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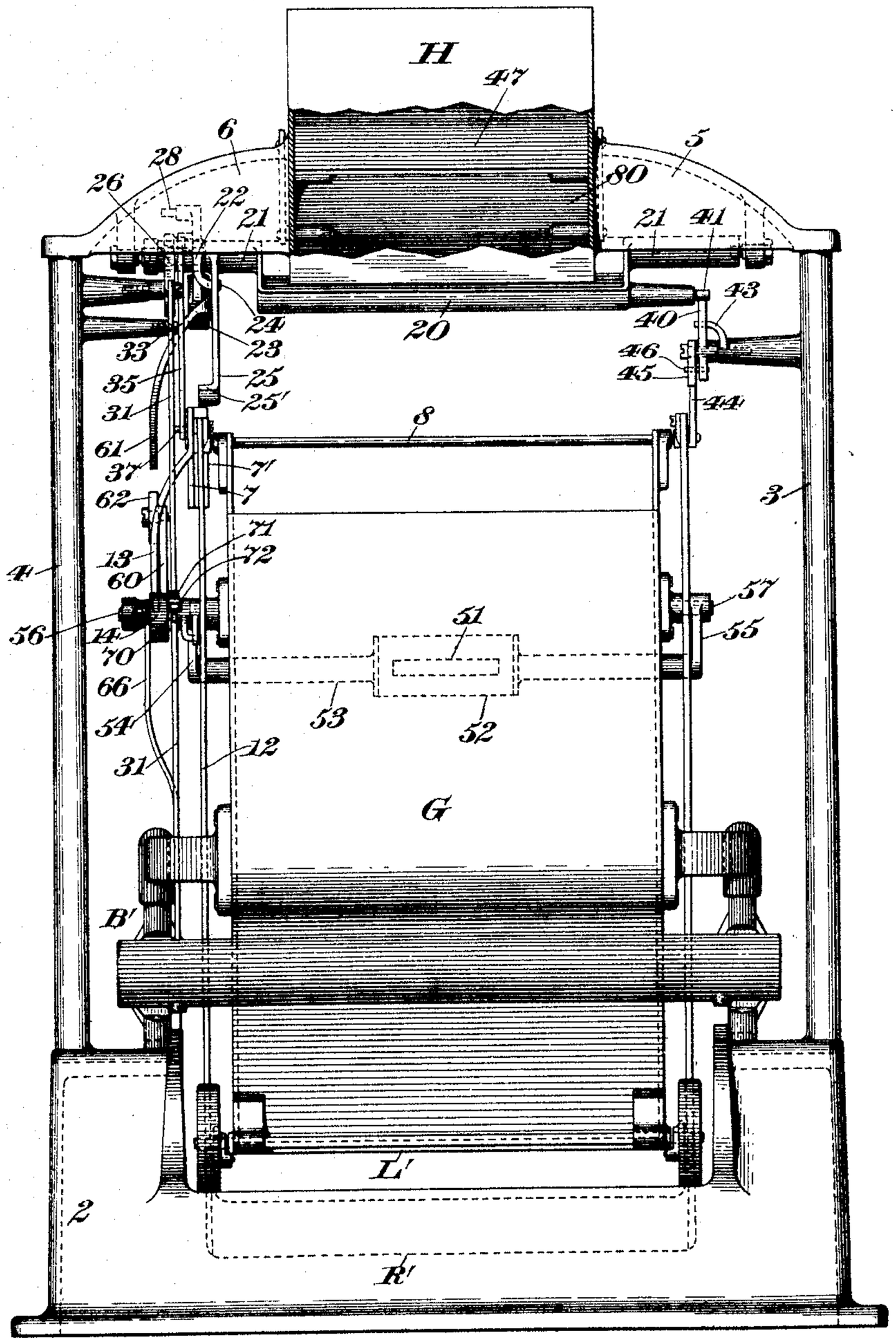
F. H. RICHARDS.

AUTOMATIC WEIGHING MACHINE.

No. 585,983 Patented July 6, 1897

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

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Fig. 2.

