

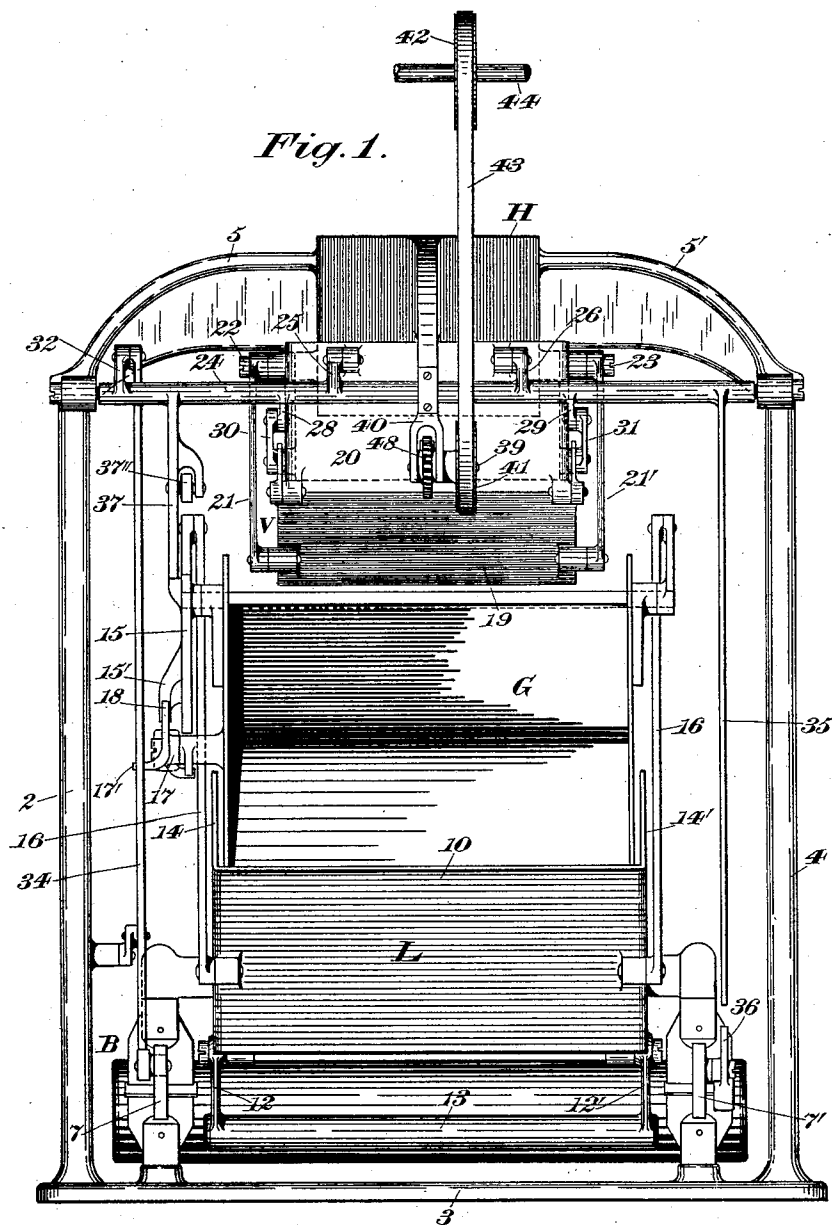
(No Model.)

4 Sheets—Sheet 1.

F. H. RICHARDS.  
WEIGHING MACHINE.

No. 572,069.

Patented Nov. 24, 1896.



