(No Model.) 4 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,292. Patented Oct. 27, 1896.

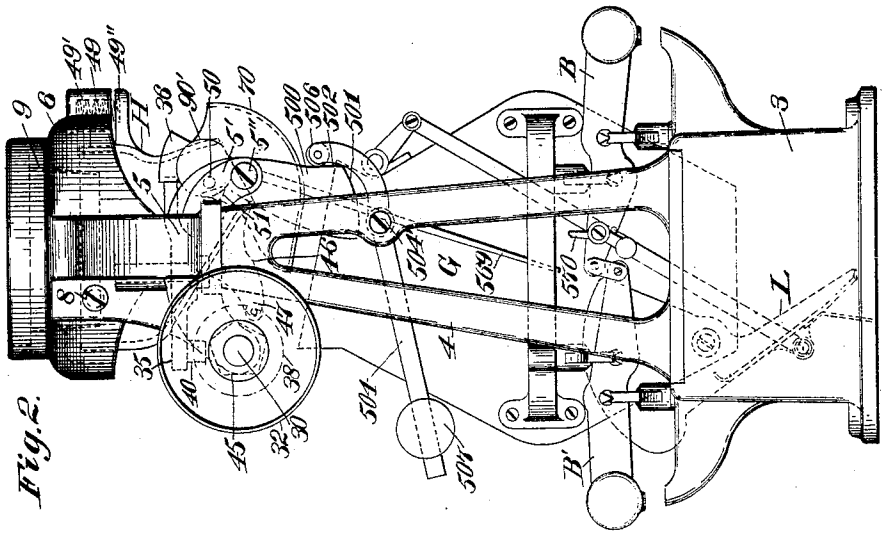

Fig. 2.

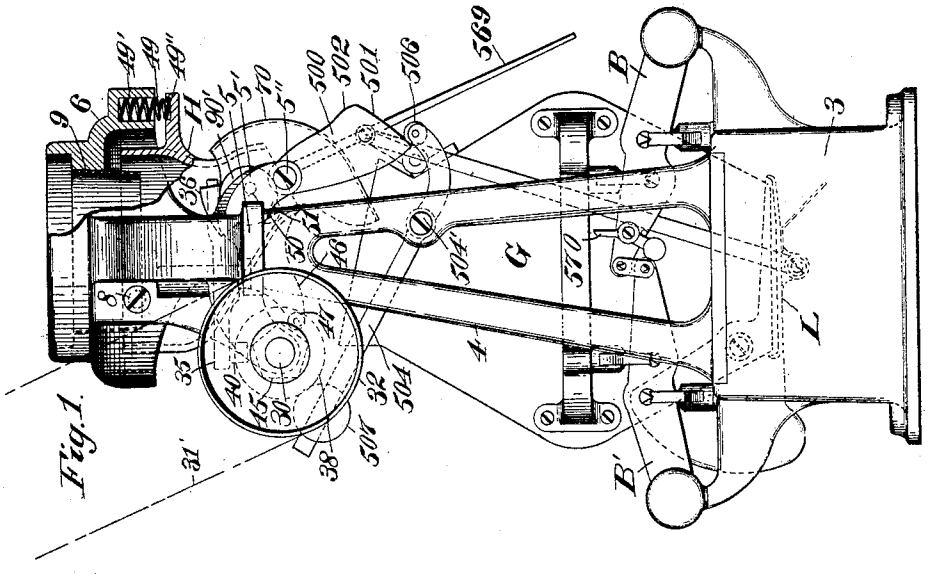

Fig. 1.

Witnesses
R. W. Pittman
Fred. J. Dole.

Inventor:
F. H. Richards.

(No Model.)

