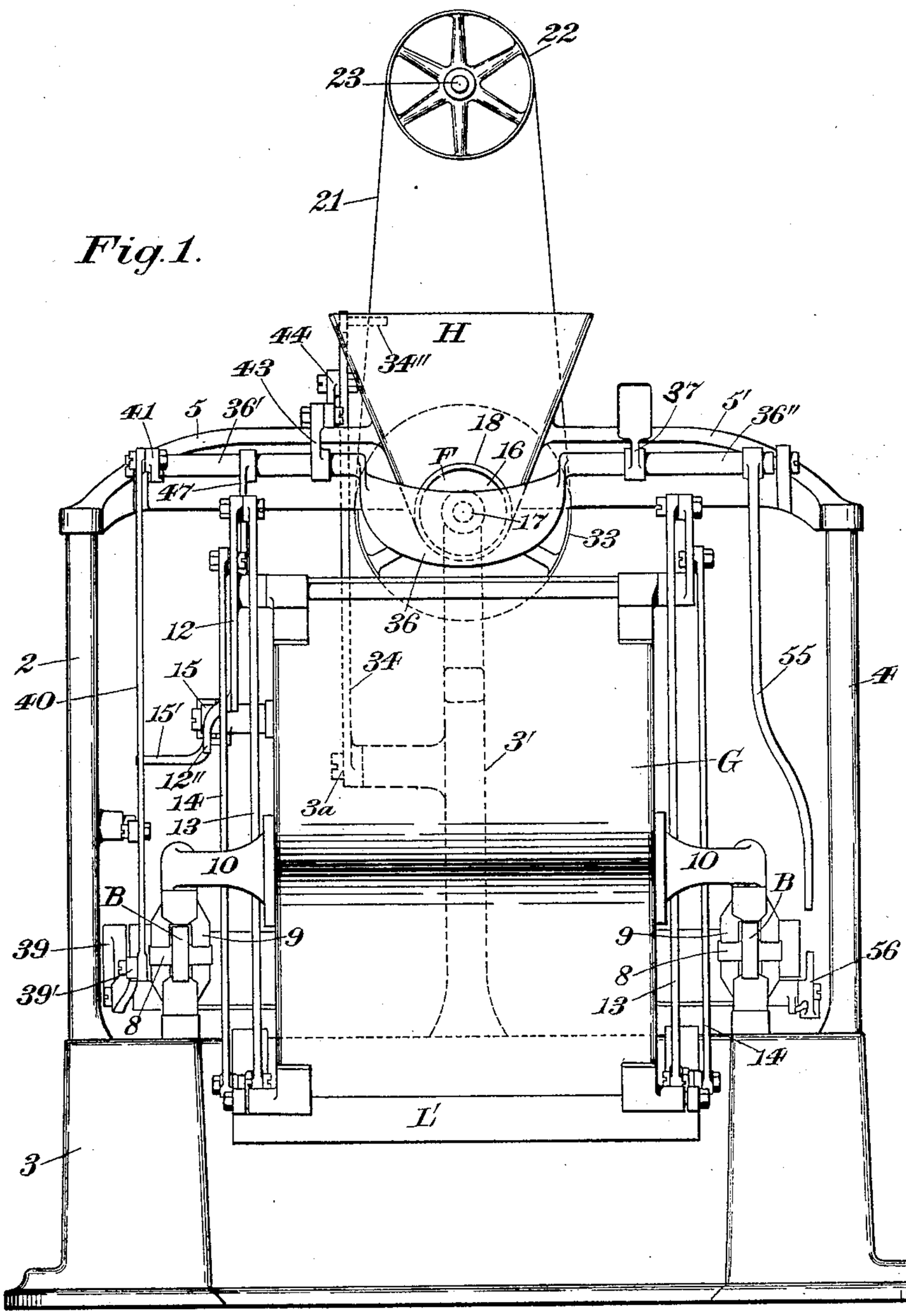
(No Model.) 5 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 572,089. Patented Nov. 24, 1896.

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

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WEIGHING MACHINE.

