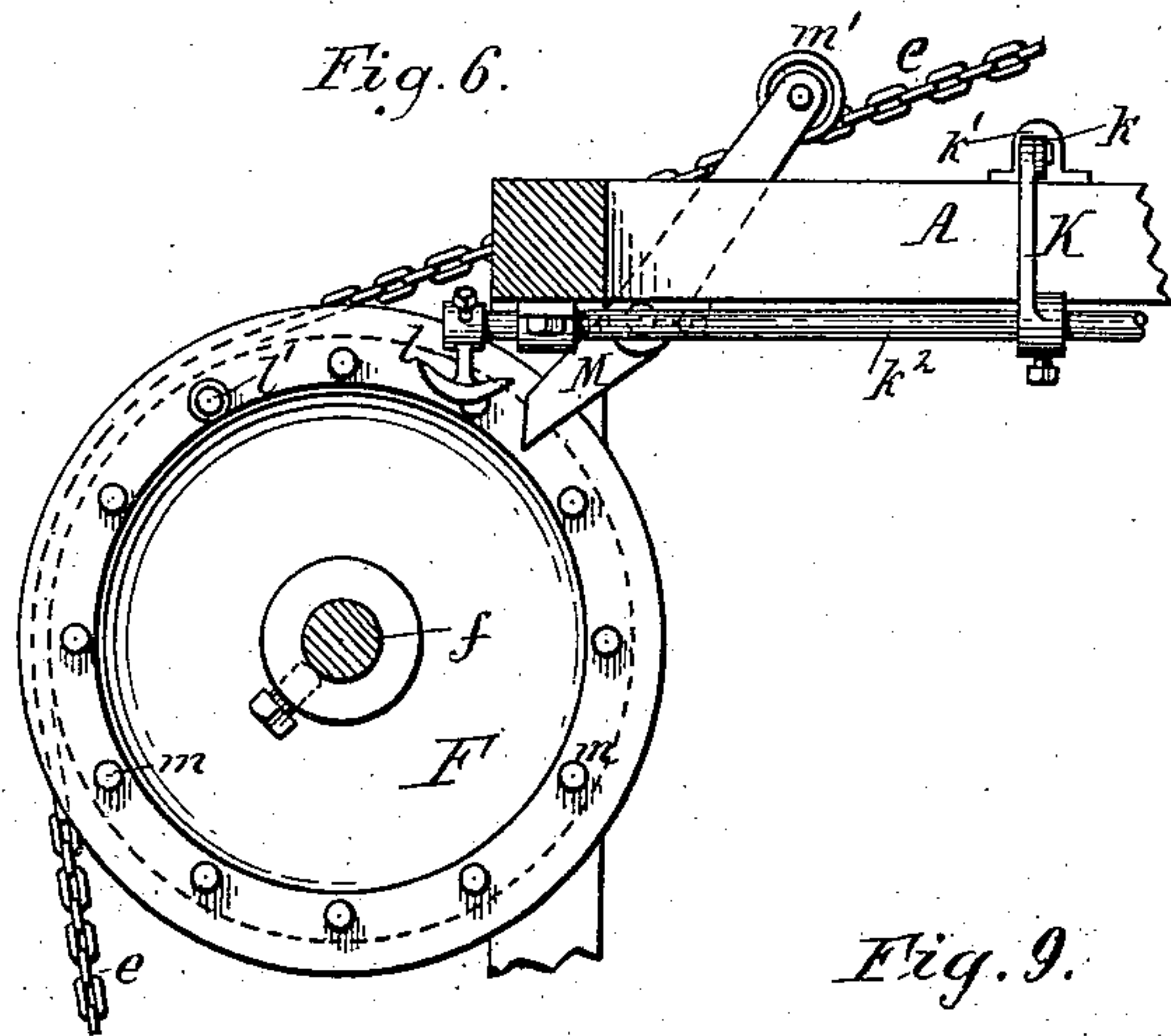
3 Sheets—Sheet 3.

