

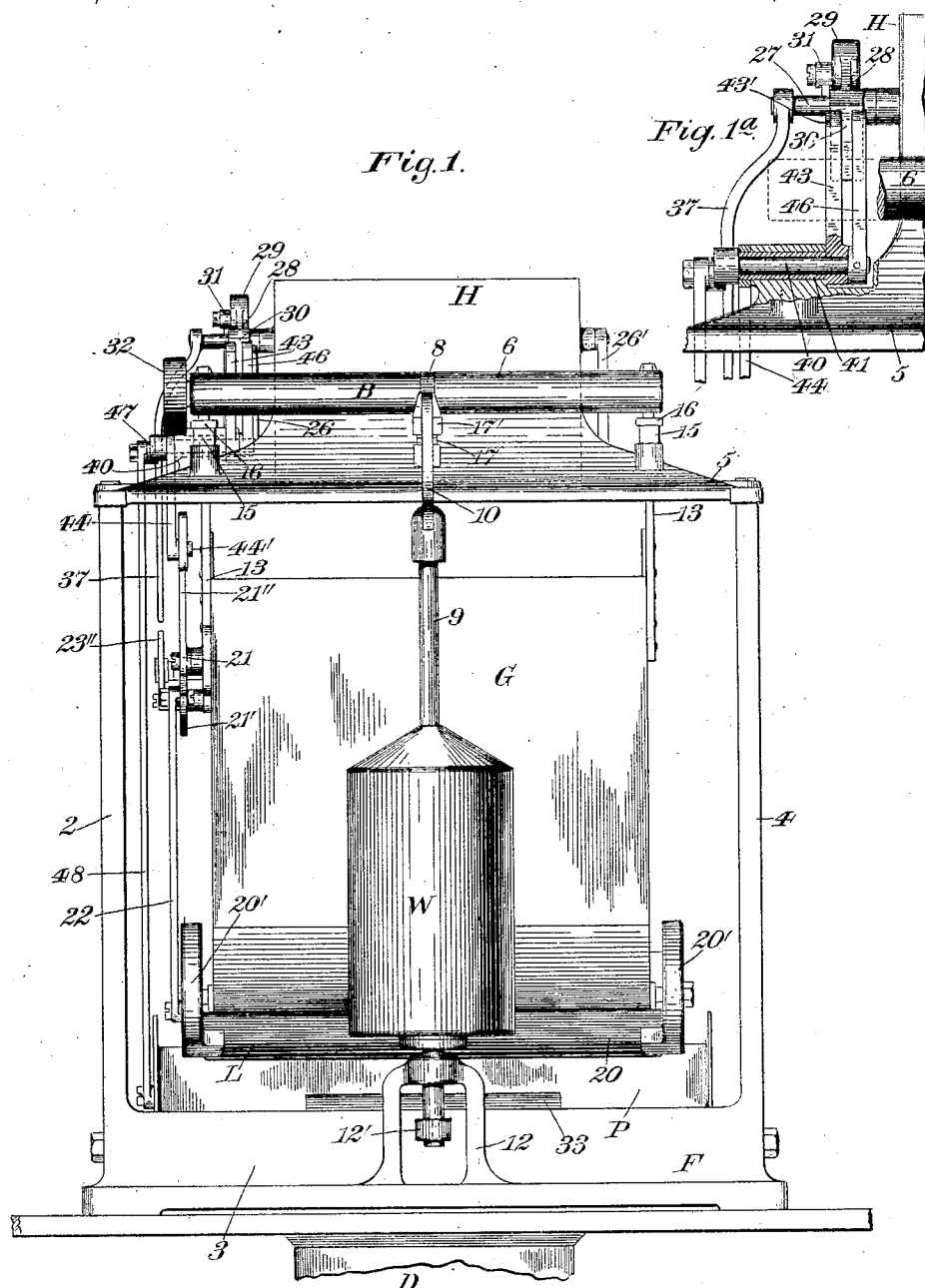
(No Model.)

5 Sheets—Sheet 1.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 570,293.

Patented Oct. 27, 1896.



Witnesses:

R. W. Pittman
Fred. J. Dole.

Inventor

F. H. Richards.

(No Model.)

