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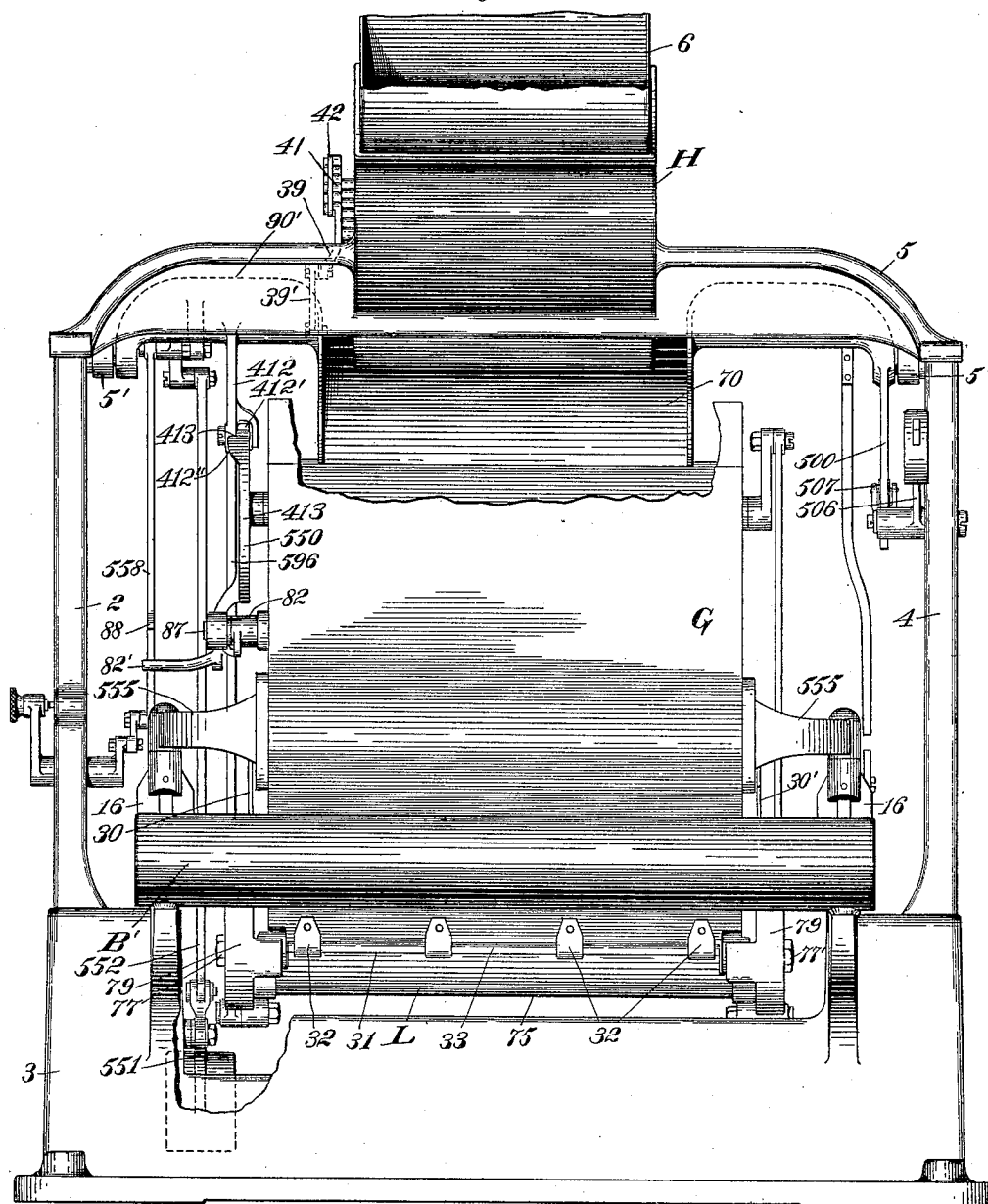
3 Sheets—Sheet 1.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 568,584.

Patented Sept. 29, 1896.

Fig. 1.



