(No Model.) 5 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 573,418. Patented Dec. 15, 1896.

Fig. 1.

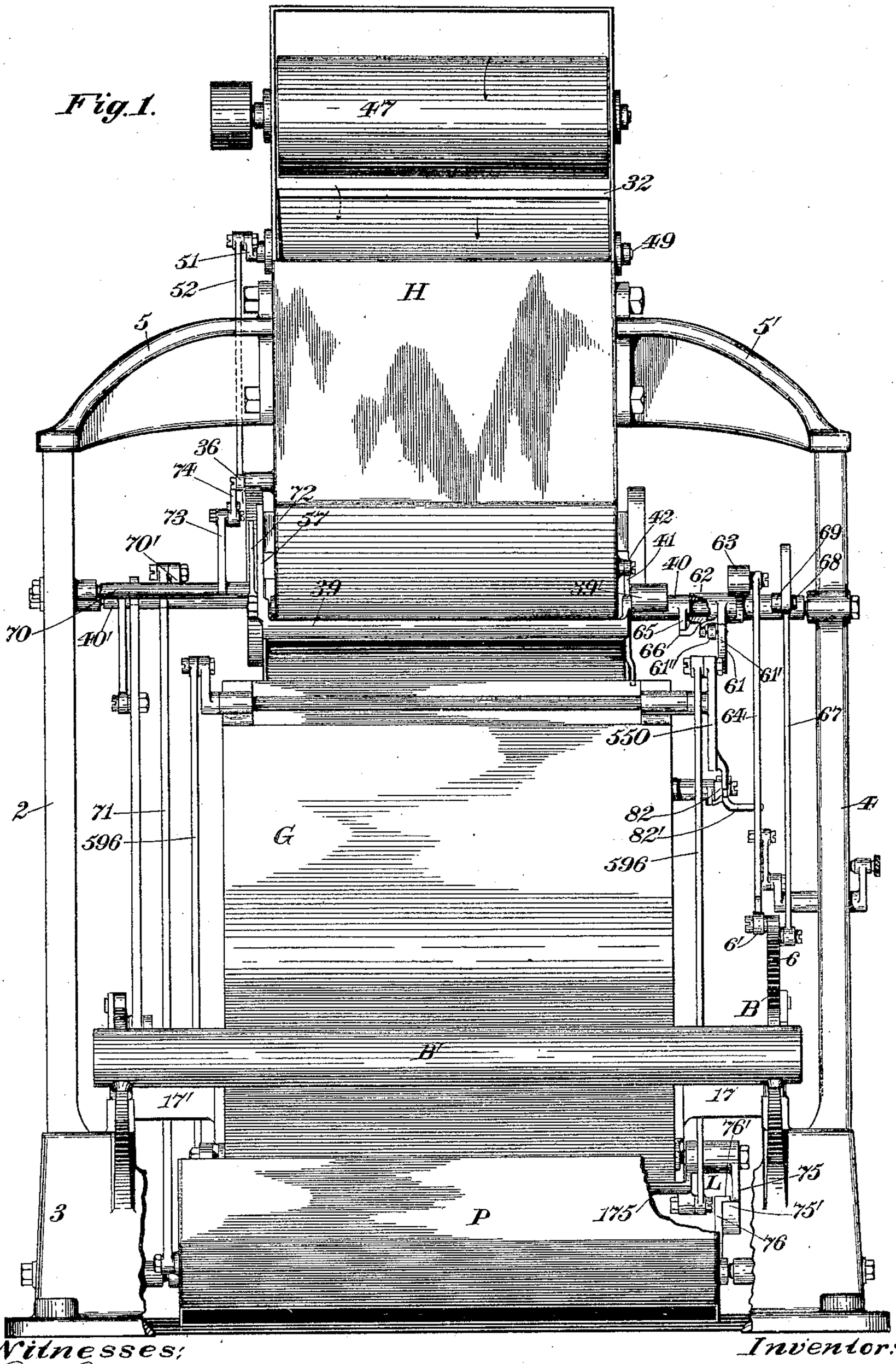

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Fig. 2.