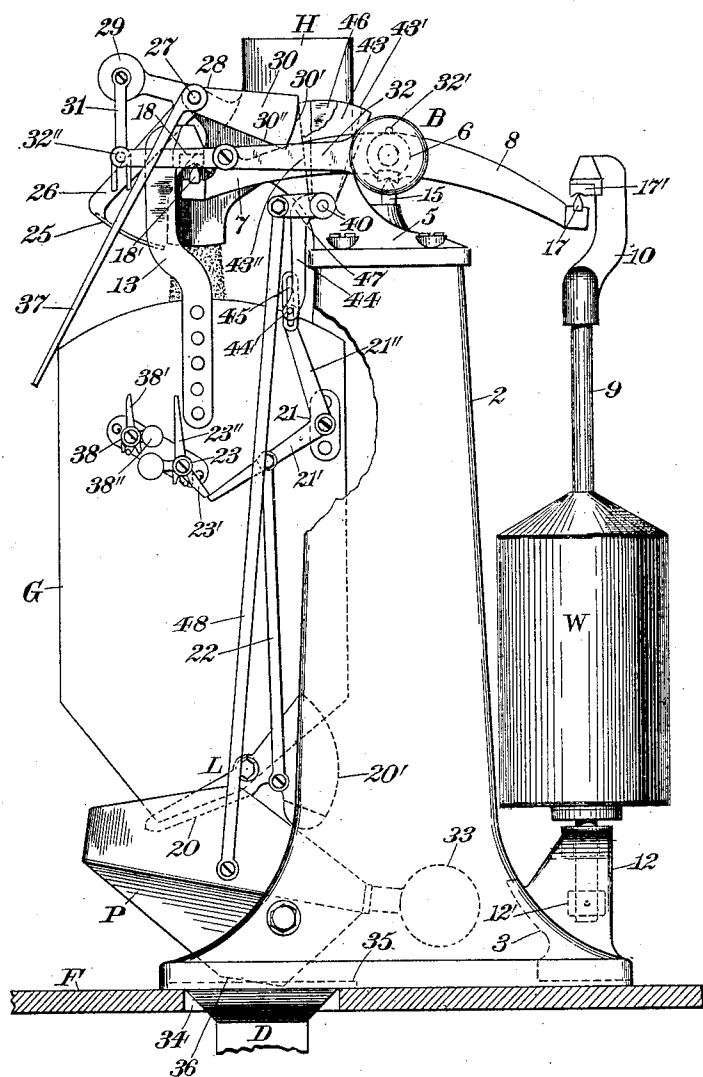
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Fig. 2.



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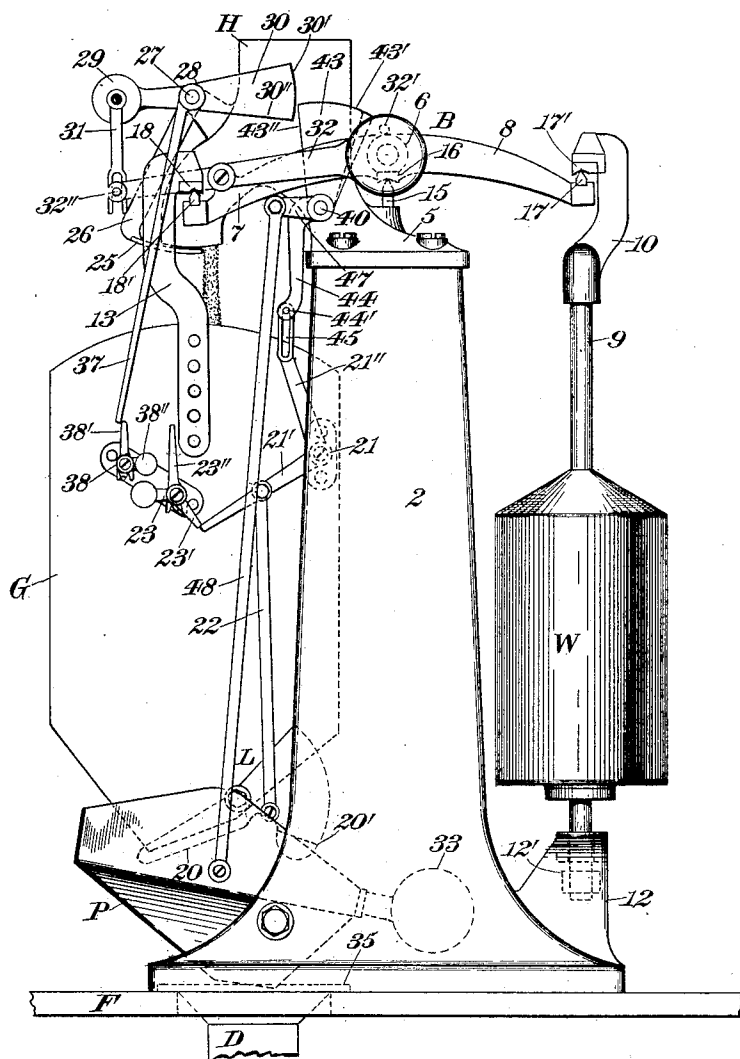
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Fig. 3.



