(No Model.) 3 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 565,220. Patented Aug. 4, 1896.

Fig. 1.

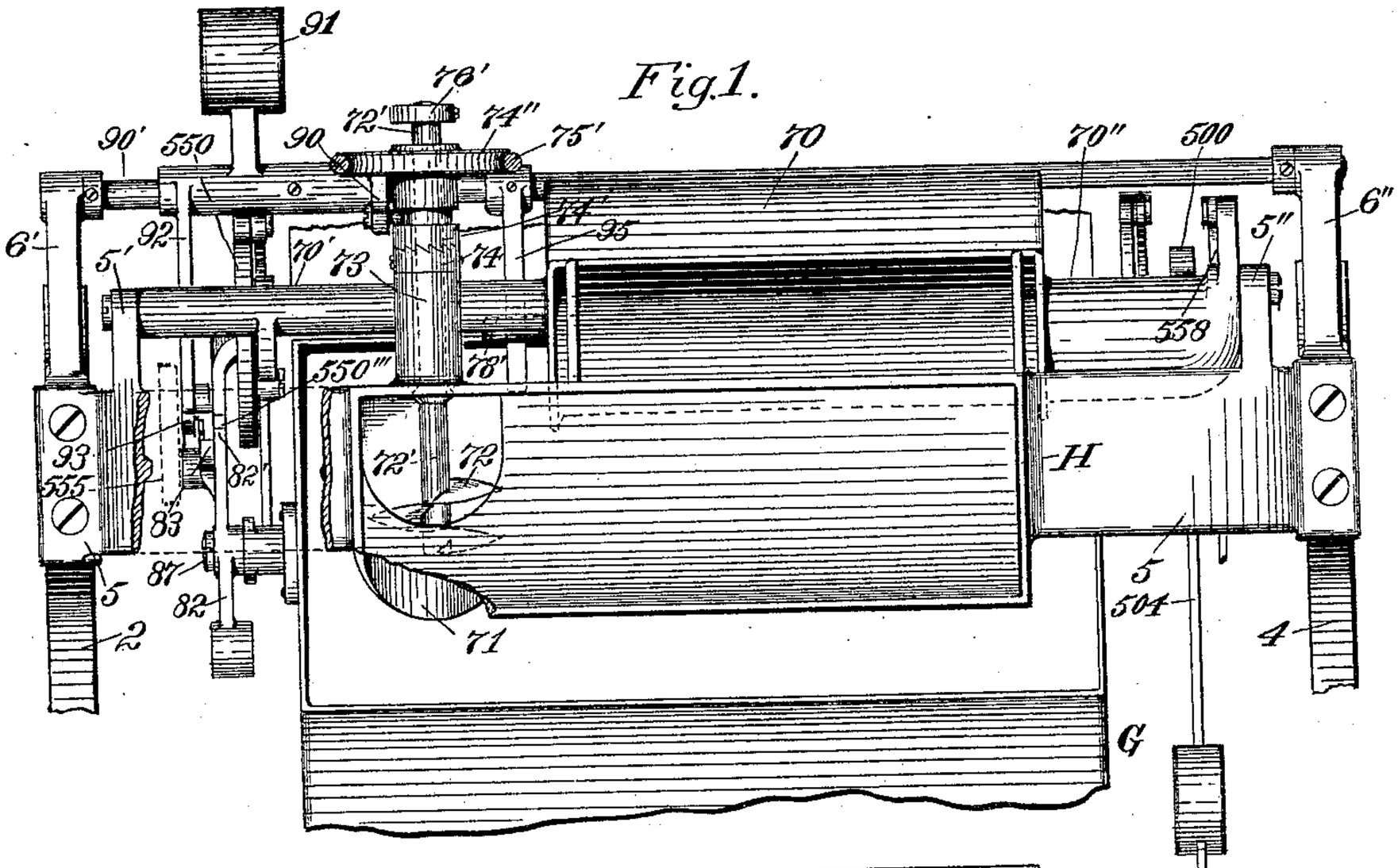

Fig. 2.

