(No Model.) 4 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 578,161. Patented Mar. 2, 1897.

Fig. 6.

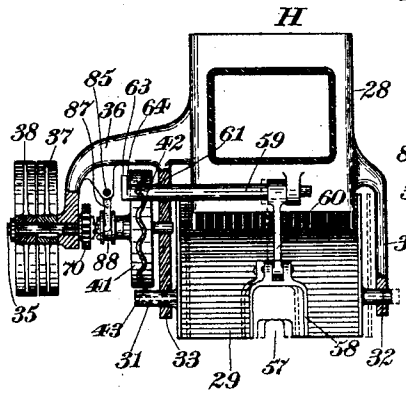
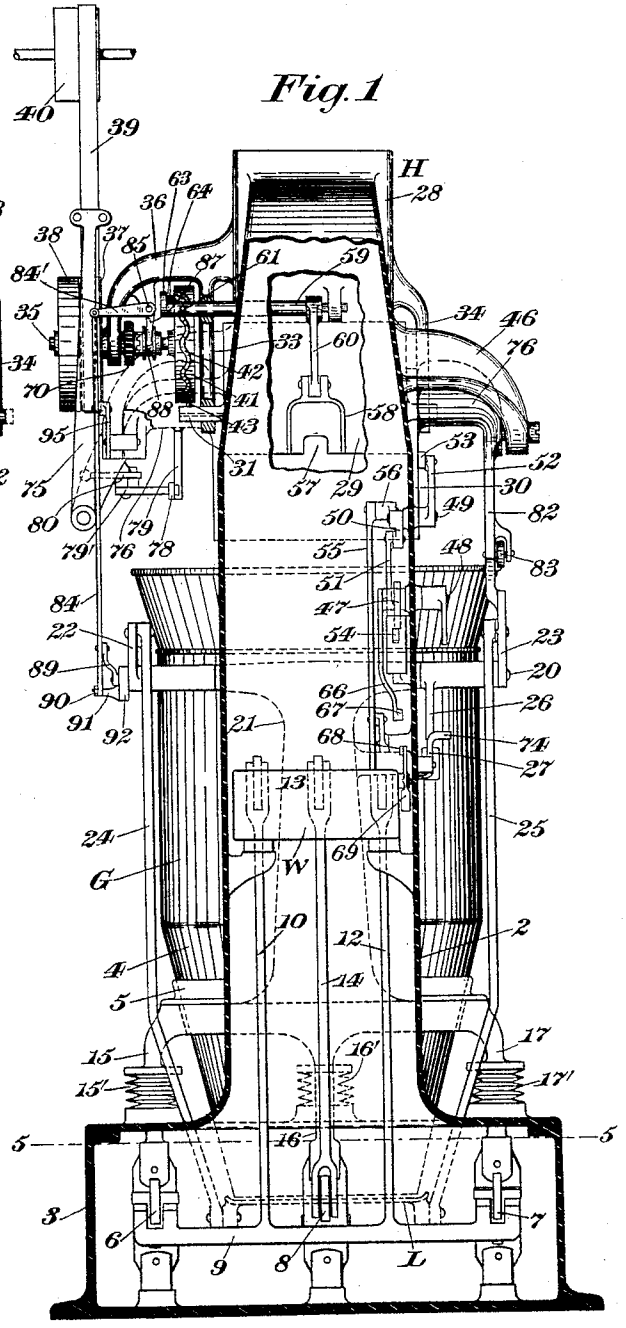


Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

F. H. RICHARDS.

WEIGHING MACHINE.

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Fig. 7.