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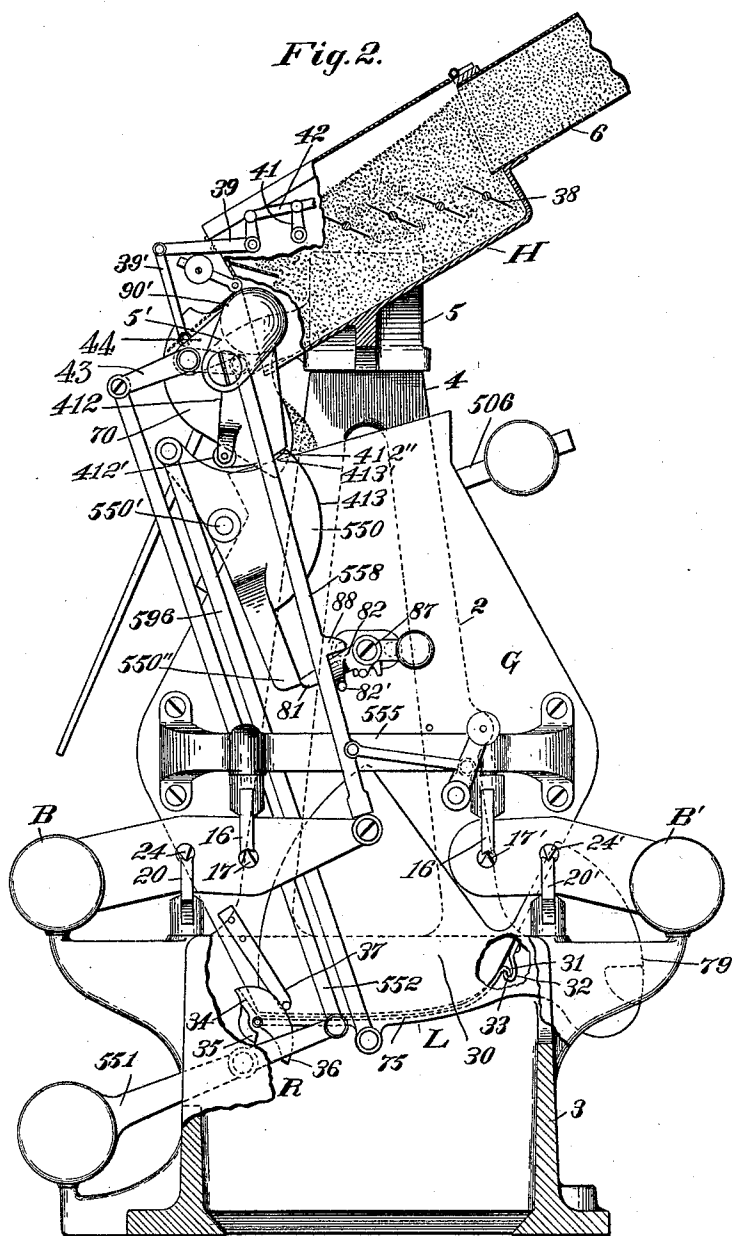
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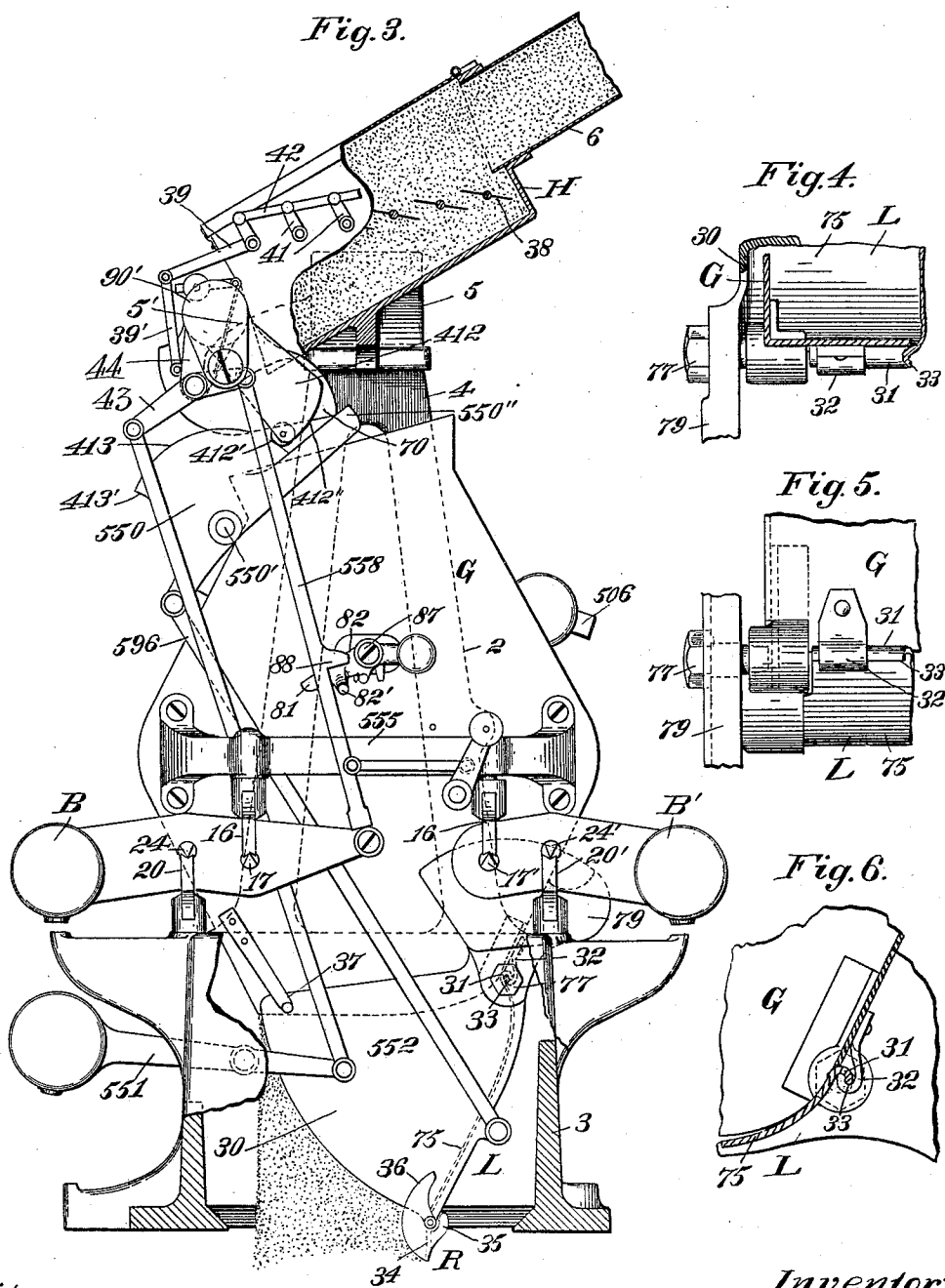
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 568,584, dated September 29, 1896.

