(No Model.)

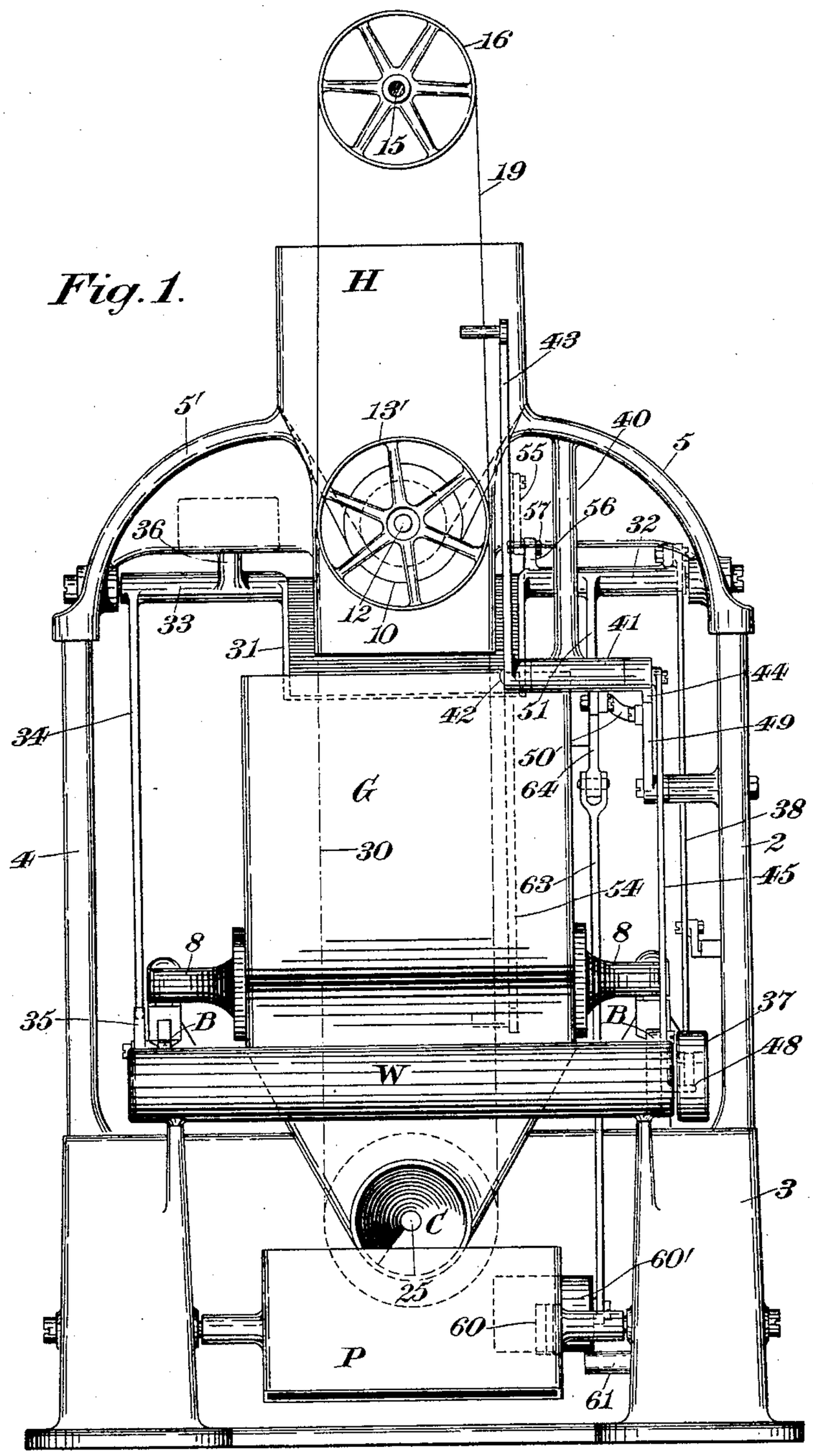
3 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 572,066. Patented Nov. 24, 1896.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