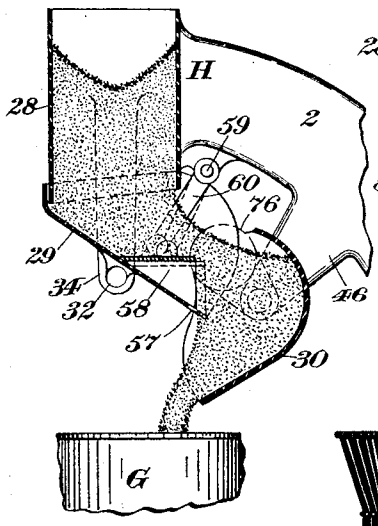
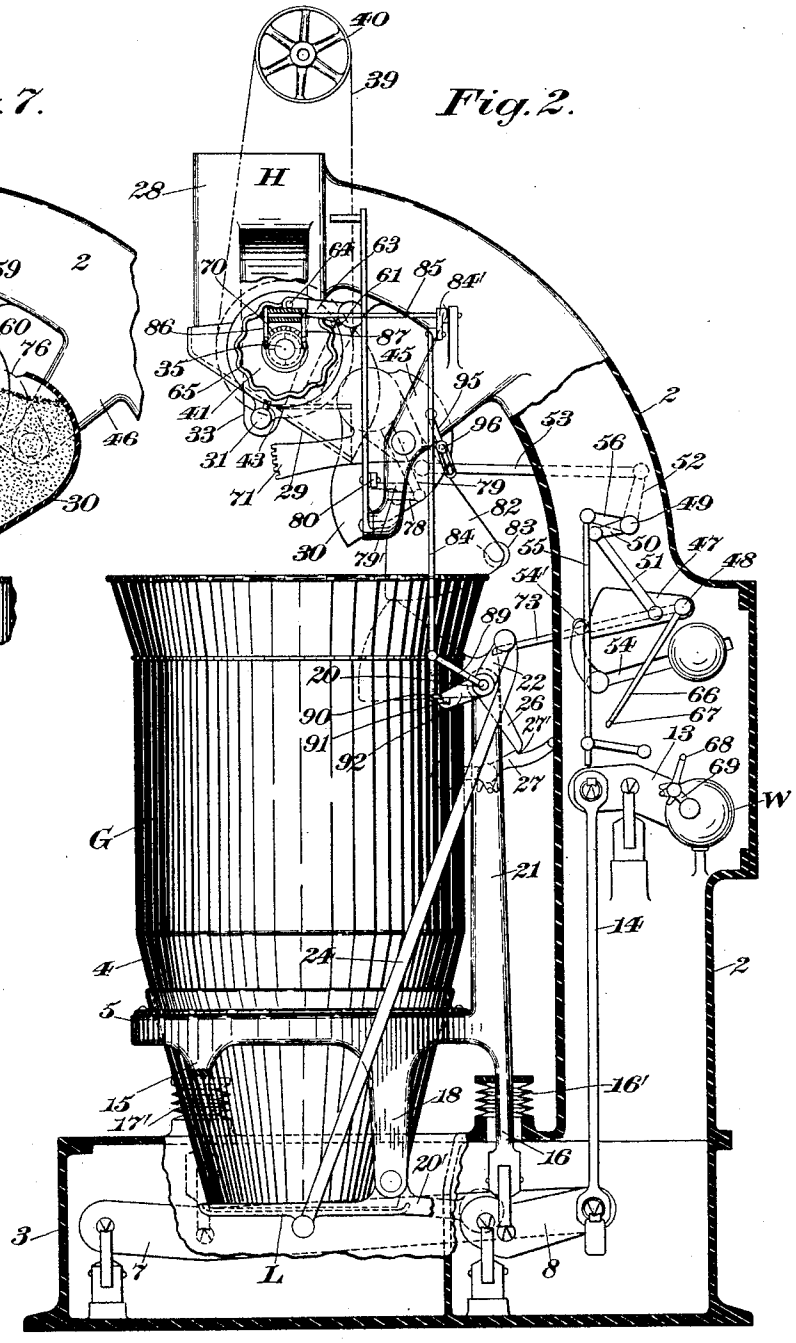


Fig. 2.



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(No Model.) 4 Sheets—Sheet 3

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WEIGHING MACHINE.

No. 578,161. Patented Mar. 2, 1897.

Fig. 8.

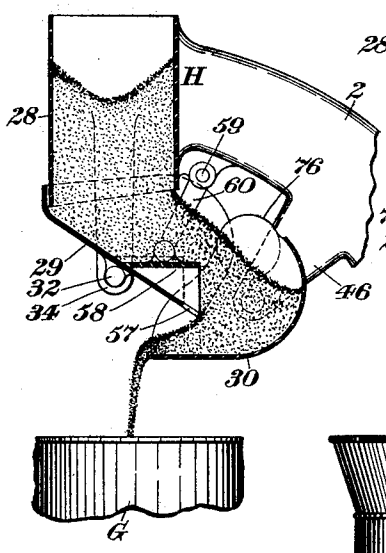
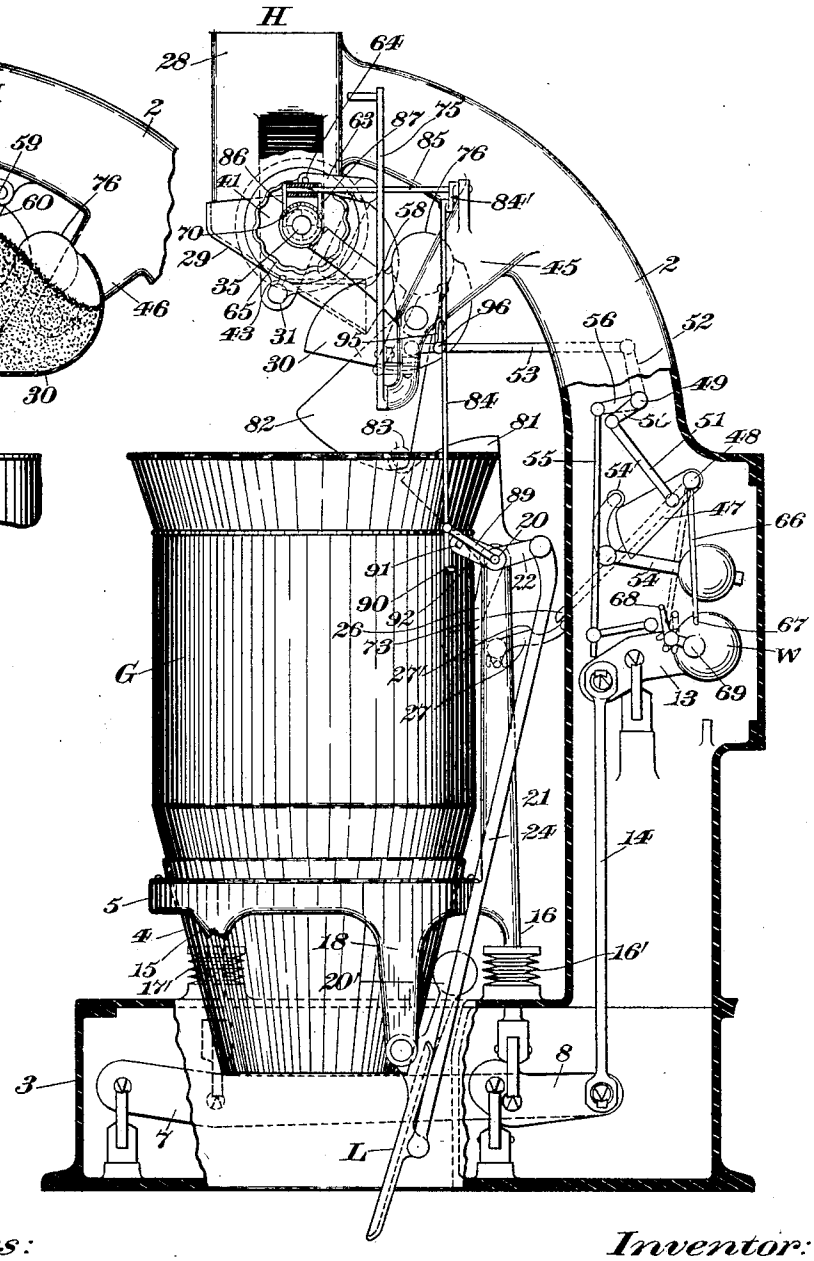


Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 578,161. Patented Mar. 2, 1897.

Fig. 4.

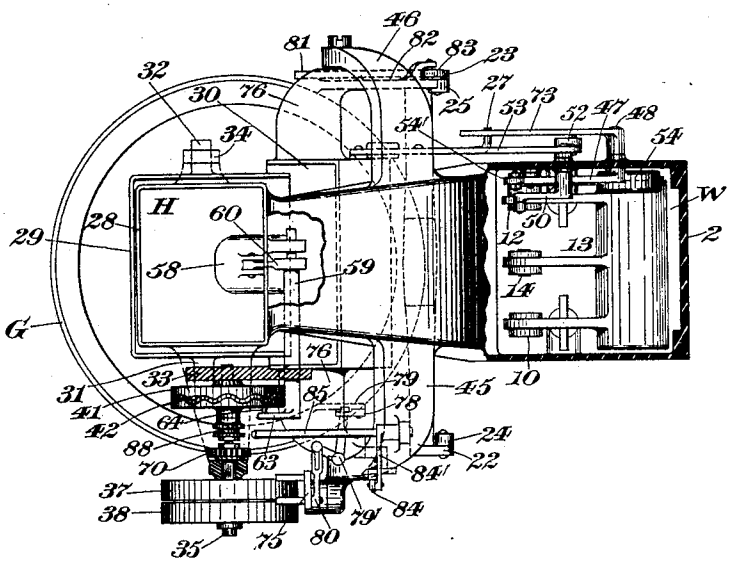
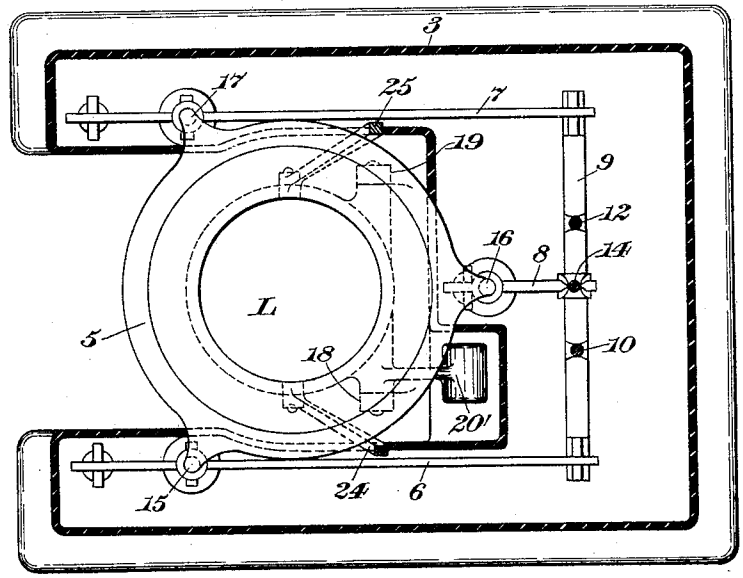


Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 578,161, dated March 2, 1897.

Application filed September 17, 1896. Serial No. 606,102. (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 being to provide an improved machine of this character embodying efficient means for maintaining an even uniform supply of material to the load-receiver during the weighing out of a load, the machine being more especially intended for weighing slow-running or sluggish substances.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear elevation of a weighing-machine comprehending my present improvements, the framing being in section, with a portion broken away to illustrate more clearly certain features of the invention. Fig. 2 is an end elevation as seen from the left in Fig. 1, the framing being also in section, and illustrates the positions occupied by the respective parts at the commencement of operation, the bucket-closer being shut and the valve wide open to permit the supply-stream to enter the bucket. Fig. 3 is a similar view showing the positions occupied by the parts at the close of the weighing operation, the valve being shut and the closer wide open to effect the discharge of the weighed bucket-load. Fig. 4 is a plan view of the upper part of the machine, portions being in section. Fig. 5 is a horizontal section on the line 5 5, Fig. 1. Fig. 6 is a detail view, in rear elevation, of the supply mechanism; and Figs. 7 and 8 are central vertical sections of the same, showing the valve in its wide-open and drip positions, respectively.

