(No Model.) 7 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 568,585. Patented Sept. 29, 1896.

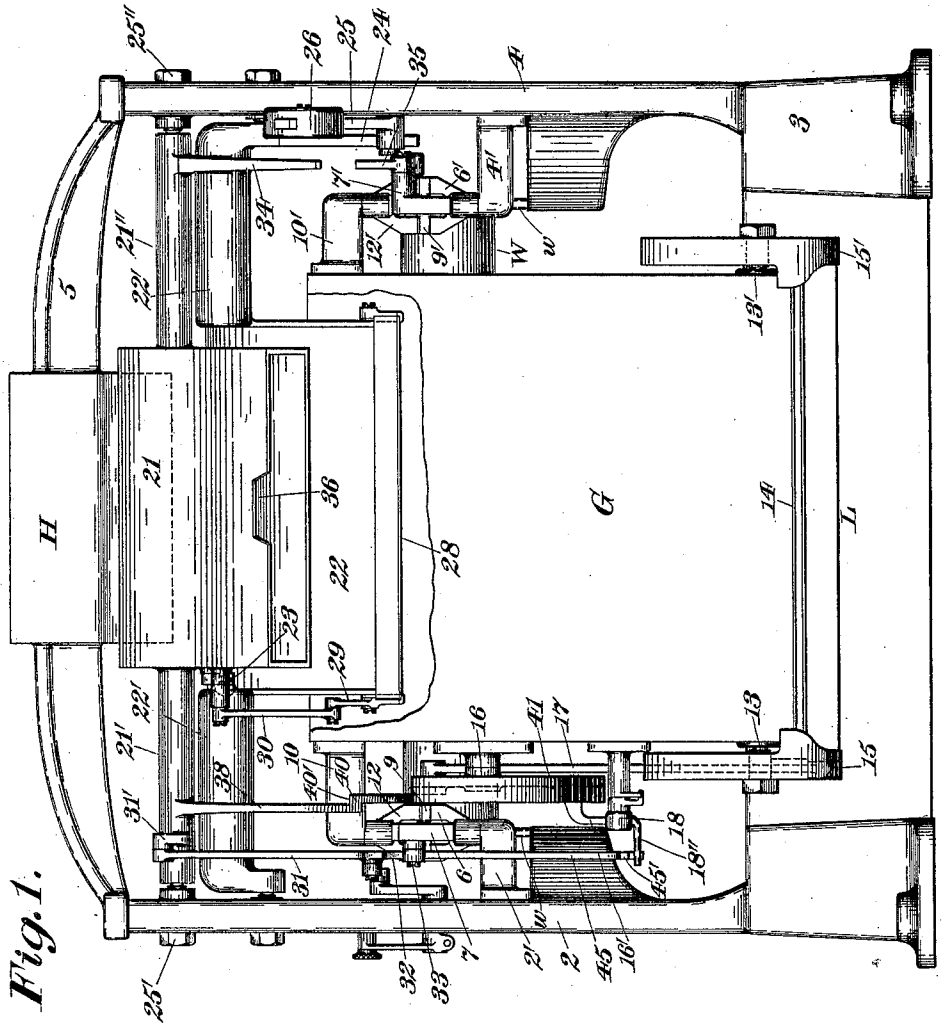


Fig. 1.

Witnesses:
Chas. D. King.
Fred. J. Dole.

Inventor:
F. H. Richards.

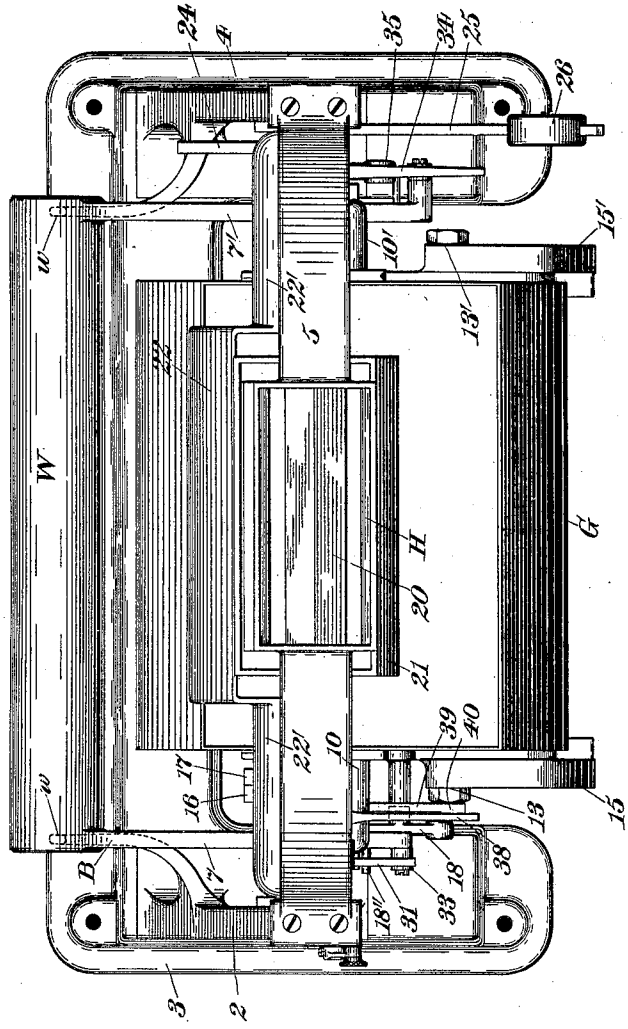
(No Model.) 7 Sheets—Sheet 2.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 568,585. Patented Sept. 29, 1896.