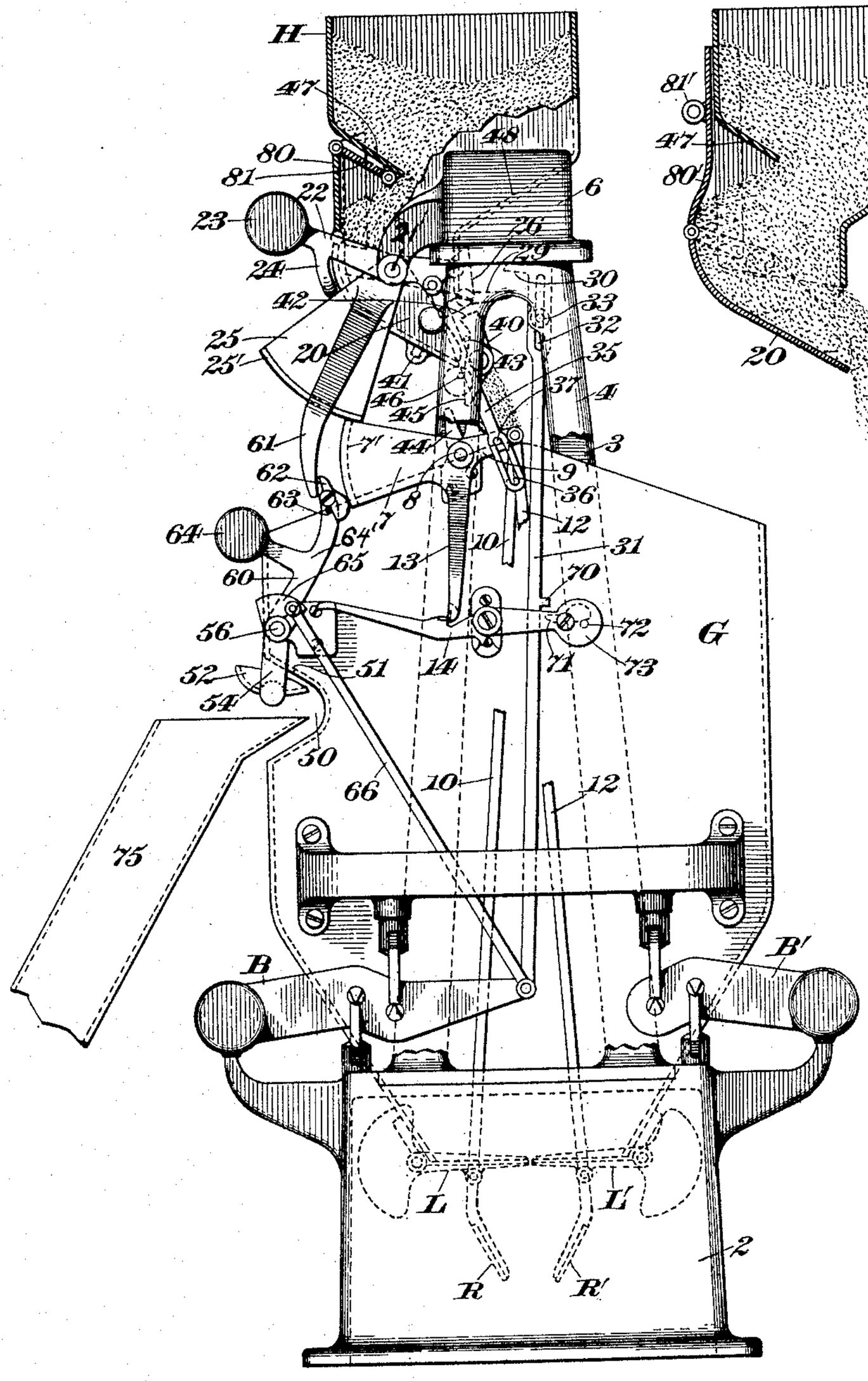

Fig. 8.

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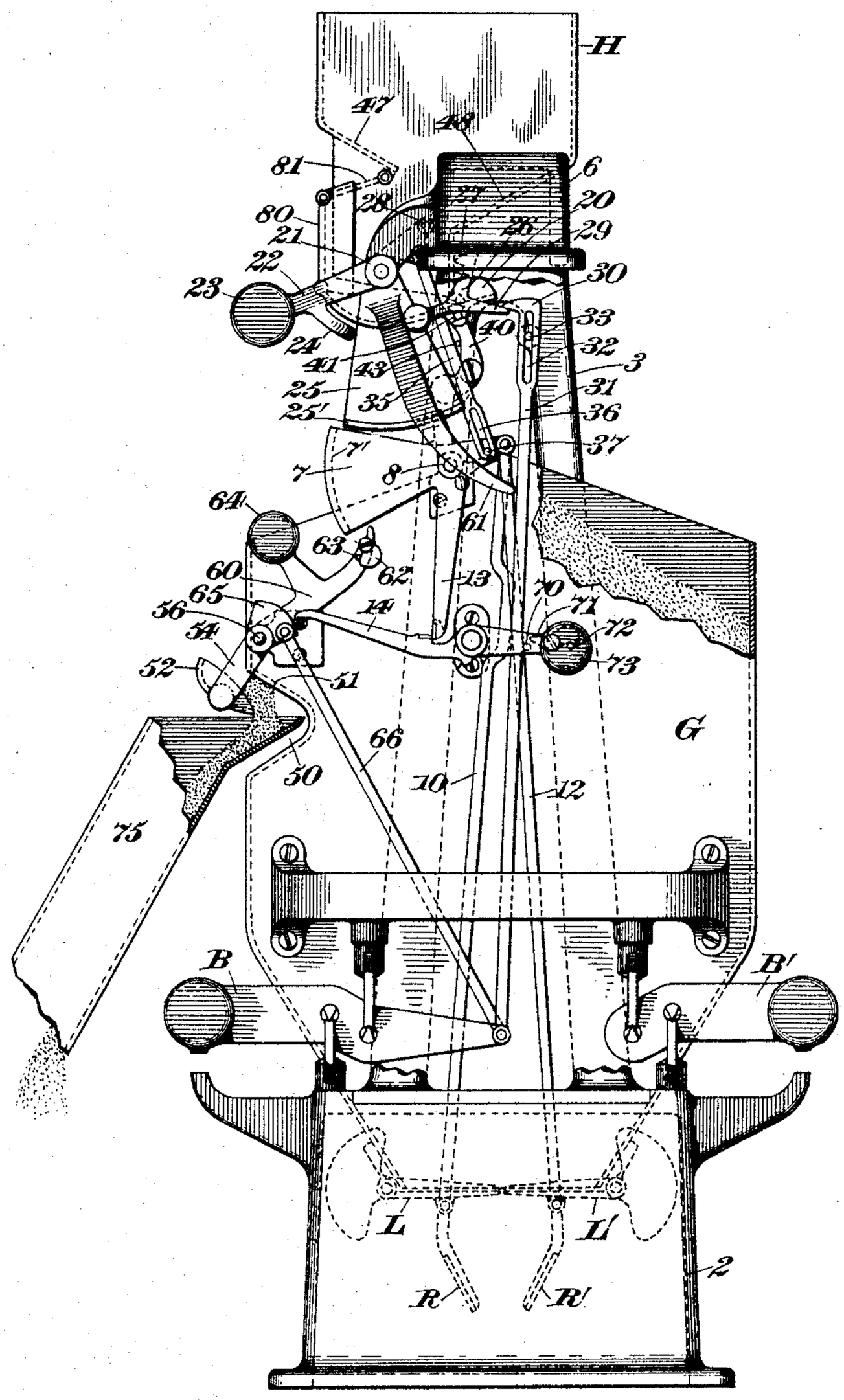
Fig. 3.



