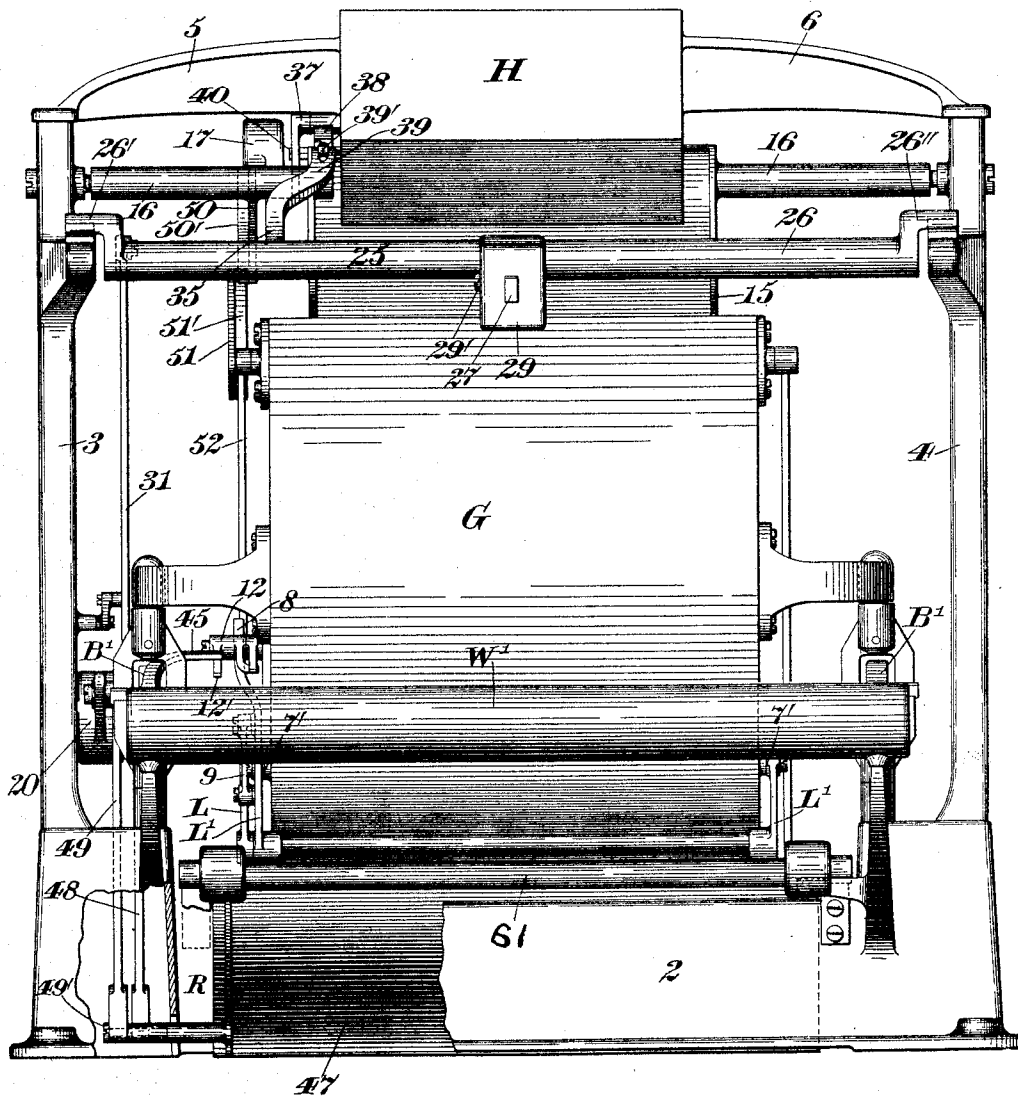


F. H. RICHARDS.  
WEIGHING MACHINE.

No. 585,972.

Patented July 6, 1897.

*Fig. 1.*



Witnesses:

Chas. D. King.  
Fred. J. Dole.