*Witnesses:*  
*J. L. Edwards Jr.*  
*Fred. J. Dole.*

*Inventor:*  
*F. H. Richards.*

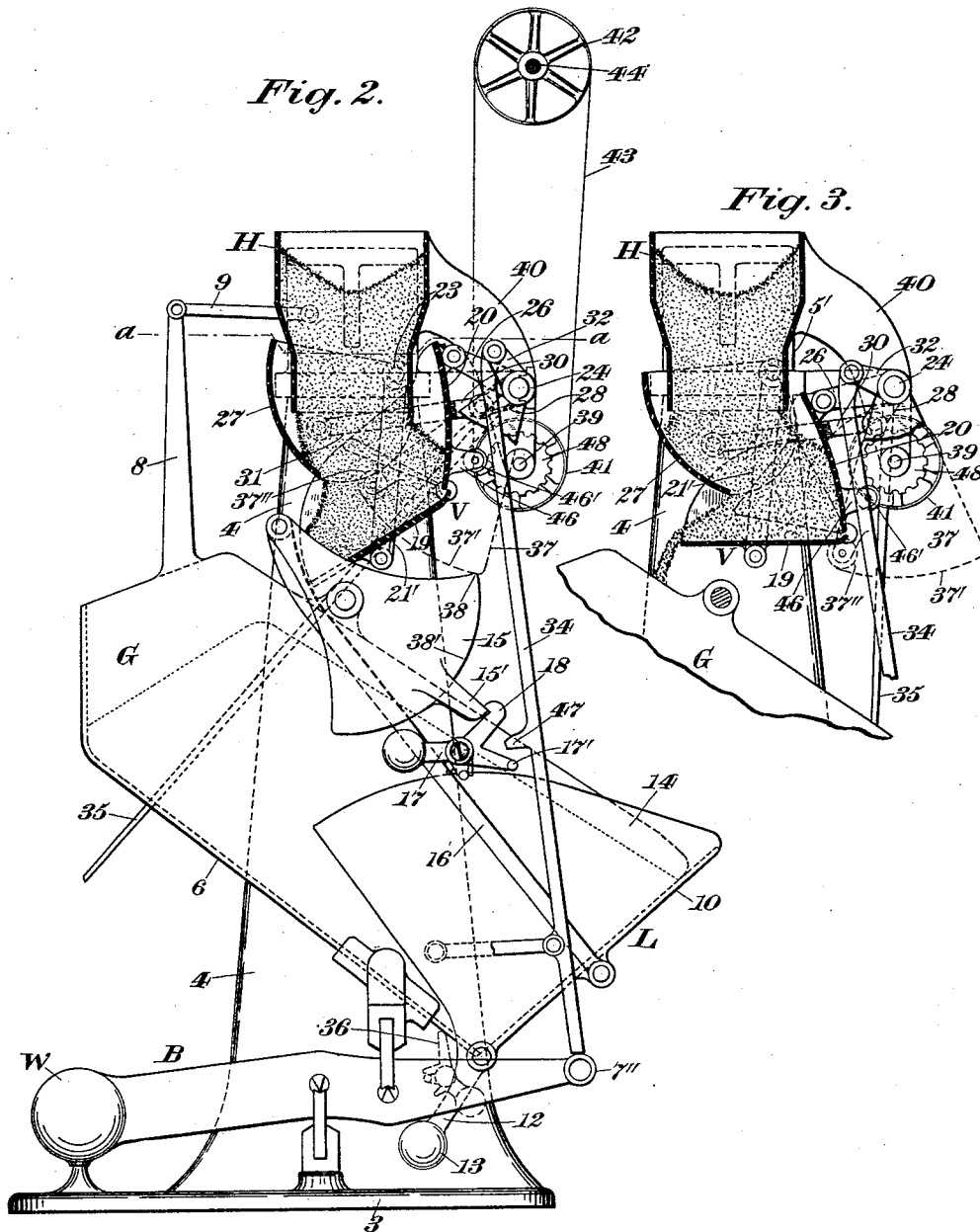
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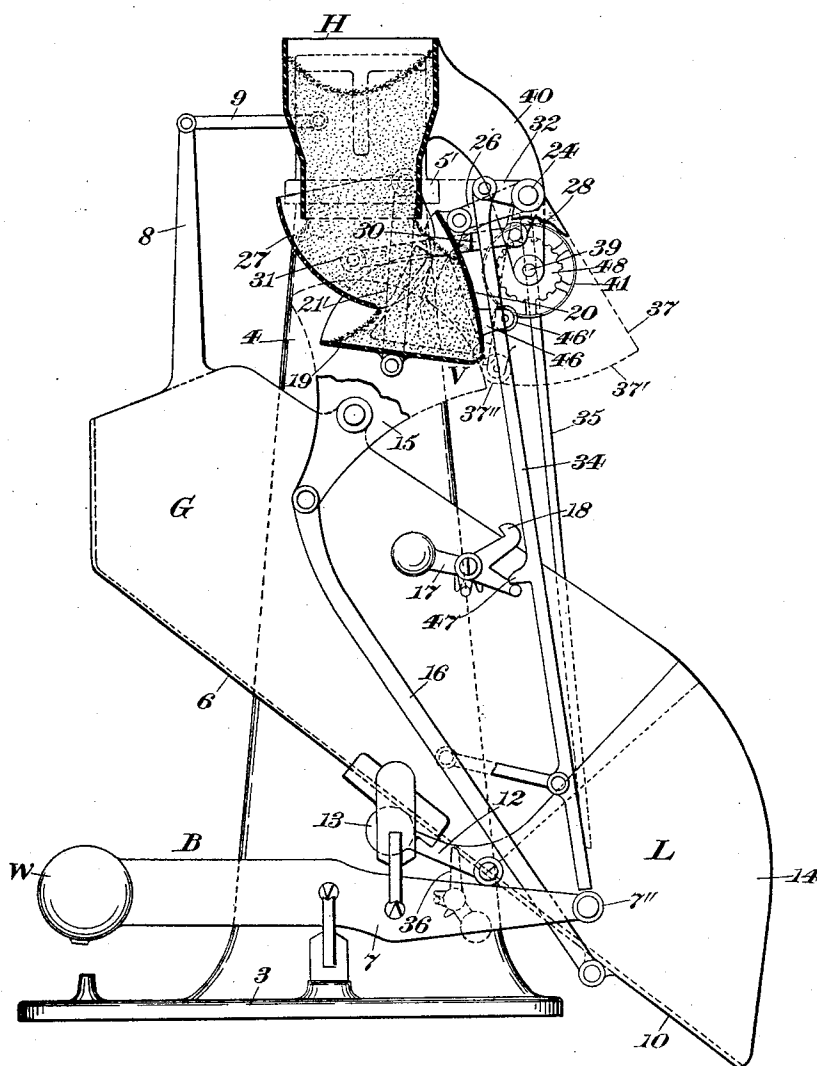
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*Fig. 4.*