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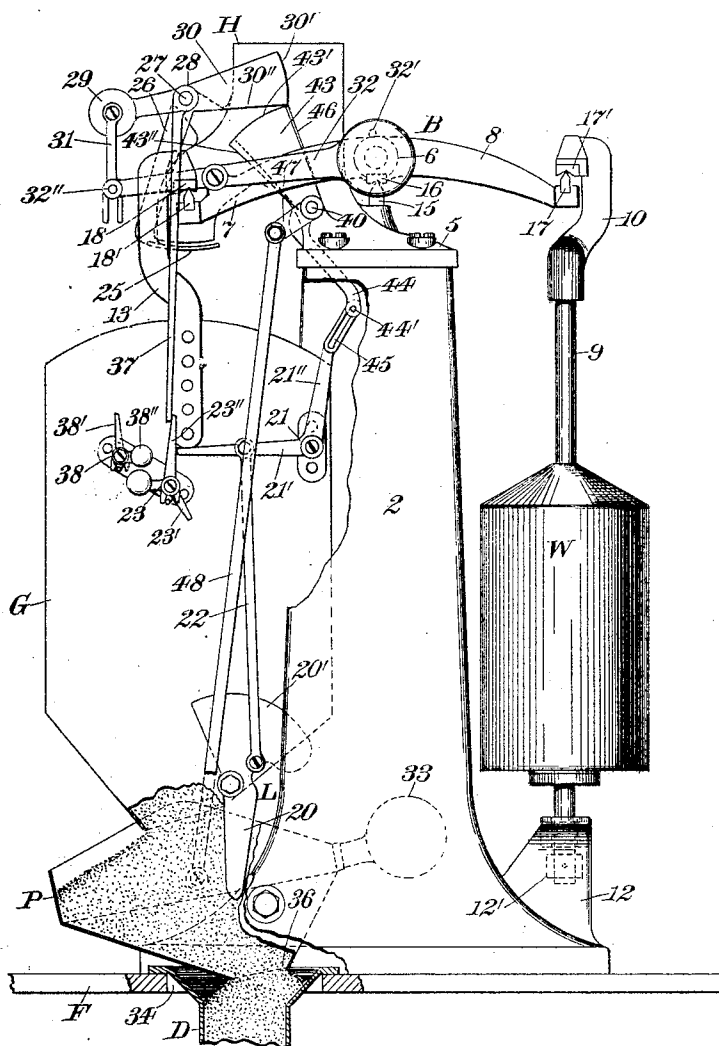
5 Sheets—Sheet 4.

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Fig. 4.