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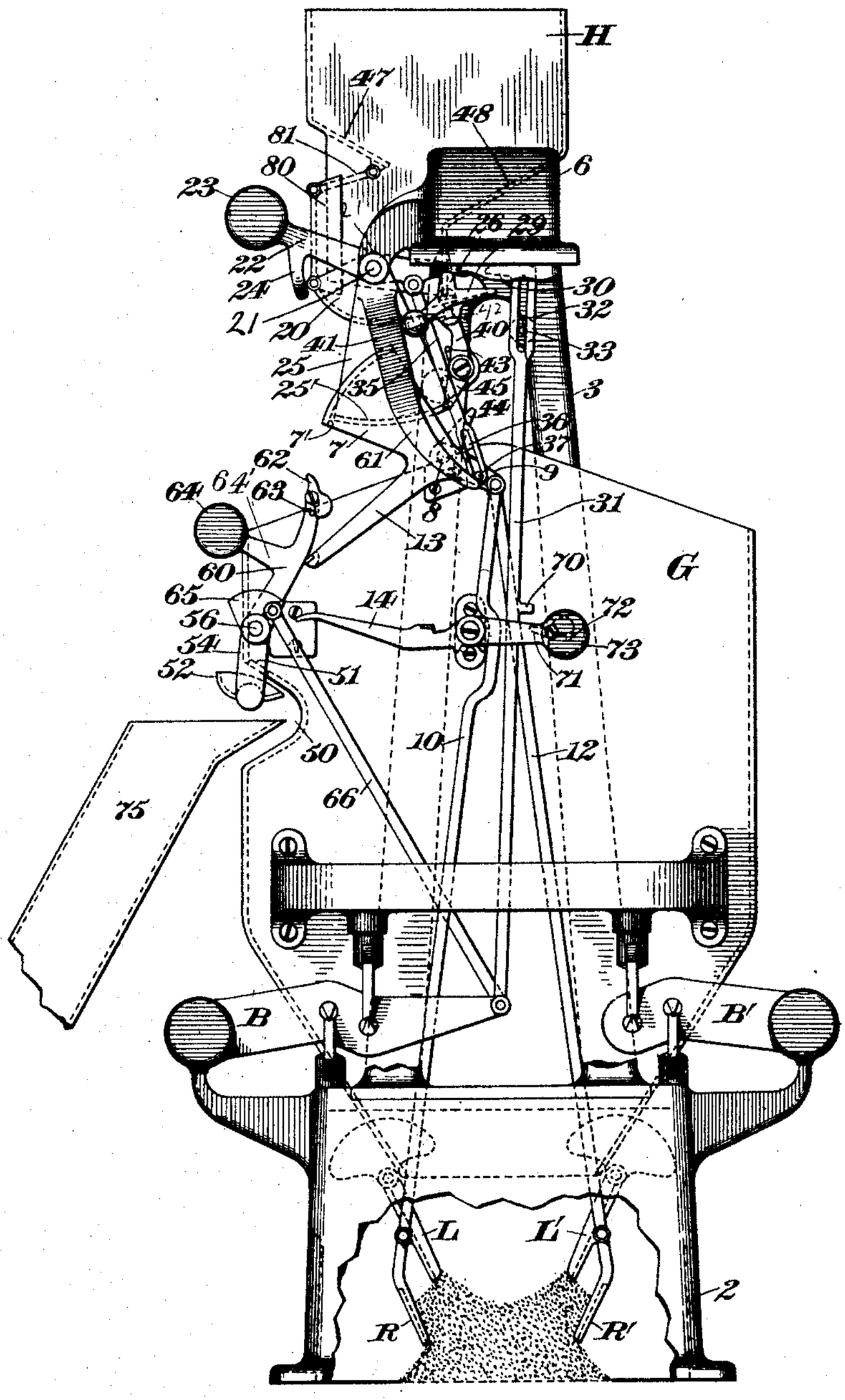
AUTOMATIC WEIGHING MACHINE.

No. 585,983. Patented July 6, 1897.

Fig. 4.



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(No Model.) 5 Sheets—Sheet 5.

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AUTOMATIC WEIGHING MACHINE.

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Fig. 7.

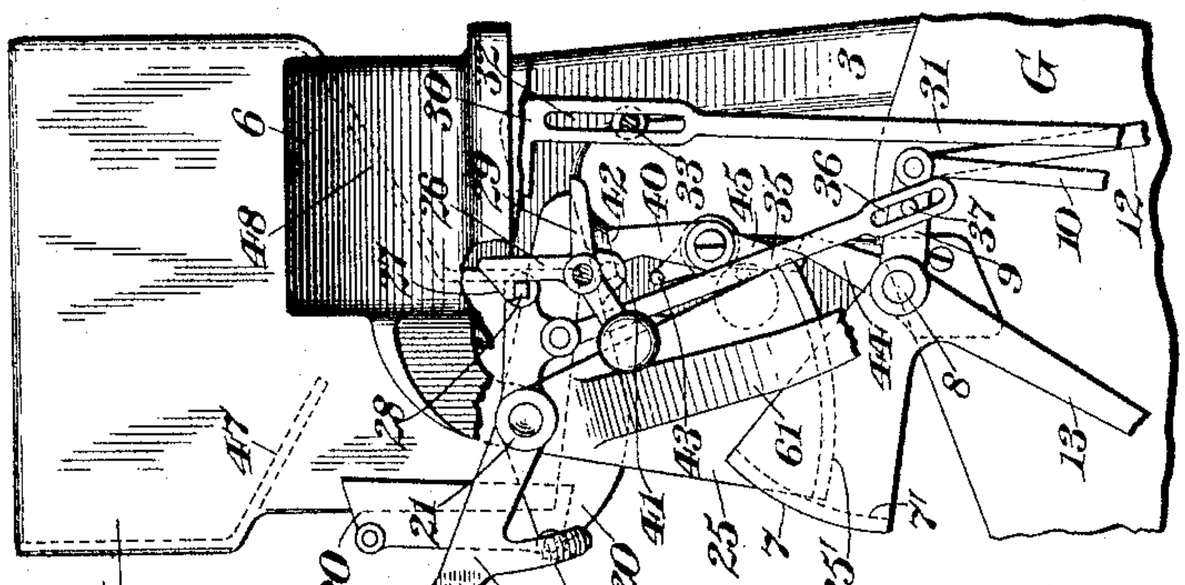


Fig. 6.