Inventor:

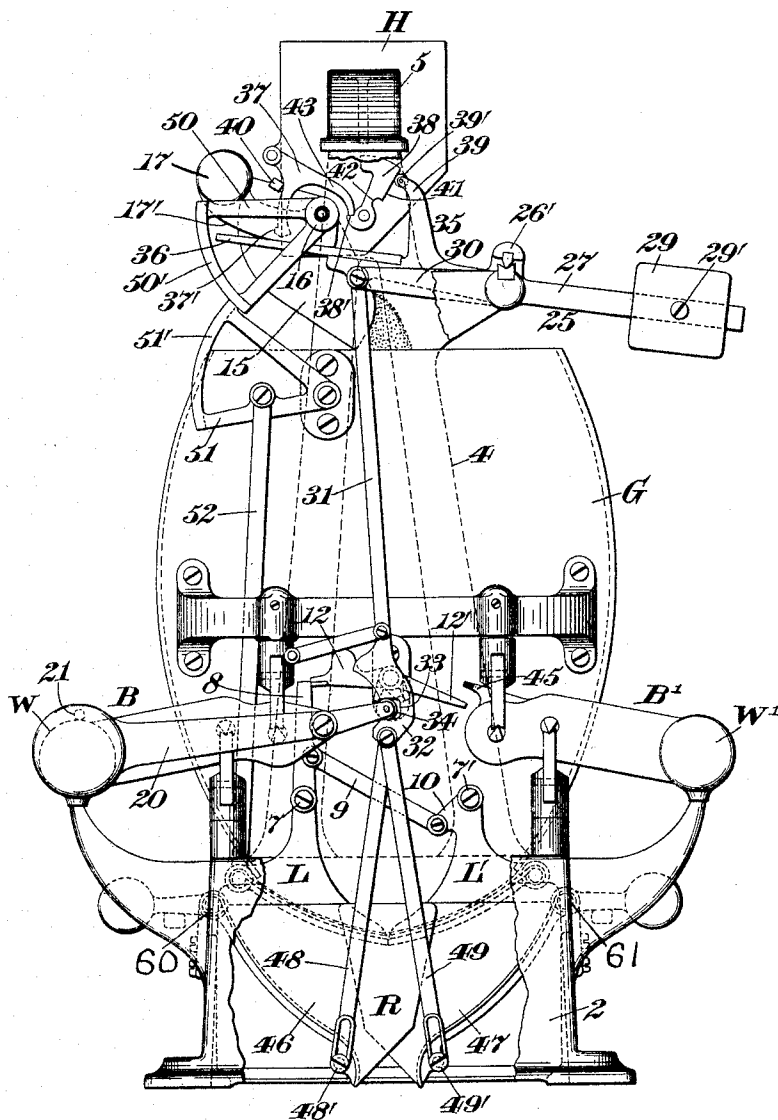
F. H. Richards.