Application filed March 26, 1896. Serial No. 584,958. (No model.)

To all whom it may concern:

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

This invention relates to weighing-machines, the objects being to provide improved means for effecting a gradual and precise reduction in quantity of the supply or supply-stream which flows into the bucket, improved valve-actuating means, improved closer and connected mechanisms, and certain other objects which, with the above, will be hereinafter more particularly described.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine embodying my improvements. Fig. 2 is an end elevation of the machine as seen from the left in Fig. 1, certain parts being broken away, the valve being open, and the closer closed. Fig. 3 is a similar view showing the valve closed and the closer open. Figs. 4, 5, and 6 are detail views of the improved closer and its connections with the bucket.

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

The framework for carrying the operative parts of the machine may be of any suitable construction, and is shown comprising two side frames or uprights 2 and 4, mounted upon a chambered supporting-base 3 and connected by a top plate 5, which is illustrated carrying a supply chute or hopper H, (to be hereinafter more particularly described,) and adapted for containing the supply of material to be directed into the bucket of the machine, and which may be supplied by suitable elevator or other apparatus through the pipe or conduit 6.

The base 3 is illustrated provided with V-shaped bearings 20 and 20', which constitute beam-supports for the beam mechanism.

The beam mechanism for supporting the bucket is shown comprising the oppositely-disposed counterweighted scale-beams B and B', which are shown provided with pivots or knife-edges 24 and 24', resting on the beam-supports, and by which the beam mechanism

is pivotally supported. The beam mechanism is also shown carrying a second series of pivots or knife-edges intermediate said first-mentioned series which constitute bucket-supports, and which are designated by 17 and 17'.

The bucket, which is designated in a general way by G, is illustrated having on each end thereof the brackets or hangers 555, which are provided with V-shaped bearings 16, corresponding in number and position with the bucket-supports, and which are pivotally supported thereby.

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 constituting such a shiftable member.