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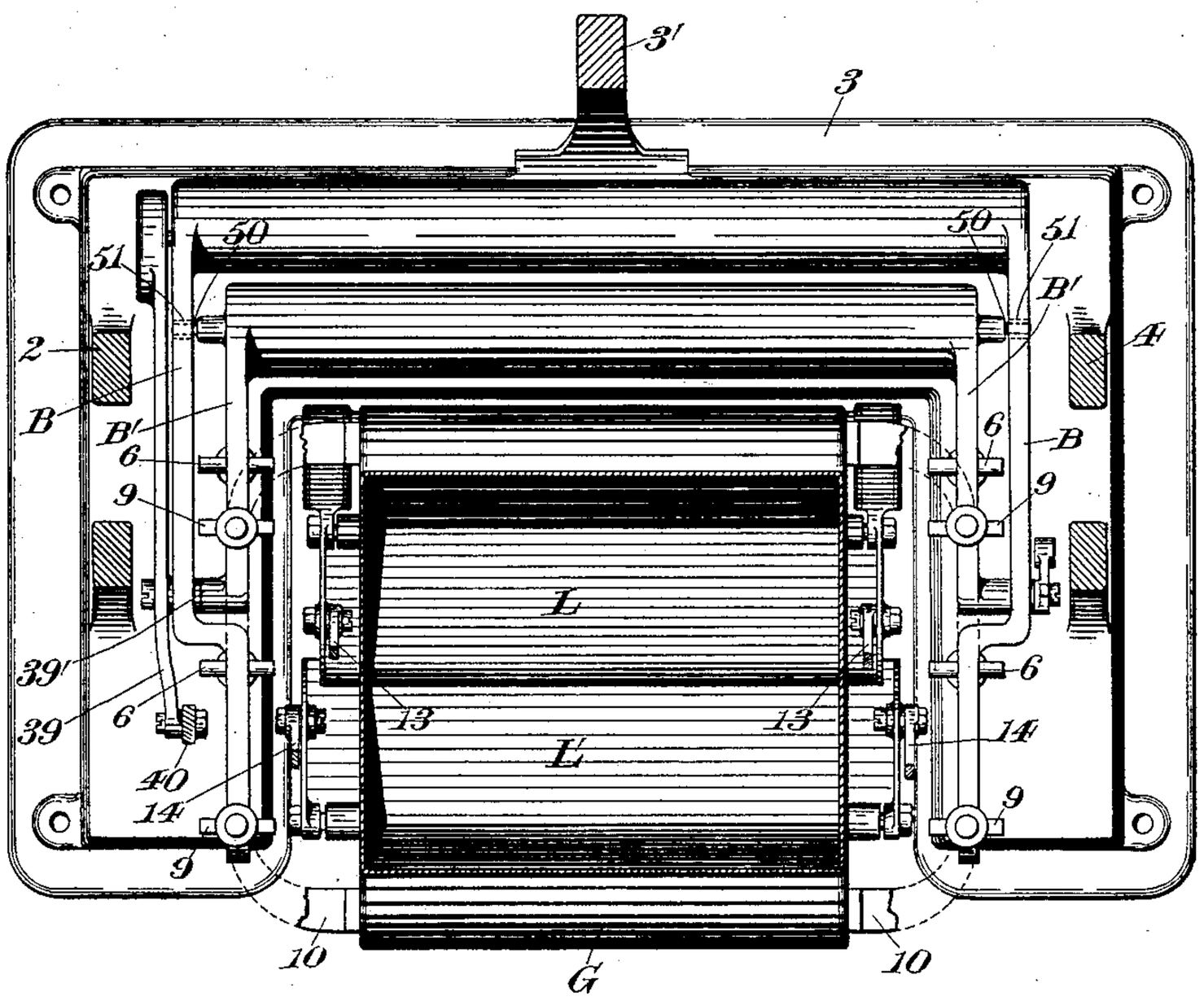
Fig. 2.