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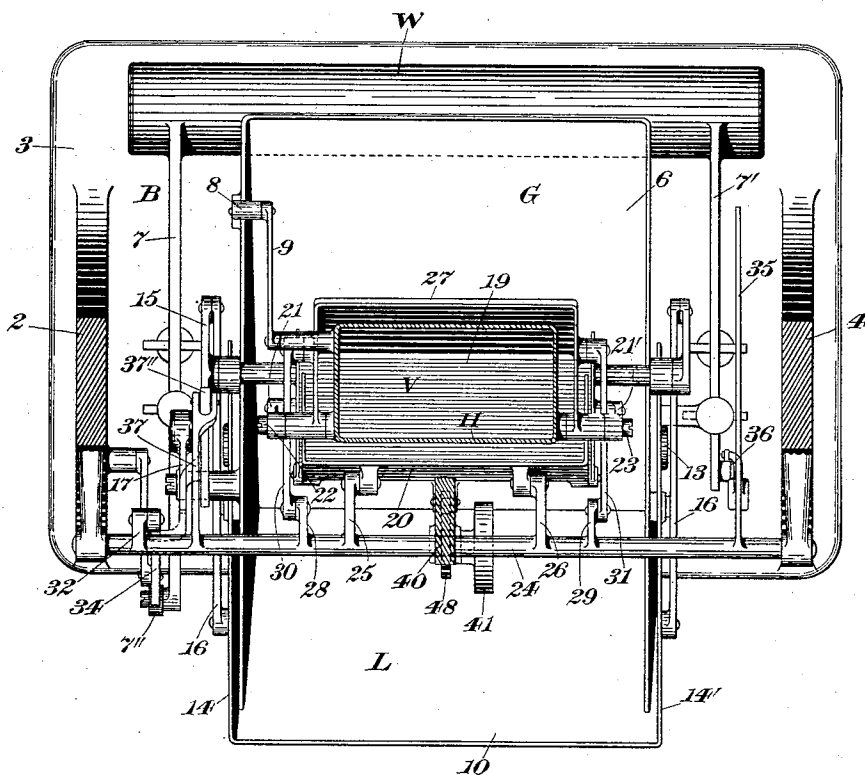
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*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

## WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 572,069, dated November 24, 1896.

Application filed July 24, 1896. Serial No. 600,376. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Weighing-Machines, of which the following is a specification.

This invention relates to weighing-machines, an object of the invention being to provide improved valve mechanism comprehending as one of its coördinate elements a valve closable by the force of a descending stream of material issuing from a chute, hopper, or other convenient source of supply, whereby the expense necessary to maintain the machine in successful operation will be materially reduced.

Another object of the invention is to furnish improved bucket mechanism so organized and operable with respect to its several constituent parts as to insure the discharge of the completed bucket-loads, as they are intermittently made up, with facility and rapidity, whereby the output of the machine is considerably increased.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine embodying my present improvements in the preferred form thereof. Fig. 2 is an end elevation as seen from the left in Fig. 1, the respective parts being represented in the positions they occupy at the commencement of operation, the valve mechanism being in central vertical section. Fig. 3 is a detail of the valve mechanism and adjacent parts, illustrating also a fragment of the bucket, the valve mechanism being in central vertical section and in the position it occupies at the commencement of the poising period. Fig. 4 is a view similar to Fig. 2, showing the positions occupied by the parts during the load-discharging period. Fig. 5 is a sectional plan view, the section being taken in line *a a*, Fig. 2.

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 structure, it being herein shown consisting of the end frames or columns 2 and 4, mounted upon the base-plate 3 and surmounted by the supply chute or hopper H, of usual

construction, the latter having the laterally-extending brackets 5 and 5', respectively, which will be suitably attached to the end frames 2 and 4.

The bucket or load-carrying receptacle of the machine is designated by G, and has the inclined bottom 6, leading to the load-discharge outlet, the discharge being controlled by the closer L, hereinafter more particularly described.

For supporting the bucket mechanism the scale-beam B is employed, it consisting in the present instance of a pair of arms 7 and 7', fulcrumed on the base-plate 3 of the machine and joined by the counterweight W. The beam-arms will be furnished with suitable bucket-supports, upon which the bucket G will be suspended, the center of gravity of the loaded bucket being preferably in vertical line with such bucket-supports, whereby the tendency of the bucket to sway during its operation will be materially reduced. For wholly preventing such action of the bucket G a vertical riser is shown at 8, connected to the framing of the machine by the interposed link 9.

The closer L consists of an approximately flat plate 10, shiftably connected to the bucket and forming the front wall thereof, it being disposed, when in its normal position, approximately at right angles to the inclined bottom 6 of the bucket, whereby the power necessary to maintain the closer in such normal position is minimized. The closer-plate 10 is shiftable into alinement with the inclined bottom of the bucket, as indicated in Fig. 4, so that it practically forms a continuation of said bucket-bottom, and it will be obvious that the contents of the bucket may be discharged with great rapidity.

For returning the closer to its normal or shut position it will be preferably counterweighted, a pair of arms 12 and 12', rigidly connected with the closer-pivots and joined by the weight 13, which preferably exerts a force slightly exceeding that of the closer, whereby the latter may be held in its wide-open position for a relatively great period of time by the weight of the discharging mass of material thereon being employed for said purpose. As soon as the mass entirely leaves the closer the latter will be instantly returned

to its normal position by the weight 13. The closer is equipped with the guard walls or plates 14 and 14', which when said closer is in its wide-open position serve as a continuation of the end walls of the bucket and prevent lateral flow of the discharging stream of material.