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

The framework for supporting the operative parts may be of any suitable structure, but I prefer to employ that herein illustrated, which consists of the chambered or hollow base or bed 3, which is substantially U-shaped in horizontal section and from which the post or standard 2 rises, the latter also being hollow, and its interior will communicate with the chamber of the base 3. The hollow base 3 and post 2 form a means for incasing certain of the operative parts of the machine, so that the latter will be protected from the deleterious action of dust, dirt, and other foreign matter.

The load-receiver is designated by G, it having the usual inlet and outlet openings for the reception and discharge, respectively, of the material.

The main portion of the bucket G is cylindrical, the lower part being tapered, as indicated at 4, so that the bucket may be tightly driven into the collar or band 5, so that I can dispense with fastening means for this purpose.

For supporting and balancing the bucket I prefer to employ the improved beam mechanism illustrated, by the use of which I obtain a relatively great amount of leverage and obviate also the employment of a large counterweight or counterweights.

The beam mechanism includes a pair of main beams consisting of two levers of equal length and a pair of supplemental or auxiliary beams. The main beams are designated by 6 and 7 and consist of two relatively long levers of equal length fulcrumed within the base 3, an auxiliary scale-beam, which is designated by 8, being located intermediate said main beams and being also located within the base, the several beams just alluded to being provided with the ordinary knife-edge supports for the bucket. The two main beams 6 and 7 exert their force against the transverse stirrup or bar 9, from which latter extend the preferably integral risers 10 and 12, which are connected at the upper ends thereof to the outside arms of the three-armed auxiliary beam 13, which is fulcrumed within the post or standard 2, the auxiliary beam 8 being connected to the auxilary beam 13 by the interposed rod 14.

The auxiliary scale-beam 13, which is supported for movement within the post or standard 2, is provided with a counterweight W, which joins the three arms thereof and which, when the machine is at rest, is sustained by suitable stops situated interiorly of said post.

The collar or band 5 has the downwardly-projecting equidistantly-disposed arms 15, 16, and 17, which are provided with notched bear-

ings working against properly-positioned knife-edges on the main beams 6 and 7 and the intermediate auxiliary beam 8, as indicated more clearly in Fig. 5.

The depending arms 15, 16, and 17 of the collar or band 5 pass through openings or apertures formed in the roof of the base, and about said openings I dispose dust-guards, which are extensible, such guards being designated by 15′, 16′, and 17′. The purpose of the guards is to prevent the entrance of dust and particles of the material being weighed to the interior of the base. These guards each consist of a bellows-like envelop of pliable leather, canvas, or similar material and will be connected to rings and flanges situated, respectively, on the three arms 15, 16, and 17 and the base 3 of the machine.

The closer, which controls the discharge outlet or opening of the bucket, is designated by L, and it consists of an approximately flat plate which is adapted to fit tightly against the lower edge of the bucket when in its normal position. Said closer is pivotally supported between the brackets 18 and 19, depending from the band or collar 5, whereby it may have a relatively wide opening movement to effect the rapid discharge of the bucket contents, and will also be provided with the counterweighted arm 20′ for returning it to its normal or shut position.

For maintaining the closer in its normal position the following means may be employed: A transverse rock-shaft is shown at 20, supported for movement by the post 21, which extends upward from the collar 5, said shaft carrying near the outer ends thereof the crank-arms 22 and 23, which are connected to the closer L by the rods 24 and 25, the hubs of said crank-arms being fixed to the supporting-shaft 20. A rock-arm is shown at 26 on the shaft 20, it extending from the hub of the arm 23, said rock-arm 26 or the free end thereof being so located as to be engaged by the counterweighted bucket-latch 27, which is pivoted to the post 21, said latch being limited in its movement by means of suitable stops and having also the shoulder 27′, against which the rock-arm 26 is adapted to impinge normally, whereby the closer will be held. When the latch 27 is depressed sufficiently far, its shoulder 27′ will be disengaged from the free end of the rock-arm 26, so that said closer is released.

A supply chute or hopper is shown at H, it consisting of a stationary portion 28, which is tubular and which may be cast integral with the post or standard 2, and a vibratory bottom 29, the floor of which is inclined and leads toward the stream-controlling valve 30. The plane of vibration of the movable bottom of the chute or hopper II will be transverse to the line of flow of the supply-stream, so that the supply-stream will be thinned or spread out and clogging of the material and the formation of lumps in the mass will be prevented. The walls of the vibratory or shaking bottom 29 of the chute II will extend above the lower edge of the stationary portion thereof to prevent waste of the material and will also be provided with the oppositely-extending stub-shafts 31 and 32, which pass through apertures formed in brackets extending downward from the stationary portion of the chute, such brackets being designated by 33 and 34.

A shaft is shown at 35, journaled in the brackets 36 and 33, said shaft being provided with the fast and loose pulleys 37 and 38, a driving-belt 39, which is passed around the power drum or pulley 40 of a suitable motor, (not shown,) being shiftable from one of said pulleys to the other, and vice versa. The shaft 35 also carries near the inner end thereof the wheel 41, which is provided with the peripheral cam groove or channel 42 of "wave" type. A projecting pin 43 on the stub-shaft 31 is located between the walls of the peripheral cam-groove 42, so that, the belt 39 being on the fast pulley 37, the cam-wheel 41 will be rotated, and a vibratory movement will be transmitted to the movable bottom 29 of the chute or hopper, as will be understood.

The main-stream controller or valve for controlling the supply-stream is designated by 30 and is substantially similar in construction and mode of operation to the improved valve disclosed by Letters Patent No. 535,727, granted to me March 12, 1895, to which reference may be had, and is pivotally suspended between the brackets 45 and 46, said valve being also balanced.