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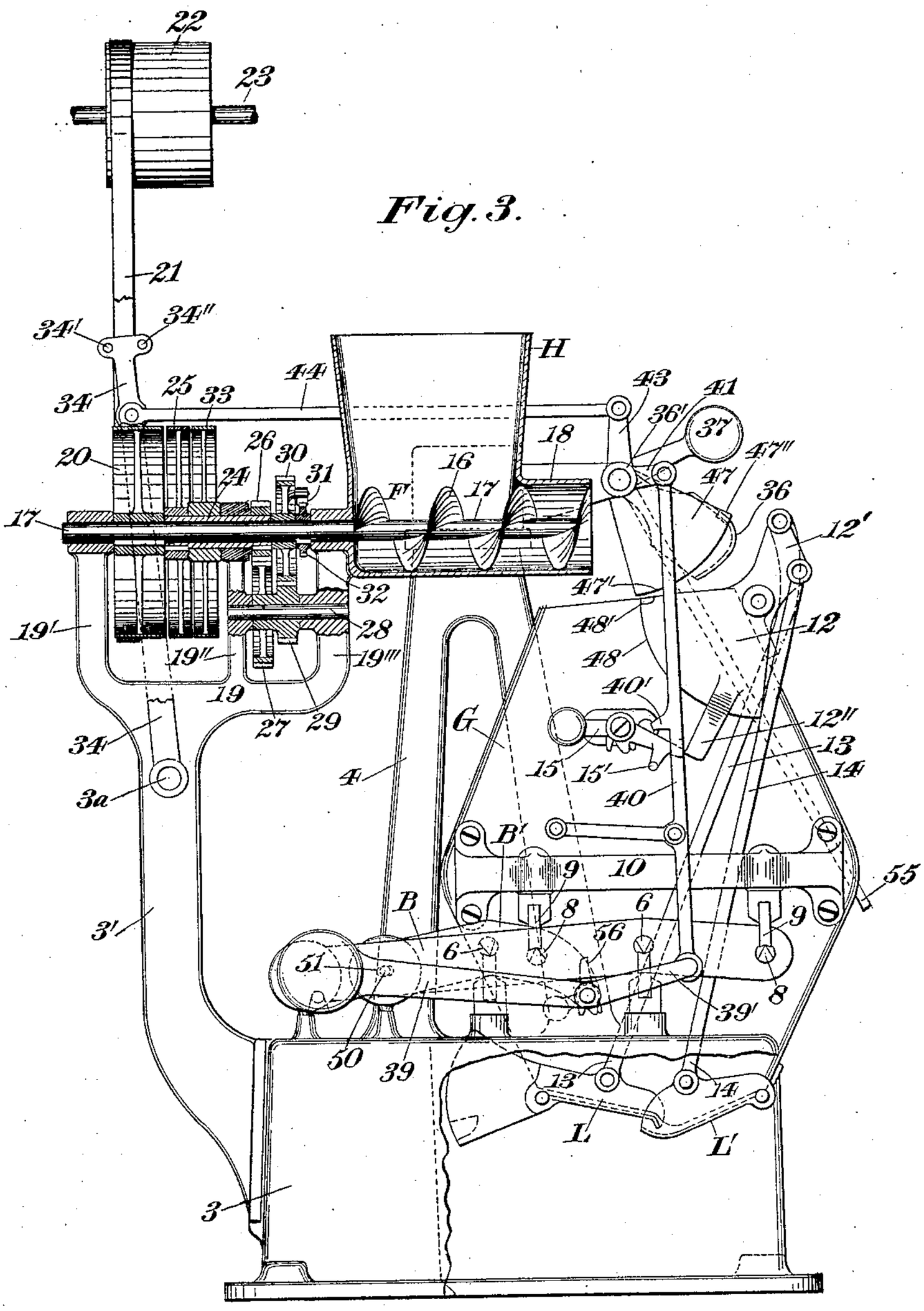
WEIGHING MACHINE.

No. 572,089. Patented Nov. 24, 1896.

Fig. 3.



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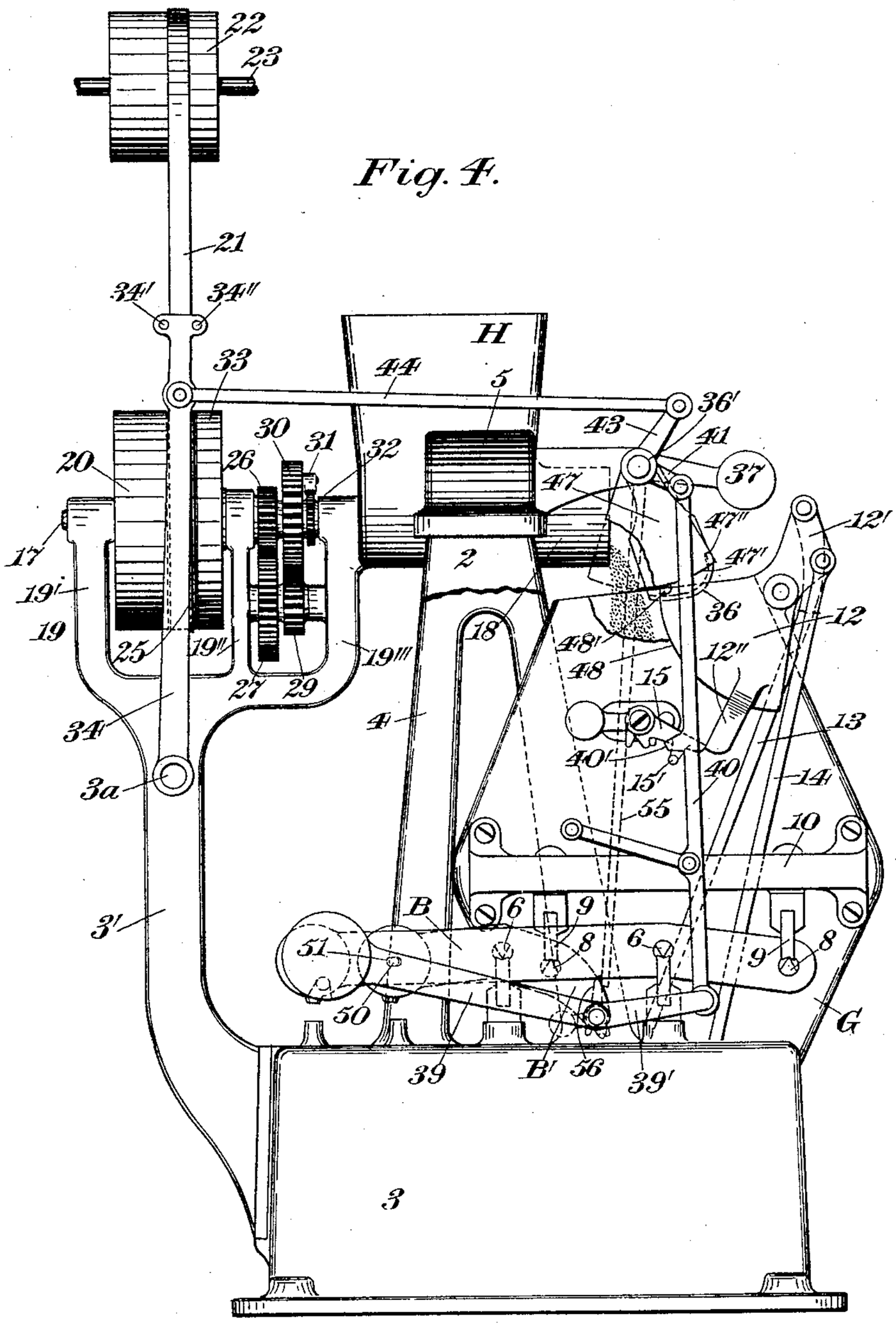
WEIGHING MACHINE.

