

(No Model.)

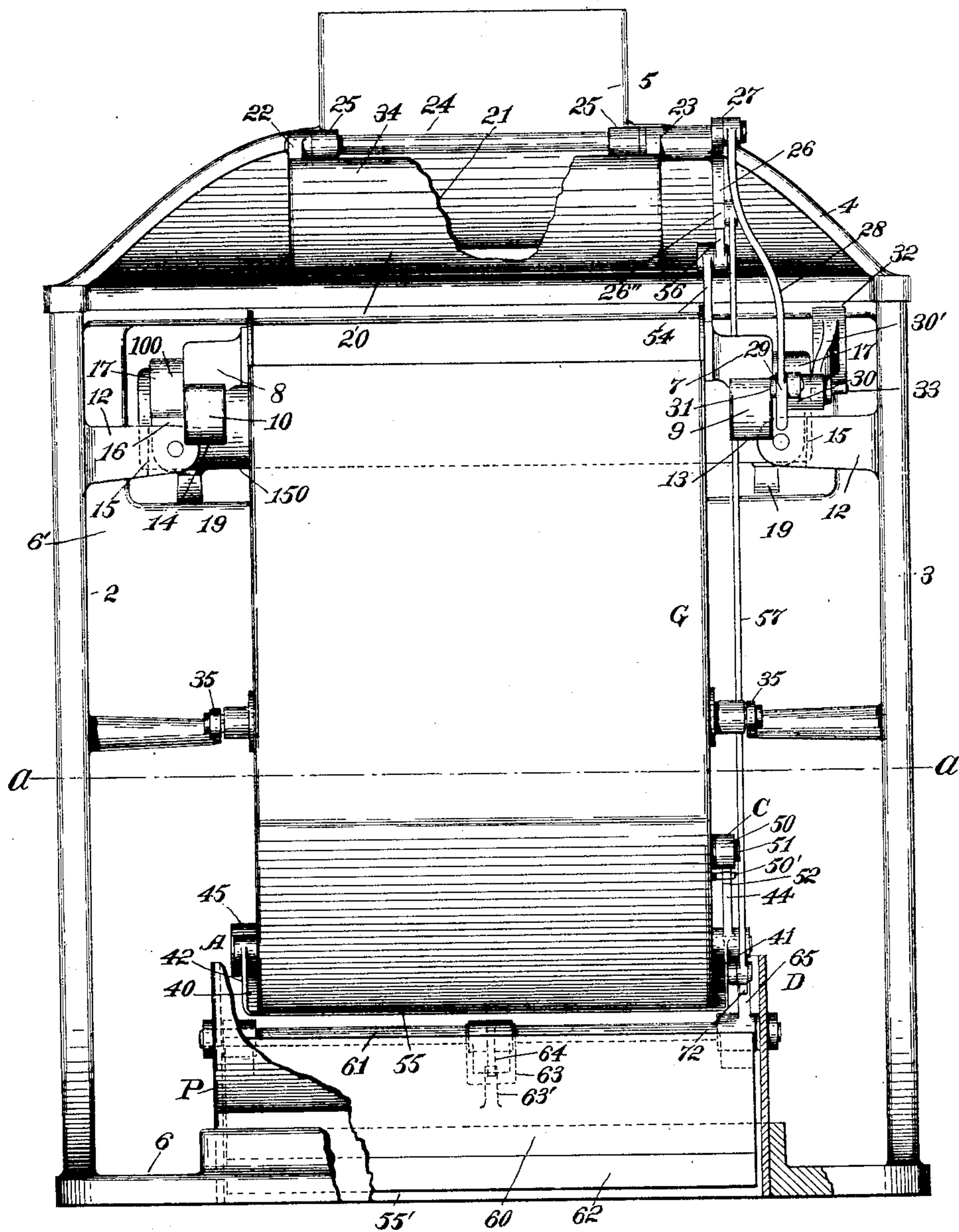
6 Sheets—Sheet 1.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 589,285.

Patented Aug. 31, 1897.

Fig. 1.



Witnesses:

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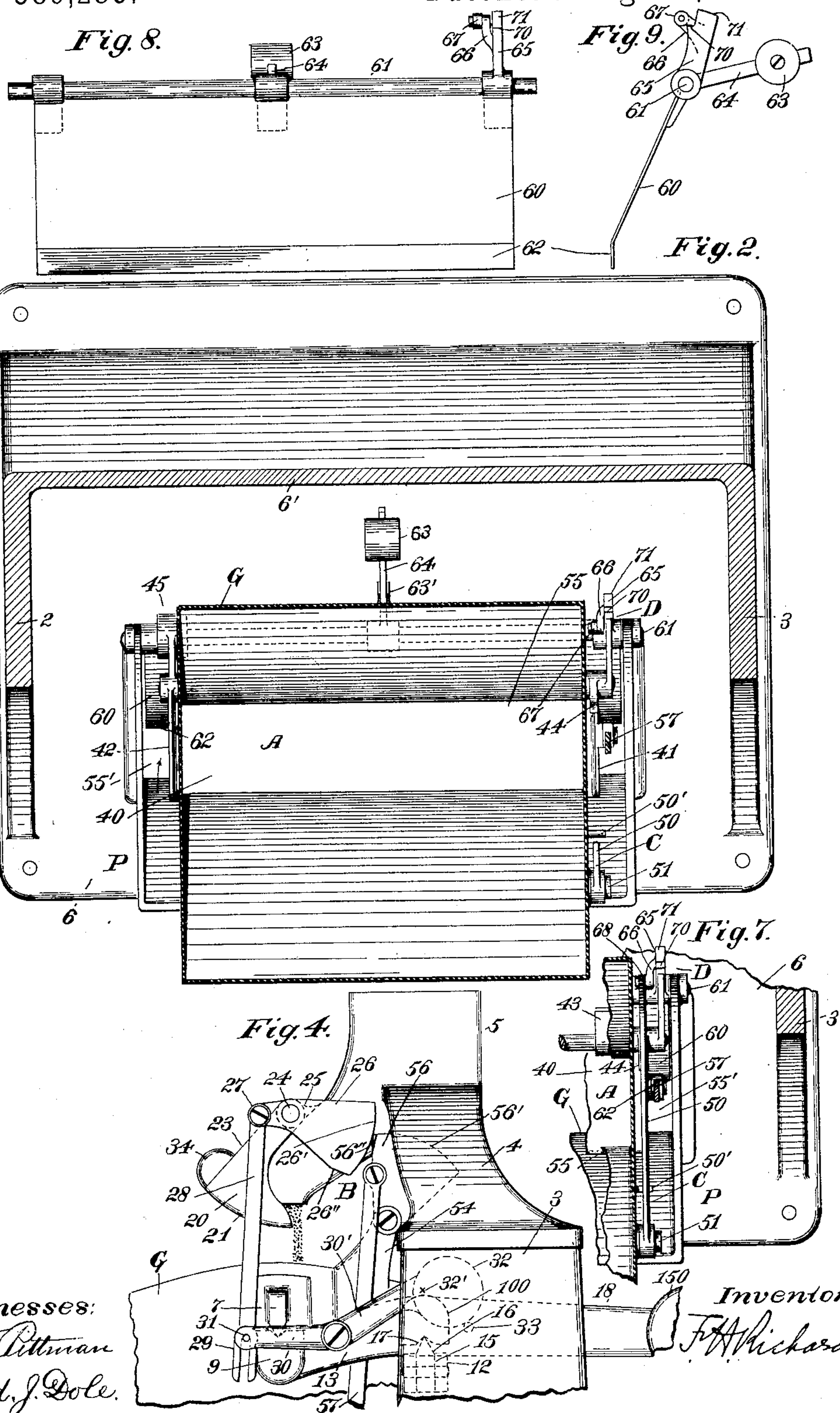
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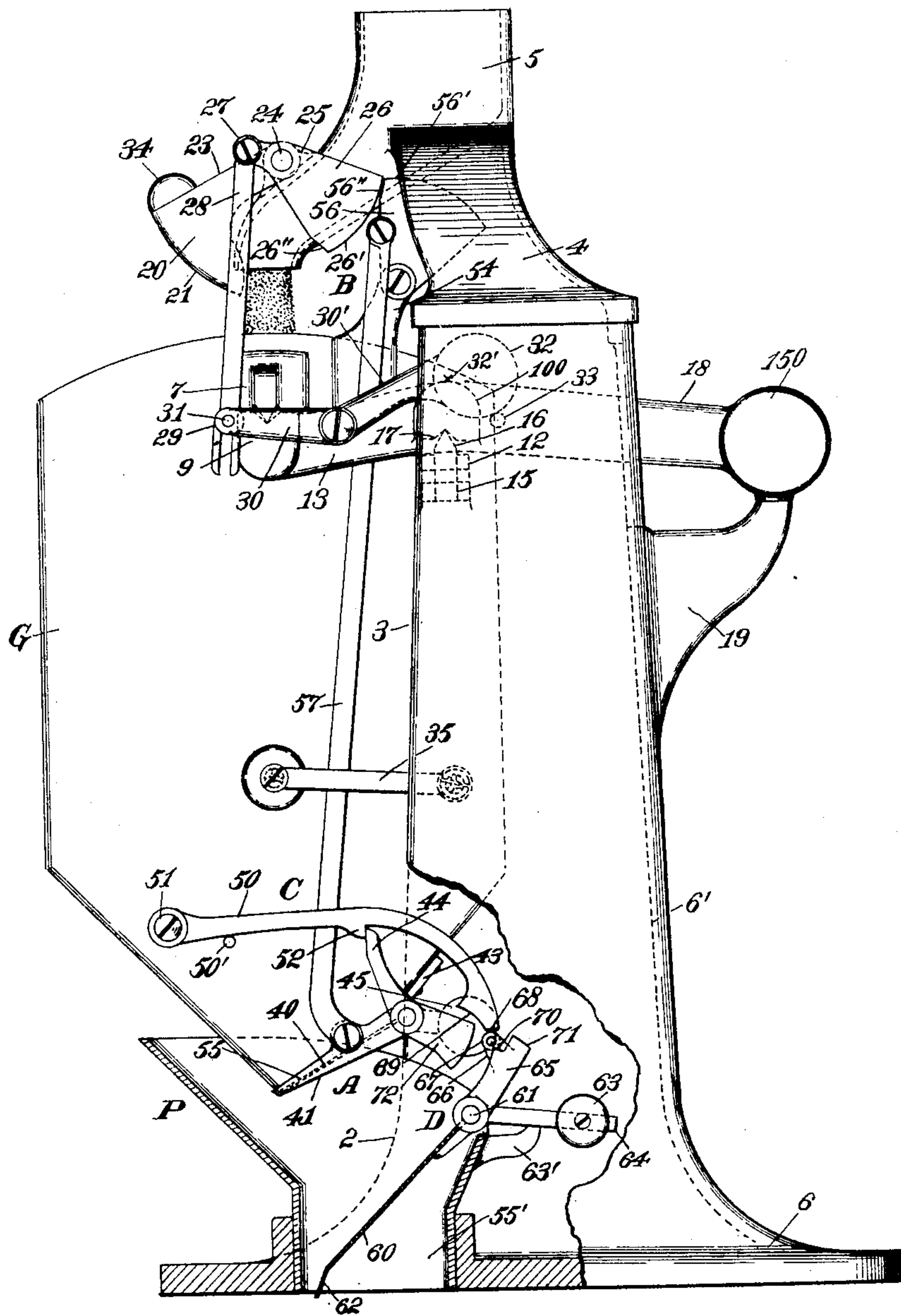
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Fig. 3.