C. H. MORGAN.

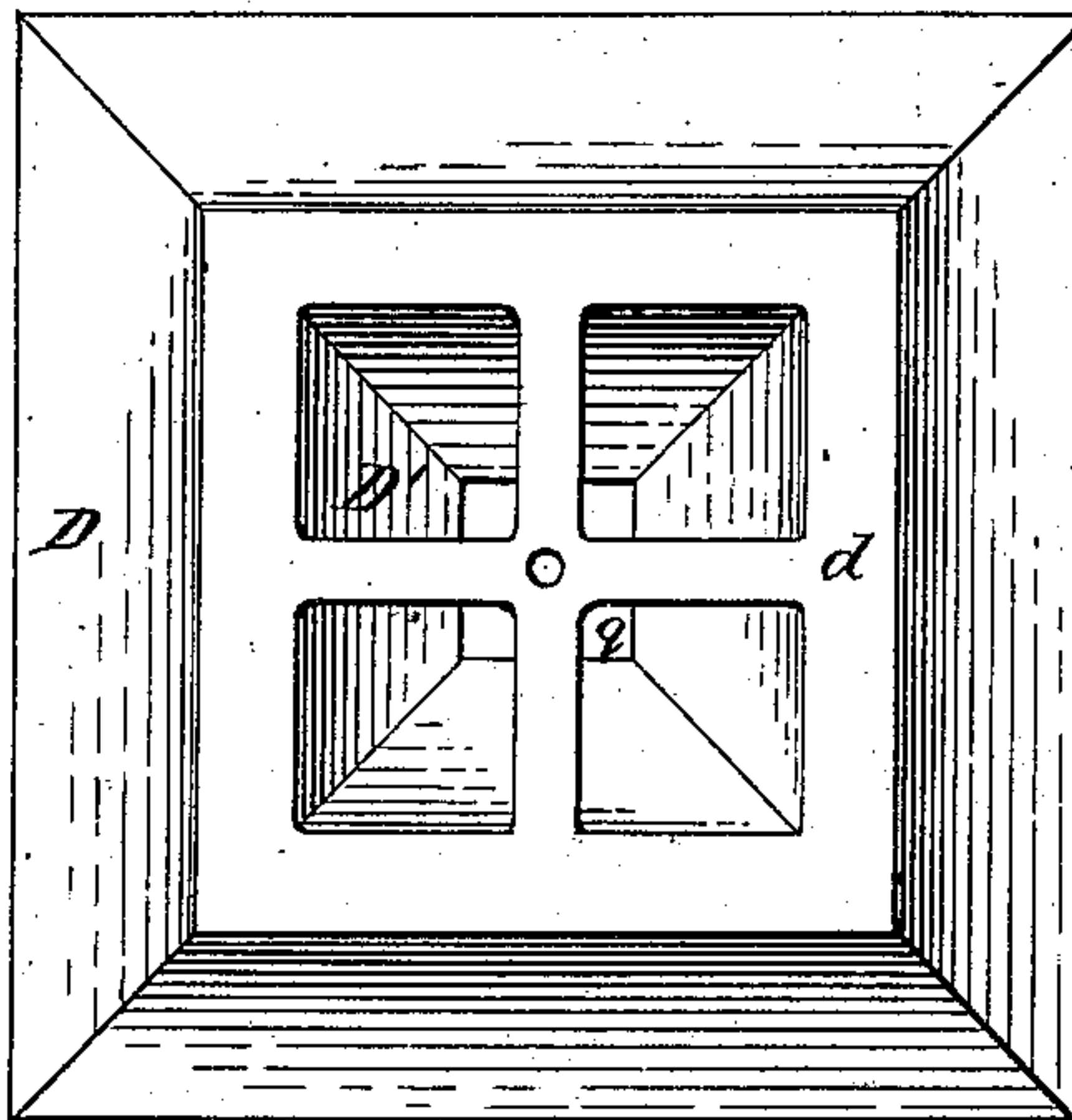
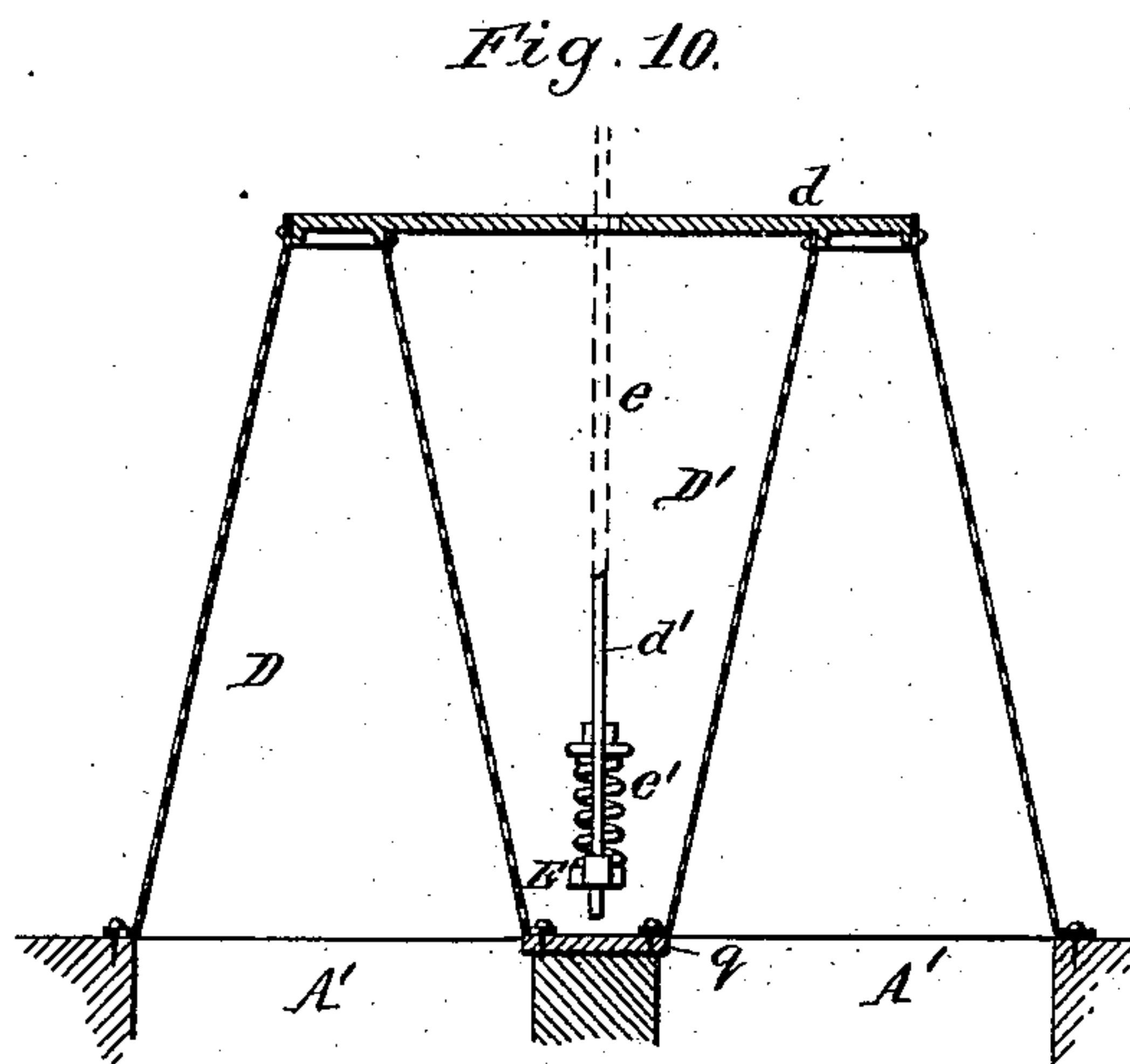
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*Fig. 11.*



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# UNITED STATES PATENT OFFICE.