No. 572,089. Patented Nov. 24, 1896.

Fig. 4.



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WEIGHING MACHINE.

No. 572,089. Patented Nov. 24, 1896.

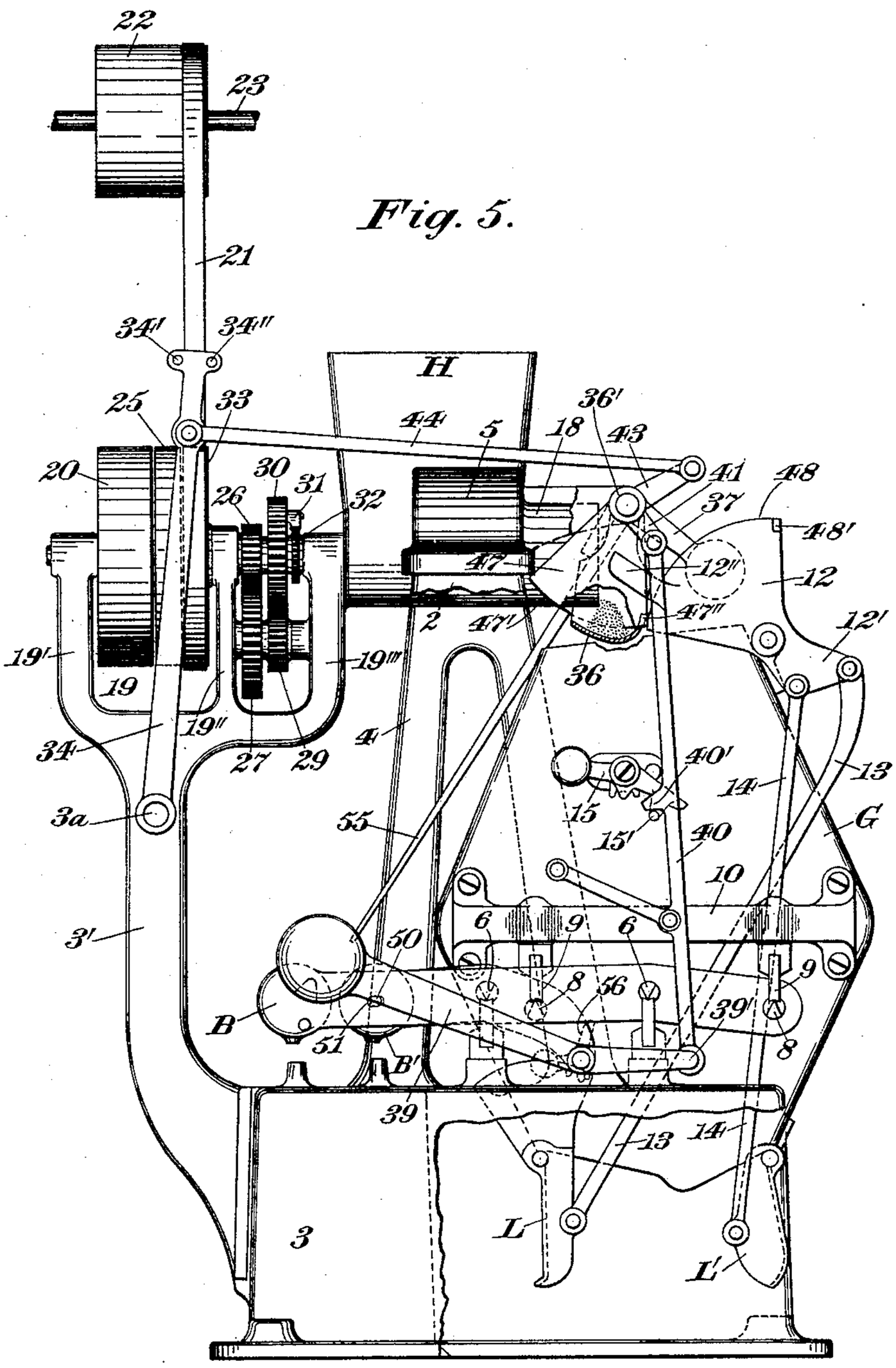

Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 572,089, dated November 24, 1896.

Application filed July 2, 1896. Serial No. 597,833. (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 of the invention being to provide an improved machine of this character more especially adapted for the automatic weighing of slow-running or sluggish materials which cannot be successfully weighed with the ordinary types of machine.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine comprehending my present improvements in the preferred embodiment thereof. Fig. 2 is a sectional plan view of the machine. Figs. 3, 4, and 5 are end elevations with parts cut away, as seen from the left in Fig. 1, and illustrate the successive positions assumed by the respective parts at the commencement of operation at the inception of the poising period and during the load-discharging period, respectively.

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

The framework for supporting the various parts of the machine may be of any suitable or preferred construction, it consisting in the present instance of the end frames or uprights 2 and 4, mounted upon the supporting-base 3.

A chute or hopper is illustrated at H, it being furnished with the laterally-extending brackets or arms 5 and 5′, which may be suitably attached to the uprights 2 and 4, respectively.

The bucket or load-carrying receptacle of the machine is designated by G, and for supporting the same the improved compound beam mechanism herein illustrated may be employed, the latter comprising the counterweighted scale-beams B and B′, respectively, having the usual bucket-supporting arms, the arms for the first-mentioned scale-beam being relatively longer than those of the other, though said beams will be preferably fulcrumed to exert approximately the same amount of leverage. One of said scale-beams (herein illustrated as the scale-beam B′) will be located within the area circumscribed by the other, the arms of both beams extending in coinciding directions from the bucket.

The arms of the two scale-beams B and B′ may be furnished with pivots or knife-edges 6, sustained by suitable supports, as the V-shaped bearings, connected to the base 3. The beam-arms adjacent to the outer ends thereof may also carry a second set of pivots or knife-edges 8, against which the V-shaped bearings 9, depending from the hangers 10 on the opposite ends of the bucket, may work.