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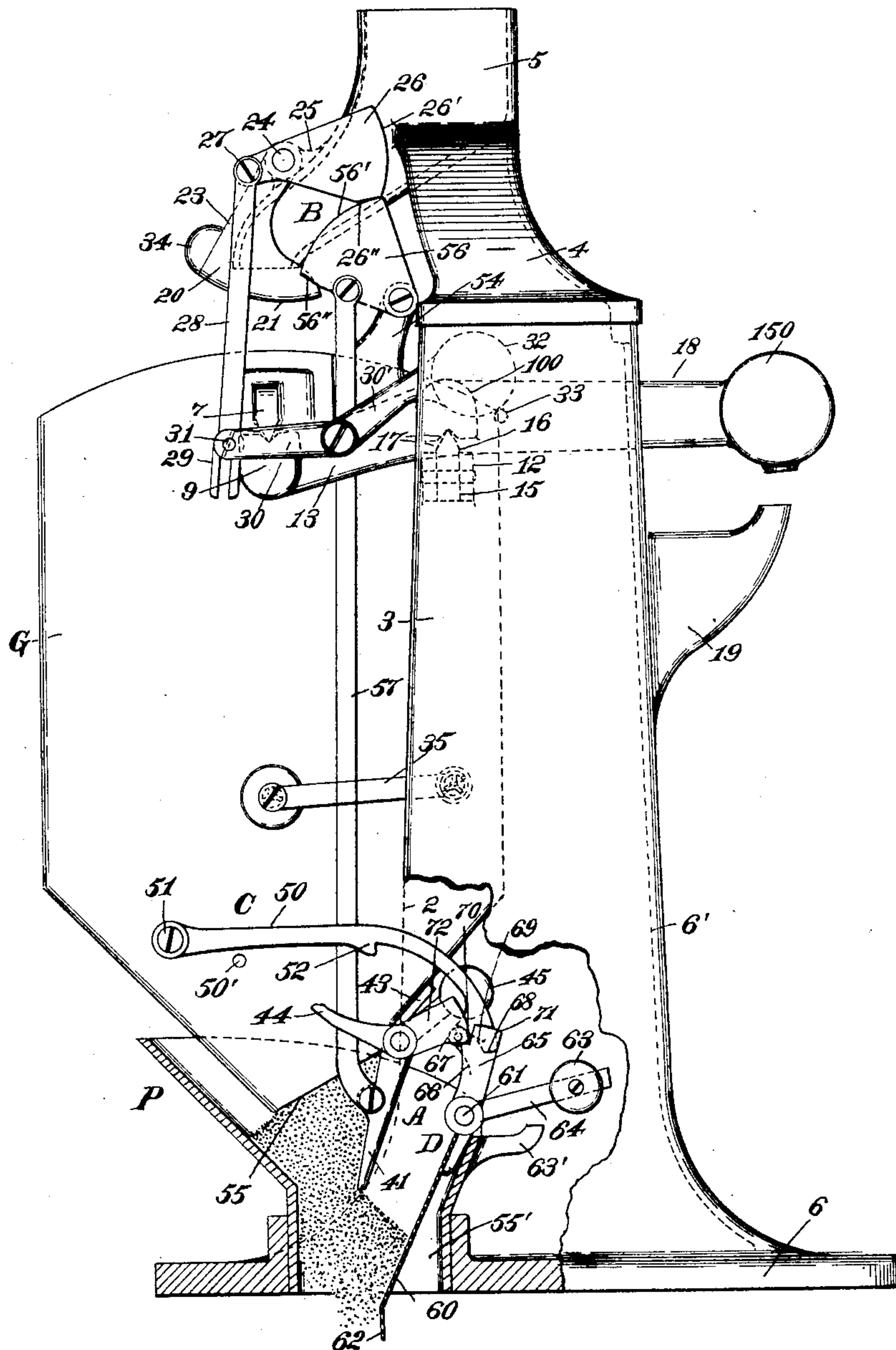
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Fig. 5.



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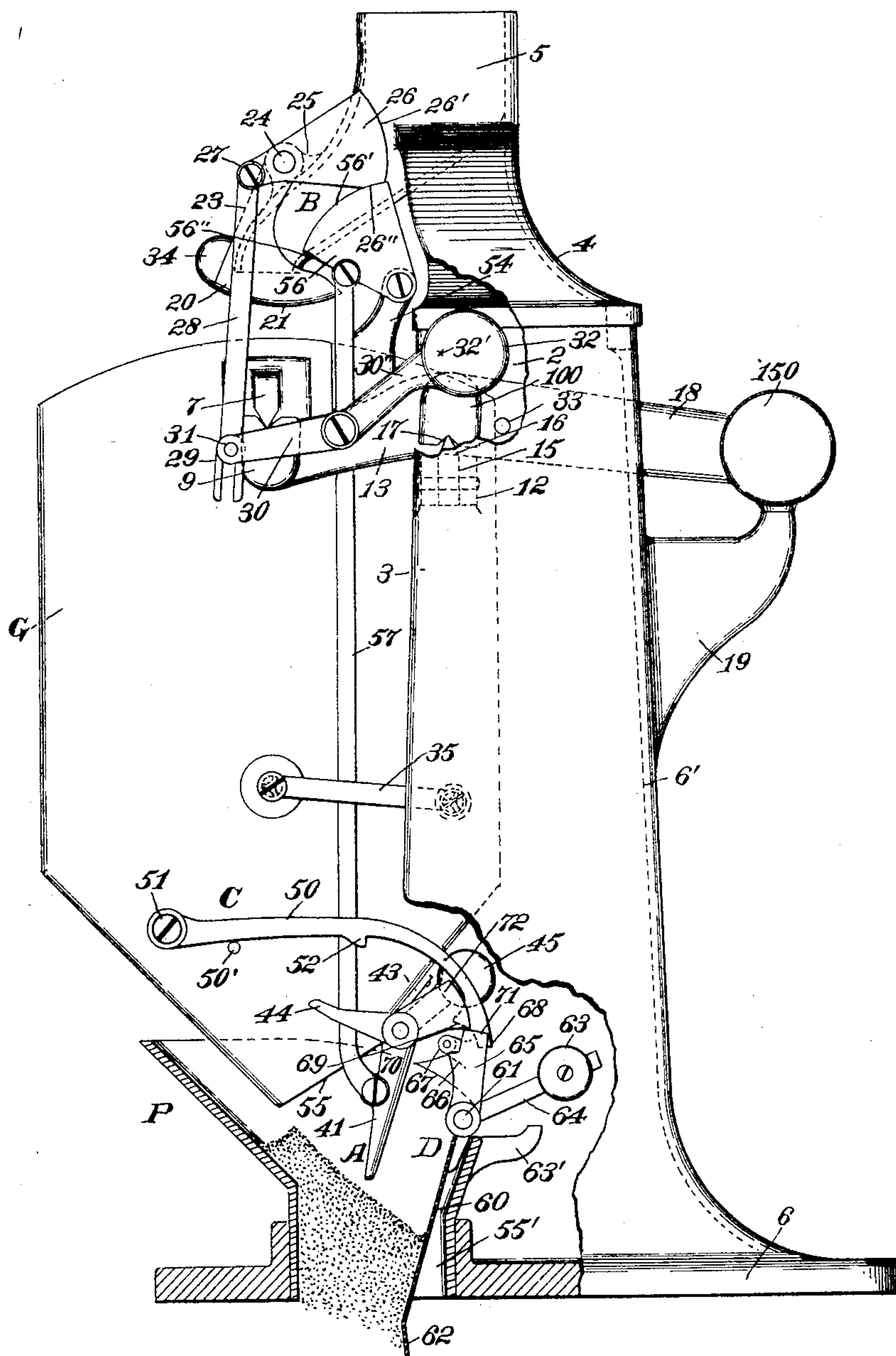
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Fig. 6.