4 Sheets—Sheet 2.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,292. Patented Oct. 27, 1896.

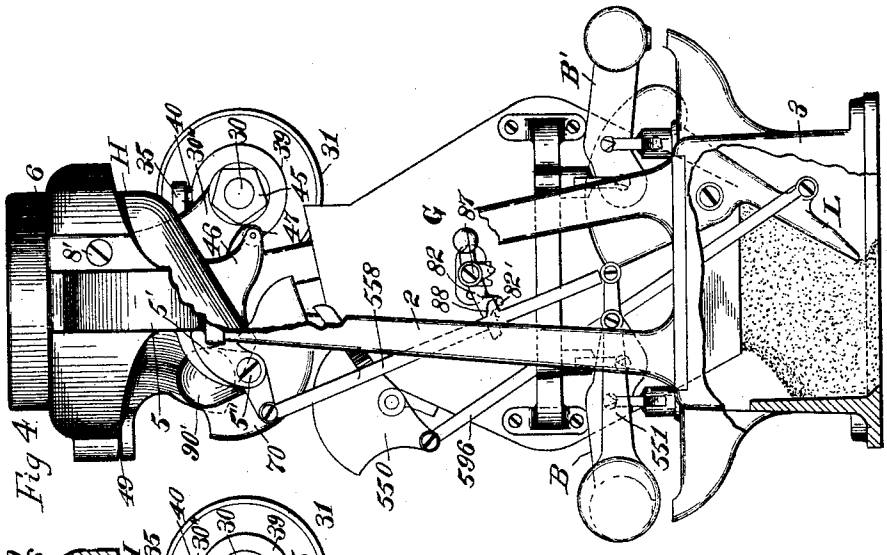

Fig 4.

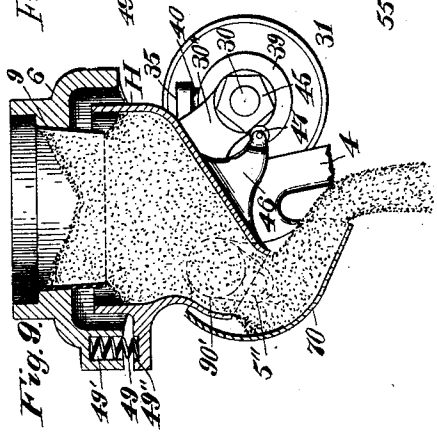

Fig. 6.

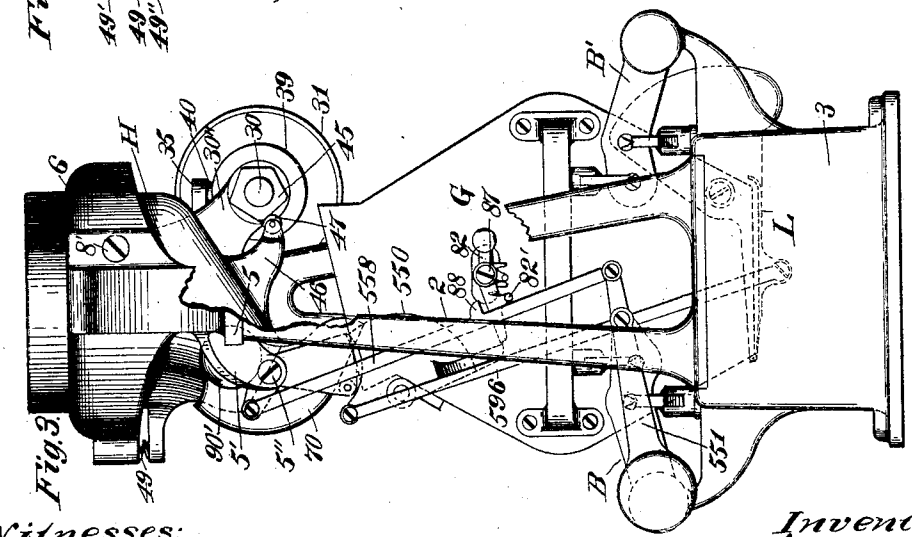

Fig. 5.

Witnesses:
R. W. Pittman
Fred. J. Dole.

Inventor
F. H. Richards.

(No Model.) 4 Sheets—Sheet 3.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,292. Patented Oct. 27, 1896.

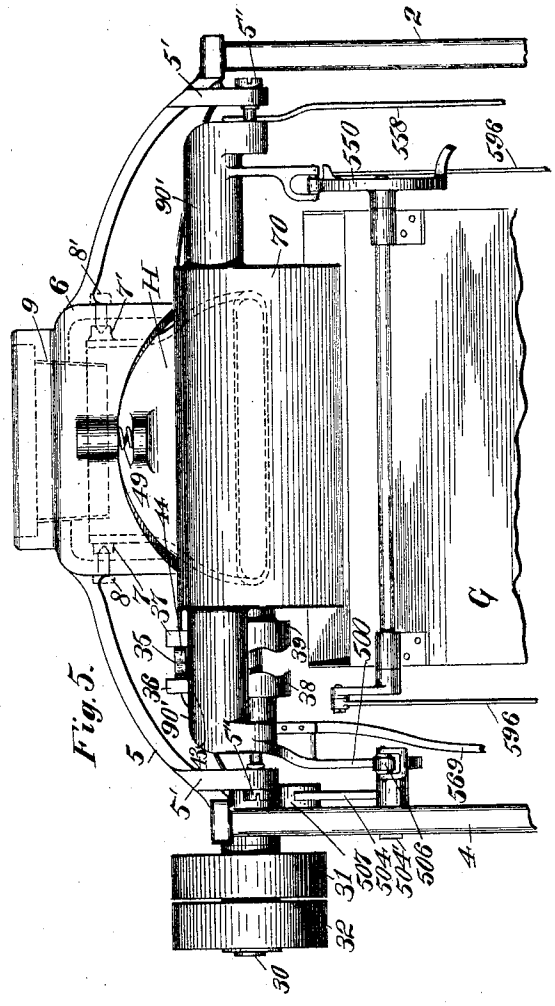

Fig. 5.