A suitable guide or guiding means will be employed between the scale-beams B and B′, respectively, for maintaining the same in a common plane throughout the movement thereof, such guiding means consisting in the present instance of a pin or stud 50, projecting from an arm of the scale-beam B′ and into the longitudinal slot or recess 51, formed in the inner face of the adjacent arm of the scale-beam B.

The closer mechanism embodies a pair of closers L and L′, which consist of suitably-formed plates pivoted, respectively, at opposite sides of the discharge outlet or opening of the bucket, said plates overlapping to form a waste-proof joint. For supporting and holding the two closers against opening movement the instrumentalities illustrated may be employed, comprising a duplex toggle consisting of the rocker 12, pivotally supported at a suitable point on the bucket G, and the two connecting-rods 13 and 14, the lower ends of said rods being pivoted to the closers L and L′, respectively, and similarly joined to the rocker extension 12′ at opposite sides thereof. The duplex toggle members will be so disposed that when the closers are in the shut positions thereof, as indicated in Fig. 3, the several toggle-pivots will be approximately in line, so that the rocker may be held against movement by a minimum pressure thereon. For thus holding the rocker 12 against oscillating movement, and also maintaining the two closers in a shut position, a counterweighted bucket-latch is illustrated at 15, it being preferably pivoted to the bucket and swinging upward to engage the rocker 12 or the arm 12″ thereof. It will be evident that on the depression of said latch by suitable means the two closers L and L′ will be freed

of all restraint, so that, such action taking place, they may be instantly forced open by the weight of the contents of the bucket.

My present invention involves the provision of a feeder which is operable for feeding or forcing a stream of material from the chute or hopper H and into the bucket G.

Means will be employed for driving the feeder at a variable speed or velocity. In the form herein illustrated the feeder will have its highest efficiency at the commencement of operation, whereby it is operable for supplying a stream of relatively large volume to the bucket G, which is intended to form the major part of the load. At a succeeding point the movement of the feeder will be slackened or reduced, the consequence being the feeding of an attenuated or reduced stream into the bucket, which constitutes the drip-stream for completing the partial load.