Witnesses

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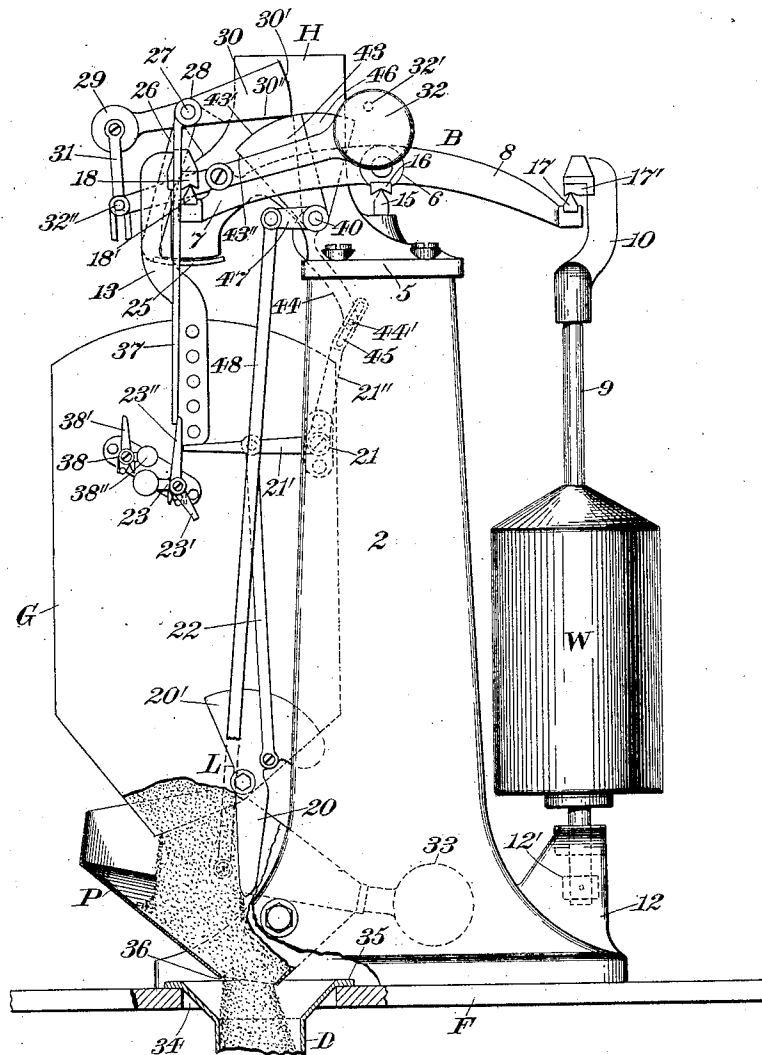
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Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,293, dated October 27, 1896.

Application filed May 8, 1896. Serial No. 590,692. (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 an improved organization of mechanism comprehending an efficient interlocking system operable between the valve and the bucket-closer and the regulator-hopper, whereby premature operation of either of these members will be positively prevented.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear elevation of a weighing-machine comprising my improvements in the preferred embodiment thereof. Fig. 1^a is a detail view of the stop mechanism. Fig. 2 is an end elevation of the machine as seen from the left in Fig. 1, illustrating the positions occupied by the respective parts thereof at the commencement of operation. Figs. 3, 4, and 5 are similar views of the machine at successive stages in its operation.

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

For the purpose of illustrating the nature and mode of operation of my present invention, it is shown in connection with a weighing-machine of the kind disclosed in Letters Patent No. 442,719, granted to me December 16, 1890, to which reference may be had. It is obvious, however, and it is to be distinctly understood that the invention is not limited to such an application, as it is capable of efficient use in connection with other types of machines.

The framework for supporting the operative parts of the machine may be of any suitable or preferred form, and is herein illustrated comprising the side frames or uprights 2 and 4, braced or connected at the bottom by the plate 3, preferably formed integral therewith, and connected at the top by the plate 5, having a preferably integrally-formed chute or spout H of ordinary construction. In practice the chute or spout H will be supplied

with a stream of material by suitable or convenient means.

The top plate 5 is illustrated carrying adjacent to its opposite ends the pivots or knife-edges 15 and 15', which constitute a suitable means for supporting the counterweighted scale-beam, which is designated in a general way by B.

The scale-beam comprises, preferably intermediate of its ends, a hollow shaft 6, to which shaft, at points near its extremities, are connected V-shaped bearings 16 and 16' respectively resting on the beam-supports or knife-edges 15 and 15'. The scale-beam also comprises a pair of forwardly-extending arms, preferably formed integral with the shaft 6 and at points near the opposite ends thereof, said arms constituting a suitable means for supporting the bucket mechanism, one of said arms being shown at 7.

The weight-carrying arm of the scale-beam is designated by 8 and projects rearward from the shaft 6, being also illustrated provided with a knife-edge 17.