CHARLES H. MORGAN, OF BUFFALO, NEW YORK.

## DUST-COLLECTOR.

SPECIFICATION forming part of Letters Patent No. 333,020, dated December 22, 1885.

Application filed May 21, 1885. Serial No. 166,285. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES H. MORGAN, of the city of Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Dust-Collectors, of which the following is a specification.

This invention relates to an improvement in that class of machines which are employed in mills, factories, and other industrial establishments for separating the dust from the air, drawn from millstones, middlings-purifiers, grain-cleaners, and other machines, by filtering the dust-laden air through bags of flannel or other cloth.

The object of my invention is to provide means for thoroughly detaching the accumulated dust from the filtering-bags at suitable intervals, the duration of which can be easily regulated as may be necessary in accordance with the character of the material operated upon.

My invention consists of the improvements which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, consisting of three sheets, Figure 1 is a longitudinal elevation of my improved dust-collector. Fig. 2 is a top plan view of the same. Fig. 3 is a vertical cross-section of the machine. Fig. 4 is a sectional elevation of the mechanism which supports the upper end of the filter-bag. Fig. 5 is a longitudinal vertical section of the lower portion of the machine. Fig. 6 is a side elevation of the mechanism whereby the bag is jarred while being raised. Fig. 7 is a side elevation of the lifting-wheel on an enlarged scale. Fig. 8 is a vertical section of the same. Fig. 9 is a side elevation of the valve-actuating mechanism. Fig. 10 is a vertical section of a modified construction of the bag. Fig. 11 is a top plan view of the same.

Like letters of reference refer to like parts in the several figures.

A represents the stationary frame of the machine, and A' is a series of hopper-shaped receptacles, made open at the top and arranged lengthwise in the lower portion of the frame A.

B represents the blastspout or trunk through which the dust-laden air-current is delivered to the machine, and which is arranged length-

wise in front of the hoppers A' and connected with each of them by openings b, which can be opened and closed by movable valves or slides b'.

C is a conveyer arranged in a trough, c, lengthwise under the hoppers A', and receiving the dust therefrom through openings c', which can be opened and closed by movable valves or slides c'.

D represents the filter or air-straining bags secured tightly with their lower ends to the open upper ends of the hoppers A', so as to form upward continuations of said hoppers and receive the dust-laden air which is blown into said hoppers from the air-trunk B. The upper end of each bag is secured to a plate, d, which is capable of a vertical movement, so that by lowering the plate the bag is collapsed and reversed, while by raising the plate to its normal position (represented in Fig. 3) the bag is distended.

d' are vertical guide-rods secured with their upper ends to the frame A, and passing through the plate d and depending into each bag, for guiding the plate d in its vertical movements.

E represents a stop and lifting plate or cross-head suspended within the bag by a chain, e, and serving to arrest the fall of the plate d and to return it to its elevated position. This plate E is preferably guided on the rods d', like the plate d.

e' is a spring or elastic cushion secured to the upper side of the plate E, to receive the impact of the falling plate d.

f represents a horizontal shaft arranged lengthwise on the front side of the machine, and supported in bearings f', secured to the frame A.

F represents chain-wheels mounted loosely on the shaft f opposite each bag D, and carrying the lifting-chains e, the fixed ends of which are attached to V-shaped bars f', which are fastened to the main frame.

G represents weights provided with pulleys g, which rest on the chains e, in the bights thereof.

H represents a carrier secured to the shaft f on one side of each wheel F by a set-screw or other adjustable device, and provided with a spring-pawl, h, which engages with a ratchet-wheel, h', secured to or formed on the side



of each wheel F, so that the rotation of the shaft *f* in the direction of the arrow in Fig. 3 will be transmitted to the wheels F by the pawls *h* and ratchet-wheels *h'* in such manner as to turn the wheels F in the same direction so long as the pawls are engaged with said ratchets.