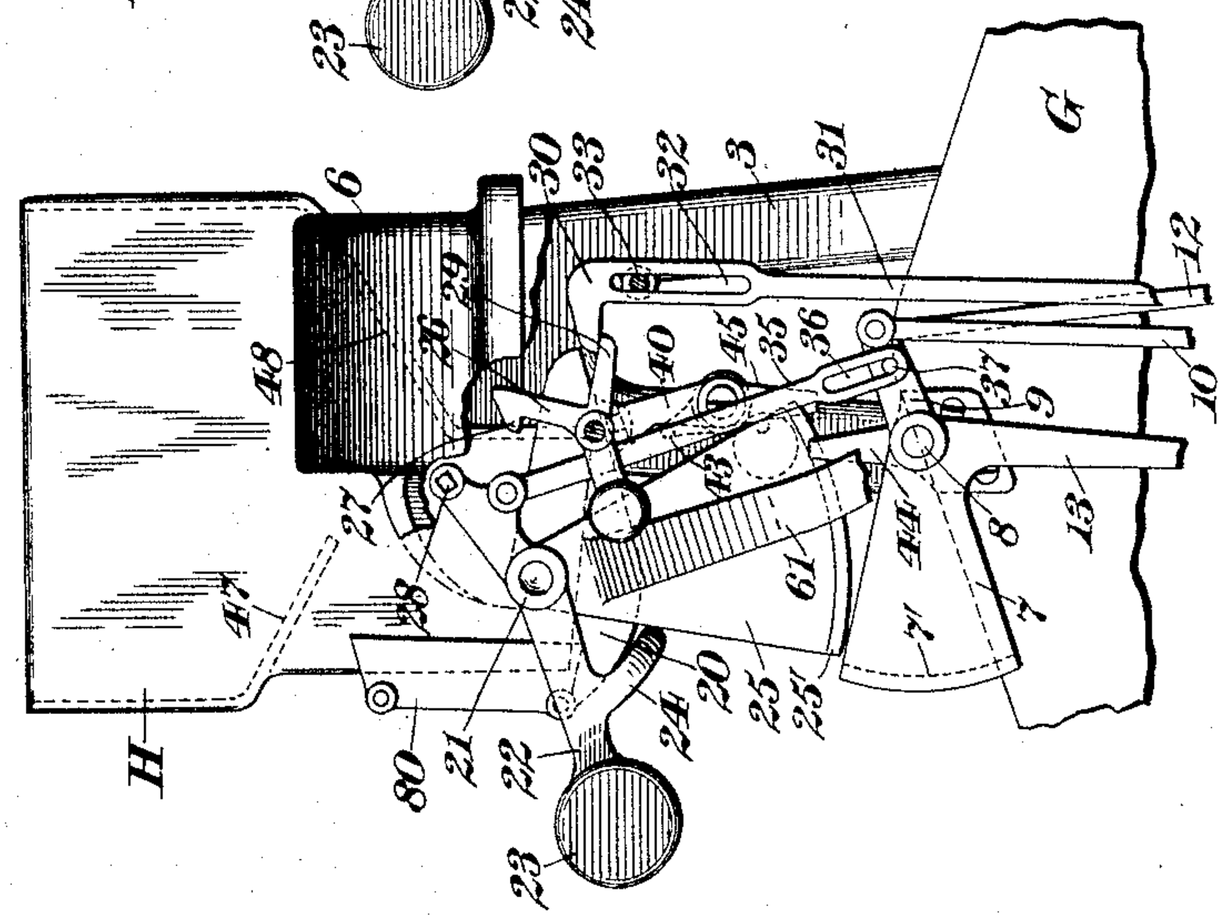
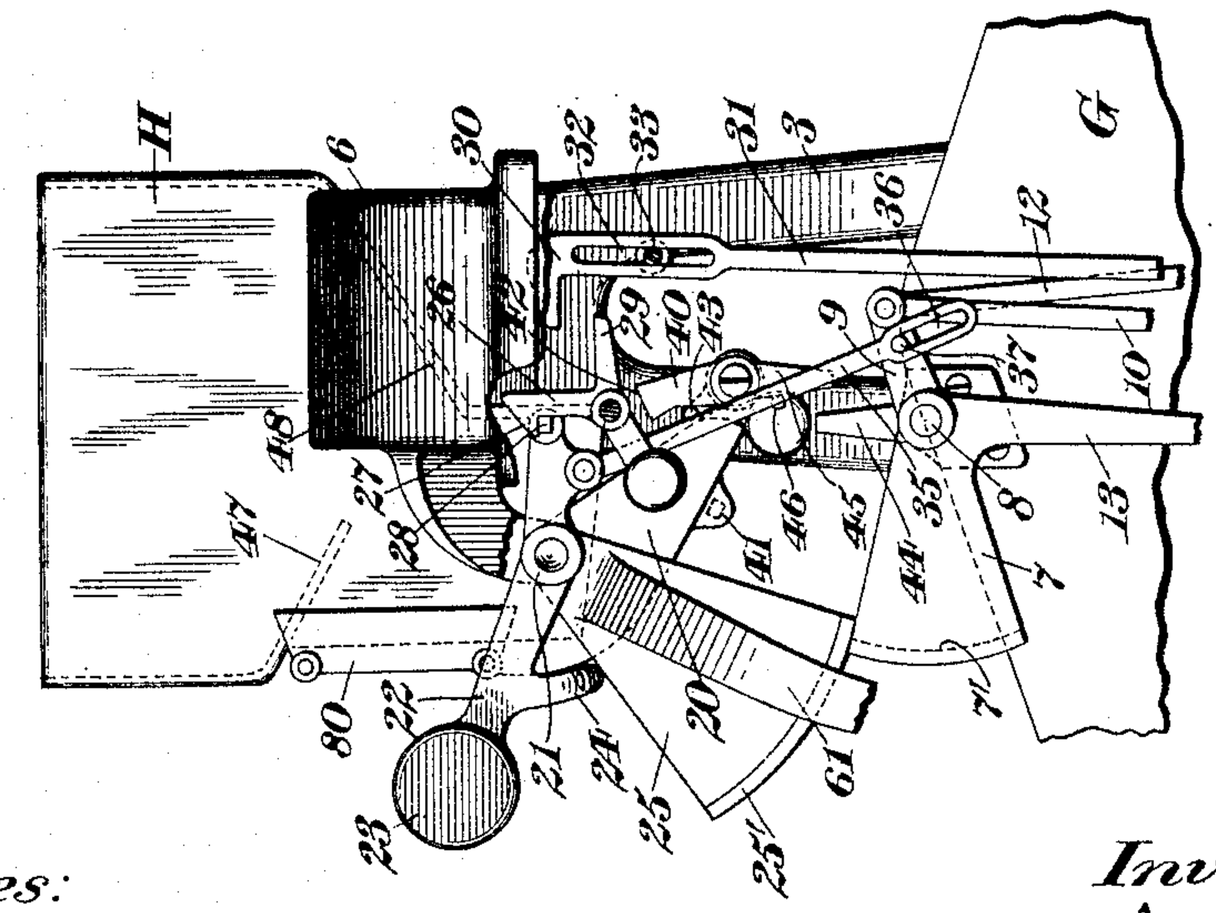


Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

AUTOMATIC WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 585,983, dated July 6, 1897.

Application filed December 24, 1896. Serial No. 616,862. (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 Automatic Weighing-Machines, of which the following is a specification.

This invention relates to weighing-machines for automatically weighing and delivering granular and other free-flowing materials in relatively large quantities or lots, the object of the invention being to provide an improved and efficient machine of the kind disclosed by Letters Patent No. 572,067, granted to me November 24, 1896.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine embodying my present improvements. Figs. 2, 3, and 4 are end elevations as seen from the left in Fig. 1 and illustrate, respectively, the positions occupied by the different working parts of the machine at three different stages in its operation. Figs. 5, 6, and 7 are detail views in end elevation, on enlarged scales, of the overload-controlling valve, the overload-supply hopper, and adjacent parts in three different positions; and Fig. 8 is a transverse vertical section of the supply-hopper and valve, and it illustrates a modified form of the invention.

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

The framework for sustaining the various parts of the machine may be of any suitable or preferred form, and in the present case it comprises a chambered supporting base or bed 2, the end frames or columns 3 and 4, which rise therefrom, and the brackets 5 and 6, which extend oppositely from the supply hopper or chute H, said parts being connected together in some well-known manner.