For closing the valve 30 to cut off the supply-stream I may employ the following means: A cam is shown at 47, located within the hollow post 2 and mounted on the short rock-shaft 48, which is supported by a wall of said post and projects therethrough. A second rock-shaft is shown at 49, having the crank-arm 50, which is connected by the interposed link 51 to the cam 47. The shaft 49 carries a second crank-arm 52, mounted on the outside of the post, to which is pivoted the connecting-rod 53, the latter being similarly connected to an end wall of the stream-controlling valve 30. A counterweighted lever is shown at 54, pivotally supported within the post 2, the non-counterweighted arm of said lever being adapted to engage the working face of the cam 47.

Fig. 2 represents the valve 30 in its wide-open position, the roll 54′ of the lever 54 being in contact with the working face of the cam 47, so that as the counterweighted arm of said lever drops the cam 47 will be swung to the right and the valve 30 will be closed.

For opening the valve 30 to cause the flow of the supply-stream into the bucket the auxiliary scale-beam 13 will be utilized, a rod 55, which depends from the crank-arm 56 on the shaft 49, being employed for transmitting an opening thrust to the valve 30. As the beam 13 descends in synchronism with the loaded bucket, the thrust-rod 55 being in engagement

with one of the arms of said beam, the closure of the valve by the counterweighted lever 54 and the intermediate mechanism will be limited. The beam 13 being in its lowermost position, as indicated in Fig. 3, and rising will transmit an upward thrust to the rod 55, and the rod 53, through the intermediate connections, will be moved to the right, so that the valve 30 may be opened, as will be clearly apparent.

For supplying the drip-stream to complete the partial load supplied to the bucket by the main stream, which is delivered thereinto by the valve 30 during the first stage of its closing movement, the inclined floor of the movable chute-section 29 will have a drip notch or opening 57 in its lower or discharge edge, through which opening and over the valve a relatively narrow stream is adapted to flow and entering the bucket will complete the partial load, the valve being momentarily held against final closing movement at this point in the operation of the machine to permit such supply.

I have shown located within the chute or hopper H a hood or auxiliary stream-controller 58, it being located over and adapted to cover the drip notch or opening 57, such hood being substantially angular in cross-section and of a width slightly exceeding that of said drip-opening and being also contiguous to the inclined floor of the shaking chute-section 29. One of the offices of said hood is to intercept the drip-stream, which ordinarily descends vertically through the drip-opening, and striking the discharge edge of the valve the power necessary to effect the final closure of said valve is consequently increased. By the employment of the hood this obstacle is removed and said valve is also rendered more certain in its action. I intend to vibrate the hood 58, and simultaneously and preferably in longitudinal and transverse planes, so that on the first-mentioned movement the hood will push forward the material which is to constitute the drip-stream, and at the same time will spread out the mass during the main supply period, which is an important essential.

For imparting the necessary longitudinal and lateral vibrations to the hood 58 to effect the hereinbefore-described results the cam-wheel 41, which has been hereinbefore described, will be utilized.

A relatively short shaft is shown at 59, it being supported by suitable brackets on the framing of the machine and carrying the crank-arm 60, which is pivoted between lugs or ears on the hood 58. The shaft also has the projecting pin 61, which is located between the walls of the peripheral cam-groove 42 of the cam-wheel 41, so that on the rotation of said cam-wheel in the manner previously described the hood 58 will be transversely vibrated through the mediums of the connections between said wheel and hood, as will be clearly understood.

For imparting the longitudinal movement to the hood 58 the following means may be employed: The shaft 59 carries the projecting arm 63, which has the pin 64 adjacent to the free end thereof, said pin being located between the walls of the cam-groove 65, which is formed in the face of the cam-wheel 41, so that on the rotation of said wheel the arm 63, the shaft 59, and the crank-arm 60 will be rocked, and the hood 58 will be reciprocated back and forth longitudinally against the floor of the chute-bottom 29. When the valve has nearly reached the end of its cut-off movement, it will be intercepted momentarily to permit the supply of the drip-stream into the bucket to complete the partial load therein; and for this purpose the following means may be used: The rock-shaft 48 is furnished with the depending rod 66, which is rigidly connected thereto and which has the outwardly-extending projection or boss 67 at the lower end thereof. A coöperating stop in the form of a by-pass is shown at 69, supported by the counterpoised side of the beam 13, said by-pass having the inwardly-extending projection 68 thereon, as shown in Fig. 1, which is disposed in the path of movement of the projection 67. As the rod 66 swings rearward from the position shown in Fig. 2 on the closure of the valve 30, the projection 67 on the rod 66 at the commencement of the poising period will be met by the projection 68 on the by-pass 69, due to the ascent of the counterpoised side of the beam 13, said by-pass being also suitably held, whereby through the connections between said rod 66 and valve 30 the latter will be held. When the bucket passes below the poising-line with its completed load, the by-pass 69, which is located on the counterpoised side of the auxiliary beam 13, will be caused to ascend with said counterpoised side of the beam, and in so doing the projection 68 will be raised clear of the projection 67 on the rod 66, so that the valve will be released and may be given its final closing movement.

For effecting the final closure of the valve I prefer to employ mechanically-operated means—that is, means operative with the driving or power mechanism—whereby such movement will be an accelerated one to obtain a rapid cut-off of the supply-stream.