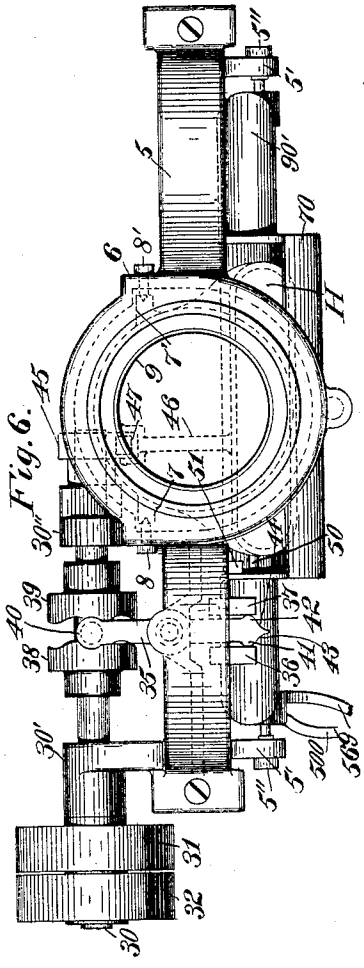

Fig. 6.

Witnesses
R. W. Pittman
Fred. J. Dole.

Inventor:
F. H. Richards.

(No Model.)

4 Sheets—Sheet 4.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,292. Patented Oct. 27, 1896.

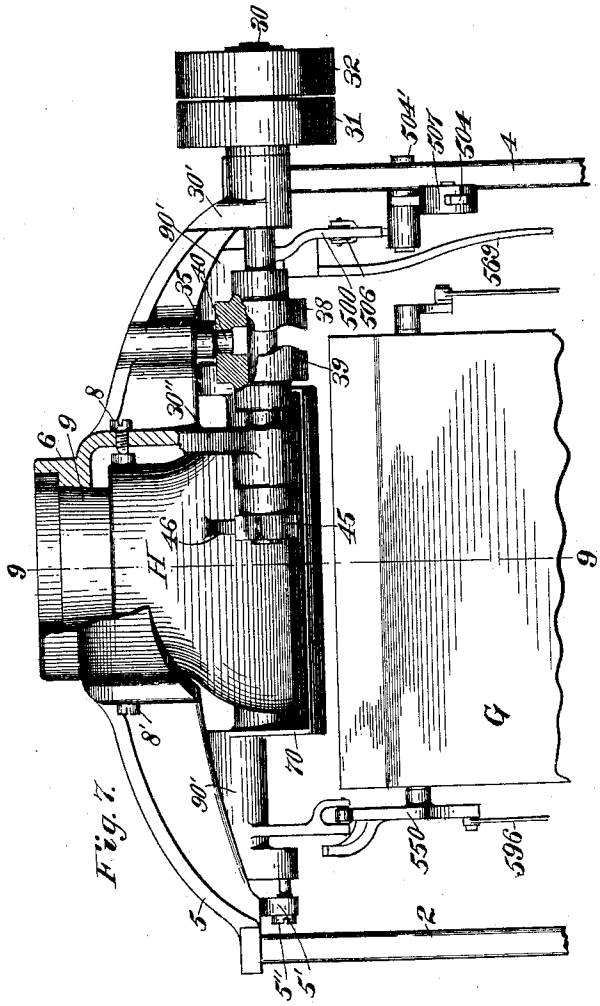

Fig. 7.

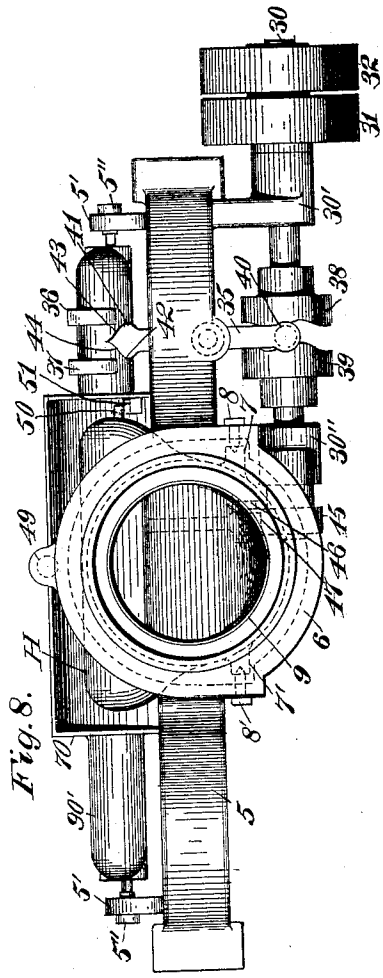

Fig. 8.

