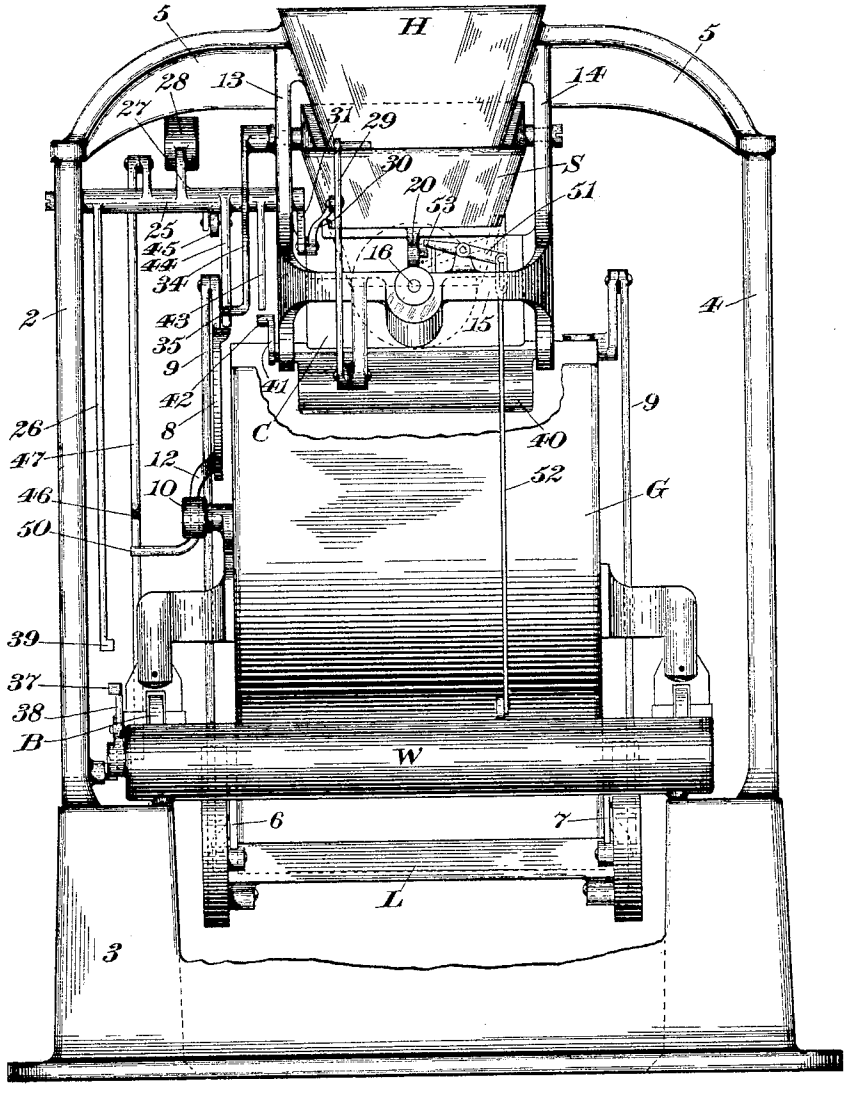
(No Model.) 4 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,304. Patented Oct. 27, 1896.

Fig. 1.



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

Inventor.
F. H. Richards.

(No Model.) 4 Sheets—Sheet 2.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,304. Patented Oct. 27, 1896.

Fig. 4.