Fig. 2.



Witnesses:
Chas. D. King.
Fred. J. Dole.

Inventor:
F. H. Richards.

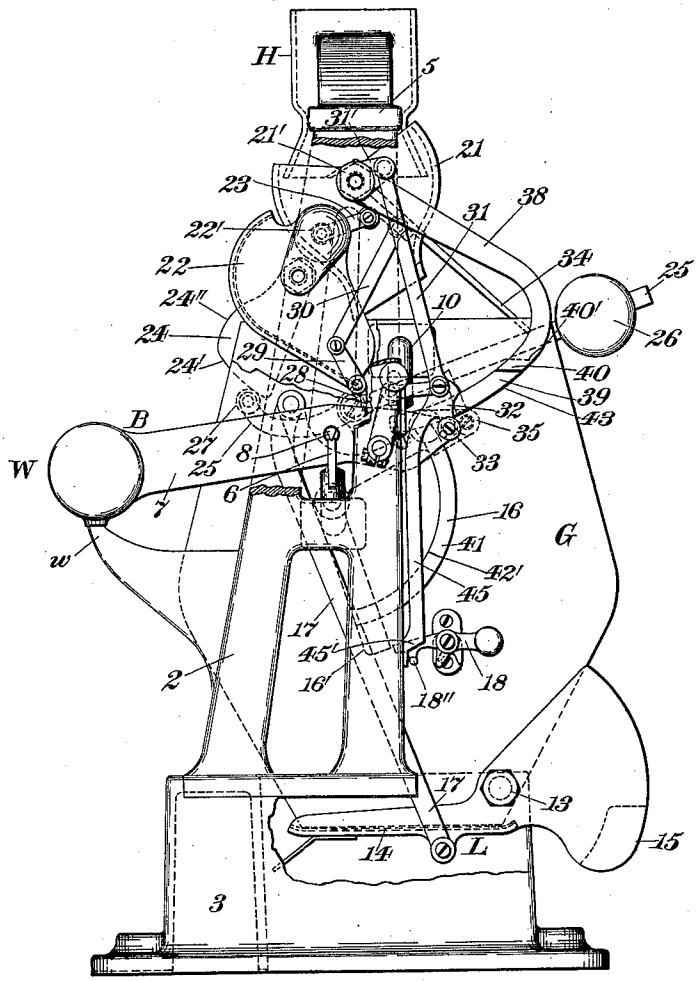
(No Model.) 7 Sheets—Sheet 3.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 568,585. Patented Sept. 29, 1896.

Fig. 3.



Witnesses:
Chas. D. King.
Fred. J. Dole.

Inventor:
F. H. Richards

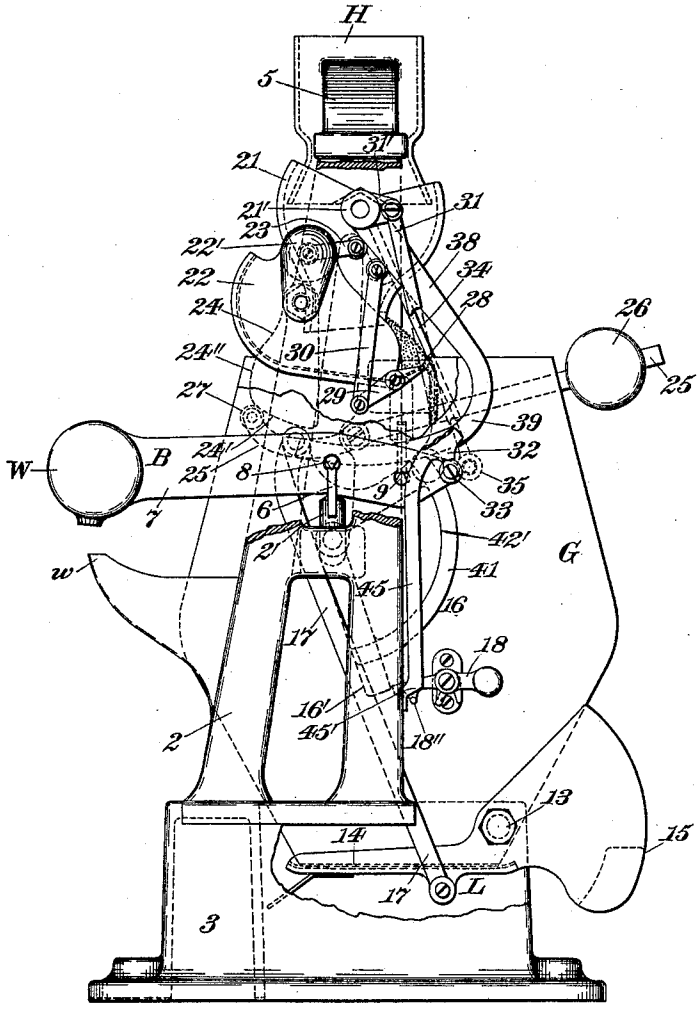
(No Model.) 7 Sheets—Sheet 4.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 568,585. Patented Sept. 29, 1896.