Witnesses:
R. H. Pittman
Fred. J. Dole.

Inventor:
F. H. Richards.

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,292, dated October 27, 1896.

Application filed April 14, 1896. Serial No. 587,536. (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, and more especially to valve and supply mechanism therefor, the object being to provide improved means of the character specified in which the supply of material may be subjected during certain stages of the operation of the machine to a vibratory or jarring action, which is produced in such a way as to cause a steady, unbroken supply of material from a supply-spout to a valve, and over said valve to a bucket or load-carrying receptacle of a weighing-machine.

In the drawings accompanying and forming part of this specification, Figure 1 is a left-hand end elevation of a weighing-machine embodying my improvements in the preferred form thereof, the chute and valve being in motion and the latter in its open position. Fig. 2 is a similar view, the chute and valve being at rest, the latter being closed and the bucket discharging its load. Figs. 3 and 4 are right-hand end elevations of the machine, with the operative mechanisms in positions corresponding, respectively, with Figs. 1 and 2. Fig. 5 is a rear elevation of the upper part of the machine, showing more particularly a form of mechanism for effecting a jarring movement of the valve. Fig. 6 is a plan view of the same, illustrating also by dotted lines a form of chute-actuating means. Fig. 7 is a front elevation of the upper part of the machine, showing also the valve and chute actuating mechanisms. Fig. 8 is a plan view. Fig. 9 is a detail view in section, taken in line 9 9, Fig. 7, illustrating the chute-reciprocating means.

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

My present invention is applicable to weighing-machines of different types; but for convenience in illustrating the nature and purpose of said invention it is herein shown in connection with a weighing-machine of the kind disclosed in Letters Patent No. 548,840, granted to me October 29, 1895, to which reference may be had, and which will be hereinafter briefly described.

The framework for supporting the operative parts of the machine may be of any suitable construction, and is herein shown comprising two side frames 2 and 4, mounted upon the chambered supporting-base 3, and connected at the top by the plate or beam 5 for supporting the supply chute or spout 11 and its operating devices.

The beam mechanism for supporting the bucket is shown comprising the oppositely-disposed scale-beams B and B′, preferably mounted upon the base 3 by means of bearings carried by said base. The beam mechanism will also be provided with suitable supports for the bucket mechanism, which comprises the bucket (designated in a general way by G) and its operative devices.

The closer for the bucket is designated in a general way by L, and is shown pivoted adjacent to one side of the discharge-opening of the bucket.

As a means for supporting the bucket-closer L an inverted toggle is illustrated, which consists of the rocker 550, pivoted to the bucket G, and the connecting rod or member 596, which is pivotally connected to the rocker and to the closer (see Fig. 3) in such a manner that when the closer is in its normal or shut position the two pivots of the rod will be nearly in line with, and the upper of said pivots will be above, the toggle-pivot, so that the rocker 550 may be engaged by a suitable latch and held with a minimum pressure thereon, as the entire weight of the bucket contents will be practically supported by the rocker-pivot.

The closer-latch is designated by 82, and is shown pivoted at 87 on the bucket G and having a stop for engaging a coöperating stop when the parts are in the closed position previously described.

Underneath the supply-spout, which as to certain features of my present improvements may be of any ordinary description having a discharge-opening, is placed a stream-supporting valve horizontally disposed in such a manner that when the parts are at rest the stream or supply of material will be sustained on the valve, but when the valve is properly

shifted or opened the mass will flow over the valve into the bucket of the machine. Some materials, however, are not free flowing and require agitation for producing a continuous flow of the same through the supply apparatus. Among these materials may be enumerated flour, mixed feed, cotton-seed meal, and the like.

As a means for insuring a free flow or movement of the material through the supply apparatus, the valve will be supported in such a manner that, in addition to its shifting lateral movement for opening and closing the same, it may have a slight reciprocatory action or jarring movement, and this preferably in a direction transverse or crosswise to its said opening and closing movement and independent of the valve-actuating mechanism, so as to jar the valve underneath the material supported upon it for reducing the adhesion of the material on the valve and destroying its cohesion while on the valve, so that it will flow freely over the discharge edge of said valve.