For maintaining the closer in its shut or normal position the following instrumentalities may be employed: A rocker is shown at 15 pivotally supported on the bucket G, a connecting-rod 16 being illustrated pivoted to said rocker and also to the closer L. A counterweighted bucket-latch is shown at 17, having the hook portion 18 for engaging the rocker-arm 15, when the closer L is in its shut position, whereby the rocker 15 and also the connected closer L may be held against oscillation.

The chute H is adapted to contain a mass of material to be weighed, which emerges from the discharge-outlet thereof in the form of a stream of material, said stream being directed toward the valve, which in the present instance is oscillatory, and by said valve into the bucket or load-carrying receptacle G.

The valve or stream controller is designated by V and consists of two hinged sections 19 and 20, the first-mentioned constituting a stream-cut-off section and consisting of an approximately flat plate 19, preferably hung from the chute H by the suspension-links 21 and 21', which are pivoted to said plate at opposite sides thereof, the opposite ends of said links being loosely about the pivots 22 and 23, extending from the chute H. The valve V will preferably be connected to the transverse valve controlling or actuating shaft 24, the latter having suitable bearings in its opposite ends for receiving journals carried by the framing of the machine, said shaft serving to transmit an opening thrust to said valve and also serving as a convenient means for checking or impeding the closure or cut-off movement of the same, as will hereinafter appear. A pair of rock-arms is shown at 25 and 26 projecting from the shaft 24 and pivoted to ears or lugs on the valve-section 20. Each of the valve-sections will have guard-walls on its ends, the guard-walls of the section 19 overlapping those of the other for preventing waste.

An oscillatory stream-director, which serves also in one of its functions as a stream-reducing medium or valve—being movable about an axis independent of the valve—is shown consisting of a curved plate 27, supported for movement by the pivots 22 and 23 on the chute H, said plate 27 having a swinging movement beneath the mouth or supply-opening of said chute. The downward-flowing stream of material from the chute H will impinge against the stream-director 27, the course of the stream being changed and delivered thereby toward the rear of the axis of oscillation of the valve-section 19, part of the force of the descending column being applied

to the hinge connection between the two valve-sections, whereby the discharge edge of the valve-section 19 will be elevated, the volume of the supply-stream being reduced by the said joint action of said valve-sections and the member 27, the supply-stream being subsequently cut off by the valve-section 19. The stream-director 27 will be self-gravitative and toward the valve-section 19, the result being the coaction of these two members for reducing the volume of the supply-stream. The reducing movement of the part 27 will be limited by the valve V by virtue of connections between these two members and the intermediate shaft 24. A pair of rock-arms are shown at 28 and 29, having the links 30 and 31 pivoted thereto and also to the stream-director 27.

It will be remembered that the closing movement of the valve V will be limited, and for this purpose the following - described means may be used: The shaft 24 is shown having the rock-arm 32, to which is pivoted the relatively long thrust-rod 34, the free end of which normally bears against the scale-beam B or a suitable projection, as the anti-friction-roll 7", on the arm 7 of said scale-beam.

The action of the valve mechanism will be obvious from an inspection of Figs. 2, 3, and 4 of the drawings, in the first-mentioned of which the valve is illustrated in its wide-open position, the director 27 delivering the down-flowing stream of material from the chute H toward the rear of the valve, from whence it gravitates into the bucket. When a certain proportion of the load has been received by the bucket, it will descend, the scale-beam B moving in unison therewith, and the arm 7 of said beam, falling away from the rod 34, will permit the closure of the valve V, and as said valve closes the shaft 24 will be rocked by reason of its connection with said valve, and the latter, through the medium of the connecting-links 30 and 31, will communicate to the part 27 a downward or stream-reducing movement, the volume of the supply-stream being reduced as the members 27 and 19 move toward each other.