The shaft 35 carries the gear 70, which is loose thereon, but which will be coupled thereto during the normal operation of the machine, said gear 70 being disposed in the path of movement of the toothed segment 71, which is operative with and projects forward from the valve, as indicated best in the end elevations of the machine.

At the commencement of the drip period the toothed segment 71 will be almost in contact with the teeth of the gear 70, so that when the valve 30 is released in the manner previously described and the counterweighted lever 54 drops the teeth of the segment 71 will be caused to mesh with the teeth of the gear 70, so that the shaft 35 rotating and said

gear being coupled to the shaft 35 the result will be an instant closure of the valve 30 for cutting off the supply-stream.

For uncoupling the gear 70 from its supporting-shaft I prefer to employ means operative with the closer, whereby on the return of the valve to its wide-open position such operation may be effected without hindrance from said gear, it being rotated idly about its supporting-shaft by the meshing-segment 71.

For tripping the closer-latch 27 to release the closer L the rigid rod 73, which depends from the short shaft 48, will be employed, the free end of said latch being situated in the arc of movement of the free end of said arm or latch-tripper 73. At the commencement of the poising period said latch-tripper 73 will be adjacent to the free end of the latch 27, said valve and tripper being momentarily held by the by-pass 69 in the manner previously described, and when these parts are released the tripper 73 will be caused to impinge against the rearward extension 74 of the latch 27, so that on the continuation of such movement the latch will be depressed and its shoulder 27′ will be disengaged from the rocker-arm 26 of the supporting-shaft 20, whereby the closer will be freed of all restraint, at which time it may be forced open by the weight of the load or contents within the bucket, as indicated in Fig. 3.

It is desirable at the close of the weighing operation to throw the various shaking or vibratory devices out of action, and for this purpose means operative with the stream-controlling valve will be employed, such function being effected by the shipping of the driving-belt 39 from the fast pulley 37 to the loose pulley or idler 38.

A vertically-disposed belt-shipper is illustrated at 75 in the form of a lever pivotally mounted on a bracket extending from the framing of the machine and having the usual belt-engaging fingers, between which the driving-belt 39 is adapted to travel.

The balance-weight 76 of the valve 30 is furnished with the rigid arm 79, to the lower end of which is pivoted the link 78, said link being similarly attached to one arm of the angle-lever 79′, which is mounted on the framing of the machine. The other arm of said angle-lever is connected by a sliding joint to the link 80, which latter is pivoted to the belt-shipping lever 75. By reason of the sliding joint just adverted to the valve may close up to the poising period without affecting the position of the belt-shipping lever 76. On the final closure of the valve 30 in the manner previously described the belt-shipper, through its operative connections with said valve, will be swung instantly to the left, and the driving-belt 39 will be thereby slipped from the fast pulley 37 to the loose pulley 38, so that the movement of the various reciprocative or vibratory parts will be stopped. On the opening of the valve the operation just described will be reversed, so that the belt 39 will be shipped to the fast pulley 37.

I have illustrated herein reciprocally-effective stops operative, respectively, with the valve 30 and with the closer L, the office of said members being to maintain the valve positively shut when the closer is open, and vice versa.

The closer-operative stop is designated by 81 and consists of a segmental blade suitably fixed to the shaft 20, the coacting member being designated by 82 and being substantially similar to its mate. The operation of the reciprocally-effective interlocking stops will be apparent from an inspection of the two end elevations of the drawings.

In Fig. 2 the valve is shown in its wide-open position with the stop member 81 approximately contiguous to the curved face of the member 82, so that should the latch 27 be prematurely tripped the oscillation of the stop member 81 will be positively blocked by its companion, the opening movement of the closer, by reason of its connection with the shaft 20, being likewise prevented. When the roll 83 of the stop member 82 has crossed the plane of the curved face of the stop member 81, the latter is free to oscillate when the latch 27 is tripped, and on such action its curved face will travel along the roll 83 of the stop member 82, so that retractive movement of said stop member 82, and hence the opening of the valve 30, will be limited.

For uncoupling the gear 70 from its supporting-shaft I prefer to employ means operative with the bucket-closer L, as hereinbefore stated, and which means will now be described.

A depending rod is illustrated at 84, it being jointed to the rock-arm 84′ on the rock-shaft 85, which is supported by the brackets on the framing of the machine. Said rock-shaft is furnished at the inner end thereof with two arms 86 and 87, which work between the walls of a peripheral groove on the sliding clutch member or coupling device 88, which is of ordinary construction, the coöperating clutch member being in the form of a series of lugs which project from the inner face of the gear 70 and which are adapted to engage similar lugs on the adjacent face of such sliding clutch member.

It will be evident that when the depending rod 84 is pulled downward sufficiently far the two rock-arms 86 and 87 will be swung inward and the clutch member 88 will be disengaged from the lugs on the gear 70 to thereby uncouple the latter from its supporting-shaft. The rod 84 is connected to the shaft 20 by the link 89, so that as the bucket descends during the weighing of a load said rod will be drawn inward toward said shaft, but through a relatively short arc. The rod 84 carries at the lower end thereof a by-pass device 90, which is disposed in the path of movement of a projection 91 on the arm 92,