As a means for supporting the scale-beam weight, which is designated by W, a rod 9 is shown, said weight being suitably secured to said rod. The rod 9 is shown carrying at its upper end a bracket 10, equipped with a V-shaped bearing 17', sustained by the pivot or knife-edge 17 of the scale-beam. Said rod 9 is also illustrated extended below the weight and passed through an opening formed in the yoke 12, and having the collar or stop 12' thereon, which impinges against the relatively straight portion of the yoke on the upward movement of said rod to thereby limit such movement. The yoke 12 also constitutes a suitable means for supporting the weight W.

The bucket, which is of the "single-chambered" class, is designated in a general way by G, and preferably has secured thereto, near its upper edge and to its end walls, hangers equipped with V-shaped bearings resting upon suitable bucket-supports or knife-edges carried by the scale-beam B. One of such bucket-hangers is shown at 13, its V-shaped bearing at 18, and the bucket-support or knife-edge at 18', connected to the beam-arm 7.

The bucket mechanism comprises two members, one of which is shiftable relatively to the other for discharging the bucket load, and the bucket-closer, which is designated in a general way by L, is shown constituting such shiftable bucket-discharge member. The bucket-closer consists of a suitably-formed plate 20, having a counterweighted arm or arms, as 20', operable for returning said closer to its normal or shut position, as indicated in Fig. 2.

As a means for supporting the bucket-closer L, the following devices may be employed: The bucket G, or a suitable bracket thereon, is illustrated as supporting for oscillatory movement the angle-lever 21, to the arm 21' of which is shown pivotally attached the connecting rod or link 22, the opposite end of said rod or link being pivoted to the closer. It will be evident that when the angle-lever 21 is held against movement by a suitable device, the connected bucket-closer L will be also restrained. For thus blocking the movement of the closer L a latch 23, pivotally supported on one end of the bucket G, is illustrated, said latch having the arm 23' for engaging the underlying arm 21' of the angle-lever 21, so that the connected closer may be held against opening movement, as indicated in Fig. 2. When the latch 23 is swung about its pivot, it will be evident that its arm 23' will be disengaged from the arm 21', this action also freeing the bucket-closer L, so that the weight of the bucket contents pressing against the latter may force it open to cause the discharge of said contents or bucket load. The latch 23 will be also provided with a suitable counterweight for maintaining it in engagement with the said arm 21', and suitable stops will be also employed for limiting the movement of said latch.

As a means for controlling the supply-stream which flows from the chute or hopper H, the valve 25 may be employed, it consisting in the present instance of a practically flat plate suitably connected to the arms 26 and 26', affixed to the supporting-shaft 27, which latter is preferably journaled in brackets or lugs formed on the chute or hopper H at opposite ends thereof.

As a means for effecting the closing movement of the valve, whereby it may be swung across the discharge-outlet or mouth of the chute or hopper, as indicated in the drawings, to thereby cut off the supply-stream, the device shown may be employed.

The valve-supporting shaft 27 is illustrated having suitably attached thereto the member 28, consisting of a counterweighted arm 29, which constitutes a valve-closing device, and the stop or segmental blade 30, these parts constituting, preferably, a unitary structure. The peculiar function of the stop or blade will be hereinafter more particularly described. The effect of the counterweighted arm 29 is to normally exert a downward pres-

sure, which is communicated to the valve-supporting shaft 27 to rock the same, and hence close the valve 25, as will be readily obvious.

As a means for actuating the valve 25 to open the same, the following-described instrumentalities may be employed: A bifurcated rod is illustrated at 31 pivotally suspended from the counterweighted arm of the valve and in position for receiving a proper thrust from a suitable device when the valve is in its closed position, so that said thrust may be transmitted to the valve to thereby open the same. A counterweighted lever is illustrated at 32 pivotally supported by the scale-beam B and connected to the arm 7 at a point adjacent to the inner end thereof. This counterweighted lever 32 is shiftable between two positions on the scale-beam B, the peculiar purpose of which will now be made apparent. The normal position of the counterweighted lever 32 is illustrated in Fig. 2, its weight being shown provided with a pin 32', projecting laterally therefrom, which rests on the scale-beam B at a point perpendicular to the fulcrum thereof, so that the effective force of said counterweighted lever will not be added to said beam when the beam is in its normal position. The counterweighted lever 32 at a point adjacent to its inner end (see dotted line, Fig. 2) is provided with a lateral projection or pin 32'', which is straddled or embraced by the bifurcation of the thrust-rod 31.