Fig. 4.



Witnesses:
Chas. D. King.
Fred. J. Dole.

Inventor:
F. H. Richards.

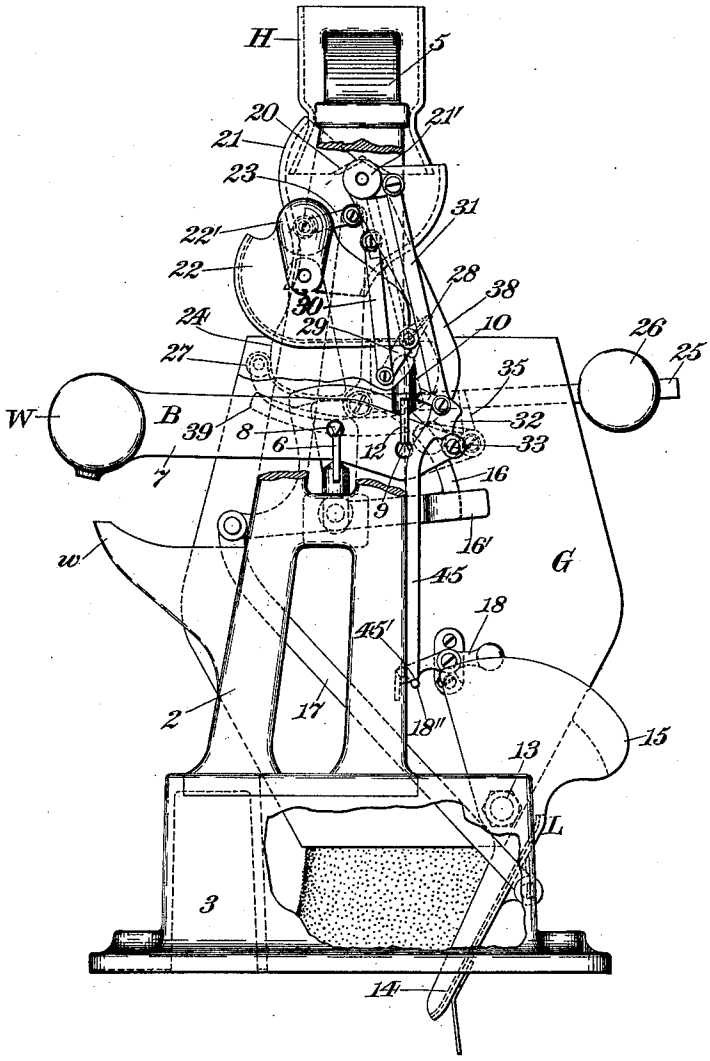
No Model.) 7 Sheets—Sheet 5.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 568,585. Patented Sept. 29, 1896.

Fig. 5.



Witnesses:
Chas. D. King.
Fred. J. Dole.