It will be evident that the scale-beam B constitutes an effective medium for limiting the too rapid closure of the valve on the downstroke of said beam. On the return of said beam it imparts an opposite thrust to the rod 34, the result being a reversal of the operation just described and the opening of the valve V. At a predetermined point in the closing movement of the valve it is desirable to intercept the same for a brief space of time to permit the supply of drip or attenuated stream to the bucket for the purpose of completing the partial load therein. A depending rod is shown at 35 rigid with the shaft 24, the lower or free end of said rod being in position to be engaged by the by-pass 36 on the beam-arm 7' at the commencement of the drip period, so that the

valve will be held against further closing movement. On the completion of the bucket-load said bucket and the beam, and hence the by-pass, will move below the poising-line, the depending rod 35 being released, whereby the valve V will be also released and may be given its final closing stroke.

Reciprocally-effective stops are employed for limiting the movements of the valve and closer, the rocker 15 constituting one of said stops, the coacting member being designated by 37, the last mentioned being rigid with the shaft 24, so that any limitation of movement of said shaft will likewise affect the connected valve V. These stop members are shown as segmental, and their operation will be clearly evident on reference to Figs. 2, 3, and 4. At the commencement of operation the point 38 of the stop 15 will be approximately contiguous to the curved face 37' of the stop member 37, so that should the latch 18 be prematurely tripped the oscillation of the stop 15 will be positively blocked and the closer L thereby held against opening movement. When the curved face 37' of the stop 37 has passed out of contact with the point 38, the rocker or stop 15 will be free to oscillate, and in so doing its curved face 38' will travel along the antifriction-roll 37'', by reason of which reverse movement of the stop member 37, and hence the opening of the valve V, will be limited by said rocker or stop, and this operation will continue so long as the closer is open or partly open.

Means will be employed for imparting a vibratory or shaking movement to the valve V, and preferably in a plane transverse of its axis of oscillation and coincident with the path of flow of the supply-stream, whereby the mass of material sustained by the valve is loosened and a free flow of said stream to the bucket is insured.

A cam or toothed wheel is shown at 48 keyed to the relatively short shaft 39, which is supported by the bifurcated bracket 40, extending down from the chute, said shaft also carrying the pulley 41, connected to the pulley 42 by the belt 43, said pulley 42 being mounted on the shaft 44. The shaft 44 will be connected with a suitable motor. (Not shown.)

An extension is shown at 46 formed on the valve V and provided with an antifriction-roll 46'.

The valve V is self-projective toward the plane of rotation of the cam-wheel 48 by reason of the disposition of the suspension-links 21 and 21', which at the commencement of operation are located slightly to the left of the perpendicular. As said roll 46' comes in contact with the teeth of the cam-wheel 48 said teeth will successively impart an opposite thrust to the valve V, such operation continuing while the roll 46' is within the range of action of said cam 48.

For tripping the latch 17, to which reference has been hereinbefore made, a projec-

tion is shown at 47 formed on the thrust-rod 34 and having a movement into engagement with the latch-pin 17' at a point near the final closure of the valve V, so that on the continuation of such movements, and subsequent to the cut off of the supply-stream, the hook 18 of said latch will be disengaged from the rocker-arm 15' and the rocker 15 and the bucket-closer L thereby freed of all restraint, so that the latter may be forced open by the weight of the bucket contents.

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 in its locked position, the valve V is open, so that a stream of material issuing from the chute H may flow into the bucket G. When a certain proportion of the load has been received by the bucket, it and the scale-beam G will descend, and the beam, falling from under the connecting-rod 34, will permit the closure of the valve V, in the manner previously described, and the simultaneous downward movement of the stream-director 27, so that on such combined movement the volume of the stream will be progressively decreased. On the final cut off of the supply-stream by the valve V the rod 34 will be thrust downward and the projection 47 will be caused to move into contact with the latch-pin 17', thereby disengaging the hook 18 of said latch from the rocker-arm 15'. Such action taking place, the rocker 15 and also the closer L will be released, whereby said closer may be forced open by the weight of the bucket contents.

No claim is herein made to the combination, broadly, with a chute, of an adjacent oscillatory valve supported to receive its closing force from the mass of material descending from such chute, as such subject-matter is set forth in my application, filed July 15, 1896, Serial No. 599,303.