extending from the closer-supporting shaft 20. The operation of the parts just described will be evident from an inspection of Figs. 2 and 3. As just stated, when the bucket descends the rod 84 will be drawn inward for a short distance by reason of its connection with the shaft 20, and the projection 91, which is below the plane of the by-pass 90, will also descend therewith. On the opening of the closer L the arm 92 will swing upward and engaging the by-pass 90 will simply elevate the same or raise it above its supporting-stud on the rod 84. As the closer L is shutting the rock-arm 92 will be swung downward, by reason of its connections with the closer, from the position illustrated in Fig. 3, and at a certain point in said movement the projection 91 on said arm will impart a blow to the by-pass 90, which at this time is held against movement by its supporting-pin, so that the rod 84 will be drawn downward and the two arms 86 and 87, by reason of their connections with said rod, will be rocked to the right, Fig. 4, and will thereby slide the clutch member 88 along its supporting-shaft 35, so that the lugs thereon will be disengaged from the coöperating lugs on the face of the gear 70 and the uncoupling of said gear from its supporting-shaft will be caused. Just succeeding this operation the valve 30 will be opened and the teeth of the segment 71, which is operative with said valve, will engage the teeth of the gear 70, which, having been uncoupled from the shaft 35, permits the return movement of the valve without hindrance, said gear being partially rotated about its supporting-shaft.

For coupling the clutch member 88 to the gear 70 means operative with the valve will be employed. A link is shown at 95, pivoted to the rod 84 and connected to the right-angular projection 96 of the valve balance-weight by a slide-joint, so that said valve may have a certain amount of lost motion without changing the position of said rod. When the valve has nearly reached its wide-open position, it will impart through the link 95 an upward thrust to the rod 84, whereby the two arms 86 and 87, which are operatively connected to said rod, will be rocked inward, and the slidable clutch member 88 will be caused to engage the lugs on the gear 70, as will be understood.

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 closer L being shut and held in such position by the latch 27, which is in engagement with the arm 26 of the shaft 20, which is operatively connected to said closer, and the valve 30 being wide open. The driving-belt 39 being on the fast pulley 37, the shaft 35 and hence the cam-wheel 41 will be rotated, whereby the movable bottom 29 of the chute H, by reason of its connection with said cam-wheel, will be reciprocated or shaken and simultaneously therewith the hood 58, which is also connected to said cam-wheel, will be caused to reciprocate or vibrate in transverse planes to thereby cause the supply-stream to enter freely the bucket G. When a certain proportion of the load has been received by the bucket, it and the beam mechanism will descend, and in so doing the auxiliary beam 13 will move away from the connecting-rod 55, whereby the valve 30 may be closed by the counterweighted lever, the antifriction-roll 54′ of which rides along the working face of the cam 47, which is connected to the valve. At the commencement of the poising period the projection 68 on the by-pass 69 will engage the projection 67 on the rod 66, so that the valve 30 will be momentarily held, the toothed segment 71 at this time being quite close to the gear 70 on the shaft 35. On the completion of the load the counterpoised side of the auxiliary beam 13, which carries the by-pass 69, will be caused to ascend, so that the projection 68 will be raised clear of the projection 67, the valve thereby being released and being given a very slight movement by the further dropping of the counterweighted lever 54. When the teeth of the segment 71 mesh with the teeth of the gear 70, a rapid movement will be communicated to the valve 30, and on such action the belt-shipper 75, by reason of its connections with said valve, will be swung to the left, Fig. 1, and the driving-belt 39 will be instantly shipped from the fast pulley 37 to the loose pulley 38 to thereby stop the reciprocation of the various parts, which are driven from the shaft 35. At about the time the driving-belt is shipped the latch-tripper 73 will be caused to impinge against the projection 74 on the latch 27, so that the shoulder 27′ of the latter will be disengaged from the rigid arm 26 on the closer-supporting shaft 20, whereby the bucket-closer L will be released. On the discharge of the bucket-load the several parts will resume their normal positions.

Having described my invention, I claim—

1. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper having a drip-opening in a wall thereof, of a hood located over said drip-opening; a valve; and means controlled by the weighing mechanism, for vibrating said hood.

2. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper having a drip-opening in a wall thereof, of a hood located over said drip-opening; a valve; and means for longitudinally vibrating said hood.

3. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper having a drip-opening in a wall thereof, of a hood located over said drip-opening; a valve; and means for vibrating said hood simultaneously in longitudinal and transverse directions.

4. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper provided with a reciprocatory bottom having a drip-opening, of a hood located over said drip-opening; a valve; and means for vibrating said hopper-bottom and hood.

5. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper provided with an inclined vibratory bottom having a drip-opening; of a stream-controller operable within said hopper, contiguous to said inclined bottom and located over the drip-opening therein; means for vibrating said stream-controller; and a cut-off valve for said hopper.

6. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper having a drip-opening in a wall thereof, of a hood located over said drip-opening; a valve; and means for vibrating said hood.

7. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper having a movable bottom provided with a projecting and suitably-supported stub-shaft, of a power-shaft carrying a wheel having a cam-groove therein between the walls of which groove a pin on said stub-shaft is located; and means controlled by the weighing mechanism for rotating said shaft.

8. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper, of a stream-controller located within said hopper; a shaft operatively connected to said stream-controller and provided with an arm; a power-shaft carrying a wheel having cam-grooves between the walls of which pins on said first-mentioned shaft and the arm thereon are located; and means for rotating the power-shaft.

9. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper the bottom of which is movably mounted and is provided with a projecting stub-shaft, of a stream-controller connected to a shaft which has an arm; a power-shaft carrying a wheel having cam-grooves on its periphery and one of its faces, between the walls of which grooves pins on the stub-shaft, said second-mentioned shaft, and the arm of the latter are located; and means for rotating said power-shaft.