Inventor:
F. H. Richards

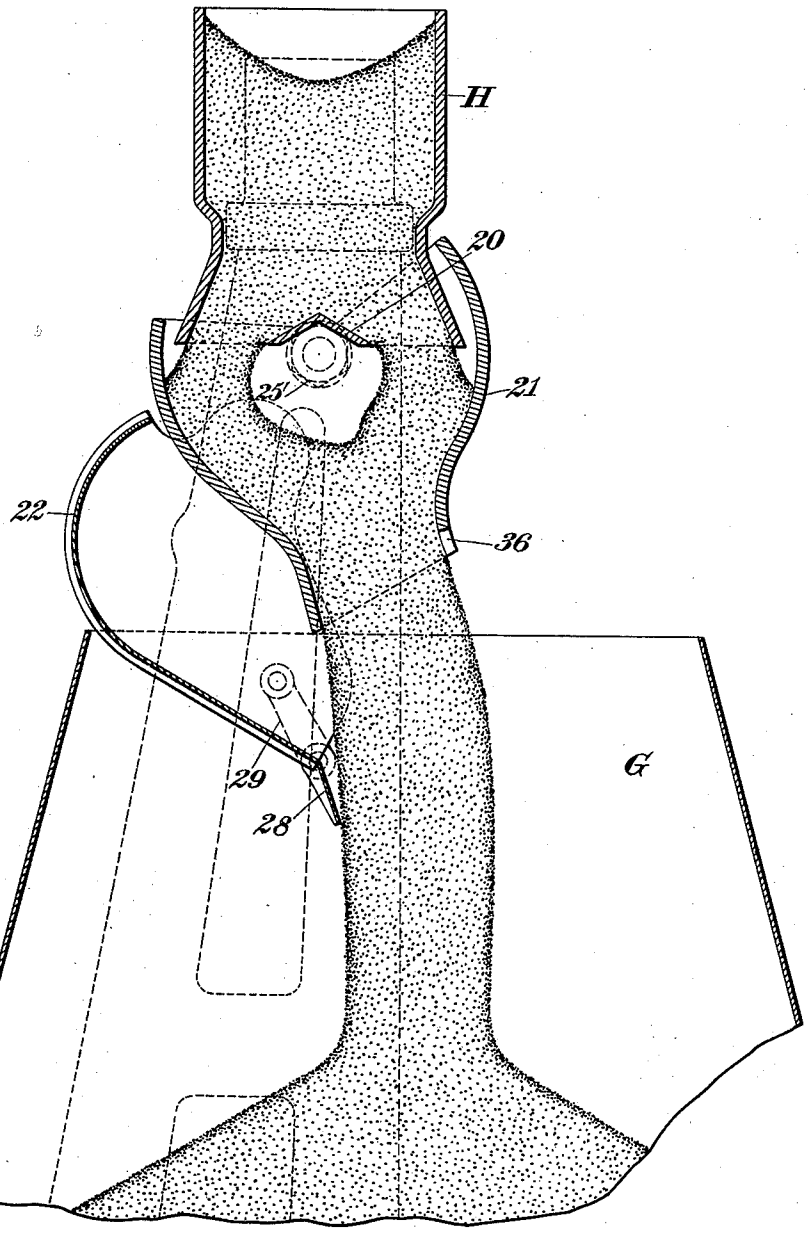
(No Model.) 7 Sheets—Sheet 6.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 568,585. Patented Sept. 29, 1896.

Fig. 6.



Witnesses:
Chas. D. King.
Fred. J. Dole.

Inventor:
F. H. Richards.

(No Model.) 7 Sheets—Sheet 7.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 568,585. Patented Sept. 29, 1896.

Fig. 7.

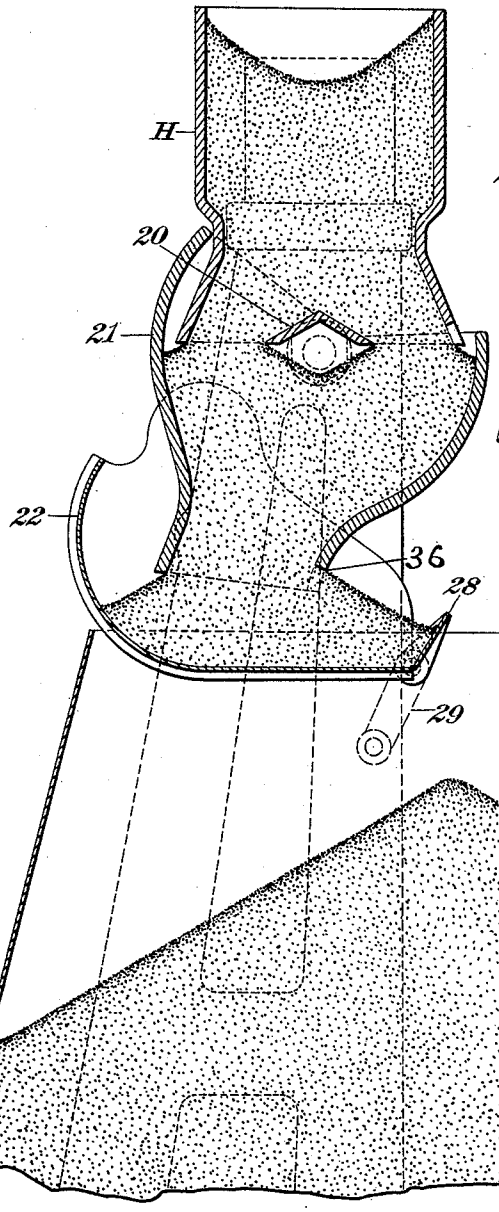
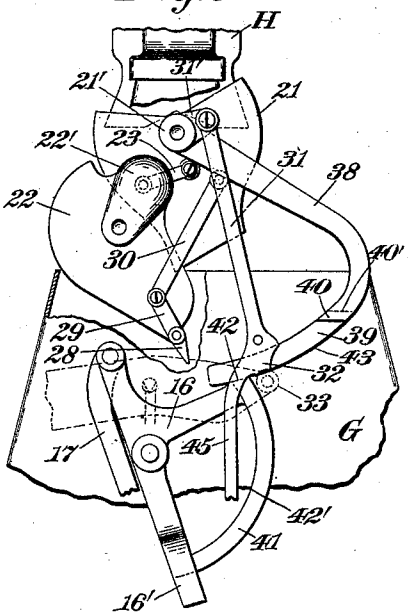


Fig. 8.