I represents stationary circular frames arranged concentric with the wheels F on the sides on which the pawls *h* are arranged, and provided with arms *i*, whereby these frames are secured to the upper portion of the main frame.

*i'* represents a stop-pin secured to the side of each frame I, in such a position as to strike against the tail of the pawl *h* as the latter rotates with the shaft *f*, thereby disengaging the pawl *h* from the ratchet-wheel *h'* of the wheel F, and permitting the latter to be turned by the weight G drawing down the chain *e*, whereby the plate E at the opposite end of the chain is raised. The pin *i'* holds the pawl *h* out of engagement sufficiently long to permit the weight to run down. When the pawl *h* clears the pin *i'*, the pawl again engages with the ratchet-wheel *h'*, whereby the wheel F is again connected with the shaft and turned so as to elevate the weight and lower the plate E until the pawl is again tripped.

In order to prevent the chains from slipping on the wheels F, the latter are preferably provided with sprockets which engage with the links of the chains.

The ratchet-wheel *h'* is provided with a single notch, so that the pawl *h* remains out of engagement with the ratchet-wheel until the pawl in rotating with the shaft again reaches the notch. The wheel F is thereby turned to lift the weight G during a part only of the revolution of the shaft *f*, and this lifting movement continues until the pawl is tripped by the stop *i'*. The weight then runs down until the plate E, in lifting the plate *d* by the spring *e'*, is arrested by the plate *d* striking against the upper portion of the frame A.

By changing the position of the stop-pin *i'* on the frame I, which latter is provided with a number of holes for the purpose, the lifting movement of the wheel F can be shortened or lengthened, thereby shortening or lengthening the drop movement of the bag likewise. The lifting movement can be similarly shortened by inserting a number of stop-pins, *i'*, in the frame I, so that the pawl is tripped a number of times during each revolution of the shaft. In this case the ratchet-wheel *h'* is constructed with numerous teeth, like an ordinary ratchet-wheel, and the number of pins or cams which operate the bag-releasing bolt, and the valve mechanism, hereinafter described, must be made equal to the number of pins *i'* which are employed.

*j* are vertical bolts secured to the plates *d*—preferably two to each plate *d*—and provided with notched heads *j'*, with which engage horizontal locking-bolts *k*. The latter are guided

in ways *k'*, secured to the upper portion of the main frame, and pivoted to rock-arms K, which are secured to horizontal transverse shafts *k''*—one for each plate *d*.

*l* is an arm secured to the outer end of each shaft *k''*, and provided with a curved end against which engages a pin, *l'*, secured to the wheel F in such manner that the arm *l* is thereby lifted and the shaft *k''* turned to withdraw the bolts *k* from the bolts *j*, whereby the upper end of the bag is released. The pin *l'* is so arranged on the wheel F with reference to the pin *i'* on the frame I that the pin *l'* first operates upon the arm *l* and releases the upper end of the bag, and that after a sufficient length of time has elapsed to permit the bag to drop and the dust to be discharged the pawl *h* engages the pin *i'* and disconnects the wheel F from the shaft, whereby the weight G is permitted to descend, and the upper end of the bag is elevated. The locking bolts *k* are thrown into engagement with the bolts *j* by the overhanging weight of the arm *l*.

*m m* are pins or projections secured to the same sides of the wheels F on which the pins *l'* are arranged, but made shorter than the pins *l'*, so as not to come in contact with the arms *l*.

M is a jarring-lever pivoted to the upper portion of the main frame, near each wheel F, and having its lower end arranged in proximity to the pins *m*, so as to be oscillated by the latter as the wheel revolves in raising the weight G. The upper end of the lever M is provided with a roller, *m'*, which bears on the chain *e* and jars the latter as the lever oscillates, thereby jerking or jarring the bag as it is raised by the chain.

The slides *b' c'* in each hopper A' are secured together or made in one piece, so as to move simultaneously, and are operated by arms *n*, which are secured to a horizontal shaft, *n'*, arranged in each hopper A'.