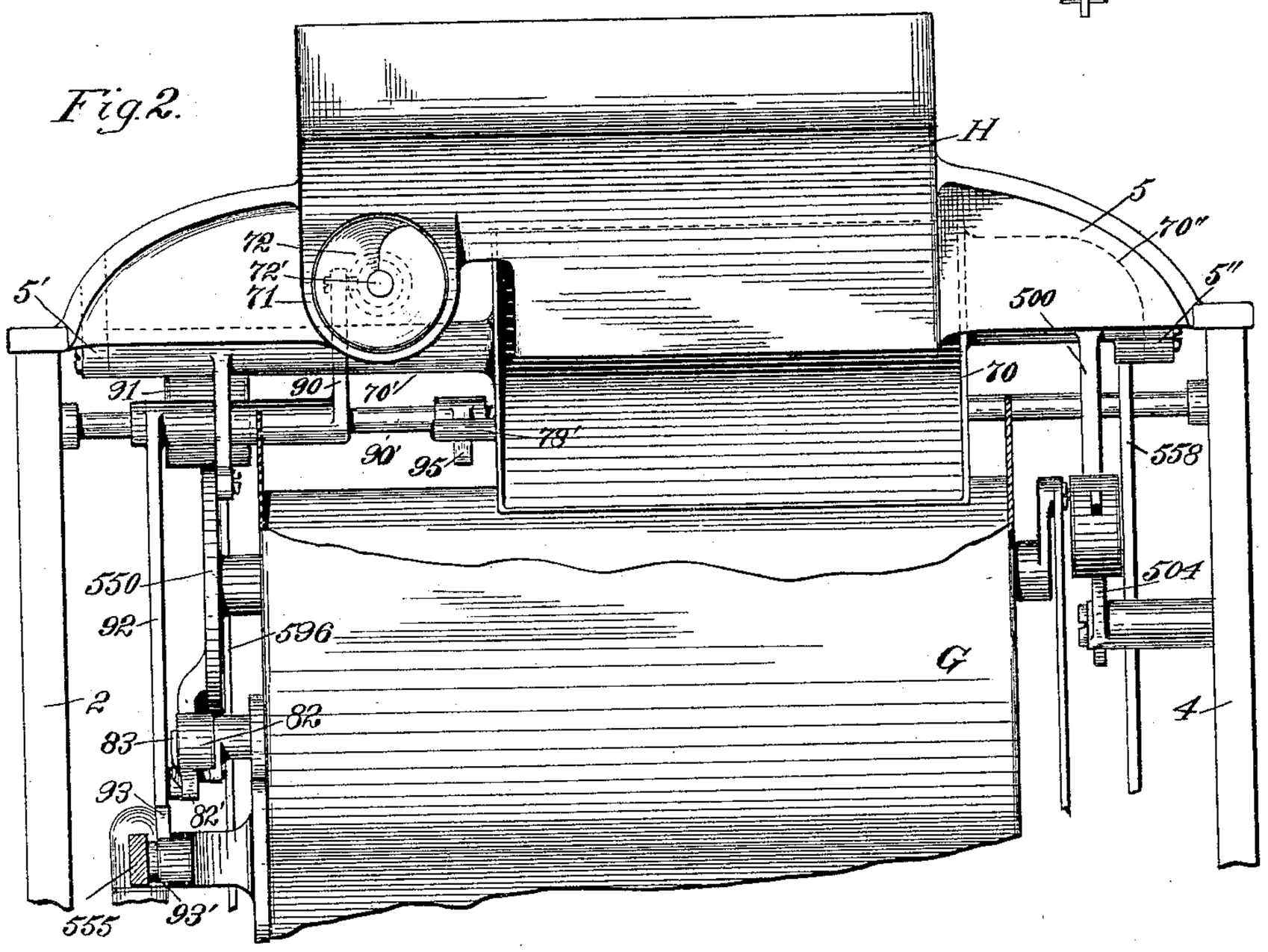

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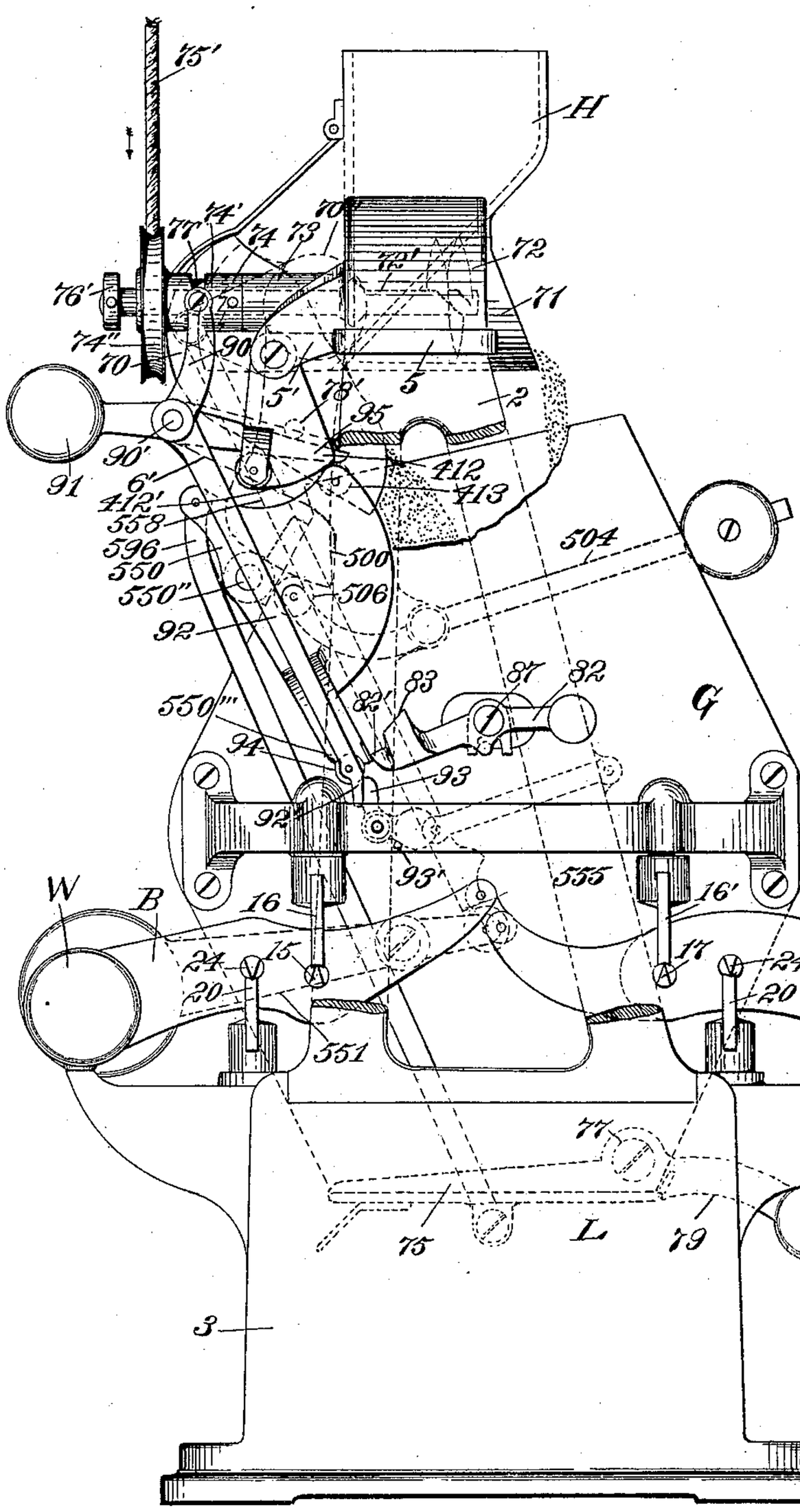
Fig. 3.