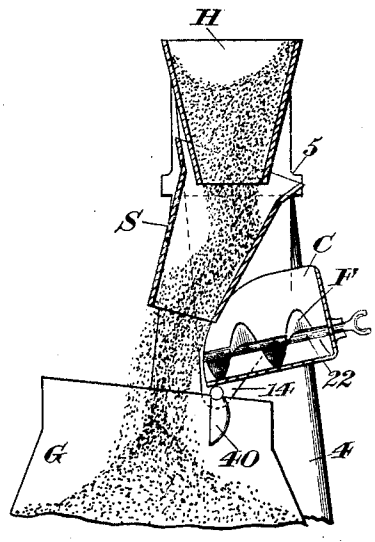
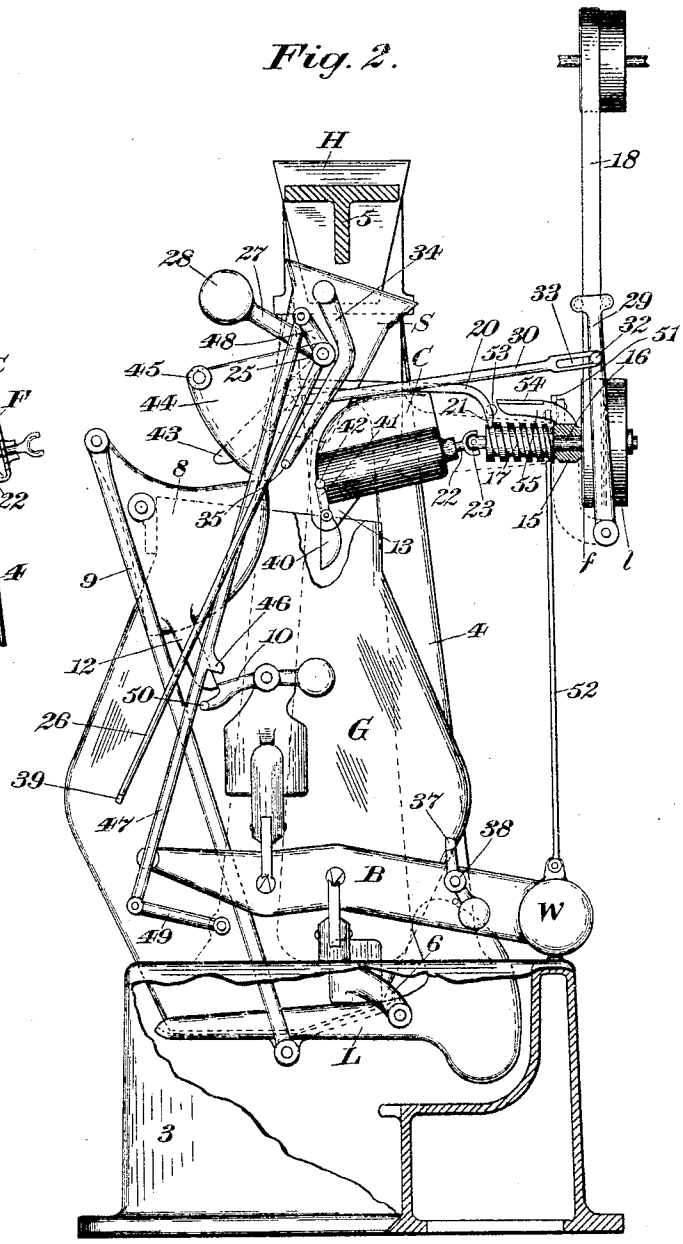


Fig. 2.



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

Inventor:
F. H. Richards.

(No Model.) 4 Sheets—Sheet 3.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,304. Patented Oct. 27, 1896.

Fig. 5.

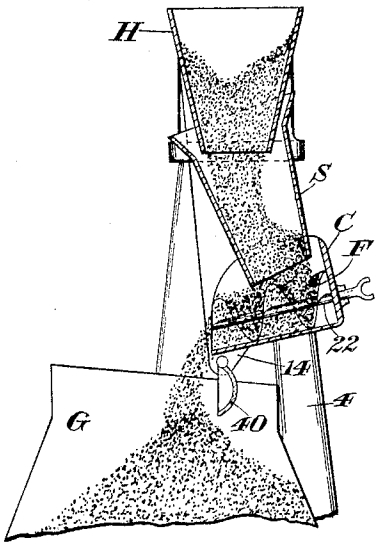
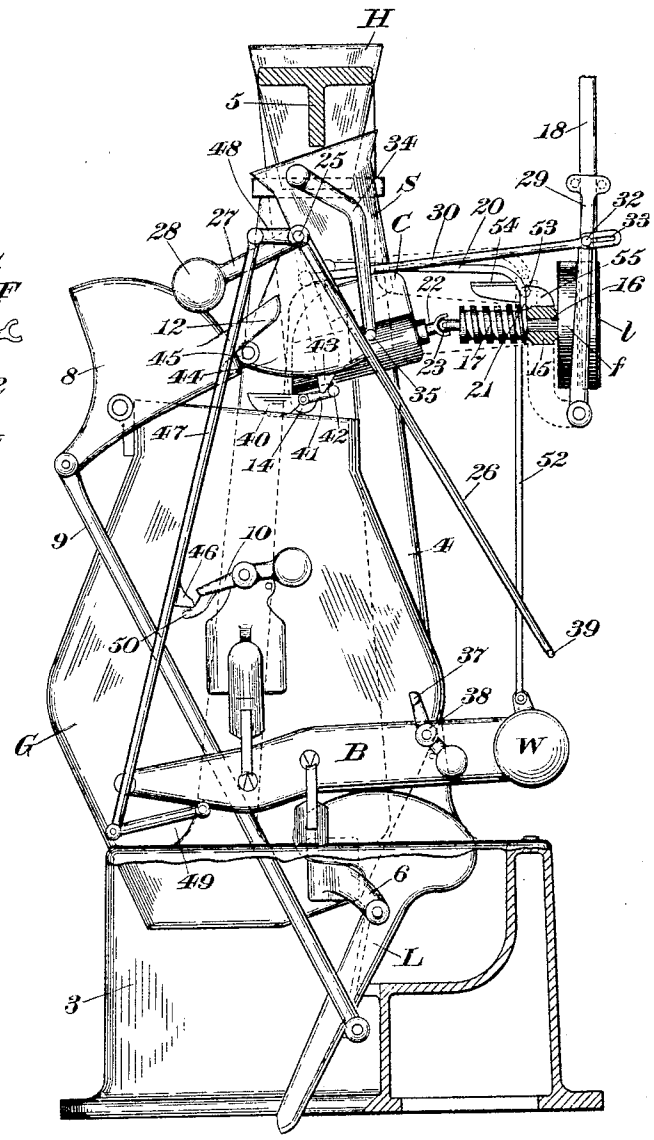