Having described my invention, I claim—

1. The combination with a bucket, of a chute; an oscillating valve supported relatively to said chute and in position for receiving its closing force by a gravitating stream of material issuing from said chute; and a stream-director operable for delivering said stream toward the rear of the valve and movable about an axis independent of said valve.

2. The combination with a bucket, of a chute; an oscillating valve supported to receive its closing force from a gravitating stream of material issuing from said chute; and a movably-mounted stream-director operable for delivering said stream toward the rear of the valve, said stream-director being movable below the mouth of the chute and about an axis independent of said valve.

3. The combination with a chute, of an oscillating valve supported to receive its closing force from a gravitating stream of material issuing from said chute; and a stream-

director supported relatively to said chute and operable for delivering said stream of material toward the rear of the valve, said stream-director being movable about an axis independent of said valve.

4. The combination with a chute, of a cut-off valve supported for oscillatory movement about two independent axes and mounted to receive its closing force from a gravitating mass of material issuing from said chute; and valve-actuating means.

5. The combination with a bucket, of a chute; a cut-off valve supported to receive its closing force from a gravitating mass of material issuing from said chute, said valve consisting of two hinged sections, the stream-cut-off section of which is connected to a relatively-fixed part of the machine by suspension-links; means for supporting the other valve-section; and valve-actuating means.

6. The combination with a bucket, of a chute; a cut-off valve supported to receive its closing force from a gravitating mass of material issuing from said chute, said valve consisting of two hinged sections; suspension-links pivotally supported by studs on said chute, said links also being connected to one of the valve-sections; means for supporting the other valve-section; and a stream-director supported relatively to the chute and by said studs.

7. The combination with a bucket, of a chute; a cut-off valve supported to receive its closing force from a gravitating mass of material issuing from said chute, said valve consisting of two hinged sections, the cut-off section of which is suspended from said chute; a controlling-shaft connected to the other valve-section; and means for actuating said valve.

8. The combination with a bucket having a closer, of a chute; a cut-off valve supported to receive its closing force from a gravitating mass of material issuing from said chute, said valve consisting of two hinged sections, the cut-off section of which is connected to a relatively-fixed part of the machine by suspension-links; means for supporting the other valve-section; valve-actuating means; and reciprocally-effective stops operative, respectively, with said valve and closer.

9. The combination with a bucket having a closer, of means comprising a latch for normally holding said closer against opening movement; a chute; a cut-off valve supported to receive its closing force from a gravitating

mass of material issuing from said chute, said valve consisting of two hinged sections, the cut-off section of which is connected to a relatively-fixed part of the machine by suspension-links; means for supporting the other valve-section; actuating means; and a latch-tripping device operative with said valve.

10. The combination with a chute, of a cut-off valve movable about two independent axes and supported to receive its closing force from a gravitating mass of material issuing from said chute; and means for actuating and for vibrating said valve.

11. The combination with a chute, of a rotary cam; a cut-off valve supported to receive its closing force from a gravitating mass of material issuing from said chute; and links suspending the valve from the chute and permitting the same to be bodily movable toward the plane of action of said cam.

12. The combination with a chute, of a controlling-shaft; a cut-off valve supported to receive its closing force from a gravitating mass of material issuing from said chute and consisting of two sections, the cut-off section of which is suspended by links from said chute; connections between the other valve-section and said valve; and valve-actuating means.

13. The combination with a chute, of a valve; a stream-director coacting with said chute and operable for directing a stream of material from said chute toward the rear of said valve and being also movable about an axis independent of the valve-axis, said stream-director being connected to and controlled by said valve.

14. The combination with a bucket and with a chute, of a controlling-shaft; a valve consisting of two sections, one of which is connected to said controlling-shaft, the other being supported from the chute by suspension-links; and a stream-director also operatively connected to said shaft.

15. The combination with a bucket and its supporting scale-beam, of a chute; a valve consisting of two sections, one of which is supported from said chute; and a shaft connected to the other valve-section and having a depending rod in operative relation with said scale-beam.

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