10. The combination with weighing mechanism and with stream-supply means therefor, of a valve; a power-shaft provided with a gear; a toothed segment operative with said valve and adapted to mesh with said gear; and means for uncoupling said gear from the power-shaft.

11. The combination with weighing mechanism embodying a bucket having a closer, of stream-supply means; a valve; a power-shaft having a gear; a toothed segment operative with said valve and adapted to mesh with said gear; and means operated by the closer for uncoupling said gear from the power-shaft.

12. The combination with weighing mechanism and with stream-supply means therefor, of a valve; a power-shaft carrying a gear; driving mechanism for said power-shaft; a toothed segment operative with the valve and adapted to mesh with said gear; a peripherally-grooved slidable clutch member on said power-shaft, having lugs adapted to engage coöperating lugs on a face of the gear; a rock-shaft provided with an arm or arms located between the walls of the groove in said slidable clutch member; and means for operating said rock-shaft.

13. The combination with weighing mechanism embodying a bucket having a closer, of stream-supply means; a valve; a power-shaft having a gear; a toothed segment operative with said valve and adapted to mesh with said gear; and successively effective means operative, respectively, with the closer and with the valve, for uncoupling said gear from, and coupling it to, said power-shaft.

14. The combination with weighing mechanism and with stream-supply means therefor embodying a hopper, of a stream-controller located within said hopper; means for vibrating said stream-controller; a valve having a toothed segment; a power-shaft provided with a gear adapted to mesh with said toothed segment; and means for rotating said power-shaft.

15. The combination with beam mechanism and with a bucket supported thereby, of a closer for said bucket; a closer-supporting shaft having an arm; a valve provided with a toothed segment; a power-shaft and its driving mechanism, said power-shaft having a gear; a slidable clutch member on said power-shaft, having lugs adapted to engage coöperating lugs on said gear; a rock-shaft having an operating-arm for said slidable clutch member; and a rod operatively connected to said rock-shaft, said rod being furnished with a projection adapted to receive a blow from a projection on the arm of the closer-supporting shaft on one of the closer movements.

16. The combination with beam mechanism and with a bucket supported thereby, of a closer for said bucket; a closer-supporting shaft having an arm; a valve provided with a toothed segment; a power-shaft and its driving mechanism; said power-shaft having a gear; a sliding clutch member on said power-shaft having lugs adapted to engage coöperating lugs on said gear; a rock-shaft having an operating-arm for said clutch member; and a rod operatively connected to said rock-shaft, said rod being furnished with a by-pass adapted to receive a blow from a projection on the arm of the closer-supporting shaft on one of the closer movements.

17. The combination with beam mechanism and with a bucket supported thereby, of a closer for said bucket; a closer-supporting

shaft having an arm; a valve provided with a toothed segment; a power-shaft and its driving mechanism, said power-shaft having a gear; a peripherally-grooved slidable clutch member on said shaft, having lugs adapted to engage coöperating lugs on the gear; a rock-shaft having arms located between the walls of the groove on said slidable clutch member and having also a third rock-arm; and a rod depending from said last-mentioned rock-arm and having a projection near the lower end thereof adapted to receive a blow from a projection on the arm of the closer-supporting shaft on one of the closer movements.

18. The combination with beam mechanism and with a bucket supported thereby, of a closer for said bucket; a closer-supporting shaft having an arm; a valve provided with a toothed segment; a power-shaft and its driving mechanism, said power-shaft having a gear; a slidable clutch member on said power-shaft, having lugs adapted to engage coöperating lugs on the gear; a rock-shaft having an operating-arm for said slidable clutch member; a rod operatively connected to said rock-shaft, said rod being furnished with a projection adapted to receive a blow from a projection on the arm of the closer-supporting shaft on one of the closer movements; and a link pivoted to said rod and connected to the closer-supporting shaft.

19. The combination with beam mechanism and with a bucket supported thereby, of a hopper; a stream-controlling valve for said hopper; a cam; an interposed shaft supported independently of the valve and operatively connected, respectively, to said valve and cam; and a counterweighted lever adapted to engage said cam.

20. The combination with beam mechanism and with a bucket supported thereby, of a hopper; a stream-controlling valve for said hopper; a valve-closing cam; a shaft supported independently of the valve and having crank-arms operatively connected, respectively, to the valve and cam by rods; and a counterweighted lever adapted to engage said cam.

21. The combination with beam mechanism and with a bucket supported thereby, of a hopper; a stream-controlling valve for said hopper; and a shaft supported independently of the valve and having a crank-arm to which is pivoted a depending rod the free end of which is adapted to bear against a scale-beam, said shaft also having a second crank-arm connected by a rod to the valve mechanism.

22. The combination with beam mechanism and with a bucket supported thereby, of a hopper; a stream-controlling valve for said hopper; a cam; a shaft having three crank-arms, to each of which is connected a rod, two of said rods being attached, respectively, to the valve and cam, the free end of the other rod bearing against a scale-beam; and a counterweighted lever adapted to engage said cam.

23. The combination with beam mechanism and with a bucket supported thereby, of a hopper; a stream-controlling valve for said hopper; a cam; a shaft having three crank-arms, to which are pivoted rods, two of said rods being attached, respectively, to the valve and cam, the free end of the other rod being adapted to bear against a scale-beam; a counterweighted lever adapted to engage said cam; a depending rod carried by said cam and having a projection adapted to be engaged by a coöperating projection on a stop located on the counterpoised side of said scale-beam.

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Witnesses:
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