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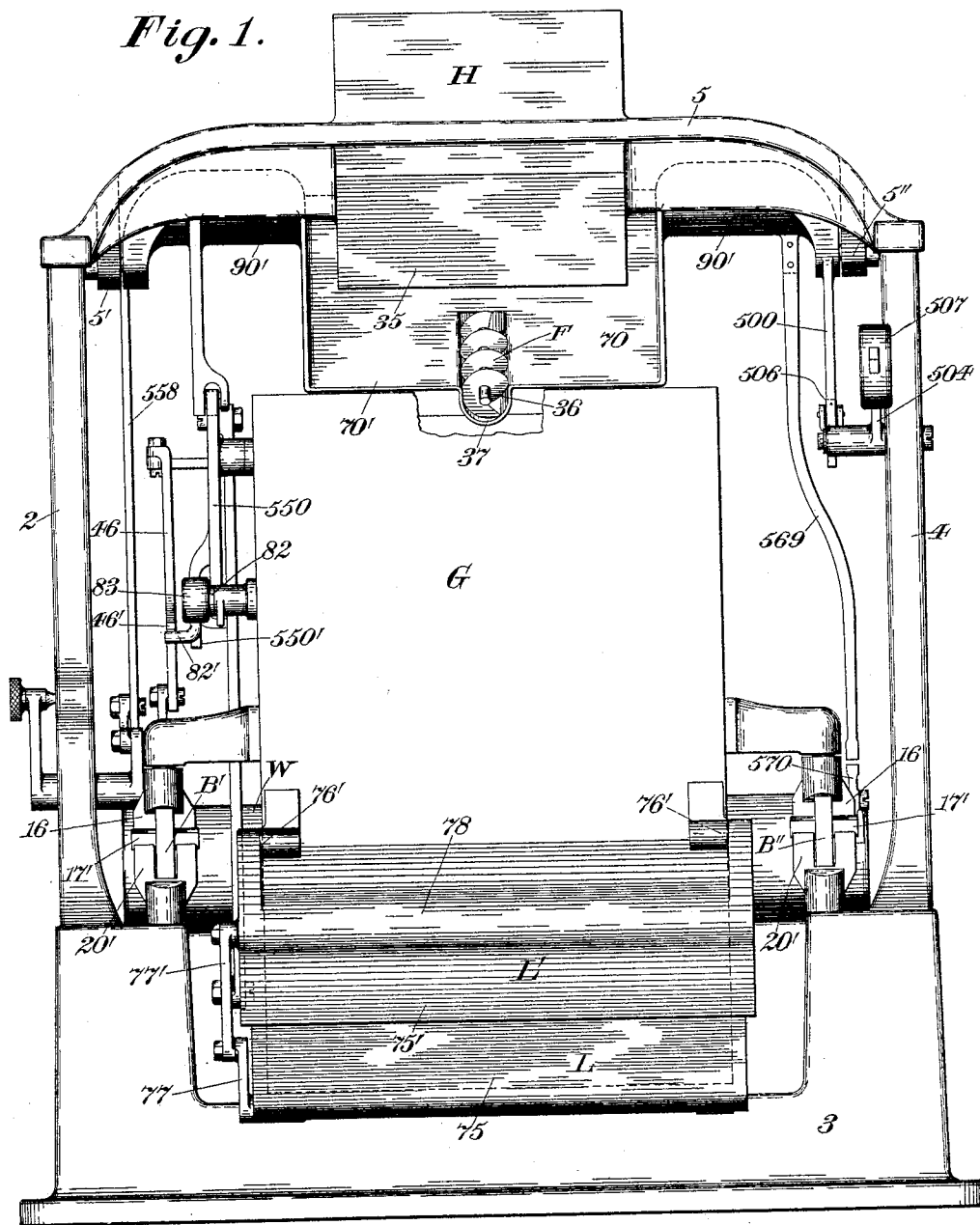
4 Sheets—Sheet 1.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 570,294.

Patented Oct. 27, 1896.

Fig. 1.



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

Inventor:
F. H. Richards.