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*Fig. 2.*



*Witnesses:*

*Chas. O. King.*  
*Fred. J. Dole.*

*Inventor:*

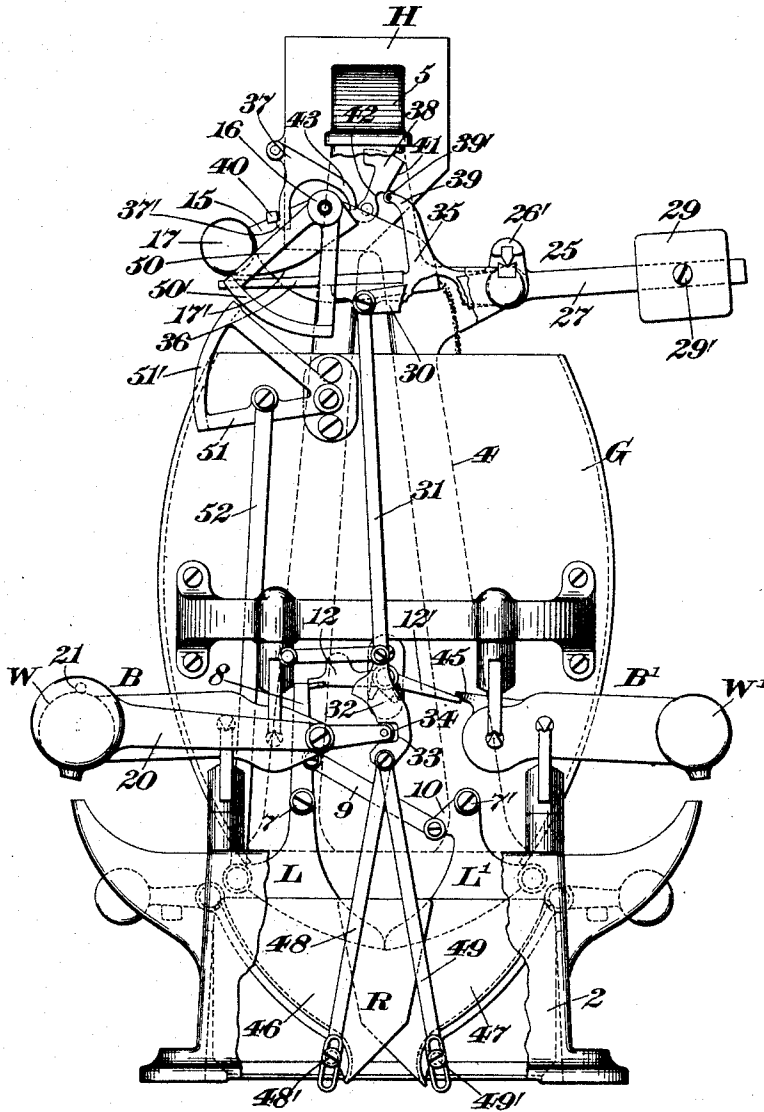
*F. H. Richards.*

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*Fig. 3.*



*Witnesses:*  
*Chas. D. King.*  
*Fred. J. Dole.*

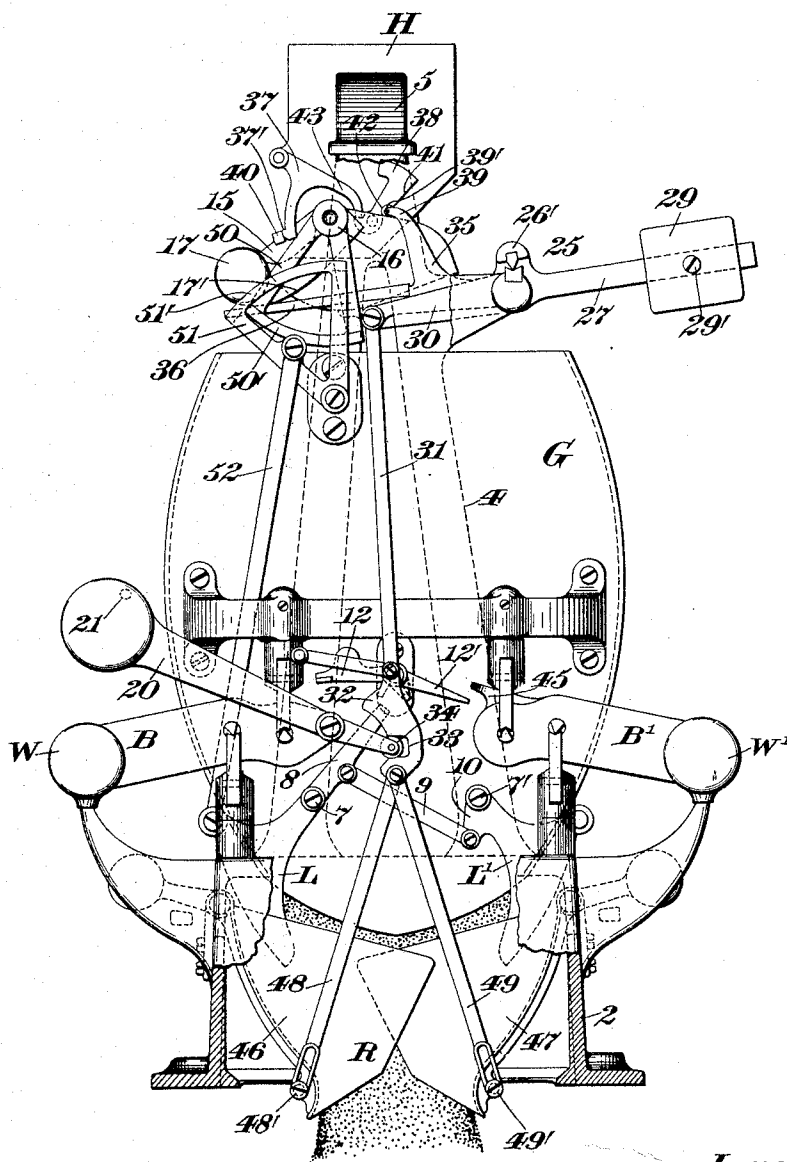
*Inventor:*  
*F. H. Richards.*

F. H. RICHARDS.  
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*Fig. 4.*



Witnesses:  
Chas. R. 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. 585,972, dated July 6, 1897.