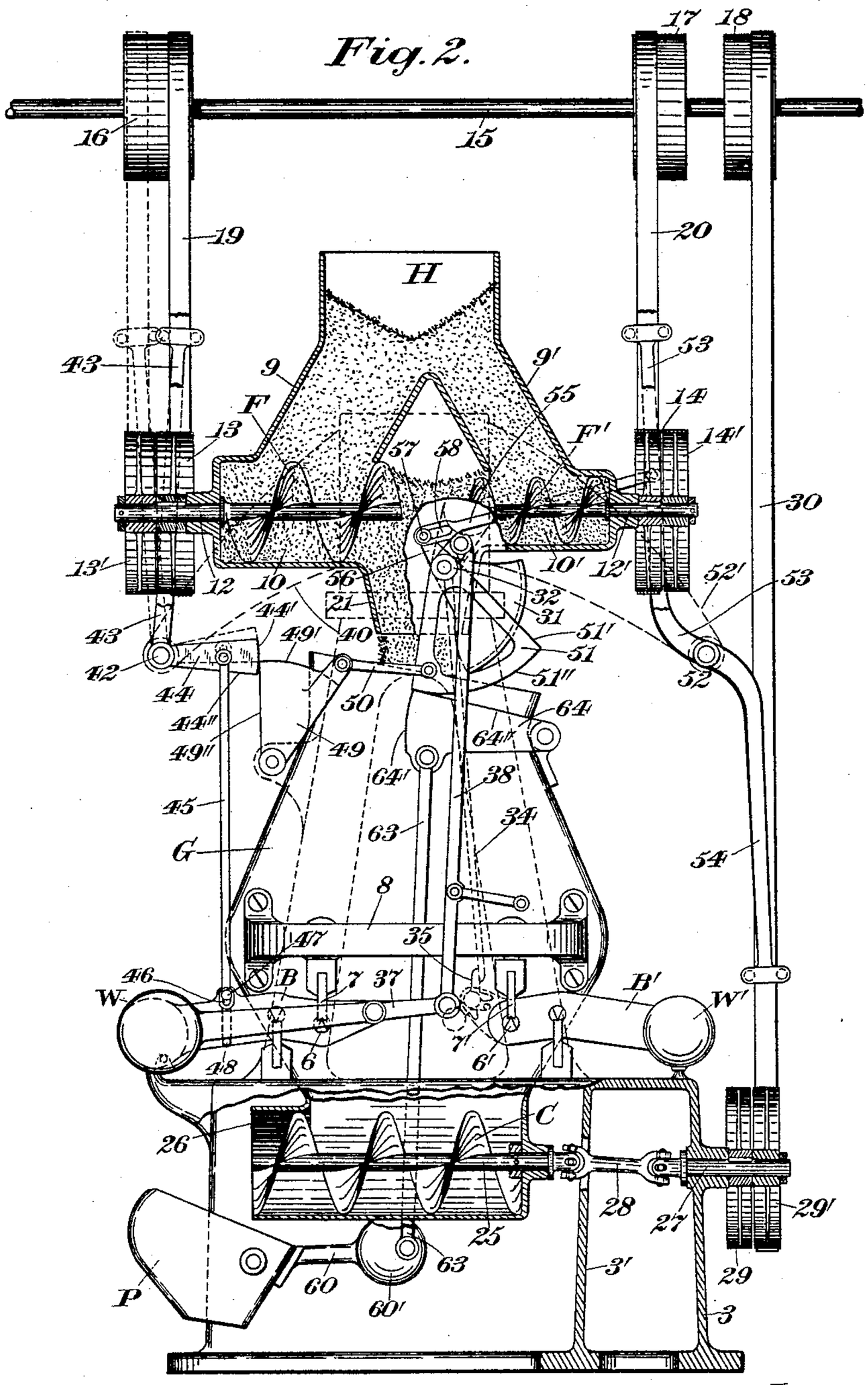

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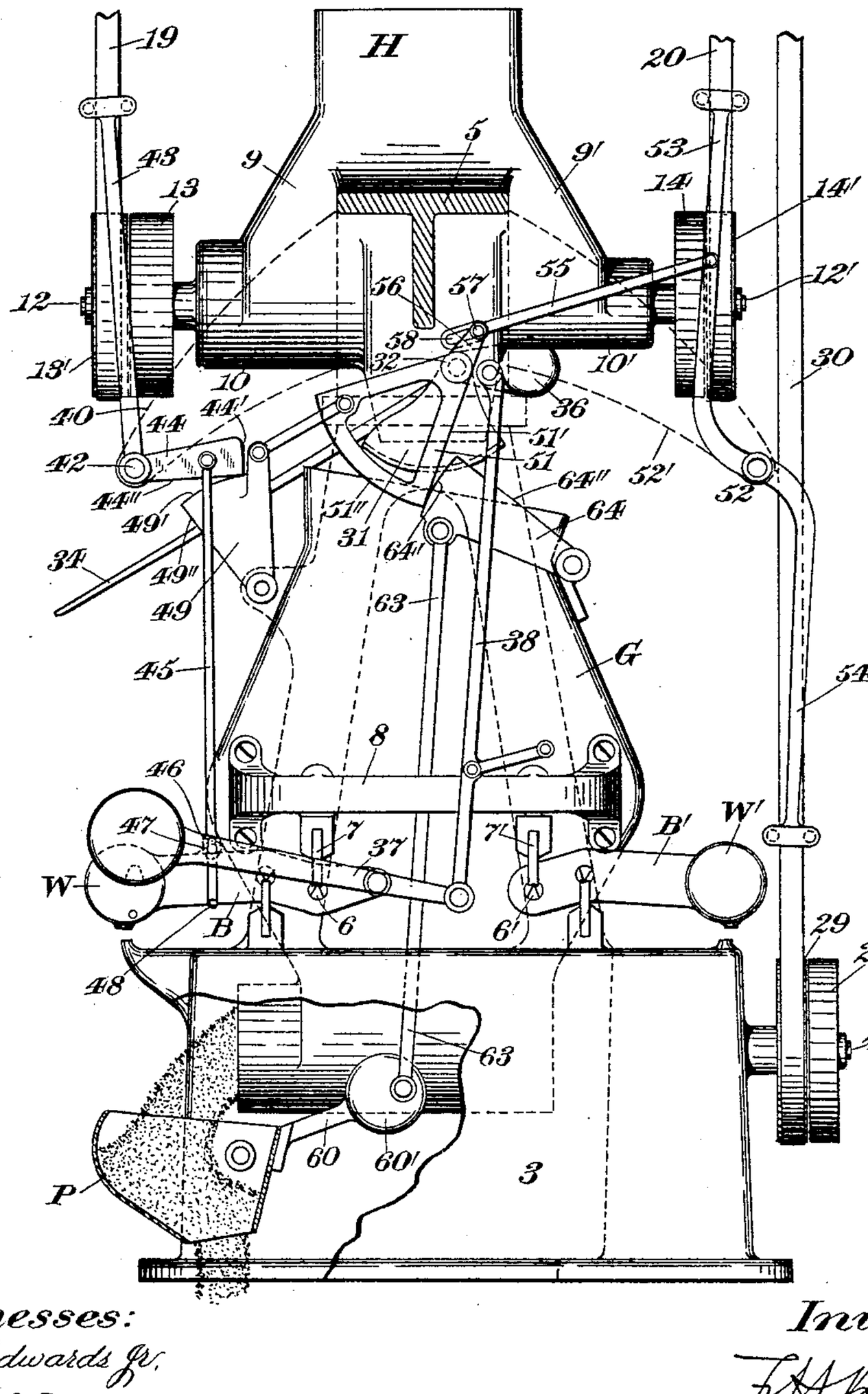
Fig. 3.



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Inventor:

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 572,066, dated November 24, 1896.

Application filed July 8, 1896. Serial No. 598,461. (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, an object being to provide an improved load supply and discharge mechanism which will effect these results in a minimum space of time, such mechanism being more especially intended for application to machines for weighing sluggish substances of various characters.

The invention has for a further object the provision of safety devices organized to insure the sequential operation of the coördinate parts of the load supply and discharge mechanism during the operation of the 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, the parts being shown in the positions they occupy at the commencement of operation. Fig. 2 is an end elevation of the machine seen from the right-hand in Fig. 1, parts being broken away in section more clearly to illustrate certain features of the invention; and Fig. 3 is a similar view illustrating the positions occupied by the respective parts during the load-discharging period.

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 kind, and is illustrated comprising the end frames or columns 2 and 4, mounted on the base 3. The supply-chute H, to be hereinafter more particularly described, is furnished with the laterally-extending brackets 5 and 5′, suitably attached to the end frames 2 and 4, respectively.

The bucket or load-carrying receptacle is designated by G, and is of the "single-chambered" type.

For supporting the bucket the compound beam mechanism shown is preferably employed, and it comprises scale-beams B and B′, suitably fulcrumed on the base 3 of the machine. Each of said scale-beams consists of a pair of arms joined by a combined shaft and counterweight, (the latter being designated by W and W′.) The beam-arms will be furnished with suitable bucket-supports, (two of these being shown at 6 and 6′ as knife-edges,) upon which the bearing-blocks 7 and 7′, depending from the hangers 8, are adapted to rest.