Fig. 3.



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

Inventor:
F. H. Richards.

(No Model.) 4 Sheets—Sheet 4.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 570,304. Patented Oct. 27, 1896.

Fig. 6.

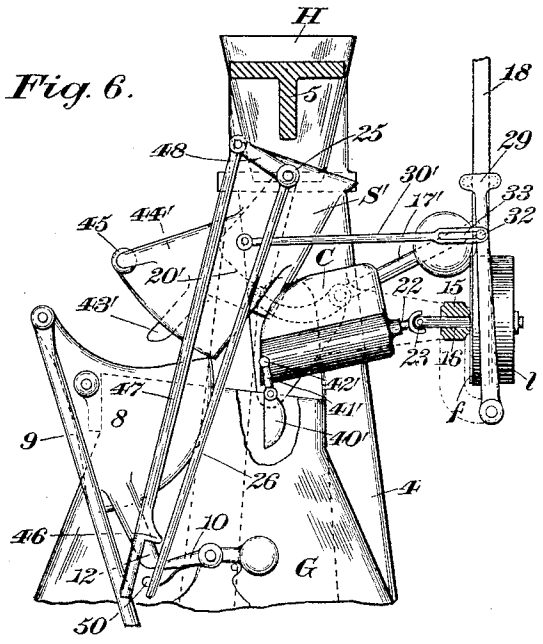
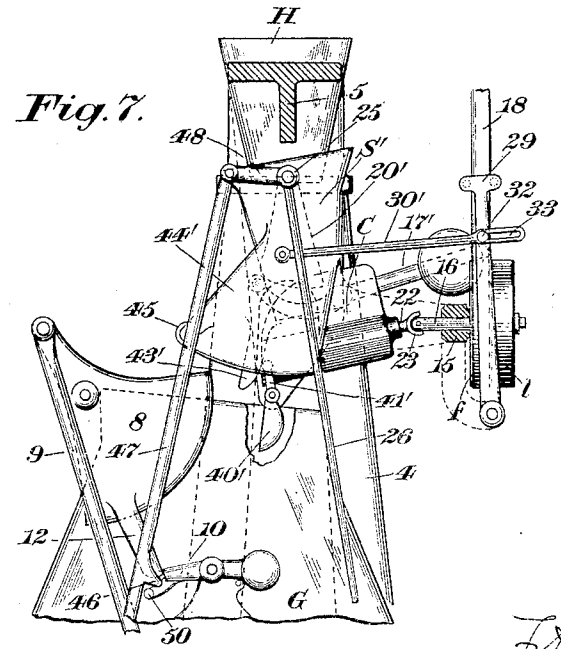


Fig. 7.



Witnesses:
F. L. Edwards Jr.
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. 570,304, dated October 27, 1896.

Application filed August 29, 1896. Serial No. 604,272. (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 object being to provide an improved machine of this class more especially adapted for maintaining an even and uniform supply of materials which are sluggish or slow-running in their nature to the load-receiver or bucket during the weighing or loading period, so that the work of the machine may be performed with rapidity and precision.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear elevation of a weighing-machine embodying my present improvements in the preferred form thereof. Fig. 2 is an end elevation as seen from the left in Fig. 1, the parts being in positions corresponding therewith. Fig. 3 is a view similar to Fig. 2, showing the closer of the load-receiver or bucket open to permit the discharge of the bucket load. Figs. 4 and 5 are detail views in central vertical section of the valve mechanism and the upper part of the bucket, showing the peculiar action of the valve mechanism at two stages in the operation of the machine. Figs. 6 and 7 are left-hand end elevations of the upper part of the machine and illustrate a modified form of the invention.