Application filed November 25, 1896. Serial No. 613,403. (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 and efficient machine of this character for automatically weighing with facility and precision various sorts of materials.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine embodying my present improvements, and it illustrates the positions taken by the respective working parts at the commencement of operation. Fig. 2 is an end elevation of the machine as seen from the left in Fig. 1, the parts being shown in positions corresponding with said figure. Figs. 3 and 4 are views similar to Fig. 2, the operative parts being represented in the positions they occupy at the commencement of the drip or poising period and during the load-discharging period, respectively.

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

The framework for sustaining the various sets of mechanisms may be of any suitable or preferred character, and in the form illustrated it comprises the chambered base or bed 2, the end frames or columns 3 and 4, rising therefrom, and the brackets 5 and 6, which extend oppositely from the supply hopper or chute H, the several parts being joined to each other in some convenient manner.

The weighing mechanism, which is similar in operation to that set forth by Letters Patent No. 548,840, granted to me October 29, 1895, to which reference may be had, includes a suitable load-receiver and beam mechanism therefor.

The load-receiver in the present instance consists of a reciprocatory single-chambered bucket supported for ascending and descending movements by a series of counterweighted scale-beams, said load-receiver being designated by G.

The bucket-supporting scale-beams may be two in number, as shown, they being mounted

upon the base 2 and carrying at their poising sides the bucket G, such features of construction being substantially the same as those represented by my aforesaid Letters Patent.

The counterweighted bucket-supporting scale-beams are designated by B and B', respectively, and each consists of a pair of parallel arms joined at the outer ends by a combined counterweight and connecting-shaft, said shafts being designated by W and W'.

The bucket G will have the usual discharge outlet or orifice, which is of relatively large area, and the egress of material from which is governed by a pair of coöperating operatively-connected closers, which are designated by L and L', respectively, said closers consisting of slightly-curved plates, which fit against the similarly-shaped lower edge of the bucket when shut, means, as a latch, being provided to hold said closers in their shut positions.

The two closers L and L' are pivotally connected to the bucket G, as at 7 and 7', and at points relatively remote from the lower edge of the bucket, so that in opening they can swing through a relatively wide arc to uncover the discharge-outlet of the bucket. The two closers will have, preferably below their axes of movement, a preponderance of weight to return them to their shut positions on the discharge of the bucket-load, the two discharge edges of the same abutting against each other, as indicated in Fig. 3, when in their normal positions, to provide a tight joint.

The closer L has the integral or rigid arm 8 extending above its pivot, to which is attached the link 9, said link being similarly jointed to the lug 10, whereby a movement in unison of the two closers is obtained as they reciprocate during the operation of the machine.

To maintain the respective closers shut, I mount upon the bucket the latch 12, which is located to engage the coöperating upright arm 8 of the closer L when the two are shut, as shown in Figs. 2 and 3, said latch being preferably counterweighted to throw it into its effective position and moving downward to engage the coöperating rigid arm 8 of the closer L.

It will be evident that on the elevation of the latch 12 above the plane of oscillation of

the closer-arm 8 the two closers L and L' will be freed of all restraint, this result being automatically attained at the close of the loading period, so that the mass within the bucket 5 may force the closers open and apart, as illustrated in Fig. 4, to discharge the load.

The latch 12 will be preferably limited in its action by properly-positioned stop-pins.

The hopper H is adapted to contain the mass 10 of material to be weighed, which is supplied thereto in some well-known manner and which it delivers in the form of a stream to the bucket G, which is located therebelow, the passage of material to the bucket being controlled or 15 governed by a suitable stream-controller, such as the tipping or oscillatory valve 15, which has a swinging movement across and beneath the outlet of the hopper H to permit or arrest the supply to the bucket.

The valve 15 is of "pan" shape, is pivotally 20 hung between the end columns 3 and 4, and is carried by the two-part shaft 16, which has bearings in its opposite ends for receiving pivot-screws on said columns. The action of 25 the valve will be controlled by the weighing mechanism, and for closing said valve I furnish the two-part shaft 16 with a rearwardly-extending counterweighted arm 17, which exerts a constant valve-closing force, such effect, however, being preferably limited or re- 30 tardated by the beam mechanism, as will hereinafter appear.