Witnesses:

Chas. D. King.

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. 568,585, dated September 29, 1896.

Application filed May 11, 1896. Serial No. 591,199. (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, one of the objects of the invention being to provide an improved valve mechanism comprehending efficient means for obtaining a gradual and precise reduction in volume of the supply-stream at successive points in the operation of the machine and by the expenditure of minimum force.

The improved valve mechanism comprises as one of its constituent elements a movably-supported chute; and it is a further aim of my present invention to employ, in connection with such a chute and with a shiftable bucket-discharge member, reciprocally effective stops operable between said parts for preventing premature action thereof.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine equipped with my improvement in the preferred embodiment thereof and illustrating the positions occupied by the respective parts thereof at the commencement of operation. Fig. 2 is a plan view of the machine. Fig. 3 is an end elevation as seen from the left in Fig. 1, the operative parts of the machine being in positions corresponding with the said Fig. 1. Figs. 4 and 5 are similar views of the machine at two succeeding points in its operation. Figs. 6 and 7 are vertical central sections of the improved valve mechanism and the upper part of the bucket of the weighing-machine, and Fig. 8 is a detail view of the stop mechanism.

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

The framework for supporting the operative parts of the machine may be of any suitable description; and it is herein shown consisting of the two side frames 2 and 4, mounted upon the base 3 and connected at the top by the plate or beam 5, to which is suitably connected the chute or hopper H, to be hereinafter more particularly described.

The side frames 2 and 4 are illustrated having formed on the inner faces thereof the brackets 2′ and 4′, to which are suitably connected the beam-supports or V-shaped bearings 6 and 6′, respectively. The scale-beam is designated in a general way by B, and is shown comprising the arms 7 and 7′, respectively, which are joined by the combined connecting-shaft and counterweight W, a suitable support or supports *w* being provided for sustaining the latter when the machine is at rest and during certain periods of its operation.

The beam-arms 7 and 7′ are shown provided with pivots or knife-edges 8, resting on the beam-supports 6 and 6′, respectively, and by which said scale-beam is pivotally supported. Said beam-arms are also provided adjacent to the inner ends thereof with bucket-supports 9 and 9′, respectively, and herein illustrated as pivots or knife-edges, by which the bucket or load-carrying receptacle of the machine may be pivotally suspended. The end walls of the bucket are shown having connected thereto the brackets or hangers 10 and 10′, respectively, to which are suitably attached the V-shaped bearings 12 and 12′, respectively, resting on the knife-edges 9 and 9′ of the scale-beam B.

The bucket mechanism comprises two members, one of which is shiftable relatively to the other for discharging the bucket-load, and the bucket-closer L is herein illustrated comprising such shiftable bucket-discharge member. The bucket G is of the "single-chambered" type or class. The closer L is shown pivotally supported at 13 and 13′ on the end walls of the bucket near one side of the discharge opening or outlet thereof, and consists of a closer proper or plate 14, having joined thereto the preferably integral counterbalanced blades or arms 15 and 15′, which are operable for returning said closer to its normal or shut position, as indicated in Fig. 3.

As a convenient means for supporting the bucket-closer L the following instrumentalities may be employed, viz: The bucket G is shown pivotally supporting the rocker 16, constituting one member of a toggle, to which is articulated the rod or link 17, serving as the other member of said toggle. The opposite end of said rod or link is likewise connected

to the bucket-closer L, and in such a manner that when the closer is in its shut or normal position the three toggle-pivots will be approximately in line with and the upper pivot of the connecting-rod 17 will be above the rocker-pivot, so that said rocker when engaged by a suitable detent device will be held against oscillatory movement by a minimum pressure, as will be apparent.

As a means for normally holding the rocker against oscillation the counterweighted latch 18 is illustrated, it being preferably pivotally supported on one end of the bucket G, and being also operable for engaging said rocker or a suitable detent-arm, as 16′, thereon when the closer is shut. In the embodiment illustrated the latch 18 swings upward to engage the rocker, and hence it will be evident that it may be disengaged therefrom or tripped by a downward movement.

The chute II is adapted to contain the mass of material to be weighed, which may be supplied thereto in some convenient manner, and is shown provided interiorly thereof with the angular deflecting-plate 20, which is located approximately midway of the front and rear walls of said chute and extends from end to end thereof. By such disposition of the deflecting-plate it is adapted to intercept and separate the descending column of material, whereby said column cannot be directed with its full impact against the valve when the latter is in a closed or partially-closed position, said plate also dividing the lower part of the chute II into two stream-outlets.

A movably-supported, preferably tubular, chute is designated by 21, and as a means for suspending said chute a rock-shaft, consisting of the arms 21′ and 21″, laterally extending from the end walls thereof and having sockets or bearings in its ends for receiving the pivot-screws 25′ and 25″, carried by the side frames 2 and 4 of the machine, is illustrated.