The supply-hopper in the present case acts, in connection with a suitable stream-controller, as a convenient means for overloading the load-receiver beyond its normal capacity, the surplus being subsequently removed by suitable load-reducing means.

The weighing mechanism includes a load-receiver and beam mechanism therefor, the load-receiver consisting of a single-chambered vertically-reciprocatory bucket G, having a discharge-outlet in its bottom through which the weighed contents can gravitate at the proper time.

The beam mechanism which supports the bucket consists of the oppositely-disposed counterweighted scale-beams B and B′, respectively, fulcrumed upon the base 2 in the usual manner and having bucket-supports near the inner ends thereof for sustaining the bucket.

The closers for controlling the discharge-outlet of the bucket are two in number, and consist of approximately flat plates fitting against the bottom of the bucket when shut and being pivotally supported at opposite sides of said discharge-outlet, said closers being designated by L and L′ and being furnished with counterweights to return them to their shut positions on the discharge of the bucket-load.

The holding means for maintaining the closers shut includes a latch which engages a suitable member, such as the rocker 7, that is connected with said closers. The rocker 7 is supported upon the bucket for oscillation, it being carried by the rock-shaft 8. The arm 9 of said rocker has pivoted thereto at opposite sides the rods 10 and 12, which are connected to the closers L and L′, respectively, a similar pair of rods being provided at the opposite side of the bucket, such last-mentioned rods being pivoted to rock-arms on the shaft 8. The rocker 7 is furnished with the arm 13, which is engaged by the latch 14, that is pivotally mounted upon the bucket, and the working arm of which is swung upward to engage the coöperating arm 13 of the rocker, these parts being represented in engagement in Figs. 2 and 3. By lifting the weighted arm of the latch 14 the other arm thereof will be depressed sufficiently to disengage it from the rocker-arm 13, the result being the release of the closers L and L′.

In connection with the closers L and L′, I employ the regulators R and R′, respectively, which are in the form of longitudinal blades movable in a plane below the two closers, and the end arms of which constitute fixed extensions of the rods 10 and 12 and the companion, parallel rods on the opposite side of the bucket, said regulators, when the closers are

shut, being disposed at nearly a right angle thereto, and the action of the two closers in opening will throw the blades into parallelism with said closers, so that the mass discharged from the bucket can be taken hold of by the regulators and will firmly retard the shutting of said closers for sufficient time to permit the complete emptying of the bucket.

It will be understood that the invention comprehends the provision of overloading means and load-reducing means operative in such order, the overloading means being intended to supply the bucket with a quantity of material in excess of the determined load to be weighed and delivered. On the receipt of the bucket by such an overload it will of course descend, and at a certain point in the travel of the bucket the surplus will be removed therefrom to bring the contents thereof to a true load or desired standard.

The overloading means consist, as has been hereinbefore stated, of the supply-hopper H and a suitable stream-controller or valve therefor, the hopper being intended to deliver the supply to the valve which directs it, when open, to the bucket, and said valve will be preferably held in its wide-open position, serving, in conjunction with the hopper H, as a means for delivering a stream of uniform volume to the load-receiver to overload the same.

The overload-controlling valve is designated by 20, it being supported for oscillatory movement beneath the orifice of the hopper H to either cut off or direct the supply-stream to the bucket, such valve being fixedly carried by the two-part shaft 21, which is pivotally supported between lugs on the brackets 5 and 6.

The actuator for advancing the overloading stream-controller consists of a lever 22, loosely carried by the shaft 21, and hence movable concentrically therewith, said actuator or lever, however, being normally held in its ineffective position relatively to the stream-controller or valve by a suitable restraining device, and when the actuator is released at the proper time its force or power will be instantly applied or added to the valve for promptly shutting the same to arrest the passage of the supply-stream from the hopper H to the bucket G.

The valve actuator or lever 22 is counterweighted, as at 24, the counterweighted arm thereof being furnished with a bent lug or pin 24, which, when the stream-controller or valve is in its wide-open position, is almost in contact with the stop or segmental blade 25, which is affixed to the valve-shaft 21.

As just stated, the actuator or lever 22 will be normally maintained in its ineffective position; and to accomplish this result a counterweighted latch 26 is provided, said latch having one of its arms shouldered, as at 27, against which the pin 28 on the valve-actuator is adapted to abut to thereby hold the valve actuator or lever in its ineffective position.

Instrumentalities to be hereinafter described are provided for holding the valve 20 in its wide-open position, so as to permit the full volume of the supply-stream to gravitate into the bucket G from the hopper H to overload the same quickly, such valve being released at a predetermined point in the descent of the bucket, and subsequently the latch 26 will be tripped and its shoulder 27 disengaged or thrown beyond the plane of oscillation of the pin 28 of the valve-actuating lever, thereby releasing or throwing said lever into action, whereby its counterweighted arm will promptly drop, and the bent lug or pin 24, by falling against the stop 25, that is operative with and fixed to the valve-shaft, will cause the immediate closure of the valve, the actuator being thrown out of operative connection with the valve when the latter has reached the end of its cut-off movement.

The tripping device for the latch 26 is the head 30 of the relatively long rod 31, that is pivoted to the inner or poising end of one of the arms of the bucket-supporting beam B, the purpose being, when the bucket and beams have passed for a certain distance below the poising-line, for the tripper or head 30 of the rod 31 to be carried against the arm 29 of the latch 26 to trip the same, and consequently release the valve-closing actuator or lever 22, whereby it can close the valve 20 to cut off the supply-stream to the bucket.

The rod 31 has at its upper end a longitudinal slot 32, the walls of which embrace a suitably-positioned guide-pin 33 on the framework to maintain the rod in an operative position as it reciprocates during the operation of the machine.

I provide means for resetting the valve-actuator 22 after the valve has reached the end of its advancing or cut-off movement, and such means will be preferably operative with the closer, whereby the force of the actuator is subtracted or removed wholly from the valve to permit its free opening movement. The forward arm of the valve-actuating lever 22 has pivoted thereto the link 35, which has at its opposite end the loop 36, which embraces the pin or stud 37 on the rocker-arm 9.

When the valve 20 and actuator or lever 22 are in their normal positions, as represented in Fig. 2, the pin 37 will be in contact with the upper short wall of the slot of the loop 36, and the actuator in closing the valve in the manner previously specified will carry the lower short wall of said slot against the pin or stud 37, as shown in Fig. 3.

Let it be assumed that the latch 14 is tripped, thereby releasing the two closers L and L′. This being the case, said closers will be forced open by the weight of the contents within the bucket, and the lightened bucket being overbalanced by the weights of the two

beams B and B' will be caused to rise, the relatively long rod 31 being elevated, so that its head or tripper 30 will be carried away from the latch-arm 29, so that the latch 26 can resume its effective lever-holding position by gravity, as shown in Figs. 4, 5, and 7.