The beam B, which is in the nature of a main beam, shiftably carries the auxiliary 35 counterweighted beam 20, which also constitutes a stream-controller-actuating device, the point of connection between these two parts being a pivotal one and adjacent to the poising side of the beam B.

The weight of the auxiliary beam 20 is normally added to the counterpoised side of the 40 scale-beam B, as shown in Figs. 2 and 3, the pin 21, which extends from the beam 20 and is shown by dotted lines in the several end elevations, normally resting upon the beam 45 B at the counterpoised side thereof, whereby the weight of the auxiliary beam 20 is added to or augments the weight of the main beam B and acts as an additional counterpoise for 50 the bucket.

At a predetermined point in the operation of the apparatus, or at a time subsequent to the unloading of the bucket, means will be 55 called into requisition for shifting the auxiliary beam 20 about its axis, whereby its force is practically added or transferred to the bucket, so that said auxiliary beam, when in its shifted position, will tend to impede or 60 check the return movement of the emptying-bucket.

When the auxiliary beam is released and returns to its primary position, as will hereinafter appear, it constitutes a convenient 65 factor for transferring to the stream controller or valve 15 the necessary power to force the same open, to again permit the supply-stream to enter the bucket.

I have represented at 25 a second auxiliary or supplemental scale-beam, it being pivotally mounted upon the framework of the machine and having a longitudinal shaft 26, 70 which is furnished with offsets 26' and 26'', which carry knife-edge pivots sustained by cooperating notched bearings on brackets of the two frames 3 and 4, said shaft having a 75 rearwardly-extending rigid weight-carrying arm 27, which may in practice be provided with suitable graduations and which carries a reciprocating sliding load-weight, which can 80 move along the arm 27 to permit the machine to weigh charges of different quantities, the set-screw 29', which binds against the beam-arm 27, being provided to hold the sliding weight 29 in an adjusted position.

The beam 27, which is operatively connected 85 for synchronous action with the auxiliary beam 20 and consequently with the main beams B and B', respectively, has a forwardly-extending arm 30, fixed to its shaft 26, to the end of which is pivoted the connecting-thrust or force-transmitting rod 31, 90 the lower end of said rod being enlarged, as at 32, such enlarged portion having a guide notch or aperture 33, which receives the projection or roll 34 on the auxiliary beam 20. 95

The shaft 26 of the auxiliary beam 27 has fixed thereto the Y-shaped member 35, to 100 one branch of which is attached the valve-limiting arm 36, upon which rests the curved under face 17' of the valve-closing actuator 17, so that, these parts being in contact, the closure of the valve 15, as the beam mechanism and bucket descend during the loading 105 period, cannot be effected too quickly, as in such case an underloading of the bucket would result.

At a predetermined point in the operation of the machine, or when the major part of the load has been delivered to the bucket, the advancing movement or closure of the 110 valve will be temporarily intercepted to permit the drip-stream from the chute II to pass over the discharge edge of the valve, as indicated in Fig. 3, and into the bucket to complete the load, the beam mechanism, when 115 the valve is thus held, continuing its descent, and the fixed arm 36 of the beam 27 will of course fall away from the valve-closing actuator 17, and when the valve is released on the completion of a load it may be quickly 120 closed by the dropping of the actuator 17.

The valve-intercepting instrumentalities in the present instance include the two stops or dogs 37 and 38, which are independently 125 carried by the chute II for oscillatory movement, and the stop or abutment arm 39 on the auxiliary beam 25, said part 39 forming one branch of the Y-shaped member 35, to which I have previously referred, and its working end being furnished with an anti- 130 friction-roll 39', which serves its usual purpose.

One of the legs of the dog 37 has a slight lug or boss 37', against which the projecting

stud 40 on the valve 15 is adapted to abut at the commencement of the poising period, so that, the dog 37 being held, the valve will be maintained in its drip or partially-closed position to allow the reduced stream from the hopper II to pass into the bucket.

The dog 38 is furnished at its lower end with a shoulder or projection, and it also has a stop-face 41, which merges or runs into a notch 42, and the objects of which will now be set forth.

At the commencement of operation the roll 39' will be in contact with the upper end of the stop-face 41, as represented by Fig. 2, and as the bucket and beam mechanism descend said roll will be caused to travel along said face.