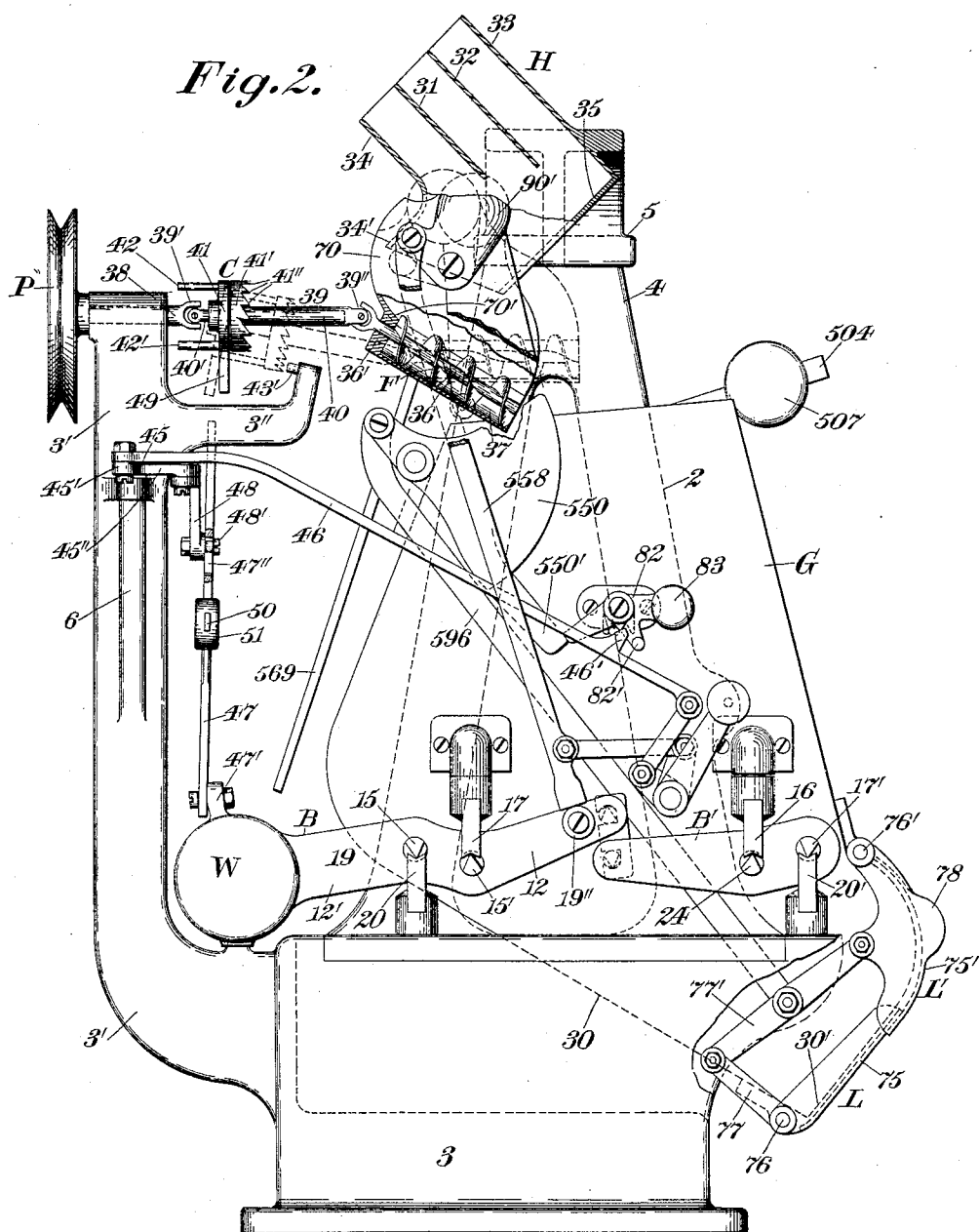
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4 Sheets—Sheet 2.