One feature of my present improvements relates to the supply chute or spout through which the material is delivered to the valve, said spout being preferably movable laterally for the purpose of varying its position relatively to the valve, and the valve being also provided with means adapted to be connected with a suitable device for imparting thereto at certain stages of the weighing operation and while the valve is in certain predetermined positions a vibratory or jarring movement, preferably in a direction transverse to the axis of movement of the valve, whereby the vibration or jarring of the supply chute or spout will be in a direction crosswise to the reciprocation or jarring of the valve, and thus produce a peculiar gyratory movement or effect on that portion of the mass of material immediately between the lower end of the supply-spout and the stream-supporting portion of the valve. By means of this peculiar organization of movable parts and the means for imparting thereto the peculiar movements described the material, especially of the slow-running kinds referred to, is very effectively disintegrated and made to flow in a relatively steady stream, which is fully controlled by the mechanism.

The top plate of the machine is shown provided with the annular band or ring 6, which constitutes a convenient means for pivotally supporting the reciprocatory or vibratory chute or spout II, which latter may be of usual construction. The chute or spout II is shown having formed thereon, near the upper edge thereof, the ears or lugs 7 and 7′, in which may be suitably formed bearings in which the pivot-screws 8 and 8′, respectively, passing through the annular ring 6, are operative.

The annular ring or band 6 is shown provided interiorly thereof with the short pipe or conduit 9, suitably connected thereto, and which projects into the chute or spout II, and in practice may be connected with an elevator or other suitable source of supply.

The valve for the chute is of the type disclosed in Letters Patent No. 535,727, granted to me March 12, 1895, to which reference may be had. Said valve is shown pivotally supported for oscillatory movement between the arms or brackets 5′, depending from the top plate 5. The valve employed will be preferably a balanced valve, the balance-weight 90′, projecting from the end walls of the valve, being shown for this purpose, and will also preferably extend beyond the lower edge of the front of the chute sufficiently far to support the descending column or stream of material in said chute II. The brackets 5′ are shown provided with pivot-screws 5″, which are operative in bearings formed in the balance-weight 90′, and are of such a length as to permit a limited lateral movement of the valve 70.

As a means for imparting the vibratory or jarring movement to the valve 70, the means shown may be employed, and will now be described.

A power-shaft is shown at 30 and as supported in brackets 30′ and 30″, suitably formed on or carried by the framing of the machine. The shaft 30 is illustrated carrying at the outer end thereof the fast and loose pulleys 31 and 32, which may be operatively connected by a belt, as 31′, or other means with a suitable motor, (not shown,) whereby, when the belt is shipped to the pulley 31, the shaft 30 and the connected devices will be actuated.

The top plate 5 is illustrated carrying on the under surface thereof the vibrator, (herein shown as a lever 35,) pivotally supported intermediate its ends by said plate and located for receiving a vibratory or reciprocatory motion from the driving mechanism and transmitting the same to the valve 70.

The balance-weight 90′ of the valve 70 is shown having formed thereon the two projections 36 and 37, between which the reciprocator or lever 35 is normally operative, so that as it is driven by the shaft 30 it may impart a reciprocatory stroke to the said projections, to be transmitted to the valve, and preferably in a direction coincident with its axis of movement, for vibrating or jarring the same, to thereby shake up and agitate the sustained mass thereon and insure a free flow of the supply-stream.

The valve 70, it will be remembered, is oscillatory, and the balance-weight 90′, being located above the center of movement of the valve, will, it is evident, be oscillated in an opposite direction, the peculiar purpose of which will be hereinafter apparent.

The shaft 30 is illustrated provided with the two cams 38 and 39, which may be keyed or otherwise suitably secured to said shaft for rotation therewith; and the cam-surfaces of said cams are shown as being of the "wave" type. The valve reciprocating or jarring lever 35 is shown provided adjacent to one end

thereof with a downward projection (herein illustrated as a pin 40) passed therethrough and disposed between the cam surfaces of the two cams 38 and 39, so that on the rotation of the said shaft and the cams therewith the cam surfaces will be effective for reciprocating the lever 35 in an obvious manner, whereby the movement thereof may be imparted to the valve. The lever 35 is shown having formed thereon adjacent to one of its ends the opposite working faces 41 and 42, which engage the two projections 36 and 37, respectively, formed on the balance-weight 90′ of the valve 70 while the latter is in its open position and during the major period of the closing movement thereof, so that on the reciprocation of the lever 35 in the manner previously described the part 41, by engaging the projection 36 on one movement of the lever 35, will jar the valve 70 in one direction, and on the opposite movement of said lever the part 42 will jar the valve in an opposite direction by engaging the projection 37 on the valve balance-weight.