The chute H has two branches or conduits 9 and 9′, respectively, which lead to the feeder-chambers 10 and 10′, in which latter the feeders F and F′ are operable, said feeders being rotative with the shafts 12 and 12′, extending through the outer walls of the chambers 10 and 10′ and operative therein, and being also successively thrown out of action at predetermined points during the descent of the bucket. Each of said shafts will carry a pair of pulleys or drums, those for the shaft 12 being designated by 13 and 13′, the first-mentioned of said pulleys being keyed or splined to the feeder-shaft 12 for rotation therewith, the other pulley being loose on said shaft. The pulleys for the feeder-supporting shaft 12′ are designated by 14 and 14′, the first-mentioned being fast on said shaft and the other movable thereabout, as in the case of the pulleys 13 and 13′.

A line or power shaft is illustrated at 15, having a series of pulleys 16, 17, and 18, (see Fig. 2,) said pulleys being suitably fixed to the shaft 15, the latter being operatively connected with a suitable motor. (Not shown.)

A driving-belt is shown at 19, passed around the pulley or drum 16 and the pulley 13, so that on the rotation of the shaft 15 such motion will be transmitted to the connected feeder F and the shaft 12.

It will be evident that on the shipment of the belt 19 to the pulley 13′ the result will be a throwing of the feeder F out of action and the stopping of the same.

A second belt is shown at 20, passing around the pulley 17 and the pulley 14, whereby the feeder F′ may be rotated on the actuation of the shaft 15. On the shipment of the belt 20 to the loose pulley 14′ the result will be a throwing of the feeder F′ out of action and the stoppage thereof, the pulley 14′ rotating idly about the shaft 12′.

The feeder F constitutes a main feeder, the

complemental feeder F′ serving as a supplemental feeder, their functions being to supply the bucket G with the main and drip streams of material.

During the major period of the operation of the machine the two feeders will rotate in unison and on such movement will feed to the two chambers 10 and 10′ a mass of material which is delivered into the supply-spout 21, depending from the hopper H, and from thence into the bucket.

At a predetermined point in the operation of the machine, or at the commencement of the poising period when the bucket-load is nearly complete, the motion of the main feeder F will be arrested, which action is automatically effected by a belt-shipping device operatively connected with a reciprocatory member of the machine, which slips the belt from the pulley 13 to the loose or idle pulley 13′.

On the stoppage in motion of the feeder F the supplemental feeder F′ will continue its movement for forcing a drip-stream to the bucket to complete the partial load therein. On the completion of the bucket-load the supplemental feeder F′ will be instantaneously stopped, subsequent to which the bucket-load will be discharged.

For discharging the bucket-load a positively-operable device will be employed, which in the present instance consists of a discharge-conveyer C in the form of a screw, mounted on the supporting-shaft 25, journaled in the rear wall of the bucket and operable in a concavity formed in the lower part of said bucket. On the rotation of the discharge-conveyer C at a proper point in the operation of the machine the mass in the bucket will be forced outward through the tubular or cylindrical spout 26, extending outward from the bucket G.

When the load-discharger conveyer C is out of action, it serves as a closer for the bucket, the blades of said conveyer being of a diameter to closely fit the bore of the discharge-chute to prevent the premature passage of material therethrough.

The conveyer-supporting shaft 25 will be connected with a suitable actuating-shaft 27, passing through and journaled in a bearing formed in the rear wall of the base 3, and the juncture between these two shafts will be, preferably, a universal one.

A connecting-link is shown at 28, located within the base of the machine and passing through an opening formed in the inner plate 3′ thereof, said link terminating in its opposite ends in gimbal-joints attached to the two shafts 25 and 27, and by virtue of such connection between these shafts the bucket G is free to ascend and descend without affecting the relationship thereof.

The shaft 27 carries a pair of pulleys which are designated by 29 and 29′, respectively, a belt being shown passed around the drum 18 and the pulley 29′, said belt being also shiftable to the pulley 29, which is fast on the shaft 27, whereby rotation may be transmitted to said pulley 29 and in turn to the discharge-conveyer C for unloading the bucket contents at the proper time in the operation of the machine.

It is desirable on the stoppage of the supplemental feeder F′ to project a valve across the outlet of the spout 21 for catching any particles which may drop from the supplemental feeder F′, or which may be in the spout 21 on the completion of the bucket-load, so that by such action they are prevented from entering the loaded bucket. The valve for this purpose is illustrated at 31, it being normally maintained in its wide-open position (illustrated in Fig. 2) to permit the feed of the full supply-stream into the bucket and having also a swinging movement under the outlet-spout 21 for catching the dripping particles therefrom. The valve 31 is supported by a two-part shaft consisting of the members 32 and 33, which have suitable bearings in the outer ends thereof to receive the journals carried by the framing of the machine.