The stream-controlling valve is designated by 22, and is of the type disclosed in Letters Patent No. 535,727, granted to me March 12, 1895, to which reference may be had. The valve 22 is shown pivotally supported beneath the outlet of the chute 21 and for oscillatory movement between the side frames 2 and 4, and as also balanced, the balance-weight 22′, extending from opposite ends of the valve-pan, being illustrated for this purpose, whereby said valve, when in its closed position, as indicated in Fig. 5, has no tendency to move in either direction.

The movably-supported chute 21 and valve 22 will have a movement toward each other, the chute changing the course of the flowing stream of material from the hopper II by such action and directing it toward the rear of the valve, and the latter, on its upward oscillation, successively reducing the volume of the supply-stream.

The chute 21 will be shifted rearward as the load in the bucket G is being made up, and for effecting this operation means operatively connecting said chute 21 with the valve 22 will be preferably employed. A link 23 is illustrated attached to the valve 22 at a point above its axis of movement, being pivoted to the balance-weight 22′ and also to the chute 21, it being evident that on the stream-cut-off movement of the valve 22 the balance-weight 22′ will be oppositely moved, or to what is shown as the "left," so that it is operable for swinging the chute 21 rearward or in a corresponding direction, whereby the descending mass of material will be gradually directed toward the rear of the valve and into the concavity thereof and the volume of the stream simultaneously reduced.

For effecting the closing oscillation of the valve, mechanism substantially similar in construction and mode of operation to that disclosed in Letters Patent No. 548,843, granted to me October 29, 1895, is herein illustrated. A valve-closing cam is shown at 24, and is provided with the connected cam-faces 24′ and 24″, said cam being suitably connected to the valve balance-weight 22′. A valve-closing lever is shown at 25, its forward arm being shown counterweighted, as at 26, and its rear or short arm provided with an antifriction-roll 27, adapted to ride successively in contact with the two connected cam-faces 24′ and 24″, the last mentioned of which is of a shape to permit the valve-closing lever to act with relatively greater power or efficiency than it does with the other. At the commencement of operation the roll 27 will be in engagement with the cam-face 24′, as indicated in Fig. 3, so that on the descent of the forward weighted arm the roll 27 will be caused to ride along said cam-face to the connected cam-face, as shown in Figs. 4 and 5, and the closing or upward oscillation of the valve 22 will be effected and concurrently therewith a rearward shifting movement of the chute 21, whereby the line of flow of the supply-stream will be changed and its direction into or toward the rear of the valve 22 insured by said action.

For effecting the opening movement of the valve 22 means preferably connected with the swinging chute will be employed, the scale-beam B constituting a convenient device for transmitting such a force to the valve, although other means for accomplishing this purpose may be used, if desired.

The valve 22, which constitutes a main valve, is shown pivotally supporting at its discharge edge a supplemental valve consisting in the present instance of a plate 28, to which is connected the relatively short actuating-lever 29, which is actuated at a predetermined point in the operation of the machine and serves to thrust the connected supplemental valve upward relatively to the main valve, so that the former is adapted to hold back the drip-stream. The rear arm of the lever 29 is illustrated operatively connected with the swinging chute 21 by the link

or rod 30, pivotally attached, respectively, at its extremities to these members.

On the upward oscillation of the valve 22 by the counterweighted lever 25 the chute 21 will be moved rearward, as specified, this movement of the connected parts being a relatively slow one. When the roll 27 has reached the juncture of the two cam-faces 24′ and 24″, said chute and valve will be suitably held to permit the flow of a drip-stream into the bucket. On the release of said parts the lever 25 is effective for instantly closing the valve 22 and further shifting rearward the chute 21, the roll 27 of said lever being caused to ride along the cam-face 24″. On the last-mentioned movement of the valve 22 and chute 21 the latter, as it swings rearward, is effective for imparting a rapid downward thrust to the rod or link 30, which is communicated to the lever 29, and in turn to the supplemental valve 28, so that the latter is moved upward to intersect the line of flow of and thereby cut off the drip-stream.

The section 21′ of the chute-supporting shaft is illustrated having formed thereon the lug or ear 31′, to which is shown pivotally connected the rod 31, which may be engaged by a suitable device, such as the scale-beam B, for imparting an upward thrust to said rod, which, through the hereinbefore-described connections, is communicated to the valve 22 for opening the same.

The scale-beam B, it will be apparent, is movable between two positions, as indicated in the drawings, and is adapted, when resuming its normal position, as illustrated in Fig. 3, for imparting such a thrust as that alluded to for swinging the chute 21 outward and simultaneously opening the connected valve 22. The lower end 32 of the rod 31 is illustrated normally resting on a projection on the scale-beam B, consisting in the present instance of the antifriction-roll 33. On the descent of the scale-beam B in the usual manner the projection 33 will fall from under the lower end 32 of said rod 31, and thereby permit the closing of the valve 22 by the counterweighted lever 25 in the manner previously described, and synchronously therewith the rearward shifting of the oscillating chute 21 through the medium of the link 23, connected, respectively, with said members. During the bucket-discharging period the scale-beam B will occupy the position indicated in Fig. 5, and as it resumes its normal position an upward thrust will be given the rod 31. This action, as will be obvious, will shift the chute 21 forward, the valve 22 being forced open by the connecting-link 23 between such members, whereby the supply-stream will be caused to flow into the bucket.