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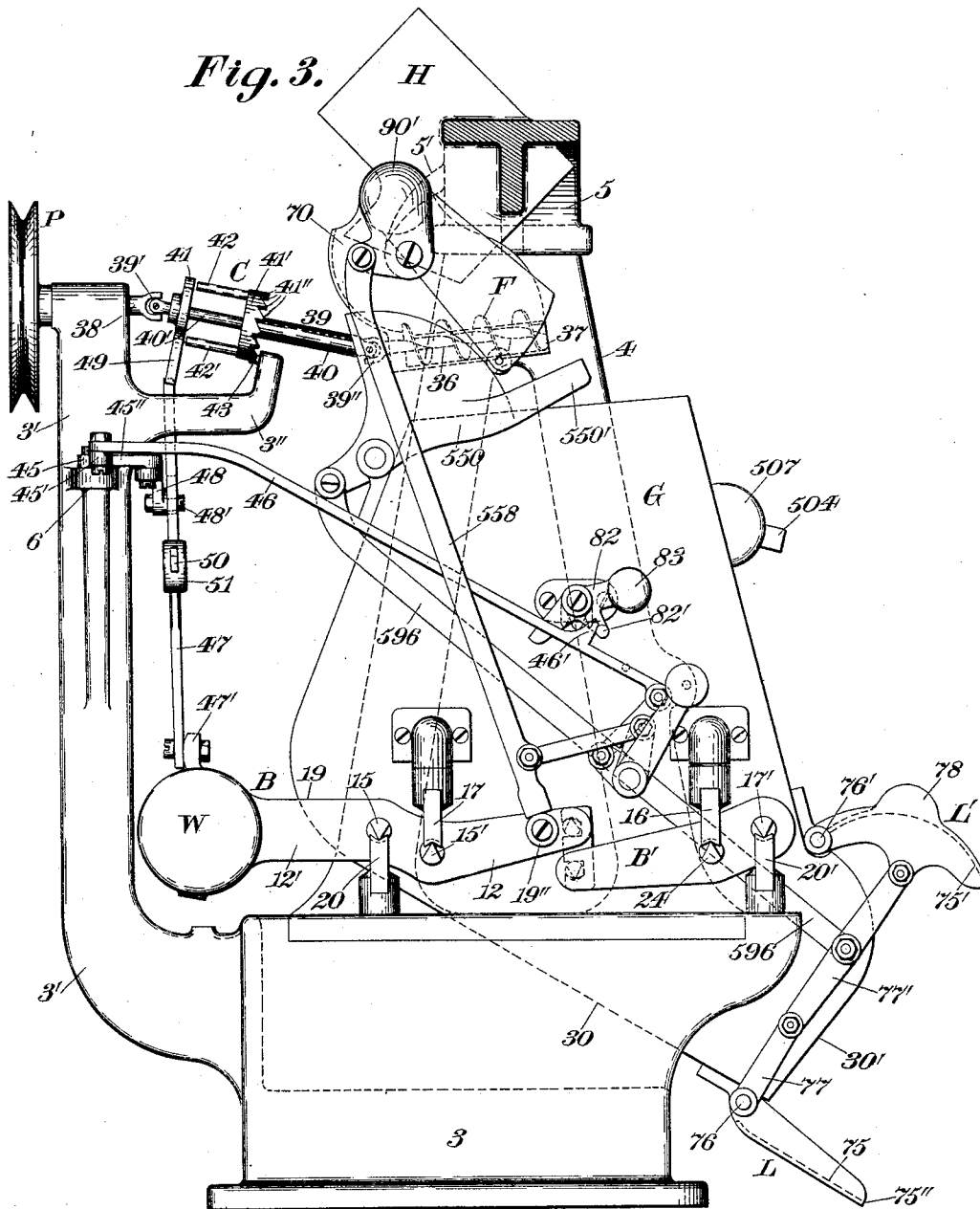
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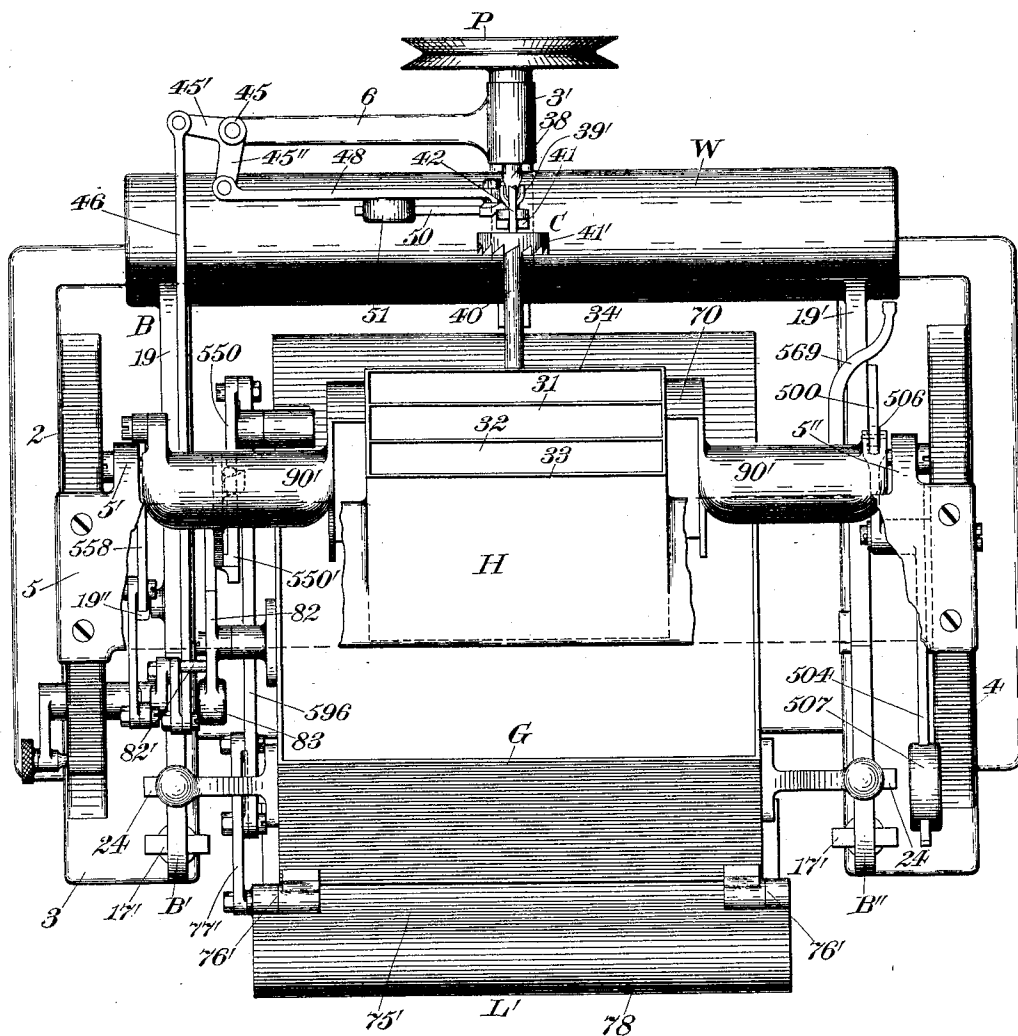
4 Sheets—Sheet 4.

F. H. RICHARDS.
WEIGHING MACHINE.

No. 570,294.

Patented Oct. 27, 1896.

Fig. 4.



Witnesses:

Chas. O. 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. 570,294, dated October 27, 1896.