As just stated, the valve 31 will be normally maintained in its wide-open position, and for this purpose the following-described devices may be employed: One of the arms of the scale-beam B′ is furnished with a by-pass stop 35, (see dotted lines, Fig. 2,) against the upper end or vertical arm of which the depending rod 34, connected to the valve-shaft member 33, is adapted to bear, suitable means being provided for limiting the movement of said by-pass during the valve-restraining action. The by-pass consists of a counterweighted lever pivoted to such beam-arm.

On the descent of the scale-beam B′ the by-pass stop 35 will move in unison therewith, and when such scale-beam passes below the poising-line, indicating the completion of a bucket-load, the depending rod 34, and hence the valve 31, will be released, so that said valve may be instantly closed for accomplishing the results hereinbefore specified.

On the opening movement of the valve 31 the depending rod 34 will engage the upper arm of the by-pass and will swing said by-pass ineffectively about its pivot, succeeding which the latter is caused to drop to its normal position by its counterweight to again check the closure of the valve 31.

For swinging the valve closed or under the outlet-spout 21 to catch the dropping particles therefrom a counterweighted arm 36 is provided, such arm projecting rearward from the shaft-section 33 and normally exerting a valve-closing force.

For opening the valve 31 the counterweighted lever 37 is provided, it being pivotally supported on the poising side of the scale-beam B or that part to the right of its fulcrum, its counterweight being added to the counterpoised side of said beam, in which position it is normally held by suitable means. At a pre-

determined point in the operation of the machine the force of said counterweight is transferred to the poising side of the beam, as illustrated in Fig. 3, and on the return of said lever to its normal position, as indicated in Fig. 4, it will impart an upward thrust to the rod 38, which is connected to the valve 31 at a point to the rear of its axis of movement, such thrust being transmitted to said valve for forcing it open.

It will be apparent that the belt 19 is shiftable from the pulley 13 to the loose pulley 13′, and vice versa, though when such shipment takes place it remains in contact with the wide pulley 16, the same action taking place with respect to the belt 20 and the pulleys 14 and 14′.

For shipping the belt 19 means operative with the scale-beam will be preferably employed, the belt 20 being preferably shipped by mechanism operative with the valve 31.

A support is shown at 40, projecting outward from the bracket 5 and terminating in a sleeve 41, in which latter is mounted a rock-shaft 42, which carries at its inner end the belt-shipping lever 43, said lever being furnished with the usual belt-engaging fingers. The shaft 42 also carries at its outer end the angular extension 44, connected with the scale-beam B, said part 44 being in the form of a segmental blade and serving in one of its functions as a stop, as will hereinafter appear, and also as a means for transmitting a belt-shipping thrust from the scale-beam B to the lever 43.

A rod is shown at 45, pivoted to the plate 44 and connected to the scale-beam B by a slide-joint, so that the scale-beam on one of its strokes may have a limited amount of lost motion without affecting the position of the rod 45 and the coöperative belt-shipper 43. The rod 45 adjacent to its lower end is furnished with a longitudinal slot 46, the walls of which extend about the pin or stud 47 on the counterpoised side of the scale-beam B, the said rod being continued below its point of connection with the beam B and having the hook 48 disposed in the path of movement of the shiftable lever 37. The purpose of said hook will hereinafter appear.

A stop or safety device in the form of a segmental blade is shown at 49, pivotally supported by the framing of the machine, and which coacts with the stop or safety device 44, the effective periods of these stops being reciprocal or alternating. The stop 44 is furnished with curved and straight stop-faces 44′ and 44″, the coacting stop 49 being similarly equipped, as at 49′ and 49″. The stop 49 is operatively connected with the valve 31, so that any limitation in the movement of the former will likewise affect the valve. The link 50, pivoted, respectively, to said stop 49 and to the segment 51, operative with the valve, forms a convenient connection between these members.

The action of the coacting stops 44 and 49 and the belt-shipping lever 43 will be obvious from an inspection of Figs. 2 and 3 of the drawings. The belt 19 being on the pulleys 16 and 13 and the motion being imparted to the shaft 15, the connected feeder F will be driven, as is obvious; and it being assumed that the supplemental feeder F′ is also rotating and the valve 31 open a stream of material will be fed into the bucket G.