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WEIGHING MACHINE.

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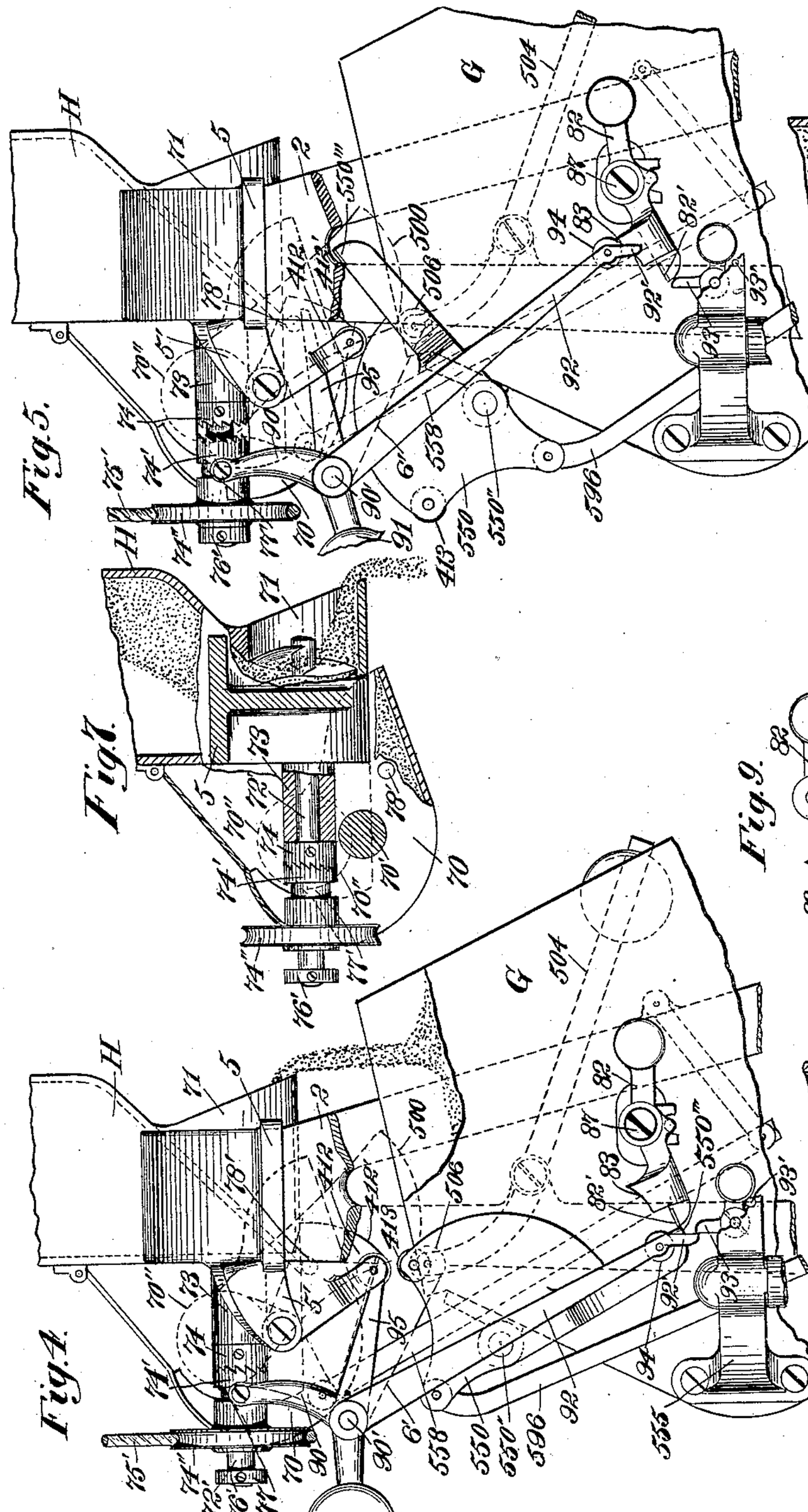