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

The framework for supporting the operative parts of the machine may be of any suitable structure, and in the form shown comprises the supporting-base 3, on which are mounted the end frames 2 and 4, the latter being connected at the top by the plate or beam 5, which carries the supply-chute or hopper H, of usual construction. The load-receiver or bucket is designated by G, and is of the so-called "single-chambered" type, it having the usual inlet and outlet openings for the supply and delivery, respectively, of material. The discharge-outlet of the bucket is controlled by a closer L, it being in the form of an obtuse angular plate adapted to bear tightly against the similarly-shaped lower edge of the bucket when in its normal position, as indicated in Fig. 3. The closer will be also pivotally supported between the hangers or brackets 6 and 7, located adjacent to and at one side of the discharge-outlet of the bucket, said closer being counterweighted, as is the custom, so that it may be returned to its normal position on the discharge of the load.

The bucket G is illustrated supporting for oscillatory movement the rocker 8, which is located near the upper forward side thereof, said rocker having pivoted thereto the relatively long rod 9, which is similarly connected to the closer L. The rocker 8 and connecting-rod 9 constitute a toggle, and the several pivots thereof will be so located as to be virtually in line, as indicated in Fig. 3, so that the rocker, and hence the closer L, may be held against oscillation during the weighing of a load.

For holding the closer against movement, the bucket G will be furnished with a pivotally-mounted counterweighted latch 10, which swings upward to engage the rocker-arm 12, said rocker and closer being shown in their locked positions in Fig. 3.

For supporting the bucket, I may employ the scale-beam B, which is fulcrumed on the supporting-base 3, and consists of two arms joined by the counterweight W, which latter, when the machine is at rest, is sustained by the base 3. The arms of the beam B will be provided with suitable bucket-supports, against which are adapted to work depending bearings connected to brackets on the bucket in the well-known manner.

My present invention contemplates the employment, in connection with suitable weighing mechanism embodying a load-receiver such as that previously described herein, of means for supplying a stream of material to said bucket, a stationary cut-off, and a swinging or oscillatory stream-controlling spout located and operable for delivering the supply-stream to the stationary cut-off, whereby blocking or clogging of the material at the stream-controlling point or points, which is a decided obstacle, will be wholly obviated and a regular movement of said spout will be assured.

The supply-chute, as hereinbefore stated, is designated by H, the stationary cut-off by C, and the interposed stream-controlling spout by S. The cut-off C is substantially trough-shaped, and its floor will preferably be slightly inclined, as clearly indicated in Figs. 4 and 5, so that a free feed of the supply-stream may be obtained. The end walls of the cut-off C will be suitably attached to the vertical members 13 and 14 of an auxiliary frame which depends from the main frame of the machine.

The swinging or oscillatory spout S, which is tubular or in form of a walled conduit, will be supported for movement beneath the mouth of the chute or hopper H and between the members 13 and 14 of the auxiliary frame, its axis of oscillation or center of movement being located at one side of a line passing through its true center, as indicated in Figs. 2 and 3, so that, as will be apparent, said spout is self-opening, and therefore the employment of means for effecting such result is dispensed with.

On reference to the sectional view, Fig. 4, the spout S is illustrated in its wide-open position, whereby a stream of material gravitating from the chute or hopper H will pass through said spout and be delivered thereby into the bucket. As the spout S is swung rearward, the volume of the down-flowing stream will be reduced by the floor of the stationary cut-off in correspondence with said spout movement, and when the spout has reached the end of its working stroke the main stream will be wholly cut off. The main stream, which is delivered in the bucket G by the swinging spout, will form the major part of a load, and on its cut-off the drip stream will be furnished to complete the partial load, and I prefer to provide such drip stream through the medium of a feeder or force-feed device, as will hereinafter appear, such feeder being particularly advantageous when the machine is weighing very sluggish materials.

For effecting the closure or rearward movement of the spout S, whereby the downflowing stream may be gradually delivered or diverted to the cut-off C, I prefer to employ mechanical means—that is, means operative with a suitable motor, said motor also being employed for driving the feeder which supplies the drip stream. The transverse member 15 of the auxiliary frame supports for rotative movement the relatively short shaft 16, which is furnished at its inner end with the worm 17, and carries at its outer end the fast and loose pulleys *f* and *l*, respectively, the peculiar purpose of which will be hereinafter specified.