The straight stop-face 49″ of the stop 49 will bear against the curved stop-face 44′, so that the oscillation of the first-mentioned member will be positively checked by the other, this relation continuing as long as these two stop-faces are in contact. A stream of material will then be fed to the bucket, and when a certain proportion of the load has been made up therein said bucket will descend, the poising side of the beam mechanism moving therewith and the counterpoised side of the latter ascending, so that the counterpoised side of the scale-beam B in rising will cause the stud 47 to impinge against the upper short wall of the longitudinal slot 46 of the rod 45, and on the continuation of said beam movement the rod 45 will be thrust upward, causing the curved stop-face 44 to travel along the stop-face 49″, this action rocking the shaft 42 and simultaneously therewith swinging the belt-shipping lever 43 to what is illustrated as the "left" in Fig. 2.

At the commencement of the poising period the belt 19 will have been shipped from the pulley 13 to the loose pulley 13′, thereby stopping the motion of the feeder F, (see dotted lines, Fig. 2,) the curved stop-face 44′ having also passed out of contact with the straight face 49″, as also indicated by dotted lines in said figure.

On the closure of the valve 31 the stop 49 will be thrust under the coacting stop 44, so that the latter, and hence the belt-shipper, will be maintained in the shifted positions thereof and the feeder F also held out of action.

For shipping the belt 20 means operatively connected with the valve 31 will be preferably employed. A compound belt-shipping device 52, pivoted to the bracket 52′ and consisting of the belt-shippers 53 and 54, is provided, the office thereof being to simultaneously shift the two belts 20 and 30, the belt 20 being slipped from the fast pulley 14 to the loose pulley 14′, whereby the supplemental feeder F′ may be instantly stopped, the shipper 54 shifting the belt 30 from the loose pulley 29′ to the fast pulley 29, whereby the load-discharge conveyer C may be thrown into action or started to unload the bucket contents, this action taking place on the completion of a bucket-load.

Means are also employed for holding the load-discharge conveyer C out of action during the effective or working period of the feeder or feeders F and F′, and vice versa.

A link is shown at 55, jointed to the shipper 53 and slidingly connected to a lug 56,

projecting from the shaft-section 32, a stud 57 on the latter projecting through the longitudinal slot 58, formed near one end of the link 55. By virtue of such connection the valve 31 will not ship the two belts, through the operative connections therebetween, until it has nearly reached the end of its effective or closing stroke.

It will be assumed that the main feeder F has been stopped and that the supplemental feeder F′ is still in motion for supplying the drip-stream to the bucket to complete the partial load therein. On the completion of the bucket-load the scale-beam and the bucket will pass below the poising-line, the by-pass 35 also moving below said line, and by such action releasing the depending rod 34, and hence the valve 31, whereby the latter may be instantly closed by the counterweighted arm 36. On the closure of the valve the link 55 will be thrust to what is shown as the "right," the belt-shipper 53 being swung in a coinciding direction and the latter shipping the belt 20 from the fast pulley 14 to the loose pulley 14′ to instantly stop the supplemental feeder F′. Simultaneously with this action the belt-shipper 54 will be oscillated to the left for shipping the belt 30 from the loose pulley 29′ to the fast pulley 29, thereby starting the load-discharge conveyer C, so that it will force the load from the bucket.

A depressible regulator-hopper is shown at P, having the usual inlet and outlet openings, the first mentioned of which is adapted to receive the discharging-stream of material from the bucket G. Said regulator-hopper P is pivotally supported within the base 3 and is furnished with a counterweighted arm 60, the office of the latter being to maintain the hopper P in its uppermost or load-receiving position. Said counterweighted arm, however, will be overbalanced when the hopper P is filled with a mass of material, so that the depression or tilting of the latter may be effected.

A projection is shown at 61, extending inward from the base, on which the counterweighted arm 60 is normally adapted to rest. (See Fig. 1.) The regulator-hopper will be furnished with means for preventing the opening movement of the valve 31 during the load-discharging period. A relatively long rod is shown at 63, pivoted, respectively, to the counterweight 60′ of arm 60 and to the segmental blade 64, which latter is supported by the bucket G for oscillation, said blade having a curved stop-face 64′, which may be thrust behind the straight stop-face 51′ of the segmental stop 51 to block the movement of the latter, and also the belt-shipper 53, so that the belt 20 will be maintained in contact with the loose pulley 14′ to hold the feeder F′ out of action.