At the commencement of the poising period the roll 39' will have nearly reached the lower end of the stop-face 41, as indicated in Fig. 3, and will be at a point nearly opposite the coating notch 42, the stud 40 of the valve 15 being in abutment with the leg 37' on the dog 37, while the leg 43 of said dog will be in contact with the shoulder 38' of the dog 38, whereby the further closure of the valve will be prevented by the stop-arm 39, acting through the intermediate dogs 37 and 38, said stop-arm blocking the action of the dog 38 while the latter is situated to hold its mate, which intercepts the valve.

When the load is completed by the drip-stream, the several beams will further settle, so that the roll 39' will be advanced to a position opposite the notch 42, such action releasing the two dogs 37 and 38 and the valve 15, so that the latter can be quickly closed by the dropping of the counterweighted arm 17, to thereby cut off the drip-stream.

It will be remembered that the closer-holding means include a latch 12, and that this is swung upward to release the closers. For tripping the latch to accomplish this end one of the members of the beam B' will be furnished with a bent arm 45, which has a movement into engagement with the tailpiece 12' of the latch, thereby lifting the opposite portion thereof or latch proper to disengage it from the arm 8 of the closer L, which also releases the companion closer L', whereby the two may be forced open simultaneously, as shown in Fig. 4, to permit the weighted charge to gravitate from the bucket G.

I provide, in conjunction with the bucket G, a regulator which is designated by R, and which consists of two sections or leaves 46 and 47, which are pivotally suspended within the base 2 of the machine, as at 60 and 61, respectively, and such members are provided also with counterweights of suitable efficiency to return them to their normal positions in Fig. 2, wherein the walls of the section 46 are shown overlapping the walls of the other. The regulator R is operatively connected to the reciprocatory rod 31, whereby, when it is depressed by the discharge of a load thereinto from the bucket the auxiliary beam 20,

by reason of its connection with said rod, may be shifted about its axis and held in such position for a limited period of time to thereby prevent the opening of the valve 15, although the main beams B and B' can return with the bucket to their initial positions as a bucket-load is discharging.

A pair of links are shown at 48 and 49, pivoted, respectively, at opposite sides of the rod 31, the opposite ends of said links being furnished with loops which embrace cooperating headed studs or screws 48' and 49' on the two regulator-sections to permit the beam mechanism to have a limited amount of descending motion without affecting the regulator R.

When the latch 12 is tripped in the manner specified and the closers L and L' are opened, the load from the bucket will enter the regulator R and its weight will be sufficient to depress the same, and the latter, acting through the rod 31, will swing the auxiliary beams 20 and 25 about their centers, as shown in Fig. 4, although the two main beams B and B' can return to their normal positions, as the connection between the beam B and the beam 20 is a pivotal one. As the regulator R is thus depressed the two sections 46 and 47 will be spread or forced apart by the mass to permit the material to run therefrom, and while the mass is within said regulator it will act against the two closers with sufficient pressure to prevent their immediate shutting, whereby the complete load may be emptied from the bucket. At about this time there will be sufficient material within the regulator to hold the beam 20 in its shifted position, and when the weight of the latter overbalances the former by the gradual emptying of the regulator it will promptly drop to its normal position, and in so doing will raise the rod 31, and consequently the fixed arm 36 on the auxiliary beam 25, so that said arm 36 by acting against the member 17 may open the valve 15 to again permit the supply to enter the empty bucket.

One of the parts of the two-part valve-shaft 16 is furnished with a flanged stop 50 of skeleton segmental shape, while the bucket G pivotally carries a coating member 51, the effective periods of these two stops alternating or reciprocating, the stop 51 being connected to the closer L by the interposed relatively long rod 52. The action of these coating stops will be clear from an inspection of Figs. 2, 3, and 4.

At the commencement of operation the flange 51' of the stop 51 will be contiguous to the oppositely-disposed flange 50' of the stop 50, so that should the latch 12 be tripped too soon the member 51 can oscillate but a very short distance, or until the flange 51' reaches the cooperating flange 50', the two closers L and L' being consequently restrained. When, however, the valve 15 has reached its cut-off position, the stop 50, which is operative therewith, will have been moved bodily across the

plane of the inside curved face of the flange 51', so that when the latch 12 is tripped the stop member 51 can oscillate about its center, and in so doing its flange 51' will ride along the flange 50' to hold the stop member 50, and consequently the valve 15, against retraction, which action continues until the shutting of the two closers, when this operation is reversed.