As the two closers open the rods 10 and 12 and the rocker-arm 9 will be drawn downward, the link 35 and the forward arm of the valve-actuating lever 22 being moved simultaneously therewith in a corresponding direction until the pin 28 is engaged by the shoulder 27 of the latch 26, the lever then being in the position shown in Fig. 4.

The valve 20 will be locked shut by a suitable detent device or latch when it has reached the end of its cut-off stroke, whereby it is held positively from opening when the bucket has passed below the so-called "poising-line." The latch for this purpose is designated by 40, and it is pivoted upon an inward projection on the column 3, said latch being counterweighted to maintain it in its upright or working position to engage a pin or stop on the valve. Such a stop-pin is represented at 41. When the valve is released from its wide-open position, as indicated in Fig 2, it will be promptly shut by the actuator 22 in the manner hereinbefore set forth, and the pin 41 will be carried against an oblique face on the latch 40 near the upper end thereof and will push the latch aside, said pin riding over such oblique face and upon the upper face 42 of said latch, as shown in Fig. 4, said latch being held against oscillation by a curved pin 43, carried by the framework. The tripping device for the valve-holding latch will be preferably operative with the closers, it being represented herein as an arm 44, fixed to the rock-shaft 8. The pivot of the latch 40 is represented as encircled by the pendent by-pass device 45, constituting a part of said latch, the weight of which maintains the same in a vertical position and against the pin or stop 46 on the latch, which pin holds the said by-pass against movement in one direction or as the closers shut. Let it be assumed that said closers have been released and are opening. This being the case, it being understood that the valve is closed and locked in such position, the arm 44 will strike the by-pass 45 and will swing the same ineffectively about its center, the latch not being disturbed, although the closers can freely open, said arm being carried to the position shown in Fig. 4. On the return or shutting movement of said closers an opposite movement will be imparted to the arm, it being swung to the left and against the by-pass device 45, which is held against movement in such direction and constitutes, practically, a fixed member on the latch, so that when the closers have nearly reached their shut positions the latch will be tripped to free the valve, so that it can be forced open, it being obvious that during the interval that has elapsed between the opening and shutting of the closers the force or power of the actuator has been subtracted from the valve 20.

The valve will be so supported as to be opened by the pressure of the mass of material supported forward of its axis and contained within the hopper H, said axis being located well to the rear of the hopper, so that when the valve is shut it sustains forward of said axis a mass of material considerably in excess of that at the opposite side of its axis, whereby on the tripping of the latch 40 when the closers have nearly reached their initial positions the valve can be readily forced open by the pressure of the downflowing stream. To facilitate this operation, the hopper H has interiorly thereof the inclined supply-directing plate 47, (see Fig. 2,) which delivers the material toward the inclined front supporting-wall 48 of the hopper and forward of the valve-axis.

The load-reducing means in the present instance includes an opening in the bucket formed therein at a point between the receiving and delivery ends of the bucket, the stream passing through said opening being controlled, preferably, by a valve.

The bucket G has at one side thereof the indentation 50, in one face of which the load-reducing opening 51 is formed, the load-reducing valve therefor being designated by 52 and being "pan-shaped" and having an oscillatory movement across the plane of the load-reducing opening to stop or permit the passage of material from the bucket. The valve 52 is carried upon the two-part shaft 53, which has at its ends the rock-arms 54 and 55, the opposite end walls of the bucket being furnished with projecting pivots 56 and 57, passing through journal-openings in the hubs of said two arms.

The shaft 53 and the rock-arms 54 and 55 constitute a carrier for the load-reducing valve 52, and the arm 54 has joined thereto the upright stop-arm 60, which coöperates with a similar member or arm 61, that is joined to the segmental stop 25, the stop-arm 60, which acts to hold the valve in its wide-open position, carrying at its upper end the by-pass 62, which forms a part thereof and which consists of a counterweighted dog pivoted thereto and held against movement in one direction by the pin 63.

As shown in Fig. 2, the depending arm 61, that is operative with the valve, is engaged by the by-pass 62, whereby the overload-controlling valve 20 will be kept in its wide-open position.

When the overload is received by the bucket, it will be remembered that it will descend below the poising-line, the arm 60, and consequently the by-pass 62, which is on the bucket, being carried downward, so that the by-pass will be caused to cross the plane of oscillation of the arm 61, and when this action takes place the valve 20 can be promptly closed by its actuator 22.

When the bucket has emptied its contents

and has risen and when the closers have been nearly shut, the valve 20 will be retracted or opened, and when it has almost reached the end of such retractive stroke the arm 61, which swings in unison therewith, will engage the by-pass 62, which is then in its normal position, and will swing the same about its center, following which the by-pass will return to its primary position to again intercept the closure of the valve and until the bucket descends below the poising-line.

The load-reducing valve 52 will be preferably balanced, it being furnished with a balance-weight 64 on the laterally-extending arm 64′ of the stop-arm 60, so that there is an equality of weight disposed respectively above and below its center of movement.

To actuate the load-reducing valve 52 to effect the removal of the surplus from the bucket and also to shut the same subsequently thereto when the load has reached the quantity determined upon, I provide a direct connection between the valve and the beam B. The rock-arm 54 of the valve has attached thereto the segmental stop device 65, to which is pivoted the rod 66, the opposite end of said rod being likewise connected to one of the arms of the scale-beam B and to the poising end thereof. When the overload is received by the bucket, as shown in Fig. 3, it, with the poising portions of the two beams B and B′, will immediately descend to a point below the poising-line, and as the several parts pass below the said poising-line the beam B will operate to draw the connecting-rod 66 downward, so that the load-reducing valve 52 will be swung open to permit the excess or surplus to run through the opening 51. As the bucket lightens it will of course rise, the result being the application of an upward thrust to the rod 66 by the beam B and the consequent shutting of the valve 52 to cut off the stream that emerges from the opening 51, and when the bucket on its upstroke reaches the so-called "poising-line" the valve 52 will be shut, so that there is contained within the bucket a true load, which is then discharged.

In connection with the overload-controlling valve and the closers I employ a pair of reciprocally-effective stops operable, respectively, with said members, the valve-operative stop being located to prevent the premature discharge of the load up to the time the bucket reaches the poising-line, while the companion member is adapted to maintain the valve 20 in its shut position and against retractive movement during the load-discharging period should the latch 40 be tripped too soon or fail to work, and the segments 25 and 7 act as such stops. The stops or segments are provided with coöperating oppositely-disposed flanges or auxiliary stops 25′ and 7′, respectively.