During the major period of the operation of the machine the valve 70 will be oppositely jarred longitudinally thereof for effecting the peculiar results hereinbefore set forth. While the valve 70 is in its open position, as indicated in Fig. 1, the two working faces 41 and 42 will be operative for imparting a constant lateral jar to the valve 70, and, as will be apparent, in a direction longitudinally of its discharge edge. As the valve is closed by suitable mechanism, one form of which is illustrated and will be hereinafter described, the two projections 36 and 37 are oppositely moved and slowly carried past the plane of lateral movement of the two working faces 41 and 42, though at the commencement of the poising period the jarring motion will be still transmitted to the valve 70; but during this period the two working faces will be very near to the inner end of the inside faces of the two projections 36 and 37. At this point in the operation of the machine the valve 70 will be held against further closing movement to permit the feed of the drip-stream into the bucket to complete the partial load therein. On the release of the valve the two projections will be immediately carried past the plane of lateral movement of the working faces 41 and 42, whereby the lever 35 becomes immediately ineffective as a stroke-transmitting factor, though it continues its reciprocatory movements. The lever 35 is also shown provided with the two inclined faces 43 and 44, which have a continuous lateral movement between the two projections and which meet at a common point, and serve also as a guide for insuring the movement of the two projections 36 and 37 within the plane of lateral movement of the vibrating lever 35 on the opening of the valve 70.

From the preceding description it will be evident that in connection with a chute, and a valve therefor means are provided for reciprocating said valve in opposite directions.

It will be remembered that the chute or hopper H has been described as supported for reciprocatory or vibratory movement, and preferably in a direction transverse to that of the valve, so that the valve-sustained and chute-contained mass will be given a peculiar gyratory action by the combined and simultaneous movement of these two members. For thus reciprocating the chute or hopper H, and preferably simultaneously with the valve, the means herein illustrated may be employed, and which will now be described.

The pivots or center of movement of the chute will be preferably located at one side of a vertical line passing through the center of gravity thereof, so that the load or mass of material therein tends to assist in effecting the downstroke of said chute.

The shaft 30 is illustrated provided at a point adjacent to the inner end thereof with the polygonally-faced cam 45, which may be splined or otherwise suitably fixed to said shaft for rotative movement therewith, the peculiar function of said cam being to effect an upward movement or oscillation of the loaded chute H.

The chute H is shown provided with the forwardly-projecting arm 46, preferably formed integral therewith, and provided at its free end with an antifriction-roll 47, serving its well-known function, and suitably mounted in a bifurcation formed on said arm. The roll 47 is interposable in the path of movement of the polygonally-faced cam 45.

The operation of these devices will be clearly apparent. On the rotation of the shaft 30 the cam 45 will be rotated therewith, and the cam-faces thereof will be successively effective for imparting an upward stroke or oscillation to the loaded chute; and for obtaining the downward or return oscillation of the loaded chute the means hereinafter described may be employed. As the perimeter of the roll 47 intersects the plane of movement of the cam 45, the successive cam-faces each engage the roll and impart an upward movement to the arm 46, which is transmitted to the chute H for shaking or jarring the same and the contents therein. For imparting a downward stroke or return oscillation, by which the same peculiar results are secured, a spring-actuator is illustrated, which in the present instance consists of the coiled spring 49, seated in complementary recesses 49′ and 49″, formed, respectively, in the annular ring 6 and in the upper edge of the chute H at a point relatively remote from its axis of movement, the tendency of said spring being to force the loaded chute downward and the roll 47, which is shown connected therewith, into the plane of movement of the rotating cam 45, by which latter the upward movement of said chute is obtained. On the completion of the bucket load it is desirable to

throw the chute out of action or stop the vibration thereof, and for obtaining this result means operative with the stream-controlling valve 70 will be preferably employed, and will now be described. The chute H at a point to the rear of its axis of movement is shown provided with a lateral projection or pin 50, disposed in the path of movement of a suitable actuator—such as the lug or projection 51—extending inward from one of the valve-walls, (herein shown as the left in Fig. 2,) so that at a predetermined point in the closing movement of said valve the lug 51, by engaging the projection or pin 50 on the chute on the further or final closing movement of the valve for cutting off the supply-stream or drip thereof, said valve will by said devices raise said chute and the arm 46 therewith, carrying the antifriction-roll 47 past the plane of movement of the faces of the cam 45, so that the latter, although it continues to rotate with the shaft 30, becomes immediately ineffective as a stroke-transmitting medium, the result being a stoppage of the chute vibrations.