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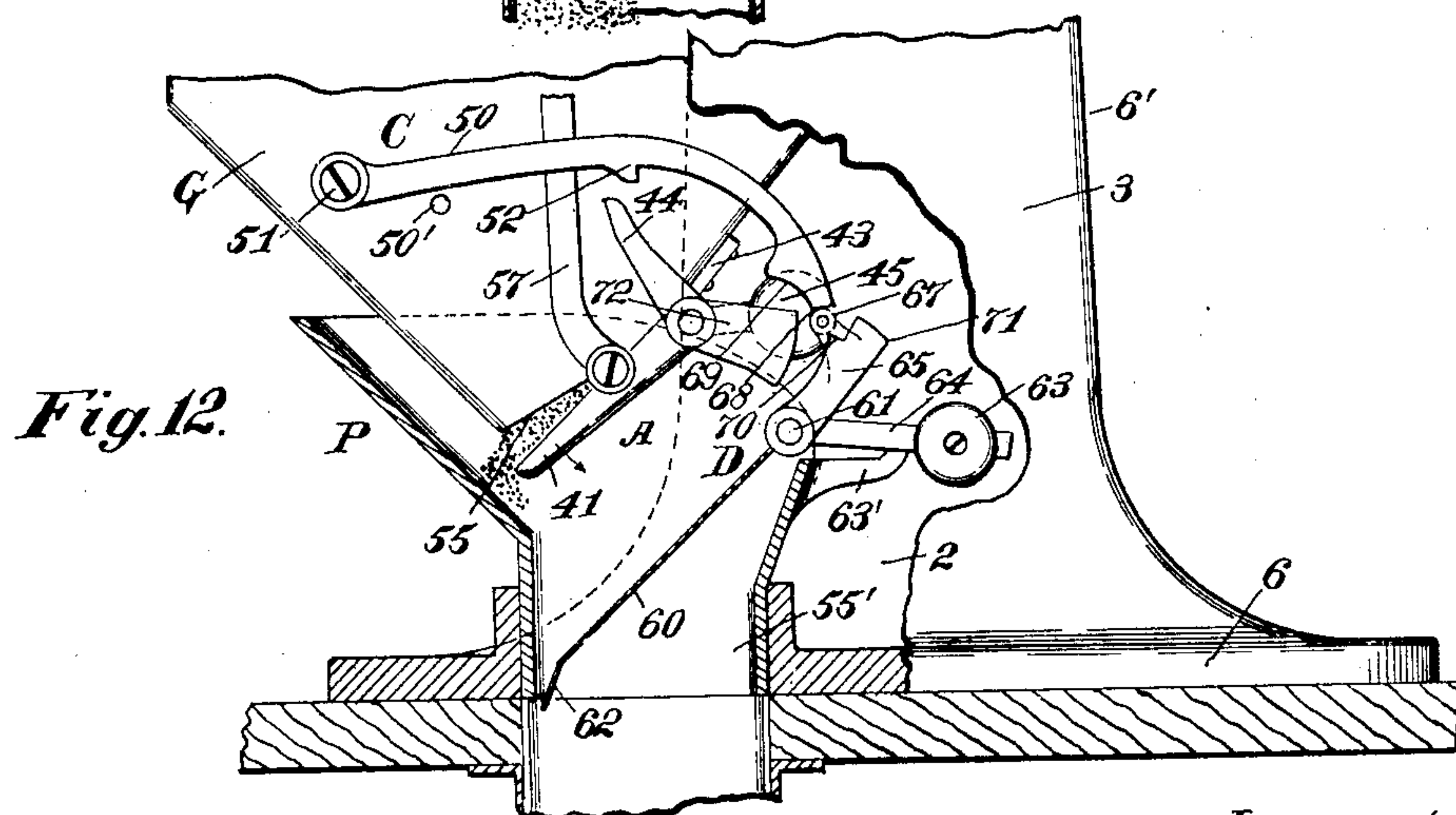
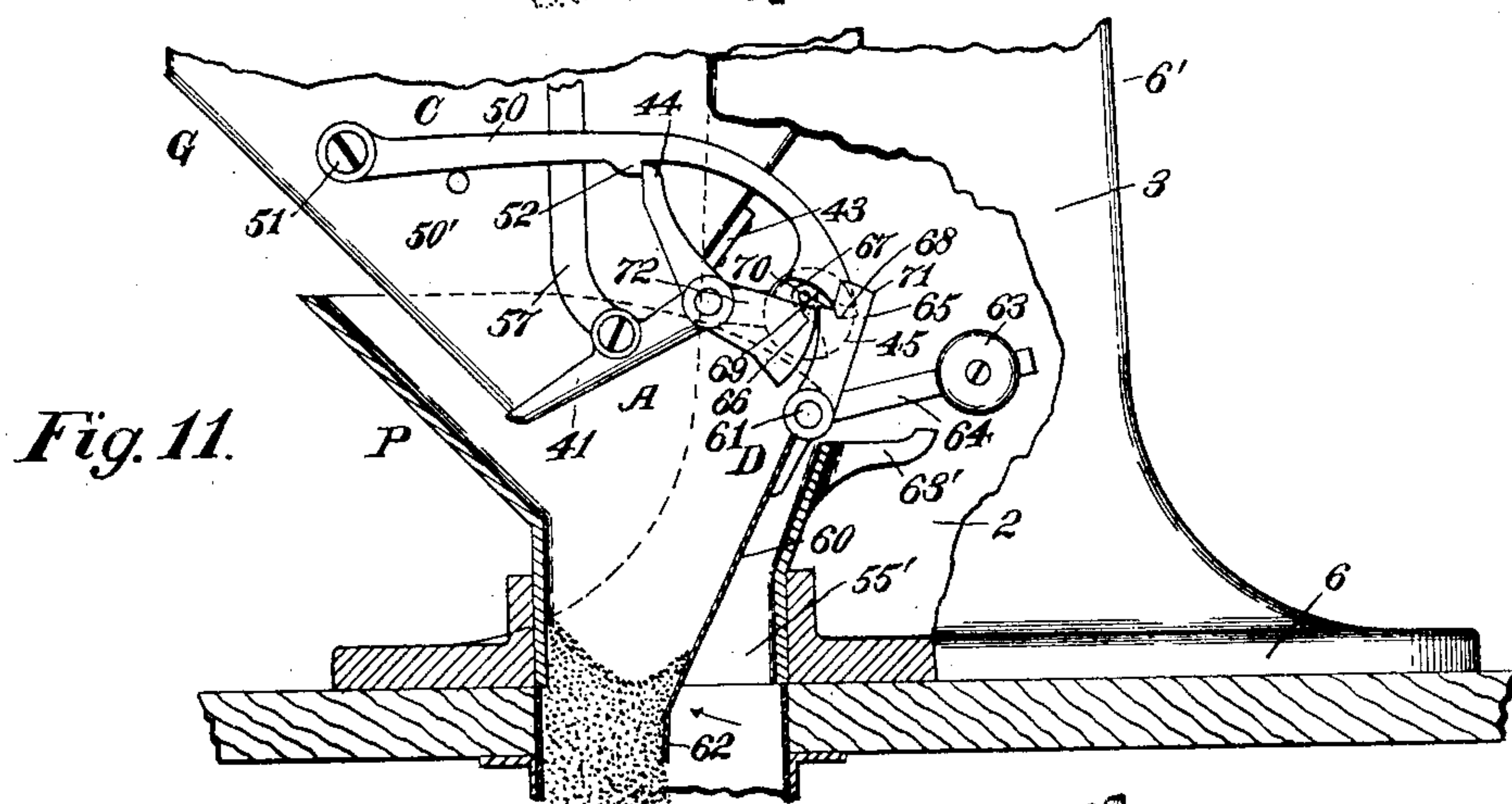
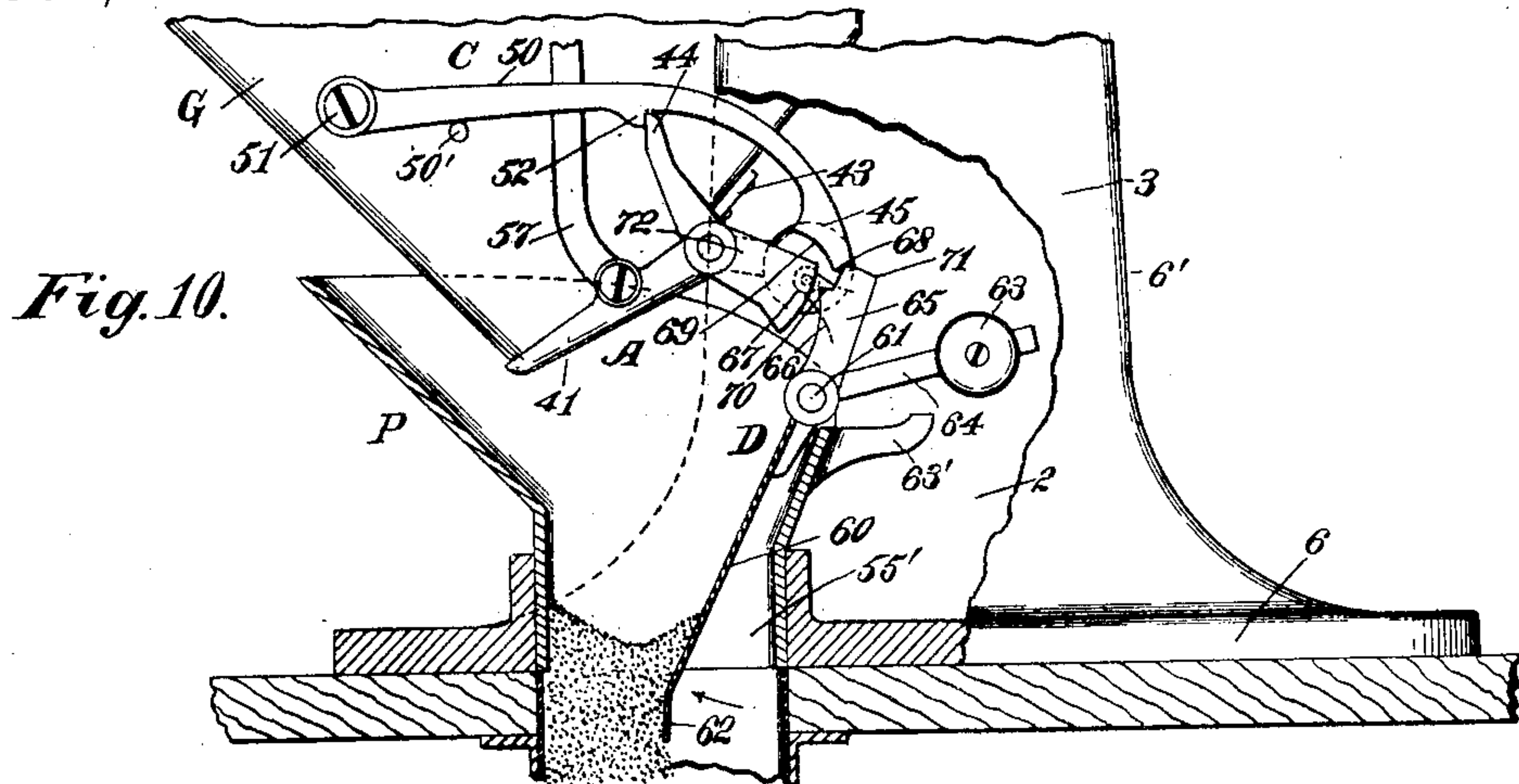
(No Model.)