The bucket-closer L is shown consisting of a suitably-formed plate or closer proper, 75, having a counterweighted arm or arms 79, preferably formed integral therewith, for returning the closer to its normal or closed position, the closer being also illustrated pivoted at 77 and 77' to the lower forward side of the bucket and adjacent to one side of the discharge-opening thereof.

As a means for supporting the bucket-closer an inverted toggle connection is shown connecting the closer and the bucket, and this toggle connection is so positioned as to be engaged by a closer-latch when the latch is in its operative position and the closer is shut. In the form illustrated this toggle comprises the rocker 550, pivotally supported at 550' on the upper rearward side of the bucket and having a long connecting-rod 596 pivoted to said rocker and also to the closer in such a manner that when the closer is shut the two pivots of said connecting-rod or toggle member will be nearly in line with and the upper of said pivots will be above the rocker-pivot, whereby when the rocker is engaged by the bucket-closer latch and held in that position the closer will be supported with a minimum pressure on the latch.

The closer-latch for locking the rocker in position when the closer is shut, and which is designated by 82, is shown herein pivoted at 87 on one end of the bucket and having a detent or stop 81 in position for engaging a co-operating stop 550'' on the toggle member 550

when the parts are in the closed position previously described. The bucket-closer latch is shown counterweighted and as limited in its movement toward the detent on the toggle connection by suitable stops. In the embodiment illustrated the closer-latch swings upward to engage the stop on the toggle member 550, and it will be evident that it will be released from engagement therewith by a downward movement.

Means are illustrated for protecting the point of pivotal connection of the toggle member 596 with the bucket-closer L by preventing the lateral flow of the material, or any particles thereof, as the bucket-loads are intermittently discharged, such particles usually clogging this bearing-point, therefore rendering the closer somewhat uncertain in its action, particularly in the case of materials of certain characteristics, as bran. The means illustrated for this purpose comprise the two end plates or guards 30 and 30', preferably formed integral with the bucket-closer, and which project for a considerable distance above the closer-blade, so that when said closer is in its open position, as indicated in Fig. 3, the upper edges of said plates will still be located above the lower edge of the bucket. Means are also provided for protecting the bearings of the closer-pivots 77 and 77'.

The bucket-closer plate is shown provided, adjacent to its pivot, with a curved or rounded surface 31, which snugly fits against or is in bearing contact with the lower edge of the front wall of the bucket throughout the movements of the bucket-closer and also while it is in its two extreme positions, so that no space is left through which any particles or granules in the bucket can work into the pivot-bearings of the closer. The bucket is also illustrated provided with suitable means intermediate the closer ends, (herein illustrated as a series of hooks or supports 32,) secured to the front wall thereof at proper intervals by screws or other holding means, and which engage the bent-over portion 33 of the closer-plate, so that sagging of said closer intermediate its pivotal supports, and hence the formation of spaces between it and the bucket at any point, is positively prevented.

The bucket-closer L is illustrated movably carrying a regulator, (designated in a general way by R and herein shown consisting of a blade or plate 34, pivotally supported adjacent to the discharge edge of said closer,) which performs a dual function, as will now be described.

It is essential that the closing movement of the bucket-closer L should be so retarded or prolonged as to permit the full and complete discharge of the bucket-load, and for accomplishing this peculiar result the regulator R is shown. While the bucket-closer L is shut the regulator will assume an oblique or approximately oblique position (see Fig. 2) for a purpose to be hereinafter described. Im-

mediately on the release of the bucket-closer the weight of the bucket contents instantly forces the same open, and simultaneously therewith the regulator R is opened or rocked downward about its pivot by the impact there-against of the discharging stream of material to the position illustrated in Fig. 3.

It will be evident that the natural tendency of the closer L is to shut by reason of its counterweighted arms; but this action will be prevented or checked by the regulator R, which, as the closer commences to close, is held against reverse movement by suitable means, and which takes a firm hold of the discharged mass while in the chamber of the supporting-base 3, and so impedes the return movement of the closer as to allow ample time for the gravitation of any particles of material that may be thereon. As soon, however, as the resistance of the material acting against the regulator is decreased—due to the gradual descent of the mass discharged by the bucket into a suitable conduit (not shown) communicating with the chambered base 3—the closer will slowly shut or approach its horizontal position.