Application filed May 9, 1896. Serial No. 590,926. (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 machine of this character comprehending efficient means for maintaining a continuous, unbroken stream of material to the bucket or load-carrying receptacle at the proper period in its operation, the invention being adapted for use in connection with machines for weighing substances of various classes, but more especially those of a sluggish or slow-running nature, such as cotton-seed meal, flour, and the like.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine comprising my improvements in the preferred form thereof, illustrating the positions occupied by the various operative parts at the commencement of operation, the valve being open and the feeder supported thereby in motion, and the bucket closer or closers in the shut position. Fig. 2 is an end elevation as seen from the left in Fig. 1, with the parts in position corresponding therewith, the chute and valve being partially broken away to illustrate more clearly certain peculiar features of construction. Fig. 3 is a similar view, the valve being closed and the feeder supported thereby at rest, and the bucket-closers open for discharging the bucket load. Fig. 4 is a plan view with certain parts of the framing removed, the parts being in positions corresponding, respectively, with Figs. 1 and 2.

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

The framework for supporting the operative parts of the weighing-machine may be of suitable or preferred form; and it is herein illustrated comprising the two side frames or members 2 and 4, mounted upon the base 3 and connected at the top by the beam or plate 5, which latter suitably carries the supply chute or hopper H, which will be herein-after more particularly described.

The bucket, which is designated in a general way by G, is illustrated as being of the "single-chambered" type, and as also having its receiving opening or inlet in alinement with the descending column or stream of material from the chute or hopper H. The bucket G is also illustrated as having the inclined bottom 30, leading toward the discharge-outlet 30', at one side thereof, said bottom being at such a disposition or angle as to permit the free flow or gravitation therefrom of the bucket contents on the opening of the bucket closer or closers. By reason of such inclined bottom it serves positively as a stream-brake, so that the force of the descending stream of material from the chute or hopper cannot be directed against the closer or closers.

As a means for supporting the bucket the beam mechanism illustrated may be employed, and will now be described. The base 3 is illustrated carrying the V-shaped bearing 20 at one side thereof, the opposite side being similarly equipped, said V-shaped bearings constituting a convenient means for supporting the scale-beam B.

The scale-beam B is illustrated comprising the arms 19 and 19', connected by the combined counterweight and shaft W. The arm 19 of the scale-beam B is shown equipped with a knife-edge 15, supported by the V-shaped bearing 20, carried by the base of the machine, the opposite arm of said scale-beam B being also provided with such a knife-edge. The two connected arms 19 and 19' of the scale-beam will be also provided with a second pair of knife-edges, constituting bucket-supports, one of which is shown at 15' pivotally supporting the V-shaped bearing 17, suitably connected to one end of the bucket, it being understood that the opposite end of the bucket will be also provided with a similar bearing.

As a means for balancing the peculiar form of bucket herein illustrated, a pair of supplemental beams are illustrated at B' and B'', respectively, and as also operatively connected with the beam B; and as they are the same in construction and mode of operation, it is deemed necessary to describe but one of said supplemental beams in detail—for example, the beam B'. The base 3, near the extreme outer edge thereof, is illustrated carrying the

V-shaped bearing 20', which constitutes a convenient means for supporting the said beam, the latter being illustrated provided with the knife-edge 17' resting on said bearing or beam-support. The beam B' is also shown provided with a bucket-support 24, consisting in the present instance of a pivot or knife-edge, the bucket G suitably carrying the V-shaped bearing 16, resting on said pivot or knife-edge.

The closer mechanism for the bucket comprises two closers or valves, (designated in a general way by L and L', respectively,) and which consist of the closers proper or plates 75 and 75', respectively, said closers being illustrated pivoted at 76 and 76' adjacent to the opposite walls of the discharge-outlet 30' of the bucket.

The closers or valves 75 and 75', respectively, will be opened in unison, this action being caused by the weight of the bucket contents when said closers are released at the proper point in the operation of the machine.

The closer-plate 75 is illustrated as being approximately flat, so that when it reaches the limit of its opening movement, as indicated in Fig. 3, it will assume a position approximately in parallelism with the bucket-bottom 30, whereby it constitutes practically a continuation of said bottom. When in such position, the pressure of the discharging mass acting against said closer 75 prevents the closing movement thereof until the last particles of the mass have passed below the discharge edge or lip 75'' of said closer, when it may be shut, it being clearly evident that during this peculiar operation said closer serves practically as a regulator.

The closer 75 being operatively connected with its mate 75', it will be apparent that the premature shutting movement of said last-mentioned member will be likewise prevented. One of the closer members or valves will preferably overlap the other when in a shut or normal position, as indicated in Fig. 2, so that a tight joint will be provided and the accidental escape of material positively prevented.

One of the closers will have an accelerated or multiplied shutting movement in advance of the other, so that the last-mentioned member may overlap the same, and the means illustrated for effecting this result will be hereinafter described.

The pivot of the closer 75 is illustrated having the rock-arm 77 suitably affixed thereto, to which is pivotally connected the link 77', the opposite end of the latter being likewise attached to the closer 75' at a point preferably intermediate its edges.

As a means for sustaining the bucket-closer an inverted toggle is herein illustrated. This toggle in the form shown consists of the rocker 550, pivotally connected to the bucket adjacent to the upper rearward side thereof, and the relatively long connecting-rod 596, operatively connected to the closer mechanism, being shown pivoted to the connecting-

link 77', and in such a manner that when the closers are in the shut or normal position thereof, as indicated in Fig. 2, the three toggle-pivots will be approximately in line with, and the upper pivot of the connecting-rod or toggle member will be above, the rocker-pivot.