It will be evident that on the opening movement of the valve 70, the projection 51 thereon falling from under the pin 50 on the chute H, said chute may be forced downward by its spring-actuator 49, so that the roll 47 may intersect the plane of movement of the rotative cam 45, and the chute thereby returned to action.

As a means for actuating the valve to open the same, the mechanism shown and described in Letters Patent No. 548,839, granted to me October 29, 1895, may be employed, and is herein illustrated, and will now be described.

A relatively long connecting-rod is shown at 558, and pivotally connected with the valve 70 at a point to the rear of its pivot or center of movement and having the lower end thereof in position for receiving an upward thrust from a suitable device or actuator, whereby the same may be transmitted to the valve for opening the same.

The scale-beam B is illustrated supporting a valve-opening actuator (herein shown as a counterweighted lever 551) pivotally connected thereto at a point near the inner end thereof, the force of which is normally exerted on the counterpoised side of said scale-beam.

At a predetermined point in the operation of the machine this lever 551 is shiftable on its supporting scale-beam, so that the effective force thereof is subtracted from the counterpoised side of said beam. On its return movement or stroke, it being in engagement with the connecting-rod 558, an upward thrust will be imparted to the connecting-rod 558 sufficient for opening the valve to cause the flow of the supply-stream and the return to vibratory action of said valve.

As a means for actuating the valve to close the same, the mechanism shown and described in Letters Patent No. 548,843, granted to me October 29, 1895, is illustrated, and will now be described.

A valve-closing cam is shown at 500 depending from and oscillatory with the valve 70. The cam 500 is shown having the two connected cam-faces 501 and 502, which constitute reducing and cut-off cam-faces, respectively. A valve-closing lever is shown at 504 pivoted to the framework of the machine at 504', and having the counterweight 507 preferably adjustable along the forward arm of said lever. The rear or short arm of the lever is shown provided with an antifriction-roll 506, suitably journaled in a bifurcation or fork formed on said arm.

At the commencement of operation the roll 506 will be approximately at the point indicated in Fig. 1 on the reducing cam-face 501, so that through the force of the descending counterweighted arm of the lever 504 a valve-closing thrust is exerted sufficient to effect the closing movement or oscillation of the valve by the riding of the roll 506 along the cam-face 501. During this operation the balance-weight 90', it will be evident, is being oppositely oscillated, whereby the projections 36 and 37 thereof will be slowly carried past the plane of transverse movement of the working faces 41 and 42 of the valve-vibrating lever 35.

At the commencement of the poising period the valve 70 will be momentarily held to permit the supply of a drip-stream to the nearly loaded bucket. For thus holding the valve the means illustrated may be employed. The valve 70 is shown having a depending arm 569, the arc of movement of which is intersected by a suitable stop, whereby when said rod is engaged by such stop the valve will be held against further closing movement. The stop illustrated for this purpose is a by-pass 570, suitably supported by the scale-beam B, and at the commencement of the poising period the rod will be engaged by said stop 570, the roll 506 being at this point at about the intersection of the two cam-faces 501 and 502. The bucket load having been completed, said bucket will descend below the poising line, the beam B descending in unison therewith, this action carrying the by-pass stop 570 downward therewith and disengaging it from the rod 569 and releasing the valve. On the release of the valve the roll, riding along the cam-face 502, which is shown as being of such shape as to permit the exertion of a relatively great force thereon, will quickly close the valve, the latter cutting off the supply-stream and being also thrown out of action, due to the rearward oscillation of the balance-weight 90' and the carrying past the plane of movement of the vibrating lever of the two projections 36 and 37. During this last-mentioned movement the valve 70 is also effective for throwing the vibrating chute H out of action by raising the same in the manner previously described.

As a means for releasing the bucket-closer L, whereby the completed bucket load may

be discharged, an actuator preferably operative with the valve will be employed.

It will be remembered that a latch 82, pivoted at 87, has been hereinbefore described as operative for preventing the opening movement of the closer by engaging a suitable stop on the closer-connected rocker 550. This latch, as shown, swings upward for engaging the rocker, and it will be apparent that it has a downward movement for releasing the bucket-closer.

The connecting-rod 558 is shown provided with a latch-actuator 88 (herein illustrated as a projection) suitably formed thereon at a proper point, which has a descending movement into engagement with a pin 82′, formed on the latch 82. This operation will take place at the close of the poising period or during the final closing movement of the valve, the rod 558 being thrust downward by the power of the closing-valve and the actuator 88 into contact with the latch-pin 82′, whereby the latch 82 is depressed and the closer freed of all restraint. At this point in the operation the bucket contents by their weight may force the closer open.