6 Sheets—Sheet 6.

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WEIGHING MACHINE.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 589,285, dated August 31, 1897.

Application filed November 27, 1896. Serial No. 613,541. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Weighing-Machines, of which the following is a specification.

This invention relates to weighing-machines, the object thereof being to provide improved weighing apparatus comprehending, among other improvements, improved means for regulating or controlling the opening and closing movements of the bucket or receptacle discharge-opening or outlet-closer.

In the drawings accompanying and forming part of this specification, Figure 1 is a front view of this improved weighing-machine, parts thereof being in section and broken away. Fig. 2 is a horizontal cross-sectional partly plan view taken in line *a a*, Fig. 1. Fig. 3 is a right-hand side elevation of the machine, a part of the framework being broken away to illustrate more clearly portions of the operating mechanism. Fig. 4 is also a right-hand side elevation of the upper portion of the machine, but illustrating a different position of the valve mechanism. Figs. 5 and 6 are views similar to Fig. 3, but illustrating different positions of the operating mechanism. Fig. 7 is a horizontal sectional partly plan view illustrating a part of the right-hand end of Fig. 2. Fig. 8 is a detail view of one form of the regulator mechanism. Fig. 9 is a right-hand end view thereof. Figs. 10, 11, and 12 are side partly-sectional views of the lower portion of the weighing-machine for illustrating the operation of the weighing apparatus when the discharge from the hopper is sluggish.

Similar characters designate like parts in all the figures of the drawings.

In a general way one of the principal improvements of this improved weighing-machine relates to the means for regulating the opening and closing movements of the load receiver or receptacle discharge-opening or outlet-closer, whereby should a part of the material not pass freely from the hopper the continued operation of the load-receiver to obtain another supply of material and to move into position to discharge the same will not be prevented, such discharge, however,

being positively prevented while any appreciable amount of material from a previous load-receiver discharge remains in the hopper, whereby the load-receiver will thus be operable to obtain a succeeding load and not be stopped or retarded should a part of the material pass from the hopper in a sluggish manner or be wedged therein.

As a preface to a description of this improved weighing-machine it will be understood that various parts and mechanisms might be more or less varied without departing from the general scope of this invention, that the valve mechanism might be of various forms from that herein shown—for instance, similar in construction to the valve mechanisms of various machines of this character heretofore patented by me and not deemed necessary to herein more particularly specify—and that while such valve mechanism is shown herein more especially adapted for use with light material, which offers only a slight resistance to the closing of the same, it could be constructed otherwise, if desired.

This improved weighing apparatus comprises, in a general way, a supply-chute, a load receiver or receptacle and its beam mechanism, valve mechanism for regulating the supply to said receptacle, and a hopper, and which parts, if desired, may be similar in construction and their means of support to those heretofore described in my various previous patents, more particular reference to which is not deemed necessary herein, with such modifications as may be herein illustrated or pointed out; a closer (designated in a general way by A) for the discharge opening or outlet of the receptacle or bucket; means (designated in a general way by B) for locking the valve closed when the closer is open and for locking the closer shut when the valve is open and which will be herein designated, for the purposes of this specification, as “valve-closer-locking means or mechanism;” independent holding or locking means (designated in a general way by C) for holding or locking the closer shut; means (designated in a general way by D) for regulating the opening and closing movements of the closer, and which regulating means in its preferred form shown is in position and operative successively to unlock

the closer and permit the same to open, to lock the same open, and unlock the same from its open-lock position, to thereby permit said closer to shut at the proper predetermined period in the operation of the apparatus.

The framework for carrying the operative parts of the apparatus may be of any suitable and desired construction, but is illustrated preferably comprising two side frames 2 and 3, connected at the top by a top plate 4, carrying a supply-chute 5, and at the bottom by a beam or base-plate 6, such side frames in this instance also being connected by a back or rear plate or wall 6', cut away adjacent to the top plate, however, to permit the scale-beam to operate beneath such top plate, as hereinafter more particularly set forth.

The material or load receiver (designated generally by G) may likewise be of any desired construction, but is herein illustrated as a receptacle or bucket preferably of the "single-chambered" type or class, and is shown provided at each side thereof with one member of a bearing, in this instance shown as the pivot member thereof, and each of which pivot members preferably comprises a knife-edge pivot 7 and 8, secured to the bucket in any desired and suitable way, but herein shown as a part thereof, and which pivots are supported by a pair of V-shaped bearings 9 and 10, one carried adjacent to the forward end of each of the bucket-supporting arms 13 and 14 of a scale-beam 100. This scale-beam 100 is shown supported below the top plate 4 by a pair of suitable bearings, which in the structure shown are preferably in the nature of V-shaped bearings, one member of each bearing (herein illustrated as the "pivot" member thereof) being secured to the framework in any desired way. For this purpose each side frame is shown provided with an inwardly-extended bifurcated bracket 12, in the furcated end 15 of which a knife-edge pivot 16 is pivotally supported, whereby each pivot member is longitudinally adjustable to properly aline itself in a horizontal plane to evenly support the scale-beam.

Each of the beam-arms 13 and 14 is provided with a V-shaped bearing member 17 in engagement with the knife-edge pivots 16 in the usual manner. These bucket-supporting arms 13 and 14 extend rearwardly of the bearings to form a pair of weight-supporting arms 18, carrying a weight 150, preferably rigidly secured thereto. It will be understood that such weight could be of various construction and may be carried, if preferred, by one rearwardly-extending arm united to the bucket-arms 13 and 14 by diverging members.

The weight 150 in the present structure when in its normal position or position of rest is shown supported and resting on a pair of bracket arms or supports 19, extending from the rear of the framework.

The valve mechanism for regulating the supply of material to the bucket, while shown as more particularly applicable to operate in connection with light material, which offers only a slight resistance to the closing of the valve, as hereinbefore set forth, yet it may be constructed to operate with various weights of material by using in connection therewith some suitable form of by-pass or otherwise modifying the same in any desired and well-known manner. In the present apparatus this valve mechanism preferably comprises an oscillatory or swinging valve 20, operable to gradually close and thus continuously reduce the flow of the material from the chute to the bucket until it is completely and thoroughly cut off, and in the present instance it comprises a concaved valve-blade 21, carried by a pair of arms 22 and 23, one at each end thereof, and which arms are shown fixed to a rock-shaft 24, preferably supported in bearings 25 at the front side of the chute 5. This rock-shaft carries at one end thereof a stop, preferably in the nature of a sector-stop 26, likewise fixed thereto and therefore movable simultaneously with the valve, and which stop forms one member of the valve-closer-locking means hereinafter described. One means shown for opening this valve at the proper predetermined period in the operation of the mechanism and for holding such valve open to permit the bucket to be supplied with material comprises weighted mechanism, one member of which is shown in this instance pivotally secured adjacent to the apex 27 of this sector and at one side of said rock-shaft, and preferably comprises a downwardly-extending valve-actuating lever 28, having a bifurcated end 29, while the other member thereof, likewise preferably a lever 30, is illustrated pivotally mounted on one of the beam-arms, as 13, for movement therewith and has one end thereof in engagement with the furcated end of the lever 28 by means of a headed fastening device, such as a screw 31, while the member 30' of said lever carries and to a certain extent forms a part of a weight 32, which is preferably formed thereon. This weight is shown herein having its approximate center of gravity 32' substantially over a neutral point, such as the pivotal point of the beam, so that the poise of the scale-beam will not be materially disturbed in the operation of the weight 32. In other words, the action of the weight 32, owing to its position, will have no appreciable effect on the scale-beam, either at the weight end or the bucket end thereof, to disturb its poise, as would be the case if the weight 32 were disposed nearer the beam-weight 150, which would thus make it form a part of the counterbalancing means, or disposed nearer to the bucket, in which instance the counterbalance-weight 150 would have to be increased in a manner that will be readily understood without further description. To limit the downward movement of this weight 32, a stop or

projection 33 is disposed on the beam-arm 13 in position to support the same. The valve is also shown, in its preferred form, provided with a weight 34, preferably formed as a part thereof, whereby said valve is a gravity self-closing valve operable on the downward movement of the bucket and its beam to gradually close, and thus by degrees reduce the size of the stream until it finally completely cuts off the supply to the bucket.