10 The operation of the hereinbefore-described machine, briefly, is as follows: Fig. 2 represents the positions occupied by the respective parts at the commencement of operation, the bucket G being empty and the operatively-  
15 connected closers L and L' being shut and held by the latch 12, which engages the rigid arm 8 of the closer L, so that, the valve 15 being in its wide-open position, the full volume of the supply may descend from the  
20 chute II and pass into the bucket. When a certain part of the load has been received, the beam mechanism and the bucket G will descend, so that the rigid arm 36 on the beam 25, by falling away from the valve-closing actuator 17, will permit the latter to close the valve 15. When the valve has nearly reached its closed position, its further progress will be momentarily intercepted in the manner  
30 clearly set forth, and as represented in Fig. 3, to permit a reduced stream from the chute II to pass into the bucket, and when the load is finished by this reduced stream the main beams B and B' will be caused to pass below the poising-line, so that the latch-tripper 45  
35 will impinge against the tailpiece 12' of the latch and will lift the latter and disengage it from the closer-arm 8 and hence release the two closers L and L', at which time they will be promptly forced open by the weight of the  
40 bucket contents, which pass into the regulator R. The mass in the regulator, by acting against the two closers L and L', will tend to check their return movement to allow ample time for the complete emptying of the  
45 bucket. When the material passes below the discharge edges of the two closers L and L', they will resume their normal positions, subsequent to which the remaining parts of the machine will be caused to return to their initial positions.

50 Having described my invention, I claim—

1. The combination, with beam mechanism and with a load-receiver supported thereby, of a supply-hopper; valve-opening mechanism including an auxiliary beam pivotally  
55 mounted on the beam mechanism for shifting movement relatively to said beam mechanism; and a regulator-hopper situated below the load-receiver and operable to shift and to hold said auxiliary beam in its shifted position and to also release the same.

2. The combination, with weighing mechanism comprehending a load-receiver and with a stream-controller, of stream-controller-  
65 actuating means including a member shiftably connected to the weighing mechanism; and a regulator consisting of two oscillatory

sections, said regulator being operable to hold said shiftable member in its shifted position.

3. The combination, with a chambered supporting-base and with weighing mechanism including a load-receiver; of a regulator consisting of two hinged sections, supported  
70 within the chambered base and located to receive a load discharged by the load-receiver.

4. The combination, with a chambered supported base and with a load-receiver; of a regulator consisting of two hinged counter-weighted sections, located within the chambered base and to receive a load discharged  
80 from the bucket.

5. The combination, with a chambered base and with weighing mechanism including a load-receiver; of a regulator consisting of two hinged sections, supported within the base  
85 and located to receive a load discharged by the bucket; and operative connections between the regulator and the weighing mechanism.

6. The combination, with weighing mechanism including a load-receiver, of a valve; a valve-actuating member shiftably supported by the weighing mechanism; and a regulator located to receive the contents discharged by the load-receiver and to shift and to hold said  
90 valve-actuating member in its shifted position as the weighing mechanism returns to its initial position.

7. The combination, with a load-receiver, of a series of scale-beams therefor two of which are connected and one of which constitutes a valve-actuator; a valve; and instrumentalities operative independent of the scale-beams, for shifting the connected members  
100 thereof.

8. The combination, with weighing mechanism including a series of scale-beams two of which are connected and one of which constitutes a valve-actuator, of a sliding weight carried by one of said scale-beams; a valve; and instrumentalities operative independent of the weighing mechanism, for shifting said  
105 connected scale-beams.

9. The combination, with weighing mechanism comprehending a plurality of scale-beams, two of which are operatively connected; of a stream-controller operated by a device on one of the scale-beams; and instrumentalities independent of the weighing mechanism, for shifting said scale-beams.  
120

10. The combination, with a load-receiver and with stream-supplying means therefor, of a stream-controller; an actuator for advancing the same, to stop the supply to the load-receiver; a pair of coöperative dogs one of which is situated to hold the stream-controller, said dog being held against action by the other dog at a predetermined point.  
125

11. The combination, with weighing mechanism including a load-receiver and with stream-supplying means for said load-receiver, of a stream-controller and an actuator for advancing the same to stop the supply of material to the load-receiver; a pair of coöperative  
130

erative dogs, one of which is situated to hold the stream-controller; and instrumentalities operative with the weighing mechanism, for blocking the action of the other dog.