During the overload-supply period the flange 7′ will be contiguous to the curved flange 25′, (see Fig. 2,) so that should the latch 14 be tripped too soon the oscillation of the member 7, and hence the opening of the closers L and L′, will be prevented by the stop 25, the flange 25′ of which blocks the movement of the segment or stop 7. When the valve 20 is released and is shut, the stop 25 will be swung therewith and across the plane of the inside curved face of the flange 7, so that when the stop or rocker 7 is freed by the tripping of the latch it will swing about its center and its flange will run in contact with the flange 25′, as shown in Fig. 4, to prevent retractive movement of the stop 25, and hence of the valve 20, and this relation will continue so long as the two closers are open.

The segment or stop 65, to which I have hereinbefore referred, serves an important object in that it constitutes a means for preventing the premature tripping of the latch when the bucket passes below the poising-line, so that the overload cannot be discharged from the bucket.

When the bucket has descended below the poising-line with its overload and the valve 20 has been shut and latched, the load-reducing valve 52 will be opened, so that the segment 65 will be swung across the arc of movement of the working arm of the latch, as shown in Fig. 3, and nearly in contact therewith, whereby the depression of said arm and the consequent release of the closers are prevented by the stop-segment 65, although the valve 20 has been closed, and the said stop 65 will continue to exercise this function until the valve 52, with which it is operative, has reached its fully-shut position, at which time the latch 14 can be freely tripped, as shown in Fig. 4.

The tripper for the latch is designated by 70, and it is shown as a fixed projection on the vertically-reciprocatory rod 31, that is pivoted to the beam B, said tripper being effective on its upstroke, as the lightened bucket rises during the load-reducing period, to elevate the weighted arm of the latch 14 and consequently depress the opposite arm thereof to disengage it from the rocker-arm 13.

The weighted arm 14 of the latch is furnished with a counterweighted by-pass device 71, constituting a part of said latch and which is pivoted thereto and the weight of which rests upon the stop-pin 72 on the latch-weight 73 to thereby hold the by-pass against action on the upstroke of the actuator or tripper 70, as will now appear.

When the bucket and beams descend on the overloading of said bucket, the rod 31 will be pulled downward, thereby causing the tripper 70 to impinge against the by-pass 71, so that the latter will yield sufficiently to allow the tripper to pass thereby and below the same, as shown in Fig. 3.

As the weighing mechanism rises, owing to the reduction of the load, the tripper 70 will be carried against the by-pass 71, which is held against movement, and at about the time the valve 52 has been shut the weighted arm of the latch will be raised and the opposite

arm thereof depressed to disengage it from the arm 13 of the rocker 7. When the latch is thus tripped, the two closers L and L′ will be free of all restraint, so that they can be promptly forced open or apart by the weight of the load within the bucket.

There is shown at 75 a portion of an inclined conduit or pipe having its receiving end disposed within the bucket-indentation 50 and below the discharge edge of the load-receiving valve 52, said conduit constituting a means for conveying away the surplus which is removed from the bucket, and the material thus removed may be disposed in the manner shown in my hereinbefore-mentioned Letters Patent.

There is illustrated at 80, jointed to the valve, a spatter-guard movable with the valve and in the form of a plate nearly equaling in length that of the valve and the office of which is to prevent the material from running over the back wall of the valve as such material is crowded rearward. Said guard 80 will preferably have end flanges which lap over the end walls of the hopper to guard against accidental escape of the material at points above the valve.

It will be noticed that the guard 80 consists of a longitudinal plate the lower edge of which is substantially in contact with the rear edge of the valve and that it extends lengthwise thereof.

To insure the maintenance of the guard in proper relation to the valve as the latter reciprocates, I pivot to said guard the longitudinal plate 81, which is also connected to the hopper H at points just below the lip of the wall 47.

The operation of the hereinbefore-described machine, briefly stated, is as follows: Fig. 2 represents the positions occupied by the several working parts at the commencement of operation, the closers L and L′ being shut and held in such position by the latch 14, that is in engagement with the arm 13 of the rocker 7, which is connected to the closers, and the valve 20 being wide open and held in such position by the stop-arm 60 the full volume of the supply-stream will flow into the bucket G from the hopper H. When a certain proportion of the load has been received by the bucket, it will descend, and when the bucket has been overloaded the arm 60, or the by-pass 62 thereon, constituting a part thereof, will pass below the arm 61, that is operative with the valve to release the same, and at about this point the head or tripper 30 of the reciprocatory rod 31, which has been drawn downward by the beam B, will trip the latch 26, so that the counterweighted lever 22 can promptly close the valve 20, which when shut is held against return or opposite movement by the latch 40, as shown in Fig. 3. When the bucket passes below the poising-line, the beam B will draw the rod 66 down, so that the valve 52 will be swung open to permit the surplus beyond the requisite load to pass into the conduit 75 through the opening 51, and as the lightened bucket rises said valve will be shut to stop the flow of such material. At about the time the load is completed the tripper 70, which is under the latch 14, will engage the by-pass 71 to trip the latch 14, whereby the two closers L and L′ will be released. On the release of the two closers they will be forced open and the load will be discharged from the bucket into the chamber of the base 2, and when the contents have been completely emptied from the bucket said closers will be shut and the remaining parts of the machine will be caused to return to their primary positions.

In Fig. 8 I have illustrated a modification of the spatter-guard. Such spatter-guard is designated by 80′, and it is shown considerably wider than that represented in the other views, an antifriction-roll 81′ on the spout being employed to guide said guard as the valve reciprocates.

Having described my invention, I claim—

1. The combination, with weighing mechanism including a load-receiver; of overloading and load-reducing means, the overloading means including a valve; and instrumentalities operative with the load-reducing means, for holding said valve in its wide-open position and against movement until the load-receiver has reached a certain point.

2. The combination, with weighing mechanism including a load-receiver; of overloading and load-reducing means, each including a valve; and means operative with the load-reducing valve, for holding the overload-controlling valve in its wide-open position and against movement until the load-receiver has reached a certain point.

3. The combination, with weighing mechanism including a load-receiver; of overloading and load-reducing means, the overloading means including a valve; mechanism operable to prevent the premature discharge of a load, and including a stop which is connected with said valve; an arm on said stop; and a second stop operable to engage said arm, to hold the same, and consequently the valve, against movement for a predetermined length of time.

4. The combination, with weighing mechanism including a load-receiver; of overloading and load-reducing means, each embodying a valve; an arm connected with the overload-controlling valve; and a coöperating stop positioned to engage said arm, said stop being connected with the load-reducing valve.

5. The combination, with weighing mechanism including a bucket provided with a closer, of an interlocking stop connected with said closer; overloading and load-reducing means, the overloading means embodying an interlocking stop that is positioned to coact with the first-mentioned interlocking stop, and which also has an arm; and means oper-

able for engaging said arm, to thereby hold the same against movement until the load-receiver has reached a certain point.