From the foregoing it will be clearly seen that the valve is held open by means of the weighted mechanism just described and closes on the downward movement of the beam-supporting arms 13 and 14 without raising the weight 32 from its stop 33, as such weight and its lever 30 moves with the beam-arm, said valve being opened at the proper time by the weight 32 in the manner hereinafter set forth.

The weights for the valve, as well as the other weights of the machine, will be experimentally determined in the first instance in order to secure the proper action of such valve and the other parts of the machine.

In this construction of weighing-machine the bucket is shown pivotally connected with the side frames 2 and 3 of the framework by some suitable means—such as links or arms 35, one at each side of said bucket—whereby lateral or swinging movement of said bucket transversely of its rising and falling plane of movement is prevented.

The bucket-closer, (designated generally by A,) in one preferred form thereof shown, comprises a suitably-formed plate or closer proper, 40, having arms 41 and 42, preferably and usually formed rigid therewith and pivotally secured to the bucket by brackets 43, whereby said closer is in position to operate at the discharge opening or spout 55 of the bucket G and which is herein illustrated at the lower end thereof.

In order that the closer may be self-operating to close such spout after the discharge of material therefrom, suitable means is provided for actuating the same and which in one form thereof is shown as a weight 45, carried at the free end of a rearward extension of one of the arms, as 42, of said closer, and which weight will be sufficient to counterbalance and quickly shut the closer when the bucket is free of its load, but insufficient in itself to maintain the same closed against the weight of the load in said bucket. The closer is shown provided with a series of working parts, (shown comprising a pair of stops 44 and 72,) the purpose of which will be hereinafter more particularly set forth.

To maintain the closer shut during the loading of the bucket and while the valve is open and until after the same is completely closed and the supply of material to the bucket thoroughly cut off, suitable holding or locking mechanism is provided, and which in one preferred form shown comprehends a locker preferably in the nature of a latch 50. This

locker is pivotally secured to one side of the bucket by means of a suitable pivotal device 51, the movement of the locker in one direction being limited by a stop 50' and involves in one form thereof a series of working parts, one of which comprises a catch or stop 52 at its under side in position to engage the stop 44 of the closer, which is shown herein as a projection or arm formed on the hub of one of the arms, as 41, of said closer, and thereby lock said closer shut. The free end of this locker is shown provided with the other working parts, hereinafter described, of the series in position to be engaged by the regulating means, which is in position and thereby operable to actuate the locker to unlock the closer and permit the same to open.

The means for locking the valve closed when the closer is open and which also locks the closer shut when the valve is open, and thus maintains the closer positively locked shut even should the locker 50 be manually raised, and which is herein designated, as above set forth, as "valve-closer-locking means or mechanism," as distinguished from the independent holding or locking means for the closer just described, comprehends, in its preferred form shown, a stop 56, such as a sector-stop, pivotally secured to an arm 54, formed on or attached to the bucket G, and which stop is in position to engage the sector-stop 26 of the valve at certain predetermined periods in the operation of the mechanism, and which valve-stop 26 constitutes a part of such valve-closer-locking means, as hereinbefore stated. This stop is operatively connected with the closer by a connector, such as a rod 57, pivotally secured to each, the pivotal point thereof with the sector being such that the greater part of the weight of the load on the closer is carried by the pivotal point at which said sector is connected to the bucket-arm.

When the closer is shut and the valve is open, the curved face 26' of the valve-stop 26 will be in engagement with a stop or plane face 56'' of the sector 56, and thus lock the closer shut. These stops are so disposed relatively to each other that the downward movement of the bucket and its stop 56, as well as the closing of the valve, will not be impeded. Hence on such descent of the bucket to its poising-point said stop 56 will be carried downward therewith simultaneously with the closing of the valve, which thus carries its stop 26 upward, Fig. 4, whereby on the further descent of the bucket with its completed load the valve-stop 26 will be carried farther upward by the complete closing of the valve, while the bucket-stop 56 will be carried into position in readiness to be shifted into place beneath the valve-stop 26 to lock the same closed, and which locking action takes place on the opening movement of the closer, which thus swings the stop 56 into position to have its curved face 56' engage a stop or plane face 26'' of the valve-stop, Figs. 5 and 6.

It will also be seen that the stops are so disposed relatively to each other that while the valve is locked closed when the closer is open such closer is, however, while such valve is still closed, free to shut unless otherwise locked open, and which closing movement would of course unlock the valve.

It will furthermore be observed, Figs. 5 and 6, that when the valve is locked closed the sector-stops are in such positions relatively to each other that the valve sector-stop 26 bears directly downward on the bucket sector-stop 56, and thus does not tend to cause the bucket to swing laterally, and consequently less force is thrown on the guide-links 35 at this time and while the regulating mechanism is in operation, and thus prevents any liability of disengaging the cooperating parts of the closer and such regulating means, as is liable to be the case in those machines where one sector bears sidewise upon the other at this period in the operation of the weighing mechanism.

Disposed below the bucket-discharge opening 55 is a hopper, (designated in a general way by P and shown herein as a "stationary" hopper having the usual discharge mouth or spout 55'.)

When the closer is unlocked and is opened by the weight of the material in the bucket, it is preferable to lock the same open and to unlock the same from its open-lock position after the discharge of the material from said bucket in order to permit said closer to shut and allow the bucket to receive another load. This is accomplished in the present construction of apparatus by means of suitable regulating means or mechanism in position and operable in the structure shown not only to unlock the same from its closed-lock position and permit it to open, but also operable to lock it open and then to also unlock the same from its open-lock position and allow the same to close.

In the preferred form thereof herein shown and described this regulating mechanism comprises a regulator-blade plate 60, (shown herein obliquely or inclinedly disposed relatively to the discharge-outlet 55' of the hopper and fixedly secured to a rock-shaft 61, journaled in the side walls of said hopper.) The regulator-blade in its preferable form is flanged at its lower end, and which flange 62 extends at such an angle relatively to the blade proper that in operation it will come flat against the stream of material, and thus obviate any tendency of the same to lift such material as it passes from the hopper.

In order to counterbalance the regulator and hold the same in position to permit the discharging material to actuate the same, it is shown provided with a weight 63, which may be adjustable thereon, if desired. In this structure the weight is adjustably secured to a rearwardly-extending arm 64 of said regulator and is supported in its normal

position or position of rest by a bracket 63', projecting at the rear of the hopper.

As above stated, in this preferred form of regulator it is shown comprehending means in position and operative not only to unlock the closer from its closed-lock position to permit it to open, but also operable to lock the same open and to unlock the same from its open-lock position to permit it to shut, and for this purpose, in one form shown, it comprises a plurality of working parts carried by the blade through the medium of an arm 65, secured thereto in any desired way or formed therewith, if desired, and therefore movable with said regulator-blade.

The working part or means operative at one period in the operation of the weighing-machine when the regulator is in its normal position and also operable at another period in the operation of such machine when said regulator is moving into its normal position to unlock said closer from its closed-lock position comprises in the form shown a laterally-extending arm 66, projecting from the arm 65 and carrying at its end a bearing or roll 67 in position to engage one of the working parts of the locker 50, (shown as the end 68 thereof,) to thereby raise the same on the descent of the bucket, whereby the weight of the material in the bucket will open said closer. This locker is also provided with a cam or guide face 69 adjacent to its end 68, to engage said roll in the manner and for the purpose hereinafter specified. The means in this instance for locking the closer open comprises a series of stops or latches 70 and 71, shown one above the other on the arm 65 and in position to engage one of the working parts—such as a stop, preferably in the nature of a stop-arm 72, carried by the closer—and on the disengagement of such stops from the closer by the movement of the regulator-blade such closer will be permitted to shut.

From the foregoing it will be observed that on the descent of the bucket to its poising-point the regulator will be substantially in the position shown in Fig. 3 and therefore in its normal position. On the further downward movement of said bucket the roll 67 of said regulator mechanism, which is likewise in its normal position, engages with the stop or stop-face 68 of the locker 50 and raises the same, thus unlocking the closer and allowing the weight of the material in the bucket to open said closer and discharge itself, such discharge operating the regulator to move the stop 70 of its arm 65 into position to engage the under face of the stop-arm 72 of the closer, which was moved upward simultaneously with the opening of such closer and thus lock the same open.

During the discharge of the material from the load-receiver and when an amount has been discharged therefrom approximately equal to the amount received thereby which was necessary to carry said load-receiver to

its position of poise said load-receiver reascends, Fig. 6, such ascent carrying the closer upward therewith, but still open, whereby the other stop 71 of the regulator mechanism is brought into position to maintain the closer open by the further rearward movement of the regulator-blade, due to the action of the discharging material, in a manner that will be clearly understood.

After the complete discharge of the material from the bucket and when the major portion of the same has passed out of the hopper the regulator-blade gradually moves forward and the open-lock stop 71 thus operated to disengage the closer-stop 72, whereby such closer will quickly shut through the medium of its weight and be first locked shut by means of the locker 50, which is raised for this purpose, as the stop-arm 44 passes under the catch 52 thereof.