During the normal operation of the machine the counterweighted lever 32 practically forms a continuation of the scale-beam B, as indicated in Fig. 2, so that on the descending movement of said beam B, said lever being in engagement with the thrust-rod 31, the closing of the valve by the counterweighted arm 29 will be limited or checked by said lever 32, as will be apparent.

At a predetermined point in the operation of the machine the lever 32 is shifted about its pivot on the beam B, as illustrated in Fig. 5, so that on its return to the normal position thereof, as indicated in Fig. 2, an upward thrust will be imparted to the rod 31 and through the hereinbefore-described connections transmitted to the valve 25 for opening the same, it being evident that said lever constitutes a valve-opening actuator.

A vertically-movable hopper is shown at P, and said hopper is depressible from its normal position, being suitably suspended for oscillatory movement between the side frames 2 and 4. For effecting the downward movement of the hopper P, this is accomplished by the weight of the mass of material or load discharged by the bucket, which overbalances the weight 33, suitably connected to said hopper at a point to the rear of its axis of movement.

A floor or support for sustaining the weighing-machine is designated by F, and is shown apertured at 34, a discharge chute or pipe D

passing through said opening. The inlet of the discharge-chute D is illustrated as flared, said chute being also provided with a flange, as 35, along its upper edge resting on the floor F and constituting a suitable means for supporting said chute.

The mass discharged by the bucket into the hopper P is directed thereby to the discharge-outlet 36 of said hopper into the communicating chute D. The discharge-outlet 36 of said hopper is illustrated relatively smaller than that of the bucket, so that if the consumption of the material supplied by the weighing-machine to a grinding-mill or the like should not exceed the supply, the mass will accumulate in the chute D and the hopper P, which will then be in its depressed position, as indicated in Fig. 5, the mass preventing the return movement of the closer L until the accumulation has run off.

It is desirable at a predetermined point in the closing movement of the valve to intercept the same, so that it may be held to thereby permit the flow of a drip or reduced stream into the bucket for the purpose of completing the partial load in the bucket.

The valve-supporting shaft 27 is illustrated having attached thereto the depending rod 37, which, it will be evident, is oscillatory with the valve 25, so that when said rod is blocked in its movement the connected valve 25 will be also checked.

The bucket G is illustrated carrying a stop, as 38, (herein illustrated as a by-pass pivotally supported thereon,) the vertical arm 38' of which is operable for engaging the depending rod 37, a suitable stop or stops being employed for preventing the movement of said latch when such action takes place.

On the descent of the bucket below the poising line—indicating the completion of the bucket load—the stop 38 will also descend therewith, thereby releasing the rod 37 and also the connected valve 25, so that the latter may be closed for cutting off the drip stream, as indicated in Fig. 4. On the return movement of the rod 37 it engages the vertical arm of the by-pass 38 and will swing the latter about its pivot, so that said rod 37 may return to its normal position, the said by-pass dropping to its normal position through the intervention of a suitable device, such as the counterweight 38".

It will be remembered that a latch 23 has been described as normally operable for holding the bucket-closer against opening movement, its detent-arm 23' engaging the underlying or coacting detent-arm of the angle-lever 21, which is connected to the bucket-closer L.

For tripping the latch 23, whereby the two detent-arms 23' and 21' may be disengaged and the closer L also freed of restraint, means operative with the valve 25 will be preferably employed. For obtaining this result the rod 37 is utilized. The latch 23 is illustrated provided with the approximately vertical arm

23", which is disposed in the path of movement of the rod 37, so that when said rod 37 has been released in the manner previously described, and on the further or final closing of the valve 25, it may impart a blow to the vertical arm 23", which will swing the said latch about its pivot and disengage the detent-arms 23' and 21'. At this juncture, the closer being free to open, the mass contained in the bucket will force the same open and be thereby discharged into the hopper P. The weight of the discharged mass will depress said hopper, the ascending movement thereof being caused by the weight 33 when a certain quantity of the material flows from said hopper into the communicating conduit D.

My present invention contemplates the provision of reciprocally effective stops operative between the valve and closer and preferably connected with said members, the stop connected to the closer being supported by the frame of the machine, so that the thrust exerted against said stop by the coacting-stop is taken up or received by the framework and cannot thereby be directed against any of the operative parts of the machine, whereby the accuracy of the machine cannot be impaired.