The feeder is designated by F and consists of a spiral screw or blade 16, suitably attached to its supporting-shaft 17, the screw 16 being rotative in the tubular and preferably cylindrical horizontal spout 18, extending from the hopper H and communicating with the interior thereof.

A standard or brace is shown at 3′ extending upward from the base and terminating at its upper end in a trifurcated bracket 19, consisting of the branches 19′, 19″, and 19‴, the two outer branches having, adjacent to the upper ends thereof, suitable bearings in which the feeder-supporting shaft 17 is journaled, the branch 19‴ being preferably formed integral with the chute or hopper H, whereby the stability of the latter is materially increased.

For effecting a variable or differential movement of the feeder F the means herein illustrated will be preferably employed and will now be described.

The feeder-supporting shaft 17 is illustrated carrying a fixed pulley 20, which constitutes a medium for transmitting high speed to the connected feeder F, said pulley 20 being keyed or otherwise suitably attached to the shaft 17. A driving-belt is shown at 21 passed around the pulley 20 and the relatively wide pulley or drum 22, the shaft 23 of which is to be operatively connected with a suitable motor. (Not shown.) The shaft 17 is loosely embraced or encircled by the bushing or collar 24, to which may be keyed the pulley 25, said pulley being operatively connected to the feeder F and preferably through an interposed train of differential gearing. A relatively small gear or pinion is illustrated at 26 meshing with a larger gear or pinion 27, which may be loose on its supporting-shaft 28, the latter being journaled in the branches 19″ and 19‴ of the bracket 19. A second small gear is shown at 29, and which may be conveniently formed integral with the gear 27, said gear meshing with a relatively large gear 30, loose on the shaft 17. The ratio of the gears 26, 27, 29, and 30 is one to two and two to one, although it is obvious that this may be varied. The relatively large gear 30 is shown having pivotally connected thereto the pawl 31, which is adapted to engage the teeth of the pinion 32, keyed to the shaft 17, on the rotation of said gear 30. The belt 21 may be automatically shifted from the pulley 20 to the pulley 25 for changing the speed of the feeder F and may also have a further shifting movement to the loose pulley or idler 33, which is rotative about the bushing or sleeve 24, so that when said last-mentioned shipment of the belt takes place the result will be an immediate throwing out of action of the feeder F or stoppage thereof, whereby it is rendered ineffective as a feed or supply device and coacts with the spout 18 in serving to control the stream.

A belt shipper or shifter is shown at 34 consisting of an upright lever having the usual belt-engaging fingers 34′ and 34″, said lever being pivoted at 3ª to the standard 3′ and being connected to a reciprocatory member of the weighing mechanism for automatic operation.

The operation of the feed driving or actuating mechanism will be readily obvious from an inspection of Figs. 3 and 4 of the drawings. Motion being imparted to shaft 23 will be communicated to the belt 21 through the pulley 22, and hence the connected pulley 20 will be thereby driven and the shaft 17, and consequently the feeder, rotated, so that said feeder is adapted for forcing a stream of relatively large volume from the hopper H through the spout 18 and into the bucket G.

At a predetermined point in the operation of the machine the belt 21 will be slipped from the pulley 22 and to the pulley 25, which action rotates said pulley 25, the bushing 24, and hence the train of differential gears or pinions 26, 27, 29, and 30, and the latter through its connected pawl 31 then rotates the pinion 32, the shaft 17, and also the feeder F at a comparatively slow speed, the result being the supply of a relatively fine stream to the bucket G.

On the stoppage of the feeder F particles of the material are usually dislodged or drop from the spout 18, and for catching these particles an oscillating valve will be preferably employed, said valve being of concaved or pan shape. The valve is designated by 36 and has the laterally-projecting arms 36′ and 36″, provided with bearings in the outer ends thereof for the reception of journals connected to the framing of the machine. This valve will be normally maintained away from the line of feed of the supply-stream to thereby permit the descent of the latter without obstruction into the bucket G.

For closing the valve or projecting it toward and subsequently across the line of feed of the supply-stream a counterweighted arm is illustrated at 37, it being suitably affixed to the valve-supporting arm 36″. The normal tendency of the counterweighted arm 37

is to close the valve, this action, however, being suitably checked or limited by suitable means, which in the present case also serve the purpose of holding the valve in its open position, the valve-opening actuator being conveniently utilized for attaining this result.

The valve-opening actuator is designated by 39 and consists of a counterweighted lever shiftably supported by the scale-beam B', it being pivoted or fulcrumed to the lateral projection 39' thereof. The counterweight of said lever will be normally maintained on the counterpoised side of the scale-beam B or that part thereof to the left of its axis, suitable stops being employed for this purpose.