In the usual construction of weighing apparatus a second load cannot be received by the bucket until all appreciable amount of material has passed from the hopper, thus somewhat retarding the action of the weighing mechanism; but in this improved construction of machine should the latter portion of the material discharged from the bucket pass slowly or sluggishly from the hopper or for some reason become wedged therein this disadvantage is overcome, and the bucket, owing to the construction and operation of the regulator mechanism, is enabled to continue its operation, so far as receiving a second load is concerned, regardless of such slow passage of the material from the hopper. Hence when the latter part of the bucket discharge does not pass freely from the hopper, Fig. 10, the regulator nevertheless is moved forward sufficiently by its weight to allow the stop 71 to release the closer, which will thus immediately shut and unlock the valve to permit it to open, whereby the bucket again receives a load and descends into position to discharge the same, as before stated, which descent carries the stop 68 of the locker in the rear of the roll 67 of the regulator mechanism, as the regulator-blade is still in operation, and therefore the stop 71 has not been completely returned into position to engage such locker-stop 68, so that such locker still retains the closer shut. When, however, all appreciable amount of material has passed from the hopper, the regulator-blade is permitted to return to its normal inoperative position, such return thereof carrying the roll 67 in engagement with the guide cam-face 69 of the locker, Fig. 11, until such roll reaches the stop end 68 thereof, whereupon it raises the same, Fig. 12, unlocks the closer, and the discharge of the bucket again takes place as before, and which discharge again operates the regulator-blade into position to lock the closer open, in a manner above set forth.

From the foregoing it will thus be seen that the regulator mechanism when in its normal or stationary position will, on the descent of

the load-receiver below its poising position, operate the locker to unlock the closer, and thereby permit the same to open, and that said regulator mechanism on moving to its normal position and approximately at that period when all appreciable amount of material has passed from the discharge-hopper will again, on the descent of said load-receiver with a premature second load, operate to unlock said closer, and thereby permit the same to open, and that, while the load-receiver is permitted to receive a second load, should the latter part of the material in the hopper pass therefrom sluggishly, it will, however, be locked against discharging the same until such hopper is thoroughly free from all appreciable amount thereof.

In connection with the operation of this improved regulating mechanism the operation of the valve mechanism is substantially as follows: As the bucket descends to its poising-point it carries therewith the sector-stop 56, and likewise the weighted arm 30, which permits the valve-lever 28 to follow and thus unlocks the valve from its open position and allows the same gradually to close by means of its weight 34 and reduce the stream of material, Fig. 4. After reaching the poising-point the bucket continues its descent, thus permitting the valve to completely close, Figs. 5 and 6, and shut off the supply thereto, such descent of the valve carrying the sector-stop 26 upward to permit its plane face 26" to be engaged by the curved face 56' of the sector-stop 56 on the opening movement of the closer, which swings such stop 56 into position to thus lock the valve-stop and thereby the valve closed, while such closer remains open.

When the bucket returns to its poising-point, which it does while the closer is still open, as above set forth, the valve is simply more tightly locked closed by the upward movement of the stop 56, the upward movement of the bucket operating through the valve-lever 28 to raise the weight 32 from its stop 33 into position to open the valve on the descent of said weight, and which takes place when the closer is released from its locked-open position and swings the stop 56 out of engagement with the face 26" of the stop 26, whereby such valve-stop 26 can swing downward as the weight 32 returns to its normal position, thereby opening the valve and holding the same open while the closer is locked shut.

Having described my invention, I claim—

1. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; and a regulator operable in one direction by the direct engagement of the discharging load therewith to lock the closer open and operable in the other direction to unlock the same from its open-lock position, to thereby permit the same to shut.

2. The combination, of a receptacle or bucket provided with a closer shiftable for

discharging the load; means for holding or locking the same shut; a hopper; and a regulator shiftable therein in one direction by the discharging load, and in position to engage said closer-locking means and unlock the closer and thereby permit the same to open.

3. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; a hopper; and a regulator shiftable therein and operable in one direction by the discharging load, to lock the closer open, and operable in the opposite direction to unlock the same from its open-lock position, to thereby permit the same to shut.

4. The combination, of a load-receiver provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; and regulating mechanism operative in one position to unlock the closer from its closed-lock position, and then operable to lock the same open, and to unlock the same from its open-lock position and permit it to shut.

5. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; and regulating mechanism shiftable in an inclined plane, in position successively to unlock the closer, lock the same open, and unlock the same from its open-lock position, to thereby permit it to shut.

6. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; and regulating means operable below such locking means, successively to unlock the closer from its closed position, to lock the same open, and to unlock said closer from its open-lock position, to thereby permit it to shut.

7. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; means for locking or holding the closer shut; and oscillatory regulating means in position successively to unlock the closer from its closed-lock position, lock the same open, and to unlock said closer from its open-lock position, to thereby permit it to shut.

8. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; oscillatory means for locking or holding the closer shut; and oscillatory, inclinedly-disposed regulating means in position successively to unlock the closer from its closed-lock position, lock the same open, and unlock said closer, to thereby permit it to shut.

9. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; means carried by the bucket, for holding or locking said closer shut; and regulating mechanism operable successively to unlock the closer from its closed-

lock position, lock the same open, and to unlock the same from its open-lock position, to thereby permit it to shut.

10. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; means carried by the bucket, for holding or locking said closer shut; a hopper; and regulating means carried by the hopper and operable successively to unlock the closer from its closed-lock position, lock the same open, and unlock the same from its open-lock position, to thereby permit the same to shut.

11. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load; a holding or locking latch pivotally connected to the bucket and operative to hold or lock the closer shut; and regulating means disposed and operable below said latch, to engage the same and successively to unlock the closer from its closed-lock position, lock the same open, and to unlock said closer from its open-lock position, to thereby permit it to shut.

12. The combination of a load-receiver provided with a shiftable member operative to discharge a load; means for locking said shiftable member shut; and regulator mechanism operative to unlock said shiftable member from its closed-lock position, thereby to permit it to open, and then operative to lock said shiftable member open.

13. The combination of a load-receiver provided with a shiftable member operative to discharge a load; means for locking said shiftable member shut; and regulator mechanism, substantially as described, controlled by the discharge of the load from said load-receiver, and normally in position to unlock the shiftable member and thereby permit it to open and be locked open, and also operable after the complete discharge from said receiver, and while a part of such load is still passing the regulator mechanism, to unlock said shiftable member from its open-lock position, and thereby permit it to shut and allow the load-receiver, during the passage of the remaining part of such first load by the regulator mechanism, to receive a second load; and said regulator mechanism being also operable in a direction opposite to that in which it was operated by the discharging load to again engage the shiftable-member-locking means in readiness to unlock the same immediately after the complete passage of the material from the regulator mechanism, and thereby permit the shiftable member to open, and the load-receiver to discharge its second load.

14. The combination, of a load-receiver provided with a member shiftable to discharge the load; means for locking or holding said shiftable member shut; and regulating mechanism operative to unlock the shiftable member when said regulating mechanism is in its normal position or is moving thereto, and also

operable to lock said shiftable member open and to unlock the same from its open-lock position, and thereby permit it to shut.

15. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; a hopper; and regulating means operable in one direction by the discharging load, and in position to unlock the closer and permit it to open and be locked open and also operable to unlock the same from its open-lock position after the complete discharge of the bucket-load, to thereby permit such closer to shut and allow the bucket to receive a second load while a part of the first load is still passing from the hopper.

16. The combination, of a rising-and-falling receptacle or bucket provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; a hopper; and regulating means operable by the discharging load and comprehending a regulator-blade and means operative successively to unlock the closer and permit it to open and to lock the same open and also operable to unlock the same from its open-lock position after the complete discharge of the bucket-load and permit such bucket to receive a second load while a part of the first load is still passing from the hopper.

17. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; a hopper; and regulating means, substantially as described, operable in one direction by the discharging load, and in position to unlock the closer and thereby permit it to open and be locked open, and also operable, after the complete discharge from the bucket and while a part of such load is still passing from the hopper, to unlock said closer from its open-lock position and thereby permit it to shut and allow the bucket, during the passage of the remaining part of such first load from said hopper, to receive a second load; and said regulating mechanism being also operable in a direction opposite to that in which it was operated by the discharging load, to engage again the closer-locking means, in readiness to unlock the same immediately after the complete discharge from the hopper of said first bucket-load and thereby permit the closer to open and the bucket discharge its second load therefrom.

18. The combination, of a rising-and-falling bucket or receptacle provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; a hopper; and regulating means, substantially as described, operable in one direction by the discharging load and comprehending a regulator-blade and means operative successively to unlock the closer and thereby permit it to open and lock the same open, and also operable, after the complete discharge from the bucket and while a part of such load is still

passing from the hopper, to unlock said closer from its open-lock position and thereby permit it to shut, and allow the bucket, during the passage of the remaining part of such first load from said hopper, to receive a second load; and said regulating means being also operable in a direction opposite to that in which it was operated by the discharging load, to again engage the closer-locking means in readiness to unlock the same immediately after the complete discharge from the hopper of such first bucket-load and thereby permit the closer to open and the bucket to discharge its second load therefrom.

19. The combination of a movable load-receiver provided with a shiftable member operative to discharge a load; regulator mechanism comprehending a plurality of united locking means, one of which is operable to lock said shiftable member open when said receiver is in its load-discharging position, and the other locking means operable to lock said shiftable member open while the receiver is returning to its normal position.

20. The combination of a rising-and-falling load-receiver provided with a closer shiftable to discharge a load; means for holding or locking said closer shut; and regulator mechanism operable to unlock the closer and permit it to open, and comprehending a plurality of united locking means, one of which is operable to lock the closer open when the load-receiver is in its lowermost position, and the other locking means operable to lock the closer open while the receiver is ascending to its normal position.

21. The combination, of a rising-and-falling bucket or receptacle provided with a closer shiftable for discharging the load; means for locking or holding the closer shut; and regulating means operable to unlock the closer and permit it to open, and comprehending a plurality of locking means disposed one above the other, and one of which is operable to lock the closer open when the bucket is in its lowermost position and the other operable to lock said closer open while the bucket is returning to its normal position, and also operable to unlock said closer from its open-lock position, to thereby permit it to shut.

22. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; and regulating mechanism operable in one direction by the discharging load and comprehending a regulator-plate and means operable to engage the closer to lock the same open and to release the same from its open-lock position, to permit it to shut.