It will be evident that when the upper line of the discharged mass has passed below the lip of the regulator-blade the latter, and hence the bucket-closer L, will be free of all restraint, at which point the counterweighted arms 79 of the bucket-closer L quickly shut said closer.

The regulator R is also shown provided with a stop or curved stop-arm 35, which may be formed integral therewith, and which, during the closing movement of the closer L, impinges against the under surface of the closer-blade and prevents reverse movement of the regulator as the closer returns to its normal position, so that said regulator practically forms a part of the closer.

Means will also be provided for shifting the regulator R relatively to the bucket-closer L for returning the same to the normal or closed position, and this shifting movement will preferably be a rapid one, so that if any particles of the discharged mass should adhere or cling to said regulator these will be shaken or dislodged therefrom by the force of such a blow or jar. The regulator is shown provided with the integral arm 36, (herein illustrated as a cam-arm,) which is so disposed as to be engaged by a suitable actuator consisting, in the present instance, of an arm 37, rigidly secured to the bucket G on one end thereof, and which is located in the path of movement of the cam-arm 36.

When the closer has nearly reached its normal or horizontal position, it being at this point in the operation of the machine free of the checking influences of the discharged mass, it will be quickly closed by its counterweighted arms, and simultaneously therewith the cam-arm 36 will be engaged by the rigid arm 37, and a blow imparted to said cam-arm, and hence to the regulator R, the shock being

sufficient to dislodge from the regulator any particles that may stick thereto, and which drop into the chamber of the base. As the closer continues its closing movement the regulator will be further upwardly oscillated, through the described means, until it has assumed its normal or oblique position relative to the bucket G, the arm 37 serving as a means for holding the regulator in such position.

By virtue of the regulator R, when in its last-mentioned position, it is unnecessary that the bucket-closer should be shut tight against the lower edge of the bucket G, as any material that escapes or leaks from the bucket will be prevented from wasting by the regulator R, which constitutes a guard for this purpose, the lateral waste of the material from the bucket being prevented by the end plates 30 and 30'.

As a means for controlling the stream which flows from the supply-chute a valve is illustrated at 70, which is substantially similar in construction and mode of operation to the improved valve shown and described in Letters Patent No. 535,727, granted to me March 12, 1895, to which reference may be had.

The valve 70 is also illustrated pivotally supported for oscillatory movement beneath the discharge-outlet of the chute or hopper H by the arms or brackets 5' of the top plate 5, and as also balanced, the balance-weight 90' being shown for this purpose.

As a means for securing a gradual and precise reduction in volume of the supply-stream at successive points in the operation of the machine, and for materially reducing the impact of the descending mass against the valve 70, a series of stream regulating or reducing blades or wings are shown operative within the chute or hopper and oscillatory therein, and which constitute valves. These blades or wings are shown operatively connected with the stream-controlling valve 70, so that as said valve is closed or opened said blades or wings will be automatically operated in unison therewith, and thereby either reduce the volume of the supply-stream or permit its flow on the valve, the latter serving as a chute and directing the onflowing stream into the bucket G. Said wings are designated by 38 and are shown pivotally supported between the end walls of the chute, and, as hereinbefore stated, are operatively connected with the valve 70.

An angle-lever is shown at 39, the longer member of which is pivotally connected with the valve 70 by the interposed connecting-link 39', which is also shown pivotally connected with said valve to the rear of the pivot or center of movement thereof, the angle of said lever being connected with the first blade of the series of blades, as indicated in Figs. 2 and 3. A series of rock-arms connected with each of the other blades is preferably provided (two of these rock-arms being shown in Fig. 3 and designated by 41) and also piv-

otally connected by the tie-rod 42, the end of the latter being also connected with the short arm of the angle-lever 39, and by which said blades may be worked in unison. The valve being open, as indicated in Fig. 2, the supply-stream flowing from the pipe 6 into the chute H will strike the stream-regulating blades 38, which, at this point in the operation of the machine, are disposed at such an inclination as to permit the free flow of the separated portions of the supply-stream between each blade of the series and onto the lower inclined wall of the chute H, from whence the mass is directed into the bucket G. As the valve oscillates to close the connecting-link 39 will be drawn downward, thereby moving the long arm of the angle-lever therewith, and as the latter oscillates about its pivot the shorter arm of the angle-lever will be moved to what is herein shown as the "left," oscillating the blades 38 through the described connections therewith, whereby the inclinations thereof are progressively decreased as the valve closes, and the volume of the separated streams which flow between said series of blades is correspondingly reduced. It will be apparent that when the blades 38 have reached the horizontal position and the valve 70 is closed (see Fig. 3) said blades serve as an effectual cut-off for preventing the flow of the main stream into the bucket G.