It will be evident that by such organization when the rocker is engaged by a suitable device it may be held against oscillatory movement by a minimum pressure thereon. For thus holding the rocker against rocking movement, and hence the connected closers 75 and 75' against opening movement during the loading period, the latch 82, pivotally supported by the bucket G, is herein illustrated. In the form illustrated this latch 82 swings upward for engaging the rocker 550 or the arm 550' thereof, the latch being provided with a suitable detent for engaging a co-operating detent on the rocker-arm 550' when the parts are in the closed position illustrated in Fig. 2. For effecting this upward movement of the latch 82 a counterweight 83 is illustrated, suitable stops being also employed for limiting the oscillation of said latch.

When the latch 82 is depressed, its detent will be disengaged from the co-operating detent formed on the rocker-arm 550', so that the rocker is free to swing about its pivot. The weight of the bucket contents may then force the closer or valve 75 open, simultaneously opening the closer 75' by virtue of the operative connections therebetween, and to the position illustrated in Fig. 3. For effecting the closing movement of the two valves 75 and 75' the last-mentioned member is illustrated provided with a counterweight 78, and when the discharged mass has passed below the lip or discharge-edge 75'' of the closer 75, the latter, and hence the connected closer 75', is free to shut, this movement being effected by the counterweight 78. As the two closers approach their normal or shut positions the return movement of the rocker 550 will be caused by the connecting-rod 596, so that when said closers have resumed the normal position thereof the rocker-arm 550' may be again engaged by the latch 82.

The supply chute or hopper is illustrated having formed interiorly thereof the blades or partitions 31 and 32, set at an inclination therein and extending from end wall to end wall thereof and preferably in parallelism with the top and bottom plate 33 and 34, respectively, of said chute. The two said plates 31 and 32, together with the bottom wall or plate 34 of the chute, constitute an efficient means for breaking the force of a descending stream of material, so that the full volume thereof cannot be directed against the front wall 35 and hence against the valve 70, as, where a stream of very large volume is impacted against said valve, it is rendered somewhat uncertain in its action. The wall 35 is preferably disposed at an angle to the series of plates hereinbefore mentioned, so that the

course of the stream will be changed thereby and its force further broken, said stream being directed toward the rear of the valve and away from its front or discharge edge, whereby the power necessary to close the same is materially reduced. The bottom wall 34 of the chute is illustrated as extended downward, as at 34', and serves as an effectual guard for preventing rearward spattering of the material during the operation of the machine.

The valve 70 is of the oscillating type and is substantially similar in construction and mode of operation to the improved valve disclosed in Letters Patent No. 535,727, granted to me March 12, 1895, to which reference may be had. The top plate 5 is illustrated having formed thereon the arms or brackets 5' and 5'', between and to which the valve 70 is pivotally supported. The valve is also a balanced valve, so that when in its closed position, as indicated in Fig. 3, it has in itself no tendency to move in either direction, the balance-weight 90' being illustrated for this purpose. When the valve 70 is in its closed position, as indicated in said figure, it is adapted for supporting the mass in the chute or hopper.

As a means for opening the valve 70 the mechanism illustrated may be conveniently employed, and will now be described. A connecting-rod is shown at 558 pivotally suspended from the valve at a point to the rear of its axis or center of movement, the lower end of said rod being normally in engagement with the beam B or with a projection, as the antifriction-roll 19'', extending from its arm 19.

The scale-beam B has the usual bucket-poising and bucket-counterpoising portions 12 and 12', respectively, located at each side of its fulcrum or pivot, and hereinafter when the ascending and descending movements of the scale-beam are referred to the bucket-poising side 12 will be meant, unless otherwise specifically stated, said bucket-poising side of the beam ascending and descending in unison with the bucket G. As the bucket and beam B, and hence the connected beams B' and B'', descend—which action is caused by the flow of the supply-stream into the bucket—the valve 70 may be closed by suitable means, the beam B, which is in engagement with the connecting-rod 558, serving as a suitable means for limiting or checking the too rapid closing movement of the valve. The parts will be so organized that when the beam B has reached the limit of its descending movement the valve will be closed. On the return movement of the beam B an upward thrust will be imparted to the connecting-rod 558 and directed toward the rear of the valve, being sufficient for opening the same to cause the flow of the supply-stream.

As a means for actuating the valve 70 to close the same the mechanism illustrated may be employed, which is substantially similar in construction and mode of operation to

that disclosed in Letters Patent No. 548,843, granted to me October 29, 1895, to which reference may be had, and which will now be described.

A cam is shown at 500 as oscillatory with the valve 70, being preferably formed integral with the balance-weight 90' thereof. The cam-surface of said cam is in position to be engaged by a suitable device—such as the counterweighted lever 504—one of the arms thereof being preferably provided with an antifriction-roll 506, the other arm having the weight 507, so that on the downward movement of said counterweighted arm said antifriction-roll 506 will be caused to ride along the cam-surface of said cam, and the force of said counterweighted arm thereby transmitted to the connected valve 70 to effect its closing movement.

The main stream will be cut off by the valve 70, and as a means for furnishing the drip-stream a feeder will be employed, said feeder being preferably supported by the valve and movable therewith, the valve constituting practically a carrier for the feeder. The feeder, which is designated in a general way by F, is shown as being of the "screw" type, the blade thereof being suitably connected to the supporting-shaft 36, said blade being also rotative in the concavity or pocket 37, formed in the valve-pan.