A relatively short rock-shaft is shown at 40, suitably supported by the top plate 5 of the machine and having sleeved thereon the tubular casing 41, to which is affixed the stop or segmental blade 43, having the downwardly-extending arm 44. The stop 43 constitutes a suitable means for preventing the opening movement of the valve when the closer is open or partially opened and the bucket is discharging its load.

The segmental blade 30, to which reference has been hereinbefore made, constitutes the valve-operative stop, it being attached to the valve-supporting shaft 27, and hence oscillatory therewith, so that any limitation in the movement of said stop 30 will likewise affect the valve. The stop 30 is illustrated having the supplemental stops or stop-faces 30' and 30", the first-mentioned of which is a curved face concentric with the axis of movement of said stop, the other being an approximately straight face departing therefrom. The stop 43 is illustrated similarly equipped, its two stop-faces being designated by 43' and 43", respectively.

It will be remembered that an angle-lever 21 has been hereinbefore described constituting a part of the closer-supporting means, it being operatively connected thereto. One of the arms of said angle-lever (herein shown as the arm 21" thereof) will be in sliding engagement with the stop 43 for actuating said stop on the initial opening movement of the bucket-closer, whereby it becomes immediately operable for preventing the opening of the valve. The angle-lever arm 21" is shown having formed therein the longitudinal slot 45, through which is passed a stud or pin 44', formed on the stop-arm 44, by reason of which

construction the bucket may have free vertical movement without affecting the relation of the coacting stops.

The operation of the hereinbefore-described stops is obvious from an inspection of the drawings. While the valve is in its open position, or partially open, as indicated in Figs. 2 and 3, the stop-faces 30' and 43'' will be approximately in contact, so that any tendency of the stop 43 to oscillate about its pivot—provided the latch 23 should be prematurely tripped—will be effectually resisted by the stop 30, the pressure of the oscillating stop being directed practically against the framing or the valve-supporting shaft 27. When the stop 30 has intersected the plane of curvature of the stop-face 43', it will be evident that said stop, and hence the connected closer L, may oscillate about their respective axes, provided, of course, the latch 23 has been tripped. On the opening movement of the closer the rod 22 will be moved upward thereby, this action rocking the angle-lever 21 about its pivot on the bucket G, the said lever swinging the connected stop 43 under the stop 30, so that the opening movement of the valve will be positively prevented while this relation continues, the stop 43 serving practically as a fixed abutment for this purpose, and its support receiving the entire thrust from the stop 30 throughout the operation.

It will be remembered that a hopper has been hereinbefore described which is depressible from its normal position by the weight of a mass of material discharged by the bucket, and that occasionally said hopper will remain in its depressed position for a relatively long period of time, due to the failure of the device which receives the material from the machine to equal the output thereof, the hopper remaining in such depressed position until the accumulated material has gravitated therefrom to the chute D. It is important to maintain the valve in its closed position when the hopper is depressed, and particularly so when such a contingency as that just pointed out arises.

The rock-shaft 40 is illustrated having attached thereto the stop 46 and as also having the crank-arm 47, to the inner end of which is illustrated pivoted the connecting-rod 48, the opposite end of the latter being likewise connected to the hopper P, such connection therewith being at a point to the left of a vertical line passing through the axis of movement of said hopper. The stop 46 coacts with the stop 30 and is operable for blocking the opening movement of the valve 25 when the hopper P is in its depressed position, as indicated in Fig. 4. When the valve is closed and the stop 43 has been swung under the stop 30, the closer may be opened and the bucket load discharged into the hopper. As soon as the mass is received by the hopper P, this descends, the rod 48 being drawn downward, and the stop 46 through the interposed crank-arm 47 swung under

the stop 30. As soon as the weight 33 overcomes that of the hopper P with the mass therein, said hopper will be caused to rise thereby, and the stop 46 will be swung from under the stop 30 through the hereinbefore-described connections, the same operation being repeated with the stop 43 when the closer has resumed its shut position.