At the commencement of the poising period means will be employed for holding the chute 21, and hence the connected valve 22, against further movement, to thereby permit the flow of a drip or reduced stream into the nearly-loaded bucket, the object being to complete the partial load.

The rock-shaft member 21″ is illustrated carrying the depending rod 34, which, it will be evident, is oscillatory with the chute 21, so that when said rod is intercepted by a suitable stop the connected chute 21 will be likewise held against further movement. The stop for this purpose is illustrated at 35 as a by-pass or counterweighted latch, it being shown pivotally supported by the beam-arm 7′. At a predetermined point in the rearward oscillation of the chute 21 the by-pass stop or the vertical arm thereof is adapted for engaging the lower end of the rod 34, suitable means being employed for holding said by-pass stop against oscillatory movement when such action takes place. When the beam B has descended below the poising-line, indicating the completion of the bucket-load, the by-pass 35 will be carried therewith, thereby releasing the rod 34, and hence the connected chute 21, so that the latter may be further shifted rearward and the valve 22 be given its final closing movement for cutting off the drip-stream. On the return movement of the chute 21 the connected rod 34 will engage the upper or vertical arm of the by-pass 35, swinging the latter ineffectively about its pivot, said chute being thereby permitted to resume its normal position.

The lower edge of the movably-supported chute 21 is illustrated intersected by a drip-opening 36 (shown most clearly in Fig. 1) of a suitable height and width, through which a drip or reduced stream may flow. When the valve 22 and chute 21 have reached the positions indicated in Fig. 4, an inclined bank of material will be sustained by the valve, which material extends from the lower edge of said chute to the lip of the supplemental valve 28. At this point in the operation of the machine it will be remembered that the valve and chute are held against further movement, the roll 27 being approximately at the intersection of the two cam-faces of the valve-closing cam 24. When thus held, a relatively narrow stream may flow through the drip-opening 36 from the mass within the chute 21 over the banked-up mass on the valve 22, from whence it flows into the bucket G. On the completion of the load by the drip-stream the chute 21, and hence the valve 22, will be released in the manner previously described, so that the valve-closing lever 25 is instantly operable for imparting the final closing movement to the valve 22 by its roll 27, riding along the cam-face 24″. When such action takes place, the chute 21 will be instantly shifted rearward and the supplemental valve 28 upward through the agency of the hereinbefore-described connections, said supplemental valve 28 on it supward movement being adapted to cut off the drip-stream.

My present invention contemplates the provision of reciprocally effective stops oper-

atively connected, respectively, with the movably-supported chute and with the shiftable member of the bucket mechanism, which in the present instance is the bucket-closer L.

The chute 21 is illustrated as having connected thereto the rod 38, provided with the preferably segmental portion 39, formed integral therewith, and which constitutes a stop device, said rod 38 being rigidly connected with the section 21′ of the chute-supporting shaft, and hence movable in unison with said chute, so that any limitation in movement of the stop device 39 will likewise affect the connected chute 21 and valve 22.

The segmental stop 39 is illustrated having formed thereon the offset 40, which constitutes a supplemental stop, the peculiar office of which will hereinafter appear.

The rocker 16, to which reference has been made, constitutes the coacting stop, it being operatively connected with the bucket-closer L by the rod 17, as before stated. The stop 16 is illustrated having formed thereon the segmental flange 41, serving as a supplemental stop, and said flange is also provided with a relatively straight stop-face 42.

The peculiar purpose of the reciprocally effective stops, to which reference has been made, is positively to maintain the chute 21 in its closed position, as indicated in Fig. 5, while the closer L is open and the bucket discharging its load, and to also prevent the opening movement of the closer when said chute is open, as illustrated in Figs. 2 and 4, and while any part of the supply-stream is flowing into the bucket. The operation of the coacting stops will be clearly obvious from an inspection of the accompanying drawings.

Fig. 3 represents the positions occupied by these coacting parts at the commencement of operation of the machine, the stop-face 42 being in contact with the stop-face 43 of the segmental stop device 39, so that any tendency of the rocking stop 16 to oscillate about its pivot will be effectually resisted by said stop 39 so long as this relation continues. When, however, the chute 21 has been closed, as indicated in Fig. 5, the face 40′ of the offset 40 will have intersected the plane of the inner face of the flange 41, formed on the stop 16, so that the latter is free to oscillate about its pivot provided the latch 18 has been depressed. As the rocking stop 16 oscillates about its pivot the curved surface 42′ of the flange 41 will ride over and be approximately in contact with the surface 40′ of the offset 40, thereby positively locking the chute 21 against return movement while this engagement continues. When the faces 42′ and 40′ have passed out of contact—due to the return movement of the rocking stop 16—as the closer L approaches its normal position the chute 21 may be swung outward or open and the stop-face 42 will ride along the stop-face 43.