When the valve 31 has reached its cut-off position, as illustrated in Fig. 3, the straight stop-face 51′ will have intersected the plane of curvature of the stop-face 64′. When the valve is thus closed, as previously described, the mass in the bucket may be discharged by the conveyer C and will be conducted to the regulator-hopper P, which tilts downward, this action raising the counterweighted arm 60, thereby elevating the rod 63 with the curved face 64′ approximately contiguous to the straight stop-face 51′, so that the return movement of the member 51 will be positively checked as long as this relation continues. When these faces pass out of contact, the segment 51 is free to return, so that the valve 31 may also be opened by the counterweighted lever 37 in the manner previously described.

It will be evident that, as indicated in Fig. 2, the stop 51 limits the upward movement of the complemental stop 64 so long as the curved face 51″ thereof is in contact with the straight face 64″, whereby tilting of the hopper P is arrested, it being evident that the stop devices 51 and 64 are reciprocally effective.

On the discharge of the bucket-load the valve 31 will be positively blocked against opening movement, the hopper P being in its depressed position, as illustrated in Fig. 3, the stop 64 locking said valve 31, as is evident. As soon as a certain portion of the mass has been discharged by the bucket the weights W and W′ of the two beams are free to descend, the valve 31 being still locked closed, and the counterpoised side of the scale-beam B will move away from the counterweighted lever 37, as indicated in Fig. 3, said lever being maintained in its shifted position through the agency of the coacting stops 64 and 51. When the valve 31 is released by the passing of the stop-face 64′ out of contact with the straight stop-face 51″ on the return of the hopper P to its normal position, the lever 37 will be also released and will instantly drop to or resume its normal position, and on such movement an upward stroke will be imparted to the rod 38 and transmitted to the valve 31 for forcing the same open.

When the valve-actuating lever 37 has nearly resumed its normal position, it will impinge against the hook 48 on the rod 45, drawing the said rod downward and rocking the member 44 and the shaft 42 and swinging the belt-shipper 43 to the right, so that the latter may slip the pulley 19 from the loose pulley 13′ to the fast pulley 13 to again start the main feeder. As the valve 31 opens it is operative through the hereinbefore-described connections for simultaneously actuating the belt-shippers 53 and 54 for shipping the belts 20 and 30 to stop the conveyer C and to start the feeder F′.

The operation of the hereinbefore-described weighing-machine is as follows: Fig. 2 represents the positions occupied by the respective parts at the commencement of operation, the conveyer C being out of action or at rest, feeders F and F′ in motion, and the valve 31 in its open position, so that on the simultaneous rotation of the two feeders they are operable for supplying a stream of material to the bucket G. When a certain proportion of

the load has been received by the bucket, it will descend, the poising side of the beam mechanism moving therewith and the counterpoising side thereof ascending, so that an upward thrust may be imparted to the rod 45 to rock the connected shaft 42 and the belt-shipper 43 to shift the belt 19 from the fast pulley 13 to the loose pulley 13′. At the commencement of the poising period (see dotted lines, Fig. 2) the belt 19 will have been shipped to said pulley 13′, the result being an instantaneous stoppage of the feeder F, the valve 31 being still held open by the by-pass 35, which is in engagement with the depending rod 34. The supplemental feeder F′ will be still in motion, and will force the drip-stream into the bucket to complete the partial load therein. On the completion of the bucket-load the poising side of the beam mechanism and the bucket will descend below the poising-line, the by-pass 35 also crossing said line, thereby releasing the depending rod 34 and also the connected valve 31, so that the latter may be instantly swung shut by the counterweighted lever 36. When said valve 31 has nearly reached the end of its cut-off movement, it will impart a stroke to the link 55, forcing it to the right and moving the belt-shipper 53 in a coinciding direction, so that the belt 20 may be slipped from the fast pulley 14 to the loose pulley 14′, which stops the supplemental feeder F′. Simultaneously with this action the belt 30 is slipped by shipper 54 from the loose pulley 29′ to the fast pulley 29 to thereby start the discharge-conveyer C for unloading the bucket G.

Having described my invention, I claim—

1. The combination with a bucket and with a supply-feeder and load-discharge conveyer therefor, of driving mechanism for said supply-feeder and load-discharge conveyer; and reciprocally-effective means for holding said load-discharge conveyer out of action during the effective period of the feeder and for holding the feeder out of action during the effective period of the conveyer.

2. The combination with a bucket and with means for supplying a stream of material thereto, of a load-discharge screw conveyer for said bucket; and means normally operative for holding said conveyer out of action during the load-supply period.

3. The combination with a bucket, of a pair of feeders therefor, each operable for supplying a stream of material to said bucket; means for successively throwing said feeders out of action at predetermined points in the descent of the bucket; a load-discharge conveyer for the bucket; and means for holding said conveyer out of action during the effective periods of said feeders.