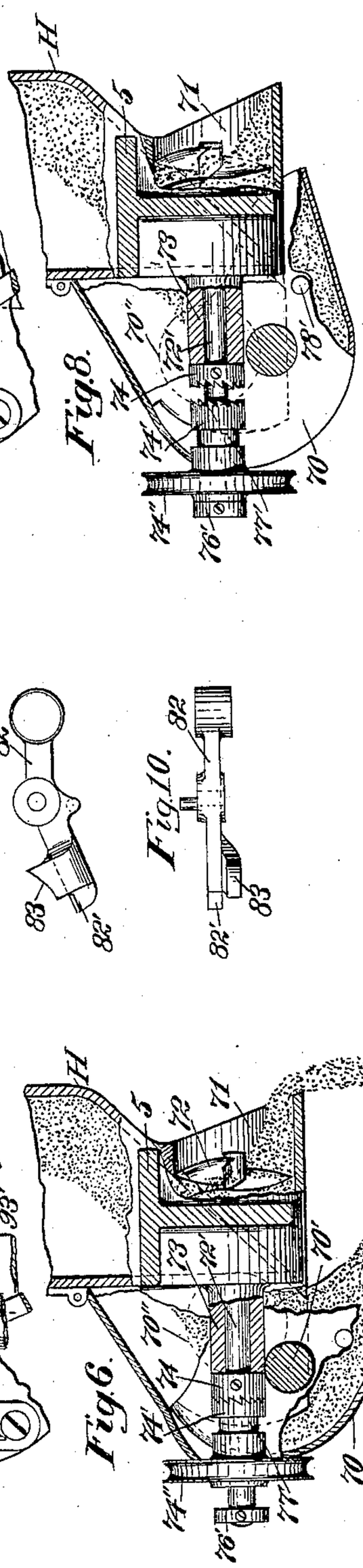

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 565,220, dated August 4, 1896.

Application filed October 1, 1895. Serial No. 564,307. (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 furnish an improved machine of that class having valve and stream feed mechanisms, and means for actuating the same, the present improvements being particularly adapted for weighing and delivering slow-running materials that cannot be successfully weighed by the ordinary types of weighing-machines.

In the drawings accompanying and forming part of this application, Figure 1 is a plan view of a portion of a weighing-machine embodying the present improvements. Fig. 2 is a front elevation of the same. Fig. 3 is a right-hand end elevation of the complete weighing-machine illustrated by Figs. 1 and 2 and showing the valve open to permit the flow of the main stream into the bucket and the feeding or forcing the drip-stream into the bucket. Fig. 4 is a similar view of the upper portion only of such machine and illustrating a succeeding step in its operation, the valve having cut off the main stream and the feeder still feeding the reduced or drip stream into the bucket. Fig. 5 is a similar view illustrating the last stage of the operation, the feeder being illustrated at rest and the bucket having received and discharging the bucket-load. Figs. 6, 7, and 8 are detail views, partly in section, and with parts broken away, and illustrating the valve and the feeder mechanisms in positions corresponding, respectively, with Figs. 3, 4, and 5. Figs. 9 and 10 are detail views, respectively, in end elevation and plan, illustrating a peculiar form of latch for holding the shiftable member of the bucket mechanism against movement.

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

For convenience in illustrating the nature and purpose of my present improvements these are shown and described in connection with a weighing-machine of the type described and claimed in Letters Patent No. 548,840, granted to me October 29, 1895; but it will be obvious from the following description that said improvements may be used as effectively with other forms of weighing-machines.

The framework for carrying the operative parts of the machine may be of any suitable construction, and is shown comprising two side frames or uprights 2 and 4, mounted upon a chambered supporting-base 3, and connected by a top plate 5, which is illustrated carrying a supply chute or hopper, such as H, which will be hereinafter more particularly described.

The base 3 will carry suitable beam-supports for supporting the beam mechanism, which latter carries the bucket mechanism, consisting of the bucket and its operative devices. Two of these beam-supports are illustrated at 20 and 20′ as the V-shaped bearings, (see Fig. 3,) and the base 3 will be similarly equipped at the opposite side thereof.

As a means for supporting the bucket or load-carrying receptacle, which is shown at G, and is of the "single-chambered" type or class, a pair of oppositely-disposed counterweighed beams are shown at B and B′, respectively, pivotally mounted on the beam-supports carried by the base 3. Each of the beams will carry a pair of pivots or knife-edges, and one of each pair is illustrated, respectively, at 24 and 24′. The beams will also carry, intermediate of the beam-supports, suitable bucket-supports, and these supports will preferably be a pair of pivots or knife-edges carried, respectively, by each of the beams, one of each pair being illustrated, respectively, at 15 and 17. The bucket G, at each end thereof, will preferably carry the hangers 555, which, in turn, carry the V-shaped bearings 16 and 16′, which correspond in number with the pivots or knife-edges 15 and 17, carried by the beams B and B′, and are adapted to be pivotally supported thereon.