The shaft 36 is illustrated journaled in the rear wall 36' of said concavity, and will be also suitably connected with a power device for effecting the operation of said feeder F. On rotation of the feeder it will be evident that it is operable for screwing forward a portion of the supply of material. When the valve has reached a predetermined point in its closing movement, as indicated by the dotted lines in Fig. 2, it will have cut off the main or gravitating stream of material issuing from the chute or hopper H. It will be apparent, therefore, that when the valve has reached such a position, its bottom plate 70' being approximately horizontal, the mass cannot flow over said bottom plate. On the movement of the feeder at this point it will be evident that it may feed from the body of material on the valve a stream of relatively small volume, which constitutes the drip-stream and which is necessary to complete the partial load in the bucket.

A power device or pulley is shown at P suitably affixed to the relatively short shaft 38 by keying or otherwise, said shaft being journaled in the standard or support 3', extending upward from the base 3 of the machine. The pulley P in practice will be connected with a suitable motor (not shown) by belting or otherwise, as desired. The power device P will be operatively connected with the feeder F, and for this purpose the extensible shaft 39 is illustrated, said extensible shaft being shown connected, respectively, with the feeder-shaft 36 and with the pulley-shaft 38, the connection between these members being

preferably a universal one, as indicated at 39' and 39'', whereby a rotative movement through a suitable clutch may be imparted to the feeder F until the valve has reached its extreme closed position, when the clutch members may be uncoupled thereby, and hence the feeder F stopped.

The feeder mechanism embodies a clutch, which may be of any suitable type. That herein illustrated, and which is designated in a general way by C, is a pin-clutch.

The extensible shaft 39 is illustrated comprising two members, one of which is telescopically connected with the other, the tubular member being designated by 40 and the other member by 40', and each of these members will carry one of the clutch members, so that when the last-mentioned parts are coupled together, as indicated in Fig. 2, a rotative movement may be transmitted by the power device P to the connected feeder F in an obvious manner. The action of the valve 70 in closing slowly disengages the clutch members, this operation being completed when the valve reaches the limit of its closing movement.

The clutch, it will be remembered, has been described as constituting two members, which are designated by 41 and 41', respectively, suitably secured to the sections 40' and 40 of the extensible shaft 39. The clutch member 41 has suitably formed in its opposite edges recesses for receiving the pins 42 and 42', projecting rearward from the preferably circular clutch member 41' and at diametrically opposite sides thereof.

At a predetermined point in the operation of the machine, or at the commencement of the poising period, the further closing movement of the valve will be intercepted by suitable devices, the valve-plate 70' at this time being approximately disposed at a horizontal position, so that the feeder F becomes operable for supplying the hereinbefore-mentioned drip-stream to the bucket. For thus intercepting the valve devices substantially similar to those disclosed in Letters Patent No. 548,840, granted to me October 29, 1895, are herein illustrated, and will now be described.

A depending rod is illustrated at 569, and is also oscillatory with the valve, being suitably connected with the valve balance-weight 90'. At a predetermined point in the closing movement of the valve this rod will be engaged by a stop—such as 570—suitably connected to the beam B, and the valve thus held, it being then in the position illustrated by the dotted line in Fig. 2, the clutch members 41 and 41' being nearly uncoupled. The valve 70 is thus momentarily held against closing movement, and when released—due to the descent of the beam B—will be given a final closing movement by the counterweighted lever 504 in the manner previously described. During this last-mentioned action the two clutch members 41 and 41' will be uncoupled, thereby stopping the movement of the feeder F.

As a means for instantly stopping the rotation of the feeder F when the clutch C has been uncoupled as described a suitable device will be also employed.

The standard 3' is illustrated having the forward and upward projecting arm 3'', near the upper end of which may be suitably formed a pin 43'.

The clutch member 41' is illustrated serrated or provided with teeth, as at 41'', which are carried into contact with the pin 43' during the final closing movement of the valve, whereby the tubular shaft member 40, and hence the connected feeder F, may be instantly stopped in their rotative movements by the pin or check device 43'.

The bucket mechanism comprises a shiftable bucket-discharge member or members, which have been hereinbefore described as the closers L and L', respectively, normally held against movement by a suitable latch. For depressing or tripping said latch means extraneous of the weighing mechanism will be preferably employed, so that the accuracy of the machine will not be vitiated, as is frequently the case when this result is obtained by a movable or reciprocatory member of the weighing mechanism. For thus tripping or releasing said shiftable member means preferably operated by the feeder mechanism will be employed, and the form herein illustrated for obtaining this result will now be described.

The standard or support 3' is illustrated having formed thereon the bracket or arm 6, which is shown supporting the angle-lever 45, the latter being pivoted to said arm at its angle. The arm or member 45' of said angle-lever is illustrated pivoted to the relatively long connecting or thrust rod 46, the opposite end of the latter being preferably connected with a relatively fixed part of the machine by a suitable guide or other means to thereby maintain said rod in an operative position throughout its reciprocal movements. The rod 46 has a movement in an inclined plane, and is shown having formed thereon the projection or lug 46', which has a movement into engagement with a suitable device, as the pin 82', formed on the latch, so that on the downstroke of said connecting-rod 46 the projection 46' thereon is operable for engaging the pin 82' to thereby trip the latch 82.