The operation of the hereinbefore-described machine briefly is as follows: Fig. 2 represents the positions occupied by the various operative parts at the commencement of operation, the valve 25 being in its full open position and the closer L locked shut. When a certain proportion of the load has been received by the bucket, it will descend, the beam B descending in unison therewith. The lever 32, descending with the scale-beam B and falling from under the bifurcated thrust-rod 31, permits the closing movement of the valve by the counterweighted arm 29. The position occupied by the parts at the commencement of the poising period is illustrated in Fig. 3, where the rod 37, connected with the valve 25, has been intercepted by the by-pass stop 38, the valve 25 also being held against further movement to permit the flow of the drip stream into the nearly-loaded bucket, which continues to descend. On the completion of the bucket load the bucket will move below the poising line, carrying the stop 38 therewith, which causes the release of the rod 37, and hence the connected valve 25, whereby the latter may be instantly closed by the counterweighted arm 29. On the release of the valve 25 the rod 37 will be carried into engagement with the latch-arm 23'' of the latch 23 and will swing the latter about its pivot, whereby its detent-arm 23' may be disengaged from the coacting detent-arm 21' of the angle-lever 21, this action freeing the connected bucket-closer L, whereby it may be instantly forced open by the weight of the bucket contents, which are then directed into the depressible hopper P and from thence into the chute D.

Having described my invention, I claim—

1. The combination with a bucket having a closer, of a valve provided with a stop; and a coacting stop supported by the framing and operatively connected with said closer.

2. The combination with a bucket having a closer, of a lever operatively connected to said closer; a valve having a stop; and a coacting stop in sliding engagement with said lever.

3. The combination with a bucket having a closer, of a hopper located to receive a load of material discharged by said bucket; a valve provided with a stop; and a pair of stops operative, respectively, with the closer and hopper and coacting with said first-mentioned stop.

4. The combination with a valve and with bucket mechanism embodying a shiftable load-discharge member, of means normally operative for holding said member against

movement; a stop operative with said valve; and a coacting stop in sliding engagement with said holding means.

5 5. The combination with a bucket having a closer, of an angle-lever operatively connected with said closer; and a stop in sliding engagement with said angle-lever.

10 6. The combination with a closer, of an angle-lever connected thereto by a link; a latch for engaging one of the arms of said angle-lever; and a stop provided with an arm in sliding engagement with the other arm of said angle-lever.

15 7. The combination with a bucket having a closer, of a valve; closer-supporting means; a stop connected to said valve; and a coacting stop in sliding engagement with said closer-supporting means.

20 8. The combination with a bucket having a closer, of an angle-lever supported by the bucket and having one of its arms connected to said closer by a link and the other provided with a longitudinal slot; a latch for engaging said first-mentioned arm; a suitably-supported stop having an arm provided with a pin passing through said longitudinal slot; and a valve having a stop coacting with said first-mentioned stop.

30 9. The combination with a bucket having a closer, of a hopper movably supported beneath said bucket; a suitably-supported rock-shaft operatively connected with said hopper and provided with a stop; and a second stop sleeved on said shaft and operatively connected with the bucket-closer; and a valve provided with a stop coacting with said first-mentioned stops.

40 10. The combination with a bucket having a closer, of an angle-lever connected thereto; a hopper movably supported beneath said bucket and adapted for receiving a load dis-

charged thereby; a rock-shaft having a crank-arm and provided with a stop; a rod operatively connected with said crank-arm and hopper; a stop sleeved on said shaft and operatively connected to the closer; and a valve provided with a stop coacting with said first-mentioned stops.

11. The combination with a valve and with a bucket having a closer, of a lever operatively connected to said closer; a rod rigidly attached to said valve; a stop on the bucket positioned for engaging said rod at a predetermined point in the closing movement of the valve, and for also releasing said rod; and a two-armed latch, one of the arms of which normally engages said lever, the other arm being disposed in the path of movement of said rod, whereby the latch will be tripped by said rod on its release.

12. The combination with a bucket having a closer, of a closer-supporting means embodying a latch; a valve provided with a depending rod movable therewith; and a stop operable for engaging said rod and for also releasing the same, whereby on the release of said rod it is adapted for tripping said latch.

13. The combination with a valve having a depending rod, of a bucket having a closer; a device operatively connected to the closer; a latch having two arms, one of which is operable for engaging said device and the other of which is disposed in the path of movement of said depending rod; and a stop for engaging said rod and for releasing the same, whereby it may be carried into contact with said arm of the latch to thereby trip the same.

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