*o* is an arm secured to the end of each shaft *n'*, and *o'* is a rod extending upwardly from the arm *o* to a lever, P, pivoted to the upper portion of the main frame. The levers P are actuated by cams *p*, secured to the shaft *f*.

The valve mechanism, as well as the mechanism whereby the bag is dropped and lifted, are so timed on each bag with reference to the other bags that only one bag is disconnected from the blast-spout B and cleaned at a time, while all the other bags remain in communication with the air-spout.

In disconnecting and cleaning one of the filter-bags the cam *p* first moves the slides *b' c'* so as to close the opening *b* and open the aperture *c'*, thereby disconnecting the hopper A' from the dust-spout B and connecting it with the conveyer-trough *c*. The pin *l'* on the wheel F, rotating with the shaft *f*, next strikes the arm *l*, thereby withdrawing the locking-bolts *k* and permitting the plate *d* to drop on the rods *d'* until arrested by the spring



*e'* of the cross-head E. This collapsing movement of the bag is comparatively slow, owing to the resistance of the air contained in the bag, which air is forced through the filter-cloth.

5 In collapsing, the bag is partially or wholly reversed, according to the distance through which the bag is permitted to fall before being arrested by the plate E. During this collapsing movement of the bag the bulk of the dust

10 adhering to the inner side of the bag is shaken off and carried down into the hopper A' and conducted by the latter to the conveyer C. The pawl *h* is next tripped by striking the pin *i'* on the frame I, whereby the wheel F is dis-

15 connected from the shaft *f*, causing the weight G to run down. This elevates the plate E and the upper end of the bag very rapidly, and during this upward movement of the bag the chain *e* is jarred by the lever M, whereby the

20 remaining dust is detached from the bag. By this rapid distending movement of the bag a strong partial vacuum is created within the same, whereby the external air is caused to flow from outside into the bag through the

25 filter-cloth, which air-current materially aids in detaching the dust from the bag. When the bag has been distended, the bolts *j* engage with the locking-bolts *k*, whereby the upper end of the bag is supported. The cam *p* has

30 remained in engagement with the lever P during these movements, and now releases the lever P, and the slides are returned to their former position by gravity, opening the communication between the dust-spout B and the

35 hopper A' and closing the opening *c'* of the conveyer-trough. When the pawl next engages with the ratchet-wheel *h'*, the wheel F is turned in the direction of the arrow in Fig. 3, thereby raising the weight G and lowering

40 the plate E in the bag until the pawl is again tripped.

The capacity of the bags which remain in communication with the blast-spout is easily made sufficiently large to prevent back-pressure

45 on the fan of the middlings-purifier or other machine from which the dust laden air is discharged.

In the modified construction represented in Figs. 10 and 11, the bag D is provided with an

50 inner auxiliary bag, D', to increase the filtering-surface. The inner bag, D', is secured with its lower narrow end to a plate or bridge, *g*, which is attached to the hopper A', and with its upper wide end to the plate *d*, which latter

55 is constructed, in this case, in the form of an open frame having openings for the escape of the air which filters through the inner bag, D'.

I claim as my invention—

1. In a dust-collector, the combination, with

60 the air-spout, of a dust-receptacle connected therewith by an aperture, a valve applied to said aperture and opened and closed automatically, and a filter-bag having its lower end rigidly secured and communicating with said

65 dust-receptacle, and having a free upper end

which is dropped to detach the dust from the bag and deliver it into the dust-receptacle, substantially as set forth.

2. In a dust-collector, the combination, with the air-spout, a dust-receptacle connected

70 therewith, and a valve which is automatically opened and closed to open and break the communication between the dust-receptacle and the air-spout, of a filter-bag having its lower end rigidly secured and communicating with

75 said dust-receptacle, and a free upper end which is dropped to detach the dust from the bag, a stop whereby the fall of the upper end of the bag is arrested, and a lifter whereby the upper end of the bag is returned to its ele-

80 vated position, substantially as set forth.