It will be remembered that a latch 18 has been hereinbefore described as operable for holding the bucket-closer L against opening movement by engaging the rocker 16 or a suitable detent-arm, as 16′, formed thereon. For tripping said latch means operative with the movable chute 21 will be preferably employed, a curved arm, as 45, connected with the rod 31, being shown for this purpose. The arm 45 is illustrated having a cam-surface 45′, which is adapted for engaging a pin, as 18″, formed on the latch 18 at a suitable point to the left of its axis of movement, whereby at a predetermined point in the operation of the machine or on the final movement of the chute 21 in the manner previously described the rod 31 may be thrust downward thereby and the cam-face 45′ of the arm 45, which is joined to said rod, may engage the latch-pin 18″, this action depressing the latch 18 and releasing the bucket-closer L, so that the weight of the bucket contents may force the same open to discharge the load.

The operation of the hereinbefore-described machine, briefly, is as follows: Fig. 3 represents the positions occupied by the respective parts of the machine at the commencement of operation thereof, the bucket-closer L being locked closed and the valve 22 and chute 21 in the open position thereof to permit the flow of the full supply-stream into the empty bucket. As the mass is received by the bucket G this descends and the beam B, descending in unison therewith and falling from under the rod 31, permits a closing movement of the valve 22 by the counterweighted lever 25, the antifriction-roll 27 of which rides along the cam-surface 24′ of the cam 24. At the commencement of the poising period the parts will occupy the positions illustrated in Fig. 4, at which time the chute 21 is held against further inward movement by the by-pass 35, which engages the depending rod 34, the valve 22 being also held against further closing movement. When the parts are thus held, a drip-stream will flow from the chute-opening 36 over the banked-up mass on the valve 22 and into the bucket G. On the completion of the bucket-load the bucket G, and hence the supporting scale-beam B, will be caused to descend below the poising-line, the by-pass stop 35 being carried with said scale-beam B and releasing the rod 34 and the connected chute 21. When such movement takes place, the valve 22 is free to be closed by its actuating-lever 25, the roll 27 of which rides along the cam-surface 24″ of the cam 24, so that the valve 22 will be given its final closing movement and the chute 21 will be further swung inward. On the last-mentioned movement of the chute 21 the rod 31 will be thrust downward and the cam-surface 45′ of the arm 45 will be carried into engagement with the latch-pin 18″, so that on the continuation of such movement the latch 18 may be depressed or tripped and the closer L released.

Having described my invention, I claim—

1. The combination with a movably-sup-

ported chute having a drip-opening, of a valve operatively connected with said chute; a supplemental valve supported by said first-mentioned valve; and valve-actuating mechanism.

2. The combination with a movably-supported chute, of a valve operatively connected thereto; a supplemental valve supported by said first-mentioned valve and provided with a lever; and a link connected to said lever and chute.

3. The combination with bucket mechanism embodying a shiftable bucket-discharge member, of a movably-supported chute; and reciprocally effective stops operatively connected with said members.

4. The combination with a movably-supported chute, of a bucket having a closer; and reciprocally effective stops connected, respectively, to said chute and closer.

5. The combination with a movably-supported chute having a segmental member constituting a stop, of a bucket-closer having a coacting stop adapted to contact with one of the faces of said segmental member to thereby prevent the opening movement of the closer.

6. The combination with a movably-supported chute having a suitable stop device provided with an offset, of a bucket and its closer; a stop connected to said closer and provided with a flange adapted to ride in contact with said offset at a predetermined point in the operation.

7. The combination with a movably-supported chute having a depending rod, of a valve operatively connected to said chute; and a shiftable member in position to impart an upward thrust to said rod.

8. The combination with a chute provided with a depending rod and supported for shifting movement, of a valve; and a stop for engaging said rod at a predetermined point in the operation and for also releasing the same.

9. The combination with a movably-supported chute and with a valve, of a bucket having a closer; a latch normally operative for holding said closer against movement; and a rod operatively connected to said chute and having an arm adapted for engaging and tripping said latch to thereby release the closer.

10. The combination with a movably-supported chute provided with a depending rod, of a valve; a stop operable for engaging said depending rod; a second rod operatively connecting with said chute; and a scale-beam adapted for engaging said rod.

11. The combination with a bucket having a closer, of a latch normally operative for holding the same against movement; a movably-supported chute; a valve; a rod operatively connected to said chute and provided with an arm having a cam-surface adapted to engage said latch; and a scale-beam operable for engaging said rod.

FRANCIS H. RICHARDS.

Witnesses:
FRED. J. DOLE,
BENTON N. PARKER.