6. The combination, with stream-supplying means, of a stream-controller; an actuator operable to advance said stream-controller; and means for throwing said actuator out of connection with the stream-controller when the latter has reached the end of its advancing movement.

7. The combination, with stream-supplying means, of a cut-off valve; an actuator operable to shut said valve; and means for throwing said actuator out of connection with said valve when the latter has cut off the stream.

8. The combination, with weighing mechanism including a load-receiver, of stream-supplying means; a valve; means for maintaining said valve in its wide-open position; an actuator operable to shut the valve; and means for throwing said actuator out of operative connection with the valve when the latter has cut off the stream.

9. The combination, with a load-receiver, of stream-supplying means therefor; a stream-controller; an actuator operable to advance said stream-controller; and means on said load-receiver, for throwing said actuator out of connection with the stream-controller when the latter has reached the end of its advancing movement.

10. The combination, with a bucket having a closer, of stream-supplying means for the bucket; a stream-controller; an actuator operable to advance said stream-controller; and means connected to, and operated by, the closer, for throwing said actuator out of connection with the stream-controller.

11. The combination, with a load-receiver having a rocker thereon, of stream-supplying means; a stream-controller; an actuator operable to advance said stream-controller; and a connection between said rocker and the actuator, to throw the latter out of connection with the stream-controller at a predetermined point.

12. The combination, with a load-receiver having a rocker thereon provided with a pin or lug, of stream-supplying means; a stream-controller; an actuator operable to advance said stream-controller, and having a link, said link having a loop which is passed over said pin or lug.

13. The combination, with stream-supplying means, of a stream-controller; an actuator supported to advance said stream-controller; and means for throwing said actuator into and out of operative relation with the stream-controller, the last-mentioned operation taking place when said stream-controller has reached the end of its advancing movement.

14. The combination, with stream-supplying means, of a stream-controller; an actuator for advancing said stream-controller; and means for throwing said actuator into and out of operative relation with the stream-controller.

15. The combination, with stream-supplying means, of a stream-controller; an actuator for said stream-controller; and a latch for engaging said actuator to hold it out of connection with the stream-controller.

16. The combination, with stream-supplying means, of a stream-controller; an actuator for said stream-controller; a latch operable to engage said actuator, to hold it normally out of connection with the stream-controller; and latch-tripping means.

17. The combination, with weighing mechanism, of stream-supplying means; a stream-controller; an actuator for said stream-controller, supported for movement independently thereof; a latch located to engage said actuator; and latch-tripping means operative with the weighing mechanism.

18. The combination, with weighing mechanism including a load-receiver, of stream-supplying means; a stream-controller; an actuator for advancing said stream-controller; a latch for engaging said actuator, normally to hold it out of operative connection with the stream-controller; and latch-tripping means operated by the weighing mechanism.

19. The combination, with stream-supplying means, of a stream-controller; a counterweighted actuator for said stream-controller; and a latch for engaging said actuator, normally to hold it out of connection with the stream-controller.

20. The combination, with stream-supplying means, of an oscillatory valve; a valve-actuator movable concentrically to said valve; and a latch located to engage said actuator, normally to hold it out of connection with the valve.

21. The combination, with stream-supplying means, of a valve and its supporting-shaft; an actuator for said valve, loosely movable about said shaft; and a latch for engaging said actuator, normally to hold it out of connection with the valve.

22. The combination, with stream-supplying means, of a valve adapted to be opened by the pressure of the supply of material thereagainst; an actuator to shut said valve; and means for throwing said actuator out of operative relation with the valve when the latter has reached its cut-off position.

23. The combination, with stream-supplying means, of a stream-controller; an actuator supported to advance said stream-controller; and means for throwing the actuator out of connection with the stream-controller when the latter has reached the end of its advancing movement, and for also locking said stream-controller against retraction.

24. The combination, with stream-supplying means, of a stream-controller; an actuator for advancing the stream-controller, supported for movement independently thereof; and means carried by the framework, adapted

to lock the stream-controller against retractive movement.

25. The combination, with weighing mechanism embodying a load-receiver; of overloading and load-reducing means, the first-mentioned including a stream-controller; an actuator for advancing said stream-controller and supported for movement independently thereof; and a detent positioned to engage said actuator at a predetermined point.

26. The combination, with a bucket having a closer and with stream-supplying means therefor, of a stream-controller; an actuator for advancing said stream-controller and supported for movement independently thereof; a latch operative independently of the closer, for holding the stream-controller against retractive movement, and means operated by the closer, for tripping said latch.

27. The combination, with weighing mechanism including a load-receiver and with load-discharge-controlling mechanism embodying a latch, of stream-supplying means; a stream-controller; a latch for engaging said actuator, normally to hold it out of operative connection with the stream-controller; and a member provided with two trippers, one for each of said latches.

28. The combination, with weighing mechanism including a load-receiver and with load-discharge-controlling mechanism embodying a latch, of stream-supplying means; a stream-controller; a latch for engaging said actuator, normally to hold it out of connection with the stream-controller; and a reciprocatory rod provided with two trippers, one for each of said latches.

29. The combination, with a bucket and with a scale-beam therefor, of stream-supplying means; a stream-controller; an actuator for said stream-controller; a latch for engaging said actuator, normally to hold it out of connection with the stream-controller; and a tripper for said latch, connected to the scale-beam.

30. The combination, with weighing mechanism including a load-receiver; load-discharge-controlling mechanism comprehending a latch; overloading and load-reducing means, the last-mentioned embodying a valve; and means operative with the valve, to block the action of said latch on the opening movement thereof.

31. The combination, with weighing mechanism including a load-receiver and with load-discharge-controlling mechanism comprehending a latch; of overloading and load-reducing means, the last-mentioned including a valve; and a stop-segment connected with said valve, to block the action of the latch on the opening of said valve.

32. The combination, with a hopper, of a valve therefor; valve-closing mechanism; a longitudinal plate jointed to the valve and extending lengthwise thereof, the lower edge of said plate being substantially in contact with the rear edge of the valve; and a guide for said plate.

33. The combination, with a hopper, of a valve; valve-closing mechanism; a longitudinal plate jointed to the valve and extending lengthwise thereof, the lower edge of said plate being substantially in contact with the rear edge of the valve; and a second plate pivotally connected, respectively, with said first-mentioned plate and with the hopper.

34. The combination, with a bucket having a discharge-outlet, of a plurality of closers; a rocker on the bucket, connected by rods with said closers; and regulators, one for each of said closers, joined to said rods.

FRANCIS H. RICHARDS.

Witnesses:
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