As a means for closing the valve 70, whereby the gradual reduction of the supply-stream may be effected, as hereinbefore described, valve-closing mechanism substantially similar in construction and mode of operation to that shown and described in Letters Patent No. 548,843, granted to me October 29, 1895, is herein shown, to which reference may be had, and which will now be briefly described.

A valve-closing cam is shown at 500, which, in practice, is preferably provided with two connected cam-faces, which are engaged by a valve-closing member, herein illustrated as a counterweighted-lever 506, pivotally supported by the framework of the machine, the antifriction-roll 507 of which successively rides over said two cam-faces, and while in engagement with one of them slowly closes said valve and consequently correspondingly reduces the volume of the supply-stream. On leaving said cam-face the roll engages and rides over the connected cam-face which is of greater power or efficiency, whereby the valve is quickly closed for cutting off the stream reduced by the blades or wings 38. A connecting-rod is illustrated at 558 operative with the valve, being shown pivotally connected at its upper end to one end of the three-pivot link 43, the latter being shown pivotally supported between its ends by the arm 44, formed on the valve balance-weight 90'.

It will be evident that as the valve closes the connecting-rod 558 will have a descending movement in unison therewith; but this descending movement will be limited by the

scale-beam B, which is in engagement with said connecting-rod 558, whereby the closing movement of the valve 70 by its actuator 506 will be controlled by said scale-beam.

5 As a means for opening the valve 70 a shiftable two-stroke member constituting a valve-opening actuator is illustrated, and in the present instance it consists of a counter-weighted lever 551, pivotally supported by a
10 fixed part of the framework, independently of the various operative mechanisms, so that as it is shifted between its two positions it can have no possible effect upon the accuracy of the machine by jarring any of the oper-
15 ative mechanisms thereof, such jars being received by a fixed part of the machine and hence having no effect whatever on the weighing operation. A connecting-rod is shown at 552 respectively connected at its extremities
20 to the three-pivot link 43 and said shiftable lever, the weight of which, when said lever is in its ineffective position, being shown sustained by the support 3', formed on the base 3 of the machine. The operation of these
25 connected parts is as follows: As the valve 70 is closed by its lever 506 the rod 558 will be moved downward, the three-pivot link 43 rocking about its pivot with the rod 552, and the latter likewise moving about its pivot on
30 the lever 551. At a predetermined point in the operation of the machine a latch-actuator (to be hereinafter described) depresses the closer-latch 82 and releases the bucket-closer L. As the closer is released one of a pair of
35 reciprocally effective stops is immediately brought into play and is operable for maintaining the valve closed and locked while said closer is open and during the time the bucket is discharging its load. When a cer-
40 tain portion of the mass has been discharged by the bucket, the counterweights of the beam mechanism overcome the lightened bucket and descend, the poising side of the beam mechanism of course ascending. As
45 said poising portion of the beam B ascends the connecting-rod 558 will be moved upward thereby, the valve, it being understood, being still locked closed. As the rod 558 is thus
50 moved the three-pivot link will be rocked, its right-hand arm moved upward and left-hand arm downward, this action shifting the lever 551 from its ineffective position, as indicated in Fig. 2, to the position illustrated
55 in Fig. 3 through the interposed connecting-rod 552. It will be assumed that at this point the valve 70 has been released by the stop, and as the lever 551 returns to its normal position an upward thrust is imparted to the
60 connecting-rod 552 sufficient for opening said valve.

Reciprocally effective valve and closer locking-stops operative, respectively, with the valve and with the closer are also illustrated for preventing the opening movement of the
65 valve while the closer is open and the bucket discharging its contents, and vice versa.