The weight W of the scale-beam B is illustrated having formed thereon the lug or ear 47', to which is pivoted the upward-extending rod 47, said rod being shown operatively connected with the angle-lever 45 by the link 48, pivotally attached to the angle-lever arm 45'' and to the rod 47 at a suitable point thereon. The connection between said link 48 and rod 47 is preferably a sliding one.

The rod 47 is shown having formed therein the longitudinal slot 47'', through which is passed the headed screw or stud 48', fixed to said rod. It will be apparent, by virtue of such sliding connection between the link 48

and the rod 47, that the latter may have a free vertical movement without by such action affecting the relation of the connected angle-lever 45 and thrust-rod 46. The upper
 5 end of the rod 47 is interposable into the path of movement of a suitable device operated by and constituting a part of the feeder mechanism, so that a lateral blow may be imparted to said rod 47 sufficient through the herein-
 10 before-described connections for effecting the downstroke of the rod 46, the depression of the latch 82 by the projection 46' thereon, and hence the release of the bucket-closers 75 and 75', respectively.

15 The clutch member 41 is illustrated provided with the radial arm or extension 49, which constitutes a means for imparting the hereinbefore-mentioned lateral blow to the rod 47 for effecting the release of the two
 20 closers.

The operation of the closer-releasing means will be clearly obvious from an inspection of the drawings.

As the mass of material flows into the
 25 bucket, this of course descends, the poising portion 12 of the scale-beam B descending therewith, the counterpoising side 12' of said scale-beam ascending, and the rod 47 will be moved therewith. At the commencement of
 30 the poising period, or when the bucket-load has been nearly completed, the valve 70 will have cut off the main or gravitating stream, it being at this time in the position indicated by the dotted lines in Fig. 2. The feeder F
 35 on the valve is then operable for feeding from said valve a relatively fine or drip stream. The clutch members 41 and 41' will be nearly disengaged, as also shown by the dotted lines in said Fig. 2. On the completion of the
 40 bucket load the valve 70 will be instantly closed, this action uncoupling the clutch members 41 and 41', the feeder F being instantly stopped. Succeeding the final closing movement of the valve 70 and the stoppage
 45 of the feeder F, the rod 47 will be thrust upward by the scale-beam B, and when it has intersected the plane of movement of the clutch-arm 49, the latter on its rotation may engage the upper end of said rod, rocking it
 50 to what is illustrated as the right in Fig. 4, and thereby, through the angle-lever 45, forcing the rod 46 downward with its projection 46' into contact with the latch-pin 82', so that the latch 82 may be tripped on such move-
 55 ment.

For securing the return movement of the rod 47, and hence the return of the parts connected thereto, said rod will be preferably counterweighted. The rod is shown provided
 60 with a laterally-extending arm 50, preferably integral therewith, and having the counterweight 51, which may be adjustable thereon. When said rod 47 has been released by the arm 49 on the descent of the scale-beam
 65 weight W, said rod 47 will be caused by said weight 51 to resume or drop to its normal position, and hence the connected rod 46 will

be moved upward and its projection 46' out of engagement with the latch-pin 82' concurrently therewith.

The operation of a weighing-machine comprising the hereinbefore-described improvements is as follows: On reference to Fig. 1, which shows the normal positions occupied by the respective parts of the machine at the
 75 commencement of operation, the valve 70 is illustrated as being in its full open position and the closers locked in the shut position thereof by means of the latch 82, which engages the closer-connected rocker 550. The
 80 supply-stream is then caused to flow into the bucket partly by gravitation and the rotative action of the feeder F. When a certain proportion of the load has been received by the bucket, it will descend, the beam mechanism
 85 moving in unison therewith, the weight W, and hence the rod 47, being caused to move upward. During this operation the poising side of the scale-beam B is descending, and the projection 19" falling from under the con-
 90 necting-rod 558 permits the closing movement of the valve 70 by the counterweighted lever 504. At the commencement of the poising period the further closing movement of the
 95 valve 70 will be intercepted by the stop 570, which engages the depending rod 569 oscillatory with said valve. At this point the valve will be in the position illustrated by the dotted lines in Fig. 2, it having nearly un-
 100 coupled the clutch members 41 and 41', as also indicated by the dotted lines in said figure. The valve at this point having cut off the stream which gravitates from the chute or
 105 hopper H, the feeder F is operable for feeding the drip-stream into the bucket to complete its load. On the completion of the bucket-load it will have a further descending move-
 110 ment, the poising side of the scale-beam B descending therewith, the stop 570 thereon releasing the rod 569, so that the valve 70 may be instantly closed, the clutch members
 115 41 and 41' disengaged, and the rod 47 moved upward, whereby it may be imparted a blow by the arm 49 of the clutch member 41, this action swinging said rod, and hence the link
 48, to the right in Fig. 4, so that the thrust-rod 46 will be forced downward with its projection 46' into contact with the latch-pin 82', and the latch 82 thereby tripped.

Having thus described my invention, I
 120 claim—

1. The combination with a chute, of a stream-controlling valve; a feeder supported thereby; and feeder-actuating mechanism.

2. The combination with a chute, of a valve
 125 therefor having a concavity formed therein; a feeder supported by said valve and operable in said concavity; and feeder-actuating mechanism.

3. The combination with a chute, of an os-
 130 cillatory valve; a feeder supported by said valve; a power device; and a clutch operatively connected with said power device and feeder, whereby at a predetermined point in

the movement of said valve the clutch members will be uncoupled.