A driving-belt is shown at 18, it being shiftable from the fast to the loose pulley automatically, and vice versa, so that the parts driven thereby may be properly thrown into or out of action, said belt being connected to the power-wheel of a suitable motor. (Not shown.)

The worm 17 constitutes a medium for effecting the rearward movement of the spout S, and for transmitting the same thereto an actuating-connector in the form of a bifurcated link is shown at 20, the opposite arms of said link being connected to the spout at suitable points. The free end of the link 20 is provided with a tooth or follower 21, which is gravitative into engagement with the thread of the worm 17, as indicated in Fig. 3. The spout S being shown in its wide-open position in such figure, it will be evident that on the rotation of the shaft 16, and hence the worm 17, the tooth 21 being in engagement with said worm, the spout S will be swung rearward in correspondence with the rotation of such shaft.

It will be understood that the action of the spout is controlled by means extraneous or independent of the weighing mechanism, such spout being intended to furnish the bulk or major part of the load or charge.

For supplying the drip stream, which is to furnish the residue or balance of the load, a feeder will be employed, the action of which will be controlled from the weighing mechanism, so that should the spout S accidentally be closed too quickly such feeder may be depended on for supplying sufficient material to complete the requisite amount. In other words, the feeder cannot be thrown out of action until the true load is completed.

The feeder is designated by F, and consists in the present instance of a screw-conveyer mounted on a short shaft 22, which is journaled in the rear wall of the stationary cut-off C, and is connected by a universal joint 23 with the driving-shaft 16. The feeder F is rotative in a concavity or channel formed in the floor of the stationary cut-off C.

It will be apparent that when the swinging spout S has shifted the down-flowing stream of material rearward and into the cut-off C, the feeder F is operable on its rotation and, as indicated in Fig. 5, for delivering a stream from the mass of material on the cut-off C to the bucket G.

The means for controlling the action of the feeder will now be described. A relatively short rock-shaft is shown at 25 supported for movement between the upright 2 of the main frame and the member 13 of the auxiliary frame, said shaft being furnished with the depending rigid rod 26, the arc of movement of which is intersected by a by-pass or similar stop mounted on the scale-beam B. The shaft 25 is also provided with an integral operating-arm 27, which is furnished with a weight 28 of proper efficiency.

A belt-shipping lever is shown at 29, it being pivotally supported by a bracket on the auxiliary frame, and having the usual belt-engaging fingers, between which the belt 18 is adapted to travel. The belt-shipper 29 will be operatively connected with the shaft 25. A link is shown at 30, one of its ends being pivoted to the rock-arm 31 on the shaft 25,

said link also being connected to the belt-shipping lever 29 by a sliding joint. The belt-shipping lever 29 is provided with the projecting pin or stud 32, which is embraced by the walls of the longitudinal slot 33, formed adjacent to the outer end of the link 30. The spout S has the crank-arm 34 rigidly secured to a projecting trunnion thereof, the depending stop 44, to which reference will be hereinafter made, normally bearing or abutting against the wrist 35 of said crank-arm, as indicated in Fig. 3, so that the too rapid movement of the depending rod 26, which is operated through the counterweight 28, will be properly limited. When, however, at the commencement of the poising period said depending rod is held against movement said spout S will have an independent movement and the rigid arm 34 will be carried away from the depending stop by the rotating worm 17 in the manner previously described herein.

At the commencement of the poising period—the spout S being in the position illustrated by the sectional view, Fig. 5—the projection 37 on the by-pass 38 will have engaged a corresponding projection 39 on the rod 26, so that the latter will be held, the left-hand wall of the longitudinal slot 33 being against the projecting stud 32 on the belt-shipping lever 29. The by-pass 38 is in the form of a pivotally-supported counterweighted lever mounted on the counterpoised side of the scale-beam B and held against movement when in its effective position by means of a suitable stop. It will be assumed that the projection 39 of the rod 26 has been engaged by the projection 37 on the by-pass, such engagement occurring at the commencement of the poising or drip-supply period. When the load is completed, the bucket will pass below the poising line, thereby causing the ascent of the counterpoised side of the scale-beam B and the elevation of the by-pass device 38, and consequently the raising of the projection 37 clear of the projection 39, so that the rod 26 will be freed and may be swung rapidly rearward through the agency of the counterweight 28, acting through the shaft 25, and the link 30, by reason of its connection with said shaft, being thrust rearward and moving the belt-shipper in a corresponding direction, the belt 18 will be shipped from the fast pulley *f* to the loose pulley *l*, so that the movement of the feeder F will be stopped.