4. The combination with a bucket and with a pair of feeders therefor, of means for successively stopping said feeders at predetermined points in the descent of the bucket; a valve having a depending rod; and a stop adapted for engaging said rod to thereby hold the valve in its wide-open position and to also release the same on the completion of the bucket-load.

5. The combination with a bucket, of a pair of feeders therefor; supporting-shafts for said feeders, each having fast and loose pulleys thereon; a power-shaft carrying pulleys connected by belts to said first-mentioned pulleys; and automatically-operable means for successively shipping said belts at predetermined points in the descent of the bucket.

6. The combination with a scale-beam, of a bucket supported thereby; a pair of feeders and their supporting-shafts, each of the latter having fast and loose pulleys thereon; a power-shaft having a pair of pulleys connected by belts to said first-mentioned pulleys; a valve; and a pair of belt-shippers operatively connected with said scale-beam and valve.

7. The combination with a bucket, of a feeder and its supporting-shaft provided with fast and loose pulleys; a load-discharge conveyer having fast and loose pulleys; a power-shaft having a pair of pulleys; a pair of belts; a compound belt-shifter for simultaneously shifting said belts; and automatically-operable means for said belt-shifter.

8. The combination with a bucket and with means for supplying a stream of material thereto, of a valve; a load-discharge conveyer for the bucket, a tilting hopper located to receive a stream of material from the conveyer; and reciprocally-effective stops operative, respectively, with said valve and hopper.

9. The combination with a bucket and with means for supplying a stream of material thereto, of a load-discharge conveyer; a shaft connected to said conveyer by a universal joint; fast and loose pulleys on said shaft; a power-shaft having a pulley; a belt on said pulley and connected to said loose pulley; and an automatically-operated belt-shipper for shipping said belt from said loose pulley to the fast pulley to thereby start said load-discharge conveyer.

10. The combination with a bucket, of a feeder therefor having a shaft provided with fast and loose pulleys; a power-shaft having a pulley connected by a belt to said fast pulley and shiftable therefrom to the loose pulley; an automatically-operated belt-shipper; a valve having a stop; and a coacting stop operative with said belt-shipper.

11. The combination with a scale-beam and with a bucket supported thereby, of a feeder and its supporting-shaft provided with fast and loose pulleys; a power-shaft having a pulley; a belt connecting the same and the fast pulley, said belt being also shiftable to the loose pulley; a shipper; a rod for operating said belt-shipper, said rod being connected to the scale-beam, whereby said belt will be shipped from the fast to the loose pulley; and means for returning said rod to its normal position.

12. The combination with a scale-beam and with a bucket supported thereby, of a feeder and its supporting-shaft provided with fast and loose pulleys; a power-shaft having a pulley; a belt connecting the last-mentioned pulley with the fast pulley, said belt being also shiftable to the loose pulley; a belt-shipper; a rod for operating said belt-shipper, said rod being connected to the scale-beam and furnished with a hook; and a shiftable lever adapted to impinge against said hook on one of its strokes.

13. The combination with a scale-beam and with a bucket supported thereby, of a feeder and its supporting-shaft provided with fast and loose pulleys; a power-shaft having a pulley; a belt connecting said last-mentioned pulley with the fast pulley, said belt being also shiftable to the loose pulley; a belt-shipper; a rod for operating said belt-shipper and connected to the scale-beam by a sliding joint; and a shiftable lever supported by the scale-beam and adapted to actuate said rod on one of its strokes.

14. The combination with a scale-beam, of a bucket supported thereby; a feeder and its supporting-shaft provided with fast and loose pulleys; a power-shaft having a pulley connected by a belt to said fast pulley, said belt being shiftable to the loose pulley; a belt-shipper having a stop operative therewith; a valve having a coacting stop; and a scale-beam connected to said first-mentioned stop to thereby actuate said belt-shipper.

15. The combination with a bucket, of a hopper having two branches leading to chambers therein; of a pair of feeders, one located in each chamber; driving mechanism for said feeders; and means for successively stopping the same at predetermined points in the descent of the bucket.

16. The combination with a bucket, of a feeder and its supporting-shaft provided with fast and loose pulleys; a load-discharge conveyer and its supporting-shaft having fast and loose pulleys; a power-shaft furnished with a pair of fixed pulleys; a pair of belts connected with said fixed pulleys and also shiftable from one to the other of the first-mentioned sets of pulleys; a valve; and a compound belt-shipper operable for simultaneously shipping both of said belts and connected by a link to said valve.

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