A valve-operative stop member is shown at

412, and the rocker 550 is herein illustrated as constituting a closer-operative stop member. The stop member 412 is shown having two stops 412' and 412'' in the form, respectively,
70 of an antifriction-roll and of a curved face concentric with the axis of movement of the valve. The stop member 550 is likewise shown provided with two stops 413 and 413',
75 the first mentioned of which is shown as a curved face concentric with the axis of movement of said member and the other as an approximately straight face departing from said
80 curved face. The operation of these various stops will now be described. When the valve is open, as illustrated in Fig. 2, the two stops 412'' and 413' will be in contact, so that if the closer L should be accidentally released
85 through the premature tripping of the latch 82 the tendency of the stop or rocker 550 to rock about its pivot will be positively prevented by the stop member 412 so long as
90 these two stops are in contact. When, however, the stop or roll 412' has intersected the plane of curvature of the stop-face 413, the stop or rocker 550 is free to oscillate—provided, of course, the closer-latch has been
95 tripped—to permit the opening movement of the closer. As the closer opens the stop 413 will peripherally contact with the stop or roll 412', (see Fig. 3,) so that while these stops are in such contact the opening or reverse movement
100 of the valve will be prevented by the stop member 550, against which the other interlocking member 412 impinges, the first-mentioned member while this peculiar relation continues serving, practically, as a fixed
105 abutment. When, however, these stops 413 and 412' have passed out of contact—due to the shutting of the closer L and consequent return oscillation of the stop member 550—the valve may be opened by its actuator 551.

While the valve is locked closed the beam B, as it returns to its normal position, is operative for shifting the lever 551, through the
110 hereinbefore-described connections, from its ineffective position to its working position, so that as said lever 551 returns to said normal position it imparts an upward thrust to the
115 connecting-rod 552, to which it is connected, sufficient for opening the valve to again permit the flow of the supply-stream into the bucket G.

It will be remembered that a latch 82 has
120 been described as being normally operative for holding the bucket-closer L against opening movement by engaging the rocker or toggle member 550, and that said latch is also depressible for releasing the closer. For thus
125 depressing or tripping the latch 82 I have herein illustrated an actuator 88, formed on the connecting-rod 558, which is shown operatively connected with the valve, and which
130 actuator has a descending movement from the valve on the closure thereof.

At the proper point in the operation of the machine, or when the bucket has passed below the poising-line, this actuator 88 will be

projected downward into engagement with the stop-pin 82' on the latch, thereby depressing the latch and releasing its detent 81 from engagement with the cooperating detent 550'' on the rocker 550, whereby the latter is free to oscillate, at which point the bucket-contents, pressing against the closer L, will force the same open for discharging the bucket-load.

10 The operation of the hereinbefore-described weighing-machine briefly is as follows: With the valve open and the closer shut, as indicated in Fig. 2, the supply-stream will flow from the chute or hopper H into the
15 empty bucket. When a certain proportion of the load has been received by the bucket, it will descend, the poising side of the beam mechanism descending therewith, the beam B falling from under the connecting-rod 558, 20 permitting a closing movement of the valve 70 by the valve-closing lever or actuator 506, which successively rides over the two connected cam-faces on the valve-closing cam 500. While the valve 70 is closing it will be
25 evident that the volume of the supply-stream which flows from the chute H is successively reduced through the medium of the blades 38, which are operatively connected with the valve. At the commencement of the poising
30 period a stream of relatively small volume will flow into the bucket for the purpose of completing the load therein, the bucket and beam mechanism further descending, and the latter also permitting a further descending
35 movement of the connecting-rod 558, and hence the actuator 88, so that when the bucket has intersected the poising-line said actuator 88 is operative for releasing the bucket-closer L by tripping the latch 82. As the bucket-
40 closer L opens the stop member 550, operative therewith, becomes immediately effective for preventing the opening movement of the valve by engaging the stop 412' of the stop member 412. The closer L being open, Fig.
45 3, the bucket-load will be discharged, and when a certain part of the mass has been discharged by the bucket the beam mechanism will ascend, the valve of course being still locked closed, so that the beam B is effective
50 for shifting the lever 551 from its ineffective to its working position through the connecting-rods 558 and 551 and three-pivot link 43, with which these two rods are connected. When the closer L is closed and locked, the
55 valve is free to open, so that as the lever 551 returns to its normal position an upward thrust will be imparted to the rod 552 sufficient for opening the valve 70.

Having described my invention, I claim—

60 1. The combination with a chute, of a valve; a series of operatively-connected blades located within said chute; an angle-lever connected to one of said blades; rock-arms connected to the other blades; means
65 connecting said rock-arms with one member of the angle-lever; and a link connected to

the other member of said angle-lever and to the valve.