At a predetermined point in the operation of the machine the lever 39 is automatically shifted about its center of movement, as indicated in Fig. 5, and on its return to normal position it is operable for transmitting an upward thrust to the connecting-rod 40, which is pivoted to the projection 41, extending from the valve-supporting arm 36', whereby such thrust will be communicated to the valve 36 for forcing the same open. The rod 40 being in contact with the short arm of the counterweighted lever 39, which during the major period of the operation constitutes, practically, a fixed extension of the beam B', it is apparent that the valve-closing movement will be limited in correspondence with the descent of the beam mechanism.

It will be remembered that a belt shipper or shifter has been described for shipping the belt 21 along the series of pulleys 20, 25, and 33. Said belt-shipper will be also operatively connected with the valve 36, whereby such movement of the belt may be automatically effected at proper points in the operation of the machine. The valve-supporting arm 36' is shown having connected thereto the rock-arm 43, to the upper end of which is pivoted the connecting-rod 44, the opposite end of said rod being jointed to the lever 34 at a point near its belt-engaging fingers. It will be evident that as the valve is swung closed by the counterweighted arm 37, as hereinbefore described, the rock-arm 43 will be oppositely oscillated, so that the belt 21, being on the pulley 20, may be shipped therefrom to the next pulley 25, and subsequently to the last pulley 33 of the series, and at successive points in the operation of the machine, for first changing the speed of and then completely stopping the feeder F.

Means will be employed for intercepting the movement of the belt-shipper 34 at a predetermined point in the operation of the machine or while the belt 21 is on the intermediate pulley 25 of the series, the feeder then being driven at its slow speed. For this purpose a by-pass stop 56, consisting of a counterweighted latch pivotally supported on the poising side of the scale-beam B', is employed, the arm of said by-pass stop being positioned to engage the depending rod 55 of the valve 36 at the commencement of the poising period, so that said valve, and hence the connected shipper 34, may be positively held against movement while such action continues, suitable means being employed for limiting the movement of the by-pass stop 56. On its return stroke the rod 55 engages and swings the by-pass 56 ineffectively about its axis. On the descent of the scale-beam B' below the poising-line, with its mate B, indicating the completion of a bucket-load, the by-pass stop 56 will move therewith, release the depending rod 55 and the valve 36, the latter being given its final closing movement by the counterweighted arm 37, said valve swinging the shipper 34 to the right, whereby the driving-belt 21 will be slipped by the said shipper from the pulley 25 to the last pulley or idler 33 of the series.

My present invention involves the provision of reciprocally-effective stops operative, respectively, with the valve and with a closer, the valve-operative stop being shown as a segmental blade 47 connected to the valve-supporting arm 36', the coacting stop being shown as the rocker 12, which is also segmental. The curved face of the stop 47 is illustrated as being concentric with the axis of movement of the valve, the similar face 48 of the rocking stop 12 being concentric with its center of movement. A supplemental stop is illustrated at 47'' projecting inward from the stop 47 and at one end of the curved face 47', and the rocking stop 12 is furnished with a similar device 48', also at one end of its curved face 48. The action of the interlocking stop mechanism will be readily obvious. At the commencement of operation the projecting or supplemental stop 48' will be in contact with the curved stop-face 47', so that should the latch 15 have been accidentally tripped the rocking movement of the stop 12 will be positively blocked by the coacting stop 47, and this action will continue so long as the stop-face 47' and supplemental stop 48' are contiguous. When, however, they pass out of contact, due to the closure of the valve 36, the rocking stop 12 is free to oscillate immediately, and on such movement its curved stop-face 48 will travel along the supplemental stop 47'', so that the oscillation of the stop 47 will be limited. When the curved stop-face 48 has passed out of contact with the supplemental stop 47'', the valve 36 may be opened in the manner previously described. On the opening of the valve the belt 21 will be instantly shipped from the pulley 33 to the pulley 20 through the operative connections between the valve and the belt-shipper 34, to thereby start the feeder F.

It will be remembered that a latch 15 has been described normally operative for maintaining the closers L and L' against opening movement by engaging the rocker-arm 12'' and that said latch is also depressible. For tripping the latch means operative with the valve 36 will be employed, such means con-

sisting of a projection, as 40′, carried by the rod 40, which has a movement into engagement with the latch-pin 15′ when the valve has nearly reached the end of its closing movement, so that on the continuation of such movement the rod 40 will descend, the latch will be tripped, and the rocker 12, and hence the connected closers L and L′, freed of all restraint.