On the completion of the load and stoppage of the feeder it is desirable to project a valve across the line of feed to catch any particles which may drop from the cut-off C or the feeder F, as such particles, which are in the form of a drizzle or spray, do not constitute a part of the load.

A drizzle-catching valve is shown at 40, it being of concaved shape and furnished with projecting trunnions or pintles, which are supported by the members 13 and 14 of the auxiliary frame, said drizzle-catching valve 40 being also located below the discharge ends of the cut-off C and the feeder F and being also normally vertically disposed to permit the unimpeded supply of material to the bucket. One of the pintles of the valve is extended beyond its support and is furnished with a crank-arm 41, the pin 42 of which is disposed in the path of movement of the rigid arm 43, which depends from the feeder-controlling shaft 25.

It will be understood that when the rod 26 is engaged in the manner previously described the shaft 25 and rigid arm 43 will be also held, said arm at this point in the operation being quite near the pin 42. When these parts are released, the arm 43 will be caused to impinge against the pin 42 and will swing the valve 40 rapidly upward, as indicated in Fig. 3, for catching the drizzle or spray.

Reciprocally effective stops are herein illustrated, they being operative, respectively, with the feeder F and with the closer L, the feeder-operative stop being designated by 44 and shown herein as a segmental blade, the co-acting member being the rocker 8. At the commencement of operation the rocker 8 will be substantially contiguous to the curved face of the stop 44, so that should the closer-latch 10 have been accidentally tripped the rocking movement of said rocker or stop 8 will be positively blocked by its mate, the closer L thereby being held. When, however, the member 44 has intersected the plane of the curved face of the rocker or stop 8, the latter will oscillate, and in so doing its curved face will travel along the roll 45 of the stop 44, as indicated in Fig. 3, so that retractive movement of the member 44 will be prevented, it being evident that the belt-shipping lever will be held in the position in which it is illustrated in Fig. 3, the belt 18 being on the loose pulley *l*, so that the feeder F will be held out of action or at rest. When, however, the closer L has reached its normal position, the rocker or stop 8 will release the stop 44, so that the belt 18 may be shipped from the loose pulley *l* to the fast pulley *f* to again start the feeder F.

For tripping the closer-latch 10, I have shown a latch-tripper in the form of a projection 46 on the reciprocating rod 47, the latter being connected to the rock-arm 48 on the shaft 25, and also, by means of the guide-link 49, to the framing of the machine. On the release of the depending rod 26 by the by-pass 38 the thrust-rod 47 will also be released, so that the latch tripper or projection 46 thereon will be caused to impinge against the pin 50 on the latch 10, thereby depressing said latch, as indicated in Fig. 3, and disengaging it from the rocker-arm 12, so that the closer L will be freed of restraint and may be forced open by the weight of the completed load within the bucket.

When the spout S has reached the limit of its rearward stroke, it will be held against return movement by the thread of the worm 17, which engages the tooth or follower 21 of the spout-actuating connector 20. For elevating the tooth 21 above the plane of the worm 17,

I may employ means operative with the beam mechanism, which will now be described. A relatively short lever is shown at 51, Fig. 1, it being fulcrumed on the transverse portion 15 of the auxiliary frame, a rod 52, which is pivoted to an ear or lug on the weight W of the beam B, being connected to said lever by a slide-joint, so that said weight and rod may have a limited amount of vertical or lost motion on the reciprocations thereof without affecting the position of the lever 51. The connector 20 is furnished with the stud or pin 53. At a point just preceding the time when the spout S has reached the end of its inward stroke the free end of the lever will be thrust under the pin 53. When a certain quantity of the load is discharged from the bucket, the weight W will drop rapidly, thereby imparting an accelerated downward thrust to the rod 52, and the free end of the lever 51, being under the pin 53 and in engagement therewith, the actuating-connector will be raised and the pin raised and deposited on the flat or guide face 54 of the bracket 55, so that the spout S may swing open. As the spout S opens, the rigid arm 34 thereof being in contact with the stop 44, the latter will be returned to its normal position, as well as the other parts connected to the rock-shaft 25, including the belt-shipping lever 29, which is joined to the shaft, so that the belt 18 may be slipped from the loose pulley *l* to the fast pulley *f*, to thereby rotate the worm 17 and to start the feeder on the succeeding operation of the machine.