Each of the scale-beams, in practice, will consist of a pair of beam-arms joined by a combined connecting-shaft and counterpoise, (the counterpoise for the beam B being designated by W, and that for the beam B′ being designated by W′.)

The weighing-machine will embody the usual poising and counterpoising mechanisms. All that portion of the beam mechan-

ism lying or located outside of the beam-supports constitutes the counterpoising mechanism, and all that portion of the beam mechanism intermediate of said beam-supports, including the bucket mechanism which is supported by the beam mechanism, constitutes the poising mechanism of the machine.

The bucket mechanism has two members, one of which is shiftable relatively to the other for discharging the bucket-load. The bucket-closer, which is designated in a general way by L, and which is illustrated constituting the shiftable member of the bucket mechanism, is shown consisting of a suitably-formed plate, or closer proper, 75, having a counterweighted arm 79, preferably formed integral therewith, the closer being also illustrated pivoted at 77 to the lower side of the bucket G and adjacent to one side of the discharge-opening thereof.

As a means for supporting the bucket-closer an inverted toggle connection is illustrated in the drawings connecting the closer and the bucket, and this toggle connection is so positioned as to be engaged by a closer-latch or holding means to thereby hold the closer against opening or bucket-discharge movement. In the form shown, this toggle connection comprises some suitable rocker—such, for instance, as 550—shown pivoted at 550″ to the upper rearward side of the bucket G, and having a long connecting-rod 596 pivoted thereto and also to the closer L in such a manner that when the closer L is shut the two pivots of said connecting-rod or toggle member will be nearly in line with, and the upper of said pivots will be above the rocker-pivot, whereby when the rocker is engaged by the bucket-closer latch, and held in that position, the closer will be supported with a minimum pressure on the latch, as practically all of the weight of the bucket contents will be carried on the pivot 550″ of the rocker 550.

The closer-latch for locking the rocker 550 in position when the closer is shut, and which is designated by 82, is shown herein pivoted at 87 to the bucket G, and having a detent or stop 82′ in position and adapted for engaging a coöperating stop 550‴ on the toggle connection, when the parts are in the closed position previously described.

The bucket-closer latch 82 is shown counterweighted, and, in the embodiment thereof illustrated in the drawings, the closer-latch swings upwardly to engage the detent carried by the rocker 550; and hence it will be apparent that said latch will be released by a downward pressure or movement. Suitable stops will also be employed for limiting the movements of the latch or closer-holding means 82.

In this art various methods are employed for obtaining the drip or reduced stream, which, in any successfully-operating weighing-machine, is a necessary and important factor. One method of securing the drip-stream is by a valve mechanism consisting of a supply-chute having two valves operative thereunder—a main valve and a supplemental or cut-off valve. The main or reducing valve reduces the volume of the supply-stream flowing from the supply-chute to a drip or drip-stream, which latter flows into the nearly-loaded bucket and until the load therein is completed, at which time this supplemental or cut-off valve is immediately actuated for cutting off the drip-stream.

Another method, and that illustrated in my Patent No. 535,727, granted March 12, 1895, is by a valve mechanism consisting of a supply-chute and a single valve operative thereunder, which latter controls the supply-stream. This last-mentioned valve gradually reduces the volume of the supply-stream to a drip-stream, at which time said valve, in practice, is momentarily held to permit the flow of the drip-stream into the bucket; and when the bucket-load is completed, said valve is immediately released for cutting off the drip-stream. In these and other forms of valve mechanisms, considerable difficulty is experienced in delivering to the bucket of the weighing-machine a drip-stream, when the material being weighed is of a sluggish or slow-moving character, owing to the marked tendency of such material to clog and block at the stream-controlling point, which renders practically impossible the securance of a satisfactory drip-stream, occasioning, necessarily, more or less loss on each successive operation of the machine. By my present improvements, this serious objection is entirely overcome.

The present improvements contemplate the maintenance of two separate streams of material—constituting the supply-stream—one the main stream which gravitates into the bucket, and the other a mechanically fed or forced drip-stream. These streams will simultaneously flow into the bucket until the load therein is nearly completed, when the flow of the main stream will be stopped. The drip-stream will be forced or fed into the bucket succeeding the stoppage of the main stream, and until the bucket-load is completed, when the flow of the drip-stream will be also stopped.

The supply-chute H is adapted for containing a mass of material, and is substantially similar to the improved supply-chute described and claimed in Letters Patent No. 548,853, granted to me October 29, 1895, and is shown provided with an inclined front wall, which thereby directs the main stream to the rear and away from the front of the valve through a stream-opening in the rear of said supply-chute.

As a means for controlling the main stream I prefer to employ, and have illustrated, a valve substantially similar to the valve shown and described in Letters Patent No. 535,727, granted to me March 12, 1895. Such a valve is illustrated at 70, supported for oscillatory

movement under the main-stream opening of the supply-spout. The end plates of the valves are shown provided with the laterally-projecting pivot arms or members 70′ and 70″, the latter of which serves as a balance-weight, so that the valve has normally no tendency either to open or close. The arms 70′ and 70″, respectively, are shown pivoted to the brackets 5′ and 5″, depending from the top plate 5.