5 12. The combination, with a load-receiver and with a hopper for delivering a stream of material to said load-receiver, of a stream-controller and an actuator for advancing the same to stop the supply of material to the  
10 load-receiver; a pair of coöperative dogs mounted on the hopper, one of them being situated to hold the stream-controller and instrumentalities for blocking the action of the other dog.

15 13. The combination, with weighing mechanism including a bucket and with stream-supplying means for the bucket, of a valve; a valve-closing actuator; a pair of coöperative dogs, one of which is situated to intercept the valve at a predetermined point in its  
20 closing movement; and instrumentalities for blocking the action of the other dog.

14. The combination, with weighing mechanism including a load-receiver and with  
25 stream-supplying means therefor, of a stream-controller and an actuator for advancing the same, to stop the supply of material to the load-receiver; a dog having a stop-face merging in a notch and also having a shoulder; a  
30 second dog having two legs one of which is in contact with said shoulder, the other leg being provided with a lug; a stud on the valve, positioned to engage said lug; and a member operative with the weighing mechanism and adapted to travel along said stop-  
35 face to a point opposite said notch, to thereby release the valve.

15. The combination, with a load-receiver and with stream-supplying means therefor,  
40 of a stream-controller and an actuator for advancing the same, to stop the supply to the load-receiver; a dog having a stop-face and also having a notch; an arm on the beam, adapted to travel along said stop-face, to  
45 block the action of said dog and having a movement to a point opposite to said notch, to release the dog; and a device intermediate said dog and the stream-controller and positioned to be held by said dog and to also  
50 block the action of the stream-controller.

16. The combination, with a load-receiver and with a regulator therefor, of two coöperative scale-beams; a rod jointed to one of  
55 said scale-beams and having a notch located to receive the other scale-beam; and an operative connection between said rod and the regulator.

17. The combination, with a load-receiver and with a regulator therefor, of two coöperative scale-beams; a rod pivoted to one of  
60 said scale-beams and enlarged at its lower

end and having a notch in said enlarged portion to receive the other scale-beam; and a connection between said rod and regulator.

18. The combination, with a bucket and  
65 with a series of supporting scale-beams therefor, one of which carries an auxiliary beam; of a second auxiliary beam having a rod pivoted thereto in which is formed a notch located to receive the first-mentioned auxiliary  
70 beam; a regulator for the bucket; and a connection between said regulator and the rod.

19. The combination, with a bucket and with beam mechanism therefor comprehending a pair of scale-beams to one of which is  
75 pivoted a rod having a notch located to receive the other beam; of a regulator for the bucket, consisting of two sections to each of which is connected a link, the opposite ends of said link being jointed to said rod.  
80

20. The combination, with weighing mechanism including a shiftably-supported beam and a load-receiver and with stream-supplying means for said load-receiver; of a stream-controller and its actuator located to advance  
85 the same, to stop the supply to the load-receiver; a pair of coöperative dogs, one of which is situated to intercept the stream-controller; and instrumentalities operative with the weighing mechanism, for blocking the  
90 action of the other dog; a regulator for the load-receiver; and an operative connection between said regulator and said shiftable beam.

21. The combination, with a bucket and  
95 beam mechanism therefor; of a pair of operatively-connected closers for the bucket, one of which has a rigid arm; a latch located to engage said arm; a stop on the bucket; a connection between said stop and one of the  
100 closers; a stream-controller having a stop located to coact with the first-mentioned stop; and a tripper for the latch, carried by the beam mechanism.

22. The combination, with beam mechanism including a series of bucket-supporting  
105 main beams and a pair of auxiliary operatively-connected beams; of a regulator operatively connected to said auxiliary beams; a pair of closers for the bucket, connected by  
110 a link; a latch for engaging a member operative with one of said closers; a stop carried by the bucket; a connection between said stop and the closers; a stream-controller having a stop located to coact with said first-  
115 mentioned stop; and a latch-tripper carried by a main beam.

FRANCIS H. RICHARDS.

Witnesses:

FRED. J. DOLE,  
HENRY BISSELL.