Having described my invention, I claim—

1. The combination with a valve supported for lateral movement to open and close the same, and supported for reciprocatory movement in a direction crosswise of its opening and closing movements; of a reciprocator free of the valve when in its closed position; and means for effecting an operative connection between the valve and the reciprocator on the opening movement of said valve.

2. The combination with a valve supported for lateral movement to open and close the same, and for reciprocatory movement in a direction crosswise to its opening and closing movements; of a reciprocator free of the valve when the latter is closed; and connecting means operative with the valve, and carried thereby into engagement with said reciprocator on the opening movement of the valve, and out of engagement with said reciprocator on the closing movement of said valve.

3. The combination with an oscillatory valve supported for reciprocatory movement longitudinally of its axis; of a reciprocator; and means for throwing the reciprocator into engagement with the valve on its opening movement, and for throwing said reciprocator out of action on the complete closure of the valve.

4. The combination with a valve horizontally disposed for supporting a stream of material; of a supply-spout for the valve supported for lateral movement relatively thereto; a valve-actuating mechanism; a spout-vibrator; and means for throwing said vibrator out of action on the closing of the valve.

5. The combination with a valve horizontally disposed for supporting a stream of material, of a supply-spout for the valve supported for lateral movement relatively thereto; means for opening and closing the valve; and means for continuously vibrating said spout during the opening movement of the valve.

6. The combination with a valve and with a supply-spout therefor movably supported for lateral movement relatively to the valve; of means for opening and closing the valve; and a spout-vibrator free of the spout; and means operable with the valve for throwing said vibrator into action.

7. The combination with a valve supported for opening and closing movements; of means for operating the valve to open and close the same; a supply-spout for the valve; a vibrator for said spout; and means for throwing said vibrator out of action when the valve is closed.

8. The combination with a valve and means for opening and closing the same; of a supply-spout over the valve and supported for reciprocatory movement; a spout-actuator located adjacent to the spout; means carried with the spout for engaging said actuator, and thereby imparting to the spout a reciprocatory movement; and means operable with the valve and located to throw said spout-actuating means out of action on the closing of the valve.

9. The combination with a chute; of a valve; and means for vibrating said valve in a direction coincident with its axis of movement.

10. The combination with a chute; of a valve; means for vibrating said valve in a direction coincident with its axis of movement; and means for transversely vibrating said chute.

11. The combination with a chute; of a valve therefor having opening and closing movements; valve-actuating mechanism; and means for vibrating said valve while in its open position, and for stopping the same when the valve is closed.

12. The combination with beam mechanism and with a bucket supported thereon, of a supply-spout having an arm; a driven shaft provided with a cam for engaging said arm; and a valve for said spout.

13. The combination with beam mechanism and a bucket supported thereon, of a supply-spout having an arm; a driven shaft having a cam for engaging said arm; a movably-supported valve; and means for vibrating said valve.

14. The combination with beam mechanism and with a bucket supported thereby, of a pivotally-supported spout having an arm; a driven shaft having a cam for engaging said arm; a valve for said spout; and valve-actuating mechanism.

15. The combination with beam mechanism and with a bucket supported thereby, of a spout supported for reciprocatory movement; a shaft having a cam for reciprocating said spout in one direction; a spring-actuator for oppositely moving said spout; and a valve for said spout.

16. The combination with a valve supported for reciprocatory movement in two directions, said valve having projections thereon; and a valve-reciprocating lever operative between said projections.

17. The combination with a pivotally-supported valve having a balance-weight provided with two projections; of a lever operative between said projections; and a shaft having a lever-operating cam.

18. The combination with a pivotally-supported spout having an arm; of a pivotally-supported valve having a balance-weight provided with two projections; a lever operative between said projections; a shaft; and cams supported on said shaft for operating said lever and arm.

19. The combination with a chute; of a valve supported for opening and closing movements; valve-actuating mechanism; means for reciprocating said valve in a direction transversely of its opening and closing movements; a depending stop-rod carried by said valve; and a stop operable for engaging said rod at a predetermined point, and for also releasing the same.

20. The combination with a pivotally-supported chute having an arm; of an annular ring for supporting said chute; a coil-spring connected with said ring and chute; a pivotally-supported valve having a balance-weight provided with projections; a lever operative between said projections; a shaft; and cams on said shaft for operating said lever and arm.

FRANCIS H. RICHARDS.

Witnesses:
FRED. J. DOLE,
HENRY J. BINGHAM.