As a means for opening and closing the valve any suitable mechanism may be employed.

The valve-closing mechanism illustrated is substantially similar to that shown and described in Letters Patent No. 548,843, granted to me October 29, 1895. A cam is shown at 500, which constitutes a valve-closing cam, and which has in practice two cam-faces—a reducing cam-face and a cut-off cam-face. A valve-closing actuator is shown at 504, pivoted to the side frame 4, and counterweighted forward of its pivot, and is provided with a friction-roll 506 to the rear of the pivot, which is adapted to contact with one or the other of the two cam-faces of the cam 500. During the first stage of the operation of the machine, the friction-roller 506 of the valve-closing actuator 504 will be on the reducing-face of the cam 500, and will thereby impart a slow-closing thrust to said valve in a direction for closing the same. When the friction-roll 506 passes beyond the reducing cam-face of said cam 500, it enters the cut-off cam-face of said cam, the latter being of greater efficiency than the former, the effect being an instantaneous closure of the valve for cutting off the main stream.

The mechanism shown for opening the valve is similar to that described and claimed in Letters Patent first hereinbefore referred to. The valve is shown provided with a long depending rod 558, operable therewith, which is adapted to receive a thrust from a valve-opening actuator. A valve-opening actuator is shown at 551 as a supplemental beam pivotally carried by the beam mechanism. This beam is shown counterweighted, and the force of this counterweight is normally exerted on the counterpoising mechanism, but is shiftable therefrom and on to the poising mechanism at a predetermined point in the operation of the machine. On the return movement of this supplemental beam 551 to the normal position, it is effective for imparting a valve-opening thrust to the connecting-rod 551 for opening the valve.

There is shown in the drawings a pair of stops operative, respectively, with the valve and with the closer, and these are illustrated at 412 and 550, and are in position and adapted for reciprocally limiting the valve and closer movements. The closer-operative stop is shown provided with a supplemental stop 413 in the form of a friction-wheel over which the supplemental stop 412′, which is illustrated as a cam-face, of the main-stop 412 rides to thereby limit or check the closing movement of the valve, and consequently to prevent a too-sudden closing movement thereof.

It will be remembered that the present improvements contemplate the maintenance of two separate and independent streams—a main stream, which is controlled by the valve 70, and a mechanically fed or forced drip-stream, which is fed or forced into the partially-loaded bucket—succeeding the cut off of the main stream by the main-stream-controlling valve 70.

The supply-chute H is shown provided with a drip-stream spout 71, which communicates with the interior of the supply-chute, (illustrated as circular in cross-section,) and in which will be supported for rotative movement a mechanically-operated drip-stream feeder 72, which is in the nature of a conveyer-screw. The tubular drip-stream spout 71 will preferably be disposed in a horizontal plane, or approximately so, so that when the feeder has been stopped at the predetermined point in the descent of the bucket, it will not be possible for the material to flow over the discharge edge of said drip-stream spout and into the loaded bucket. The diameter of the conveyer-screw or feeder 72 will be slightly less than that of the circular drip-spout to permit the perfectly free rotation of said feeder therein.

The feeder 72 will preferably be fixedly secured to its carrying-shaft 72′ in some suitable manner. The rotation of the feeder-shaft 72′, and thereby its feeder, will be stopped at a predetermined point in the operation of the machine; and for effecting this purpose I prefer to employ a clutch mechanism, one member of which will be operative with the feeder, and the other of which will have a sliding movement away from said fixed clutch member. For unclutching these clutch members connection will be made from a moving part of the machine. The supply-chute is shown at the rear thereof provided with a relatively long bearing 73, in which is illustrated, mounted for rotation, the feeder-carrying shaft 72′. The shaft 72′ is illustrated carrying a fixed member 74 of a clutch or clutch mechanism. Any of the well-known forms of clutches may be used, but I prefer to employ the clutch shown. This fixed clutch member may be secured to the shaft 72′ in some well-known manner, as by the pin illustrated. The slidable clutch member, which is illustrated at 74′, is connected with a suitable motor, and will have a movement on the shaft 72′ toward and from the fixed clutch member 74. The inner faces of the clutch members will each be provided with teeth or serrations, and it will be obvious that when these teeth are in mesh, or engaged, the fixed clutch will be rotated, and hence the feeder-carrying shaft 72′ and the feeder 72 itself, and when said slidable clutch member 74 is moved away from its mate, the rotation of the feeder will be stopped.

The movable or slidable clutch member 74′

is shown provided with a pulley or band-wheel 74″, about which is illustrated, passed, a rope or belt 75′, which will also be connected with some suitable driving mechanism or motor. (Not shown.)

The outer extremity of the feeder-carrying shaft 72′ is also illustrated carrying a stop 76′ for limiting the outward movement of the slidable clutch member 74 when this is disengaged from its mate. This slidable clutch member is also shown provided with a peripheral channel or groove 77′, which is adapted to be engaged by a suitable throw-out device for unclutching the clutch at the proper point—that is, on the completion of the bucket-load.