23. The combination, of a rising-and-falling receptacle or bucket provided with a closer shiftable for discharging the load; means for locking or holding the closer shut; and regulating mechanism embodying a regulator-plate and an instrumentality operative successively to unlock the closer from its closed-

lock position, lock the same open, and to unlock the same from its open-lock position, to thereby permit it to shut.

24. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; and regulating mechanism operable in one direction by the discharging load and comprehending an inclinedly - disposed, oscillatory, counterbalanced regulator-plate carrying means movable in the same plane therewith to lock the closer open and operable on the movement of said plate to release the same from its open-lock position, to thereby permit it to shut.

25. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; means for locking or holding the closer shut; and regulating means comprehending a shiftable, inclinedly - disposed, flanged regulator-plate and means operative successively to unlock the closer from its closed-lock position, lock the same open, and to unlock said closer from its open-lock position, to thereby permit it to shut.

26. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; and regulating mechanism comprehending a pivotally - disposed regulator-plate having a plurality of working parts operative successively to have one of its working parts engage the closer-locking means to unlock said closer from its closed-lock position, and have another of its working parts engage the closer to lock the same open, and to unlock said closer from its open-lock position, to thereby permit it to shut.

27. The combination, with weighing mechanism embodying a receptacle or bucket provided with a closer shiftable for discharging the load, said closer having a pair of stops; of a locking-latch pivotally secured to the bucket and having a catch for engaging one of the stops of said closer, to thereby lock the same shut, and also having a stop or stop-face; and regulating mechanism operable to engage the stop of the locking-latch, to thereby unlock the closer and permit the same to open and to then engage the other stop of such closer and lock the same open.

28. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load, said closer having a plurality of working parts; a locker also having a plurality of working parts and operable to have one of its working parts engage one of the working parts of the closer, to thereby lock the same shut; and regulating mechanism likewise having a plurality of working parts and operable successively to have one of its working parts engage a working part of the locker, to thereby unlock the closer and permit it to open and to have another of its working parts engage a working part of the closer, to thereby lock the same open.

29. The combination, with weighing mechanism embodying a receptacle or bucket pro-

vided with a closer shiftable for discharging the load, said closer having a pair of stops; of a locking-latch pivotally secured to the bucket and having a catch for engaging one of the stops of said closer, to thereby lock the same shut, and also having a stop and a cam-face adjacent thereto; and regulating mechanism comprehending a regulator-blade operable in one direction by the discharging load, and having a bearing or roll in position to engage the stop of the locking-latch, to unlock the same from the closer-stop and permit said closer to open, and also having a stop adapted to engage the other closer-stop and thereby lock the same open.

30. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load; means for locking the same shut; a hopper; a regulator-plate disposed in said hopper for shiftable movement; and an instrumentality operative therewith and in position successively to unlock the closer, to permit it to open, lock the same open, and to release the same from its open-lock position, to thereby permit it to shut.

31. The combination, with weighing mechanism embodying a bucket or receptacle provided with a closer shiftable for discharging the load; of a locker having a series of working parts, one of which is operative to lock the closer shut; a hopper disposed below the bucket; a regulator-blade pivotally disposed for oscillatory movement in said hopper and operable in one direction by the discharging load and likewise having a series of working parts, one of which is operative to engage one of the working parts of said locker to unlock the closer to permit it to open, and another operative to engage the closer, to thereby lock the same open.

32. The combination, with weighing mechanism embodying a rising-and-falling bucket or receptacle having successive ascending positions and provided with a closer shiftable for discharging the load, said closer having a pair of stops; of a locking-latch pivotally secured to the bucket and having a catch operative to engage one of the stops of the closer to lock the same shut, and also having a stop or stop-face; a hopper having a discharge-mouth; and regulating means comprising an inclinedly - disposed, oscillatory regulator-blade pivotally secured to said hopper and having a counterbalance-weight, and a member operative with the regulator-blade, to engage the stop or stop-face of the locking-latch, to thereby unlock the closer to permit the same to open, and also having a series of stops operative successively to engage the other stop of the closer, to thereby lock the same open in its successive ascending positions.

33. The combination, of pivotally-supported beam mechanism carrying a bucket or receptacle; valve mechanism operable to regulate the supply of material to said bucket and comprising a shiftable valve; and means com-

prehending weighted mechanism for operating said valve, the weight thereof having its center of gravity substantially over a neutral point of said beam, whereby it does not appreciably affect the poise thereof.

34. The combination, of pivotally-supported beam mechanism carrying a bucket or receptacle; valve mechanism operable to regulate the supply of material to said bucket and comprising a shiftable valve; and means movable with said beam mechanism and comprehending weighted mechanism for opening and holding said valve open, the weight thereof having its center of gravity substantially over a pivotal point of said beam, whereby it does not appreciably affect the poise thereof.

35. The combination, of pivotally-supported beam mechanism carrying a receptacle or bucket; and valve mechanism operable to regulate the supply of material to said receptacle and comprising a shiftable valve, an actuating-lever therefor, and a lever secured to said beam, for movement therewith and having one of its ends in operative engagement with said actuating-lever and carrying adjacent to its opposite end a weight having its center of gravity substantially over a pivotal point of said beam mechanism, whereby it does not appreciably affect the poise thereof, and operable to open and hold the valve open.

36. The combination, of pivotally-supported beam mechanism carrying a receptacle or bucket; and valve mechanism operable to regulate the supply of material to said bucket and comprehending a weighted valve self-closable on the descent of said bucket, an actuating-lever pivotally secured to said valve, and a lever pivotally secured to said beam and in operative engagement at one end with said actuating-lever and carrying adjacent to its opposite end a weight having its center of gravity substantially over a neutral or pivotal point of said beam mechanism, whereby it does not appreciably affect the poise thereof, and operable to open and hold said valve open.

37. The combination, of pivotally-supported beam mechanism carrying a bucket or receptacle provided with a closer shiftable for discharging the load; valve mechanism operable to regulate the supply of material to said bucket and comprising a shiftable valve; means comprehending weighted mechanism for operating said valve, the weight thereof having its center of gravity substantially over a neutral or pivotal point of said beam mechanism, whereby it does not appreciably affect the poise thereof; and means for locking the valve closed against operation by said weight, when the closer is open.

38. The combination, of pivotally-supported beam mechanism carrying a bucket or receptacle provided with a closer shiftable for discharging the load; valve mechanism operable to regulate the supply of material to said bucket and comprising a shiftable valve; means comprehending weighted mechanism,

for operating said valve, the weight thereof having its center of gravity substantially over a neutral or pivotal point of said beam mechanism, whereby it does not appreciably affect the poise thereof; and valve-closer-locking means operatively connected to said valve and closer and operable to lock the valve closed against operation by said weight when the closer is open, and to lock the closer shut when the valve is open.

39. The combination of a load-receiver provided with a shiftable member adapted to discharge a load; means for locking or holding said shiftable member shut; and regulator mechanism controlled by the discharging load and operative in one position to unlock said shiftable member from its closed-lock position and thereby permit said member to open and be locked open, and then operative to unlock said member from its open-lock position to permit it to shut.

40. The combination of a load-receiver provided with a shiftable member operative to discharge a load; means for locking or holding said shiftable member shut; and regulator mechanism controlled by the engagement of the discharging load therewith and operative to lock the shiftable member open when unlocked from its closed-lock position, and thereby permit the discharge of the load.

41. The combination, of a load-receiver provided with a closer shiftable for discharging the load; means for locking the same shut, and a regulating instrumentality normally in position before the discharge of the material from the load-receiver to unlock said closer and permit the same to open; and then controlled by the discharging material from said load-receiver at a certain predetermined period to again unlock said closer should a premature load be received by said load-receiver, and thereby permit said closer to open.

42. The combination, of a load-receiver provided with a closer shiftable for discharging the load; means for locking said closer shut; shiftable means operative when in its normal non-movable position to unlock said closer at a predetermined period and permit it to open, and also operative during a predetermined period of its shifting movement to again unlock said closer and permit it to open.

43. The combination, of pivotally-supported beam mechanism carrying a bucket or receptacle provided with a closer shiftable for discharging the load and also provided with a shiftable stop operatively connected with the closer; valve mechanism comprising a swinging valve also having a stop adapted to have a bearing engagement on the stop of the bucket in a direct downward direction when the closer is open, whereby any tendency to move the bucket laterally is obviated; an actuating-lever for said valve; and a lever movable with said beam mechanism and having one of its ends in engagement with the actuating-lever and its opposite end carrying a weight having its center of gravity substan-

tially over a neutral or pivotal point of said beam mechanism, whereby it does not appreciably affect the poise thereof.

44. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; a valve operable to regulate the supply of material to said bucket; valve-closer-locking means operable to lock the closer shut when the valve is open and to lock the valve closed when the closer is open; independent means for locking or holding the closer shut; and regulating means operable to engage said independent locking means, to thereby unlock the closer and permit the same to open.

45. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load, a valve operable to regulate the supply of material to said bucket; valve-closer-locking means operable to lock the closer shut when the valve is open and to lock the valve closed when the closer is open; and regulating means operable to engage said closer and lock the same open.

46. The combination, of a receptacle or bucket provided with a closer shiftable for discharging the load; a valve operable to regulate the supply of material to said bucket; valve-closer-locking means operable to lock the closer shut when the valve is open and to lock the valve closed when the closer is open; independent means for locking or holding the closer shut; and regulating mechanism operable to engage said independent locking means, thereby successively to unlock the closer and permit it to open, lock the same open, and to unlock the same from its open-lock position, to thereby permit it to shut.

47. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load; a valve operative to regulate the supply of material to said bucket; means operatively connected with said valve and closer, for locking the closer shut when the valve is open and for locking the valve shut when the closer is open and comprising a stop carried by the valve, a stop carried by the bucket and shiftable thereon and in engagement with the valve-stop, and a lever connecting said bucket-stop and closer, whereby they are operated together; independent locking or holding means for the closer; and regulating means operative to engage said independent locking means, thereby successively to unlock the closer and permit it to open, lock the same open, and to unlock said closer from its open-lock position, to thereby permit the same to shut.

48. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load; a valve operative to regulate the supply of material to said bucket; means operatively connected with said valve and closer, for locking the closer shut when the valve is open and for locking the valve closed when the closer is open and embodying a plurality of stops, one movable with the

valve and the other with the bucket, and one having a bearing engagement on the other in a direct downward direction at a certain predetermined period in the operation of the apparatus, whereby tendency to move the bucket laterally is obviated; independent locking or holding means for the closer; and regulating mechanisms operable in one direction by the discharging load, and in position to engage said independent locking means, thereby successively to unlock the closer and permit the same to open, lock said closer open, and to unlock said closer from its open-lock position, to thereby permit the same to shut.

49. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load and with a shiftable stop operatively connected with said closer; a shiftable valve operable to regulate the supply of material to said bucket; a stop operative therewith and having a direct bearing engagement in a downward direction on the stop of the bucket at a certain predetermined period in the operation of the apparatus, whereby tendency to move the bucket laterally is prevented; actuating means operable to open and hold the valve open; an independent locker for locking the closer shut; and regulating means operable to engage said locker, to thereby unlock the closer and permit the same to open.

50. The combination, of a pivotally-supported beam mechanism carrying a bucket or receptacle provided with a closer shiftable for discharging the load; valve mechanism operative to regulate the supply of material to said bucket and comprising a shiftable valve, an actuating-lever therefor, a lever movable with said beam mechanism and operatively connected at one end to said actuating-lever and carrying a weight at its opposite end and having its center of gravity substantially over a neutral or pivotal point of said beam mechanism, whereby it does not appreciably affect the poise thereof; valve-closer-locking means in operative engagement with the valve and closer, for locking the valve closed against operation thereof by said weight when the closer is open and for locking the closer shut when the valve is open; independent locking means for said closer; and regulating mechanism operative to engage the independent locking means, thereby successively to unlock the closer and permit the same to open, lock the same open, and unlock said closer from its open-lock position, to thereby permit the same to shut.

51. The combination, of pivotally-supported beam mechanism carrying a bucket or receptacle provided with a closer shiftable for discharging the load; valve mechanism comprehending a valve operative to regulate the supply of material to the bucket and mechanism for opening and holding the same open and embodying a weight having its center of gravity substantially over a neutral or pivotal point of said beam mechanism, whereby

it does not appreciably affect the poise thereof; means operatively connected with the valve mechanism and closer, for locking the closer shut when the valve is open and for locking the valve closed against operation thereof by said weight when the closer is open and embodying a plurality of stops, one movable with the valve and the other with the bucket and closer, and one bearing directly downward on the other at a certain predetermined period in the operation of the machine, whereby tendency to move the bucket laterally is prevented; independent locking means for the closer; and regulating mechanism operable in one direction by the discharging load, and in position to engage said independent locking means, thereby successively to unlock the closer and permit the same to open, lock the same open, and unlock said closer from its open-lock position, to thereby permit it to shut.

52. The combination, of a pivotally-supported beam mechanism carrying a bucket or receptacle provided with a shiftable stop and with a closer shiftable for discharging the load, said closer having a plurality of working parts; a lever connecting said stop and closer; valve mechanism comprehending a weighted valve shiftable to regulate the supply of material to said bucket and having a stop movable therewith, said stop having a bearing engagement in a direct downward direction on the bucket-stop at a certain predetermined period in the operation of the apparatus, whereby tendency to move the bucket laterally is prevented, an actuating-lever pivotally secured to said valve, a lever pivotally secured to and movable with the beam mechanism and operatively connected at one end to said actuating-lever and carrying at its opposite end a weight having its center of gravity substantially over a neutral or pivotal point of said beam mechanism, whereby it does not appreciably affect the poise thereof; a locking-latch pivotally secured to the bucket and having a plurality of working parts, one operative to engage one of the working parts of said closer, to thereby lock the same shut; and regulating mechanism comprehending a regulator-blade operable in one direction by the discharging load and carrying a plurality of working parts, one operative to engage a working part of the locking-latch, to thereby unlock the closer and permit the same to open, and another operative to engage a working part of said closer and lock the same open and also operative to permit the same to shut at the proper period in the operation of the apparatus.

53. The combination, of a bucket or receptacle provided with a closer shiftable for discharging the load; a hopper; a valve operable to regulate the supply of material to said receptacle; valve-closer-locking means embodying a pair of stops, one movable with the valve and the other with the bucket and op-

eratively connected with and shiftable with the closer, and one of said stops bearing directly downward on the other stop when the closer is open, whereby tendency to move the bucket laterally is prevented; independent locking means for the closer; and regulating means operable in one direction by the discharging load, and in position to engage said independent locking means, to thereby unlock said closer and permit the same to open and then to lock the closer open, and operative in the opposite direction not only to unlock said closer to thereby permit the same to shut and allow the bucket to receive a second load, but also into position, when the hopper is not completely free of the first bucket-load, to reengage the independent locking means in readiness to again actuate the same after the complete discharge from said hopper and thus again unlock the closer.

54. In a weighing mechanism, the combination with a bucket, of a bucket-closer; and a closer-latching regulator having a latch thereon for holding the bucket-closer when the latter is open, thereby latching the closer in its open position.

55. The combination of a load-receiver provided with a shiftable member operative to discharge a load; main locking means for locking the shiftable member shut; independent locking means for also locking said shiftable member shut; and regulator mechanism operable to lock said shiftable member open.

56. The combination of a load-receiver provided with a shiftable member operative to discharge a load; main locking means for locking the shiftable member shut; independent locking means for also locking said member shut; and a regulator operative in one position to unlock said independent locking means and permit the shiftable member to open.

57. The combination of a load-receiver provided with a closer shiftable to discharge a load; main locking means for locking said closer shut; independent locking means for also locking said closer shut; and a regulator operative when in its stationary position to unlock said independent locking means and thereby permit the closer to open; and also shiftable at one predetermined period into position to again unlock said independent locking means to permit the closer to open when the load-receiver obtains a premature second load.

58. The combination of a load-receiver provided with a shiftable member operative to discharge a load; main locking means for locking the shiftable member shut; independent locking means for also locking said shiftable member shut; and a regulator operative in one position to unlock said independent locking means and permit the shiftable member to open, and then operative to lock the same open.

59. The combination, of a load-receiver provided with a closer shiftable for discharging the load; means for locking the closer shut;

and regulating mechanism normally in position to unlock the same, and thereby permit said closer to open, and then operative successively to lock said closer open and unlock the same at the proper predetermined period, and also shiftable in the same direction as its open-lock-unlocking movement to again unlock said closer should the load-receiver obtain a premature second load; and then operative successively to lock such closer open to permit the discharge of such premature load and then release the closer to permit said closer again to shut.

60. The combination of a load-receiver provided with a shiftable member operative to discharge a load; means for locking said shiftable member shut; and shiftable means controlled by the engagement of the discharged material therewith after the same has completely left said load-receiver, and operative, when said receiver obtains a premature load, to unlock said locking means and permit said shiftable member to open.

61. The combination of a load-receiver provided with a closer shiftable to discharge a load; a discharge-hopper; means for locking the closer shut; and a weighted instrumentality normally in position to unlock said locking means to permit said closer to open, and shiftable into position by its weight, and controlled by the passage of the material from said discharge-hopper again to unlock said locking means to permit the closer to open when the load-receiver obtains a premature second load.

62. The combination of a load-receiver provided with a closer shiftable to discharge a load; main locking means operative to lock the closer shut; independent locking means for locking said closer shut; and regulator mechanism operable successively to engage one of said locking means, thereby to unlock the closer and permit the same to open, then lock the same open, and then to unlock the same from its open-lock position to permit said closer to shut.

63. The combination, of a hopper; a load-receiver provided with a closer shiftable for discharging the load; a valve operable to regulate the supply of material to said load-receiver; valve-closer-interlocking means operable to lock the valve closed when the closer

is open and to lock the closer shut when the valve is open; independent means for also locking the closer shut; and a regulator-plate operable in one direction on the discharge of the load from said hopper to engage said independent locking means, and thereby unlock said closer and permit the same to open should the load-receiver obtain a premature second load.

64. The combination, of a load-receptacle provided with a closer shiftable for discharging the load; means for holding or locking the closer shut; and a regulator operable in one direction by the direct engagement therewith of the discharging load, and also operative to unlock the closer from its closed-lock position and thereby permit the same to open.

65. The combination, of a load-receptacle provided with a closer shiftable for discharging the load; means for locking the closer shut; a regulator-plate, and means carried thereby and in position to unlock the closer from its closed-lock position, to thereby permit the same to open.

66. The combination, of a load-receptacle provided with a member shiftable to discharge the load; and a regulator disposed below such shiftable member and operable in one direction to lock the member open.

67. The combination, of a load-receptacle provided with a member shiftable to discharge the load; a regulator-plate; and means carried thereby and operable therewith in one direction to lock the member open.

68. The combination, of a load-receptacle provided with a closer shiftable for discharging the load; a hopper; and a regulator shiftable therein and operable in one direction by the discharging load to lock the closer open.

69. The combination of a load-receiver provided with a shiftable member operative to discharge a load; regulator mechanism controlled by the direct engagement therewith of the discharging material, and operative when in its normal stationary position to unlock said closer and permit the same to open and thereby discharge the load.

FRANCIS H. RICHARDS.

Witnesses:

FRED. J. DOLE,
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