The operation of the hereinbefore-described machine is as follows: Fig. 3 represents the positions occupied by the respective parts at the commencement of operation, the closers L and L′ being shut and held in such position by the latch 15, which is in engagement with the rocker-arm 12″, the valve being open and the driving-belt 21 on the pulley 20, so that when motion is imparted to the drum or pulley 22 it will be transmitted to the pulley 20, and hence to the feeder F, the latter being driven at a relatively high speed. On such movement of the feeder it is operable for feeding from the hopper H, through the spout 18 and into bucket G, a stream of large volume. When the bucket has received a certain portion of its load, it will descend, the poising side of the beam mechanism, and hence the non-counterweighted arm of the shiftable lever 39, moving downward in unison therewith, so that when said counterweighted lever falls from under the connecting-rod 40 the slow closure of the valve 36 by its counterweighted arm 37 will be permitted, and during this action the driving-belt is being slowly moved toward the pulley 25 by the shipping of the lever 34, which is connected to the valve 36. At the commencement of the poising period, as illustrated in Fig. 4, the driving-belt 21 will have been shipped to the intermediate pulley 25, the valve 36 being at the time held against movement by the by-pass stop 56, which intercepts the depending rod 55 of said valve. When the belt 21 is on the pulley 25, the feeder F will be driven through the interposed train of differential gearing consisting of the pinions 26, 27, 29, and 30 and the pawl 31 and pinion 32. Said differential gearing materially reduces the rotative speed of the feeder, whereby the stream supplied to the bucket is much reduced or attenuated. This reduced stream will be fed into the bucket, the latter in the meantime further descending. On the completion of the bucket-load the beam B′ will descend below the poising-line and the by-pass stop 56 thereof will release the depending rod 55 of the valve 36, so that the latter may be instantly projected across the line of flow of the supply-stream by its counterweighted lever 37, and during this movement said valve is instantaneously effective for operating the belt-shipper 34 to slip the belt 21 to the loose pulley 33, whereby the feeder F will be stopped, the valve on such final movement catching any particles that may fall from the spout 18 on the stoppage of the feeder F. During this last-mentioned movement of the valve 36 the projection 40′ on the valve-thrust rod 40 will be forced downward into engagement with the latch-pin 15′, thereby depressing the latch and releasing the closers L and L′, so that they may be instantly forced open by the weight of the bucket contents to discharge the same.

Having described my invention, I claim—

1. The combination with a bucket, of a pair of scale-beam arms united at their rear ends by a counterweight; and a second pair of scale-beam arms also united at their rear ends by a counterweight, said last-mentioned pair being located within the area circumscribed by the first-mentioned pair, and the beam-arms and weights of both pairs being parallel with each other.

2. The combination with a bucket, of a pair of beam-arms united at their rear ends by a counterweight; a second pair of beam-arms also united at their rear ends by a counterweight and located within the area circumscribed by the first-mentioned pair of beam-arms, the beam-arms and counterweights being in parallelism with each other; and a guide between said pairs of beam-arms.

3. The combination with a bucket, of a pair of beam-arms united at their rear ends by a counterweight; a second pair of beam-arms also united at their rear ends by a counterweight and located within the area circumscribed by the first-mentioned pair; and a pin-and-slot guiding connection between said pairs of beam-arms.

4. The combination with weighing mechanism, of a screw feeder; a pair of pulleys connected to said feeder, one of them through an interposed train of differential gears; a belt shiftable from one of said pulleys to the other; and a belt-shifter controlled by a reciprocatory member of the weighing mechanism.

5. The combination with weighing mechanism embodying a reciprocatory member, of a feeder; a pair of pulleys connected to said feeder, one of them through an interposed train of differential gears; a belt shiftable from one of said pulleys to the other; and a belt-shifter automatically operated by said reciprocatory member.

6. The combination with a valve, of a feeder; a pair of pulleys connected to said feeder, one of them through an interposed train of differential gears; a belt shiftable from one of said pulleys to the other; and a belt-shifter automatically operated by said valve.

7. The combination with a valve, of a feeder; a series of three pulleys, two of which are connected to said feeder, one of them through an interposed train of differential gearing, said third pulley constituting an idler; a belt shiftable along said series of pulleys; and a belt-shifter automatically operated by the valve.

8. The combination with a valve, of a feeder and its supporting-shaft provided with

a bushing; a pair of pulleys rotative, respectively, with said shaft and bushing; a train of differential gears operatively connected, respectively, to said feeder and bushing; a belt movable from one of said pulleys to the other; and a belt-shifter automatically operated by the valve.

9. The combination with a valve, of a feeder and its supporting-shaft provided with a bushing; a pair of pulleys rotative, respectively, with said shaft and bushing; a pinion fast on said shaft; and a train of differential gears, the first member of the series being connected to said bushing and the last furnished with a pawl for engaging the teeth of said pinion; a belt movable from one of said pulleys to the other; and a belt-shifter automatically operated by the valve.

10. The combination with a feeder and its supporting-shaft and with a valve having supporting-arms, one of which is provided with a rock-arm; of a bushing on said shaft; a pair of pulleys attached, respectively, to said shaft and bushing; a train of differential gears connected with said bushing and feeder; a belt movable from one of said pulleys to the other; and a belt-shipping lever joined to said rock-arm by a rod.

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