As a means for unclutching the clutch, to thereby stop the feeder, and to also stop the flow of the drip-stream, I prefer to employ the throw-out device or shifting mechanism shown. A transverse shaft is shown at 90′, supported for rocking movement by the arms or brackets 6′ and 6″, which are shown projecting rearwardly from the side frames 2 and 4 of the framework. This shaft 90′ is illustrated fixedly carrying at a point adjacent to one end thereof and for oscillatory movement therewith the shifting-lever 90, the function of which is to shift or move the slidable clutch member 74′ out of engagement with the fixed clutch member; and this shifting-lever 90 is in the nature of a self-active shifter, being illustrated counterweighted at 91. The normal tendency of this lever 90 is to unclutch the clutch members 74 and 74′; but this action will be prevented by a suitable stop carried by the poising mechanism of the machine. This shifting-lever is shown provided with a relatively long depending arm 92, which is operative therewith and which terminates in a detent or stop 92′, which is adapted to be engaged by a coöperating stop or detent, as 93, illustrated carried by the bucket G. For holding the arm 92, and thereby the lever 90, against shifting movement, the stop 93 shown will be preferably employed. This stop is in the nature of a by-pass stop and is supported by the bucket G for oscillatory movement thereon and as counterweighted forward of the pivot thereof. A stop-pin 93′ will also be provided for maintaining the by-pass stop 93 in operative position. The length of the upper or vertical arm of the by-pass relatively to the depending arm 92 is such that said vertical arm will engage the detent 92′ at the commencement of the operation of the machine, to hold the arm 92, and thereby the lever 90, against shifting movement until the bucket has reached and gone below the poising-line, when said detent 92′ will be released for throwing the feeder out of action. On the return movement of said arm 92, the detent 92′ thereof will swing the by-pass about its pivot and thereby be permitted to resume its normal position, as shown by Fig. 3.

It will be remembered that the shiftable member of the bucket mechanism (illustrated as the closer L) has been described as held against movement by the latch 82 by engagement of a detent on said latch with a coöperating detent carried by the rocker 550, and that when a downward pressure is exerted on said latch 82 these detents will be disengaged, so that the weight of the material in the bucket resting on the closer will immediately open the latter for discharging the bucket-load. As a means for releasing the closer L the lever or arm 92 is shown provided with an actuator or releaser device 94 for tripping said latch.

The closer-latch 82 is illustrated provided with a cam or stop face 83, which is adapted to be impinged by the releaser device 94, which is preferably in the form of a friction-roll, as shown. It will be apparent that immediately on the release of the detent 92′ by the detent 93 the shifting-lever 90, which is then free of restraint by reason of the counterweight 91, will immediately be effective for unclutching the clutch mechanism, thereby throwing the feeder out of action, and succeeding this operation the lever 92, which carries the releaser device 94, will continue to move, and during this movement the releaser device or latch-actuator 94, which is operative therewith, will release the closer by disengaging the detents, respectively, of the rocker 550 and the latch 82. Hence it will be evident that for throwing the feeder out of action and for releasing the shiftable member of the bucket mechanism means, in the nature of a combined throw-out device and latch-actuator, are provided for successively throwing the feeder out of action and for releasing the closer. It will also be evident that for releasing the shiftable member of the bucket mechanism a self-active releaser device is provided.

As a means for returning the feeder to action I prefer to employ an actuator operated by and from the power of the opening-valve. The transverse shaft 90′ is shown provided with a forwardly-extending stop-lever 95, shown fixedly secured to said shaft at a point adjacent to the valve 70, and which is oscillatory with said shaft and also with the shifting-lever 90. When the shifting-lever 90 is released in the manner previously described, it will be apparent that the stop-lever 95 will also be released, and when so released said stop-lever 95 will be projected upwardly through the agency of the counterweight 91 of the shifting-lever 90. The upward movement of this stop-lever 95 will be arrested by a suitable stop, against which said lever 95 abuts when the feeder is thrown out of action. The stop for this purpose is illustrated at 78′, carried by the end plate of the valve 70. It will be apparent that on the opening movement of the valve the stop-arm 78′, which then serves as an actuator, will be effective to carry the lever 95 downwardly, and during this action the shifting-lever 90 will also be oscillated. On this oscillation

the lever 90, which controls the movement of the slidable clutch member, will return said member to its position in mesh with its mate or fixed clutch member 74, whereby the feeder 72 will again be rotated, in the manner previously described, for feeding the drip or reduced stream into the bucket G.

Briefly described, the operation of a machine embodying my present improvements is as follows: Fig. 3 illustrates the normal position of the machine at the commencement of the operation thereof, the full supply-stream, composed of the main stream and the drip-stream, flowing into the bucket G. When a sufficent portion of the load has been received by the bucket, this tends to descend. With the descent of the bucket the lever 551 will fall slowly from under the connecting-rod 558, permitting a slow closing movement of the valve by the valve-closing actuator. At the commencement of the poising period the major portion of the load will have been received by the bucket, and the lever 551 will have a movement away from the rod 558 by the transference of the weight thereof on to the poising mechanism, thereby permitting an instantaneous closure of the valve by the valve-closing actuator for cutting off the main stream. On the cut off of the main stream the drip-stream will continue to be fed into the bucket by the mechanically-operated feeder 72. When the bucket G has reached and gone below the poising-line on the completion of the bucket-load, the by-pass 93 will release the detent 92′. When the latter detent is released, the shifting-lever 90 will also be released, and the latter will immediately unclutch the clutch, thereby stopping the movement of the feeder, and hence stopping the flow of the forced or fed drip-stream. On the release of the detent 92′ the lever 92 will also be released, and succeeding the unclutching of the clutch and consequent stoppage of the drip-stream the releaser device 94 will immediately trip the latch 82, which operation releases the closer for discharging the bucket-load.