The operation of the hereinbefore-described weighing-machine is as follows: Fig. 2 represents the positions assumed by the respective parts at the commencement of operation, the closer L being maintained in its shut position by the latch 10, which is in contact with the rocker-arm 12, the spout S being wide open, so that a stream of material flowing from the chute or hopper H will be delivered by said spout into the empty bucket. The tooth 21 of the valve-actuating connector will also be in engagement with the worm 17, so that the belt 18, being on the fast pulley *f*, the shaft 16, and hence the worm 17, will be rotated, whereby the spout S will be swung rearward and the volume of the supply stream which gravitates into the bucket will be reduced. The rod 26 will be also swung rearward simultaneously with the spout S until it meets the by-pass 38 on the scale-beam B, said rod being thereby held, though the spout will have a further closing movement, or to the position illustrated in Figs. 3 and 5. The major part of the load having been completed, the bucket G and the poising side of the scale-beam B having descended, the feeder F, which is rotating, will be operable for delivering the drip stream to the bucket and until the load is completed, at which time the bucket will descend below the poising line. On such movement of the bucket the projection 37 on the by-pass 38 will be thrust against the co-operative projection 39 on the rod 26, so that the latter will be released and may be swung farther rearward by the counterweight 28, the shaft 25 being also rocked, and the belt-shipper 29, by reason of its connection with said shaft, oscillated, so that it may slip the belt 18 from the fast pulley *f* to the loose pulley *l* to instantly stop the feeder F. Near the close of this last-described movement the rigid arm 43 on the rock-shaft 25 will impinge against the pin 42 on the crank-arm 41 of the drizzle-catching valve 40 and will force the latter upward, and simultaneously the rod 47 will be thrust downward until the projection 46 thereof engages the latch-pin 50, so that the latch 10 will be depressed and the closer L thereby released.

In Figs. 6 and 7, I have illustrated a slightly-modified form of the invention, which is substantially similar in operation to the preferred embodiment thereof. In such modification the stop member 44′ is cast integral with the spout S′, the latter being provided with the rigid depending arm 43′ for actuating the drizzle-catching valve 40′. For closing the spout S′ or swinging it rearward, I have illustrated mechanism substantially similar to that disclosed in Letters Patent No. 548,843, granted to me October 29, 1895, to which reference may be had, such mechanism including a counterweighted lever 17′ and a coöperative cam 20′, which depends from the supporting-shaft on the spout S′. The connecting-link 30′ in the modification is connected directly to the spout S′.

Having described my invention, I claim—

1. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a cut-off; a swinging stream-controlling spout adapted to deliver the supply-stream to the cut-off; a feeder located between said spout and cut-off; and driving mechanism for said feeder.

2. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a cut-off, the floor of which is concaved; a swinging stream-controlling spout adapted to deliver the supply stream to the cut-off; a feeder mounted in the concavity of said cut-off; and driving mechanism for said feeder.

3. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a cut-off; a spout adapted to deliver the supply stream to said cut-off; a feeder located between said cut-off and spout; driving mechanism for said feeder; and means operated by said driving mechanism for actuating said spout.

4. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a cut-off; a swinging stream-controlling spout; a worm; means for rotating said worm; and a device connected to said spout and having a tooth adapted to engage said worm to thereby actuate said spout.

5. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a cut-off; a swinging stream-controlling spout; a worm; means for rotating said worm; a device connected to said spout, having a tooth adapted to engage said worm; and means for disengaging said tooth from the worm.

6. The combination with a scale-beam and with a bucket supported thereby, of means for supplying a stream of material to said bucket; a cut-off; a swinging stream-controlling spout; a worm; means for rotating said worm; a spout-actuating device having a tooth adapted to engage said worm; and means operative with the scale-beam for disengaging said tooth from the worm.

7. The combination with a scale-beam and with a bucket supported thereby, of means for supplying a stream of material to said bucket; a cut-off; a swinging stream-controlling spout; a worm; means for rotating said worm; a link connected to said spout and having a tooth adapted to engage said worm; and a lever connected to the scale-beam and adapted to engage a projection on said link, to thereby elevate the tooth thereof above the plane of the worm.

8. The combination with a scale-beam and with a bucket supported thereby, of means for supplying a stream of material to said bucket; a cut-off; a swinging stream-controlling spout; a worm; means for rotating said worm; a link connected to said spout and having a tooth adapted to engage said worm; a lever connected to the scale-beam and adapted to engage a projection on said link, to thereby elevate the tooth thereof above the plane of the worm; and a guideway on which said projection is deposited.