4. The combination with a valve, of a feeder supported by said valve; a power device; and an extensible feeder-operating shaft connecting said feeder and said power device.

5. The combination with a valve, of a feeder supported by said valve; a tubular member connected to the feeder; a power device; and a shaft connected to said power device and sliding in said tubular member.

6. The combination with a bucket and with a chute for supplying a stream of material thereto, of stream-controlling means consisting of a valve and a feeder supported by said valve; and a power device operatively connected with said feeder by a universal joint.

7. The combination with a feeder, of a power device; and an extensible member between said parts and attached to one of said parts by a universal connection.

8. The combination with a valve, of a feeder supported thereon; a power device; and an extensible connection between said feeder and power device.

9. The combination with a valve, of a feeder supported by said valve; a power device; an extensible shaft connected, respectively, with said power device and feeder and comprising two sections; and a clutch, each of the members of which is attached to one of said shaft-sections.

10. The combination with a valve, of a power device; a feeder supported by said valve; an extensible shaft connected, respectively, to said power device and feeder by a universal joint and comprising a tubular section, the other section sliding therein; and a clutch embodying two members, each of which is attached to one of said shaft-sections.

11. The combination with a chute, of an oscillatory valve therefor having a concavity; a feeder supported by the valve operable in said concavity; a pulley; a telescopic shaft comprising two sections connected, respectively, with said pulley and feeder by a universal connection; and a clutch embodying two members, each of which is attached to one of said shaft-sections.

12. The combination with a chute having an inclined bottom and a series of plates in parallelism therewith, of a valve for said chute; and valve-actuating mechanism.

13. The combination with a chute having an inclined bottom and a series of plates in parallelism thereto, and having also a front plate disposed at an angle to said series of plates; of a stream-controlling valve; and valve-actuating mechanism.

14. The combination with bucket mechanism comprising a shiftable bucket-discharge member normally held against movement; of feeder mechanism embodying a feeder operable for supplying a stream of material to the bucket; and means operated by said

feeder mechanism for releasing said shiftable bucket-discharge member.

15. The combination with a bucket having a closer, of a latch normally operative for holding the same against opening movement; feeder mechanism comprising a feeder operable for feeding a stream of material into said bucket; and latch-tripping means operated by said feeder mechanism.

16. The combination with a bucket mechanism comprising a shiftable bucket-discharge member, of a latch normally operative for holding said member against movement; a shaft having a device rotative therewith and provided with an arm; latch-tripping means; and a member operatively connected with said latch-tripping means and interposable into the path of movement of said arm.

17. The combination with bucket mechanism comprising a shiftable bucket-discharge member, of a latch normally operative for holding the same against movement; a latch-tripping device; a shaft comprising a projecting arm; and a movably-supported member operatively connected with said latch-tripping device and interposable into the path of movement of said projecting arm.

18. The combination with a scale-beam, of bucket mechanism supported thereby and embodying a shiftable bucket-discharge member normally held against movement; a device operable for releasing said shiftable member; a rod carried by the scale-beam and operatively connected with said device; and means for operating said rod.

19. The combination with a scale-beam, of bucket mechanism supported thereby and comprising a shiftable bucket-discharge member normally held against movement; a device for releasing said shiftable member; a rod operatively connected to the scale-beam; an angle-lever connecting said rod and releasing device; and means for operating said rod.

20. The combination with bucket mechanism comprising a shiftable bucket-discharge member, of a latch normally operative for holding the same against movement; a latch-tripping device; a counterweighted rod operatively connected with said latch-tripping device; and means for operating said rod.

21. The combination with a scale-beam, of bucket mechanism comprising a shiftable bucket-discharge member normally held against movement; means for releasing said shiftable bucket-discharge member; a rod connected to said scale-beam; a link in sliding engagement therewith and operatively connected to said releasing means; and means for operating said rod.

22. The combination with a scale-beam, of a bucket supported thereby having a closer; a latch normally operative for holding the same against opening movement; a thrust-rod having a projection for tripping said latch; a rod operatively connected with said scale-

beam; and operative connections between said last-mentioned rod and the thrust-rod.

23. The combination with a scale-beam, of a bucket supported thereby and having a closer; a latch normally operative for holding the same against opening movement; a thrust-rod having a projection for tripping said latch; a rod operatively connected to said scale-beam; an angle-lever connected to said thrust-rod; and a link connected, respectively, to said angle-lever and to the scale-beam connected rod.

24. The combination with a feeder, of a power device; connections between said members embodying a clutch, one of the members of which is provided with an arm; bucket mechanism comprising a shiftable bucket-discharge member normally held against movement; means for releasing the same; a rod operatively connected with said releasing means, and interposable into the path of movement of said arm.

25. The combination with a bucket having a discharge-outlet, or two overlapping closers therefor, one of which is provided with a rock-arm; a link connected to said rock-arm and to the other closer; a rod attached to said link; a rocker connected with the rod; and means for holding said rocker against movement.

26. The combination with a scale-beam, of a bucket therefor having an inclined bottom wall leading toward its discharge-outlet, a pair of overlapping closers for said outlet, one of which is provided with a rock-arm; a link connecting said rock-arm with the other closer; a rod connected to said link; a rocker connected with the rod; and means for holding said rocker against movement.

FRANCIS H. RICHARDS.

Witnesses:

FRED. J. DOLE,
HENRY BISSELL.