2. The combination with a chute, of an oscillatory stream-controlling valve therefor; a 70 series of blades operative within said chute and extending partially across the same; an angle-lever connected at its angle to the first blade of the series; rock-arms connected to the other blades; a rod operatively connect- 75 ing said rock-arms and one member of the angle-lever; and a link pivotally connected to the other member of the angle-lever and to the valve at a point to the rear of its axis of movement. 80

3. The combination with bucket mechanism embodying a member shiftable for discharging a bucket-load, of a regulator-blade movably supported by the shiftable member and so located thereon as to take hold of the 85 mass of material discharged by the bucket, whereby the return movement of the shiftable member will be retarded.

4. The combination with a bucket having a closer, of a regulator-blade movably supported by said closer and located thereon to 90 take hold of the mass of material discharged by the bucket on the opening of the closer, whereby the return movement of the closer will be retarded. 95

5. In a weighing-machine, the combination with a bucket having a closer, of a blade pivotally supported by said closer adjacent to the discharge edge thereof. 100

6. In a weighing-machine, the combination 105 with a bucket having a closer; of a blade thereon; and means for shifting said blade relatively to the closer.

7. In a weighing-machine, the combination with a bucket having a closer; of a regulator- 110 blade movably supported thereby, and having an arm; and an actuator for engaging said arm, to thereby shift the regulator relatively to the closer.

8. In a weighing-machine, the combination 115 with a bucket having a closer; of a blade movably supported thereby, and having a cam-arm; and a rigid arm carried by the bucket for engaging said cam-arm, to thereby shift said blade. 120

9. In a weighing-machine, the combination with a bucket having a closer; of a blade movably supported thereby, and having an arm and a stop for engaging the closer; and an actuator for engaging said arm. 125

10. The combination with a bucket, of a closer therefor comprising a plate having a continuous bearing-surface from end to end thereof adjacent to its point of support and in contact with one of the edges of a bucket- 130 wall.

11. The combination with a bucket, of a closer supported thereby and comprising a plate having a rounded surface extending from end to end thereof adjacent to its point 135 of support and in contact with one of the edges of the bucket-wall.

12. The combination with a bucket, of a closer therefor comprising a plate having a continuous bearing-surface from end to end thereof and in contact with one of the edges
5 of the bucket-wall; and means for supporting said plate at intervals between its ends.

13. In a weighing-machine, the combination with a bucket; of a closer therefor comprising a plate having a bearing-surface in
10 contact with one of the edges of a bucket-wall, and having also a bent-over portion; and a hook or hooks carried by the bucket for engaging said bent-over portion.

14. In a weighing-machine, the combination with a chute; of a valve therefor; and
15 a shiftable counterweighted lever supported by the framework, and constituting a valve-opening actuator.

15. In a weighing-machine, the combination with a chute; of a valve therefor; a
20 shiftable counterweighted lever supported by the framework; and means operatively connecting said member and valve.

16. In a weighing-machine, the combination with a scale-beam; of a chute; a valve;
25 a shiftable counterweighted lever supported independently of the scale-beam and connected with the valve; and connections between said valve and scale-beam.

30 17. In a weighing-machine, the combination with a scale-beam; of a chute; a valve; a shiftable two-stroke member a three-pivot link operative with said valve; and a depending member carried on each end of said link,
35 and having said members in position to be

operated by said scale-beam and shiftable member, respectively.

18. In a weighing-machine, the combination with bucket mechanism embodying two
40 members, one of which is shiftable relatively to the other for discharging the load, and with a scale-beam; of a latch normally operative for holding said shiftable member against movement; a valve; a counterweighted
45 lever; a rod connected to the valve, and in position for operation by said counterweighted lever; and a second rod provided with a latch-actuator, connected to the valve and in position for operation by said scale-
50 beam.

19. In a weighing-machine, the combination with bucket mechanism embodying two
55 members, one of which is shiftable relatively to the other, and with a scale-beam; of a valve; a stop operative for maintaining the valve closed during the bucket-discharging period; a counterweighted lever supported
60 independently of said scale-beam; and connections between said counterweighted lever, the valve, and scale-beam.

20. The combination with the framework and with a valve, of a valve-opening actuator supported by said framework; and a scale-beam connected with, and operable on one
of its strokes for shifting, said actuator.

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