9. The combination with a scale-beam and with a bucket supported thereby, of means for supplying a stream of material thereto; a cut-off; a swinging stream-controlling spout; a worm; means for rotating said worm; a link connected to said spout and having a tooth adapted to engage said worm; and a lever connected to the scale-beam by a rod and adapted to engage under a projection on said link, to thereby elevate the tooth thereof above the plane of the worm.

10. The combination with a scale-beam and with a bucket supported thereby, of means for supplying a stream of material to said bucket; a swinging stream-controlling spout; a cut-off; a worm; means for rotating said worm; a bifurcated link connected to said spout and having a tooth adapted to engage the worm; a fixed bracket having a guideway; and a lever operatively connected to the scale-beam and adapted to engage under a projection on said link, to thereby elevate the tooth thereof above the plane of the worm and to deposit said projection on the guideway.

11. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a swinging stream-controlling spout; a cut-off; a feeder located between the spout and cut-off; driving mechanism for the feeder, including a worm; and a device connected to said spout and having a tooth adapted to engage said worm.

12. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a swinging stream-controlling spout; a cut-off; a feeder located between said cut-off and spout; driving mechanism for said feeder, including a worm and also having fast and loose pulleys; a belt shiftable from one of said pulleys to the other; a device connected to said spout and having a tooth adapted to engage said worm; and automatically-operated belt-shipping means.

13. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a stationary cut-off; a swinging stream-controlling spout adapted to deliver the supply stream to the stationary cut-off; and a drizzle-catching valve and its actuating means.

14. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a stationary cut-off; a swinging stream-controlling spout adapted to deliver the supply stream to the stationary cut-off; and a drizzle-catching valve operated by said spout.

15. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a stationary cut-off; a swinging stream-controlling spout adapted to deliver the supply stream to the stationary cut-off and having a rigid arm; and a drizzle-catching valve provided with a crank-arm, the pin of which is adapted to be engaged by the rigid arm of said spout.

16. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a cut-off; a swinging stream-controlling spout; a feeder located between said spout and cut-off; driving mechanism for said feeder; a shaft having a depending rod, said shaft being limited in its movement by means operative with the spout; means for actuating said shaft; a stop adapted to engage said depending rod and also to release the same; and feeder-throw-out means controlled by said shaft.

17. The combination with weighing mechanism embodying a bucket, of means for supplying a stream of material thereto; a cut-off; a swinging stream-controlling spout; a feeder located between said spout and cut-off; driving mechanism for said feeder; a counterweighted shaft supported for movement independently of said spout and provided with a depending rod, said shaft being limited in its movement by means operative with the spout; holding and releasing means for said shaft; and feeder-throw-out means controlled by said shaft.

18. The combination with weighing mech-

anism embodying a bucket, of means for supplying a stream of material thereto; a cut-off; a swinging stream-controlling spout; a feeder located between said spout and cut-off; driving mechanism for said feeder, including fast and loose pulleys; a belt shiftable from one of said pulleys to the other; a shaft supported for movement independently of said spout and limited in its movement thereby; actuating means for said shaft; instrumentalities for holding and releasing said shaft successively at predetermined points; and belt-shipping means controlled by said shaft.

19. The combination with a scale-beam and with a bucket supported thereby, of means for supplying a stream of material to said bucket; a cut-off; a swinging stream-controlling spout; a feeder located between said spout and cut-off; driving mechanism for said feeder; a shaft supported for movement independently of said spout, said shaft also having a depending rod provided with a projection; a scale-beam having a by-pass stop provided with a coöperating projection adapted to engage the other and also release the same; means for actuating said shaft; and feeder-throw-out means controlled by said shaft.

20. The combination with a bucket having a closer and with instrumentalities for normally holding the same against movement, of a scale-beam for supporting said bucket; a cut-off; a swinging stream-controlling spout; a feeder; a shaft supported for movement independently of said spout, said shaft having a stop thereon and also having a depending rod; means for engaging and for also releasing said rod; feeder-throw-out means controlled by said shaft; and a stop operative with the closer and coacting with said first-mentioned stop.

21. The combination with a bucket having a closer and instrumentalities, including a latch, for normally holding said closer against movement; of a scale-beam for supporting said bucket; a cut-off; a swinging stream-controlling spout; a feeder; a shaft supported for movement independently of said spout and having a latch-tripper; holding and releasing means for said shaft; and feeder-throw-out means controlled by said shaft.

FRANCIS H. RICHARDS.

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