When the bucket G has ascended and reached the stream-receiving position, as indicated by Fig. 3, the supplemental counterpoise 551 on its return stroke, oscillating about its pivot on the beam B, imparts an upward thrust to the connecting-rod 558 for opening the valve 70. On the opening movement of the valve the actuator 73 on the end wall thereof, being in engagement with the stop-arm 95 of the throw-out device, will oscillate the latter and hence the lever 92 about its pivot. When the lever 92 has nearly assumed its normal position, as illustrated in said Fig. 3, the lower end thereof will engage the upper or vertical arm of the by-pass 93, swinging said arm about its center of movement, thereby permitting said lever to resume its normal position. The tendency of the lever 92 is to shift upwardly, but this tendency will be normally prevented by the by-pass 93, which, engaging said lever, positively holds the same against movement during the closing movement of the valve until the latter has cut off the main stream and until the bucket has reached and gone below the poising-line.

It will be apparent that as the lever 92 is oscillated in the manner just described the actuating-lever 90, which governs the movements of the slidable clutch member 74′, being moved in a forward direction will slide said slidable member forwardly on its shaft 72′ until the teeth or serrations thereof are in engagement with the fixed clutch member 74, at which time the feeder 72 will again be rotated for feeding or forcing the drip-stream into the bucket G.

Having thus described my invention, what I claim is—

1. In a weighing-machine, the combination with beam mechanism, and with bucket mechanism supported thereon for ascending and descending movements; of a stream-spout; a mechanically-operated feeder; a throw-out device for throwing said feeder out of action; and a by-pass stop carried by one of said mechanisms, and normally holding said throw-out device against movement.

2. In a weighing-machine having poising mechanism, the combination with a supply-chute for supplying a main stream of material, of a stream-controlling valve therefor; valve-actuating mechanism; a throw-out device for throwing said feeder out of action; and means carried by the poising mechanism for holding said throw-out device ineffective during the closure of, and the cut off of the said stream of material by, said valve.

3. In a weighing-machine, the combination with a supply-chute, and with a valve therefor; of a stream-spout; a mechanically-operated feeder located in said spout; a throw-out device for throwing said feeder out of action; and means operated by said valve for returning the feeder to action.

4. In a weighing-machine having poising mechanism, the combination with bucket mechanism consisting of two members, one of which is shiftable relatively to the other; of a latch normally holding said shiftable member against movement; and a self-active releaser device for tripping said latch to thereby release the shiftable member of the bucket mechanism; and a stop carried by said poising mechanism for normally holding said releaser device against movement, substantially as specified.

5. In a weighing-machine, the combination with bucket mechanism comprising two members, one of which is shiftable relatively to the other; of a latch for holding said shiftable member against movement, and having a curved stop-face; and a releaser device consisting of a friction-roll for impinging against said curved face for tripping the latch, where-

by the shiftable member of the bucket mechanism will be released, substantially as specified.

6. In a weighing-machine, the combination with beam mechanism, and with a bucket mechanism supported thereon for ascending and descending movements; of a stream-spout; a feeder operative in said spout; clutch members operatively connected, respectively, with the feeder and with driving mechanism; a throw-out device operatively connected with, and adapted for unclutching, said clutch members; and a by-pass stop carried by one of said mechanisms for normally holding said throw-out device against movement.

7. In a weighing-machine, the combination with a bucket mechanism having two members, one of which is shiftable relatively to the other; of a stream-spout; a mechanically-operated feeder operative therein; and a combined throw-out and releaser device adapted for successively throwing the feeder out of action, and for releasing the shiftable member of the bucket mechanism, substantially as specified.

8. In a weighing-machine, the combination with beam mechanism, and with a bucket mechanism supported thereon for ascending and descending movements; of a supply-chute, and a valve therefor; a stream-spout, and a stream-feeder operative therein; a shaft for supporting said feeder; a fixed clutch member carried by such shaft; a slidable clutch member having a sliding movement on said shaft, and operatively connected with driving mechanism, whereby when said clutch members are in engagement, the feeders will be actuated; a throw-out lever connected with said slidable clutch member and adapted also to unclutch said clutch members; and a stop, carried by the bucket mechanism, normally holding said lever against movement, and adapted also to release the same at a predetermined point in the descent of the bucket.

9. In a weighing-machine, the combination with a supply-chute; and an opening and closing valve for controlling a stream of material flowing therefrom and having a stop thereon; a drip-stream spout; a drip-stream feeder operative in said spout; a throw-out lever operative for throwing said feeder out of action; a stop-lever having a movement with the throw-out lever, and adapted to abut against the stop carried by the valve when the feeder is thrown out of action, whereby when the valve is opened, it will be effective for returning said feeder to action, substantially as specified.

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