3. In a dust-collector, the combination, with the air-spout and dust-receptacle, of a filter-bag having its lower end rigidly secured and communicating with said dust-receptacle, and

85 a free upper end capable of being dropped, and an automatic locking device whereby the upper end of the bag is alternately supported and released, substantially as set forth.

4. In a dust-collector, the combination, with

90 the air-spout and dust-receptacle, of a filter-bag having its lower end rigidly secured and a free upper end capable of being dropped, a stop whereby the fall of the upper end of the bag is arrested, a lifter whereby the upper end

95 of the bag is returned to its elevated position, and an automatic locking device whereby the upper end of the bag is supported, substantially as set forth.

5. The combination, with the filter-bag D,

100 air-spout B, dust-receptacle A', and conveyer *c* C, of the valves *b'* *c'*, which are moved simultaneously, and whereby the communication of the dust-receptacle with the air-spout is opened when its communication with the

105 conveyer is closed, and vice versa, substantially as set forth.

6. The combination, with the dust-receptacle A' and the filter-bag D, provided at its free upper end with a plate, *d*, of the sus-

110 pended stop E and the lifting mechanism connected therewith, substantially as set forth.

7. The combination, with the stationary frame A, dust-receptacle A', and the filter-bag D, provided at its free upper end with a plate,

115 *d*, of the guide-rods *d'* and the suspended stop-plate E, substantially as set forth.

8. The combination, with the dust-receptacle A' and the filter-bag D, rigidly secured at its lower end, and having its free upper

120 end attached to a movable plate, *d*, which is capable of being dropped, of the stop E, provided with an elastic cushion, *e'*, against which the plate *d* strikes when the upper end of the bag has dropped the proper distance, substan-

125 tially as set forth.

9. The combination, with the dust-receptacle A' and the filter-bag D, of the stop E, attached to a chain, *e*, the rotating shaft *f*, the chain-wheel F, which is alternately connected

130



with and disconnected from said shaft, and the weight G, applied to said chain, substantially as set forth.

10. The combination, with the dust-receptacle A' and filter-bag D, of the stop E, attached to a chain, *e*, the rotating shaft *f*, provided with a carrier, H, having a pawl, *h*, the chain-wheel F, having a ratchet-wheel, *h'*, a stop, *i'*, whereby the pawl is thrown out of engagement, and the weight G, applied to the chain, substantially as set forth.

11. The combination, with the main frame A, the dust-receptacle A', and filter-bag D, of the stop E, attached to a chain, *e*, the rotating shaft *f*, provided with a carrier, H, having a pawl, *h*, the chain-wheel F, having a ratchet-wheel, *h'*, a stationary frame, I, having a stop, *i'*, made adjustable on said frame, and the weight G, applied to the chain, substantially as set forth.

12. The combination, with the main frame A and the filter-bag D, provided at its upper end with a plate, *d*, carrying a notched bolt, *j*, of an automatic locking-bolt, *k*, which is moved to secure and release the upper end of the bag, substantially as set forth.

13. The combination, with the main frame A and the filter-bag D, of the stop E, attached to the chain *e*, a chain-wheel, F, whereby the stop E and the upper end of the bag are raised, and a jarring-lever, M, bearing upon the chain *e*, substantially as set forth.

14. The combination, with the main frame A, dust-receptacle A', air-spout B, conveyer *c* C, and filter-bag D, of the slides *b'* *c'*, actuating-lever P, connected with said slides, rotating shaft *f*, and a cam, *p*, whereby the lever P is moved, substantially as set forth.

15. In a dust-collector, the combination, with the air-spout and dust-receptacle provided with a discharge-opening, of a filter-bag having one end rigidly secured and the other end movable, and a valve whereby the dust-discharge opening is automatically opened and closed, substantially as set forth.

Witness my hand this 9th day of May, 1885.

CHARLES H. MORGAN.

Witnesses:

JNO. J. BONNER,  
CHAS. J. BUCHHEIT.