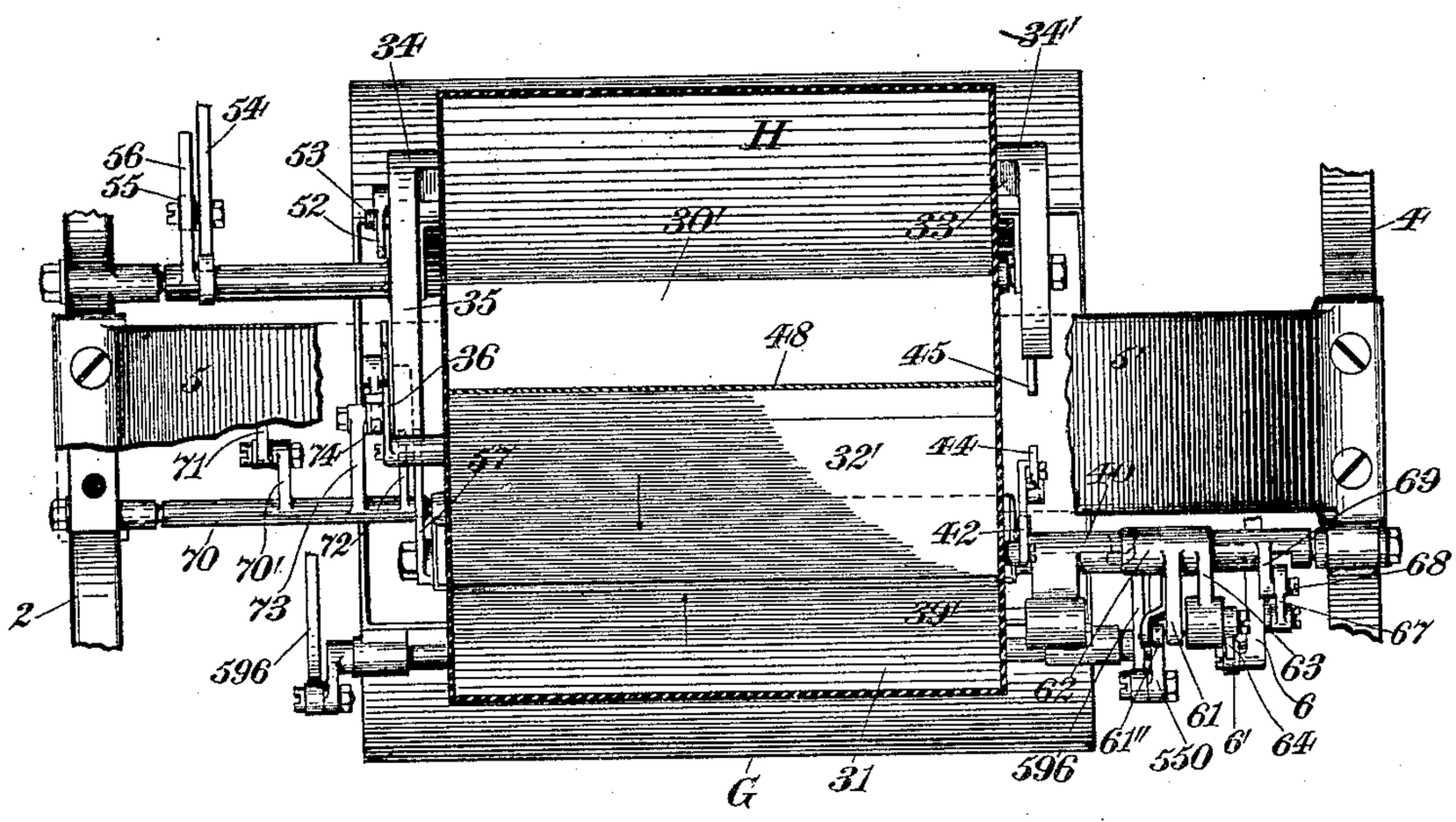
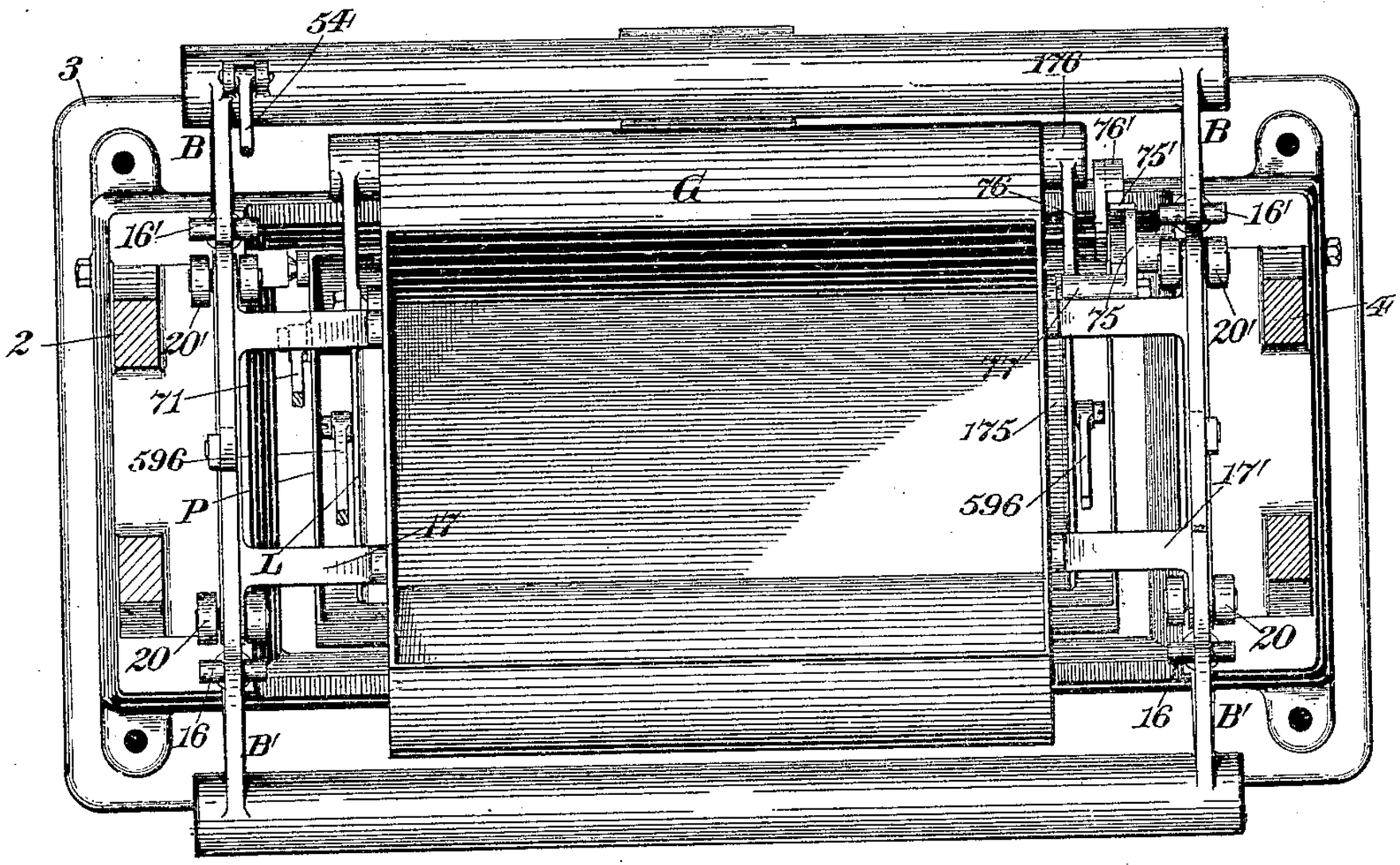


Fig. 3.



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5 Sheets—Sheet 3.

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WEIGHING MACHINE.

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Fig. 4a.

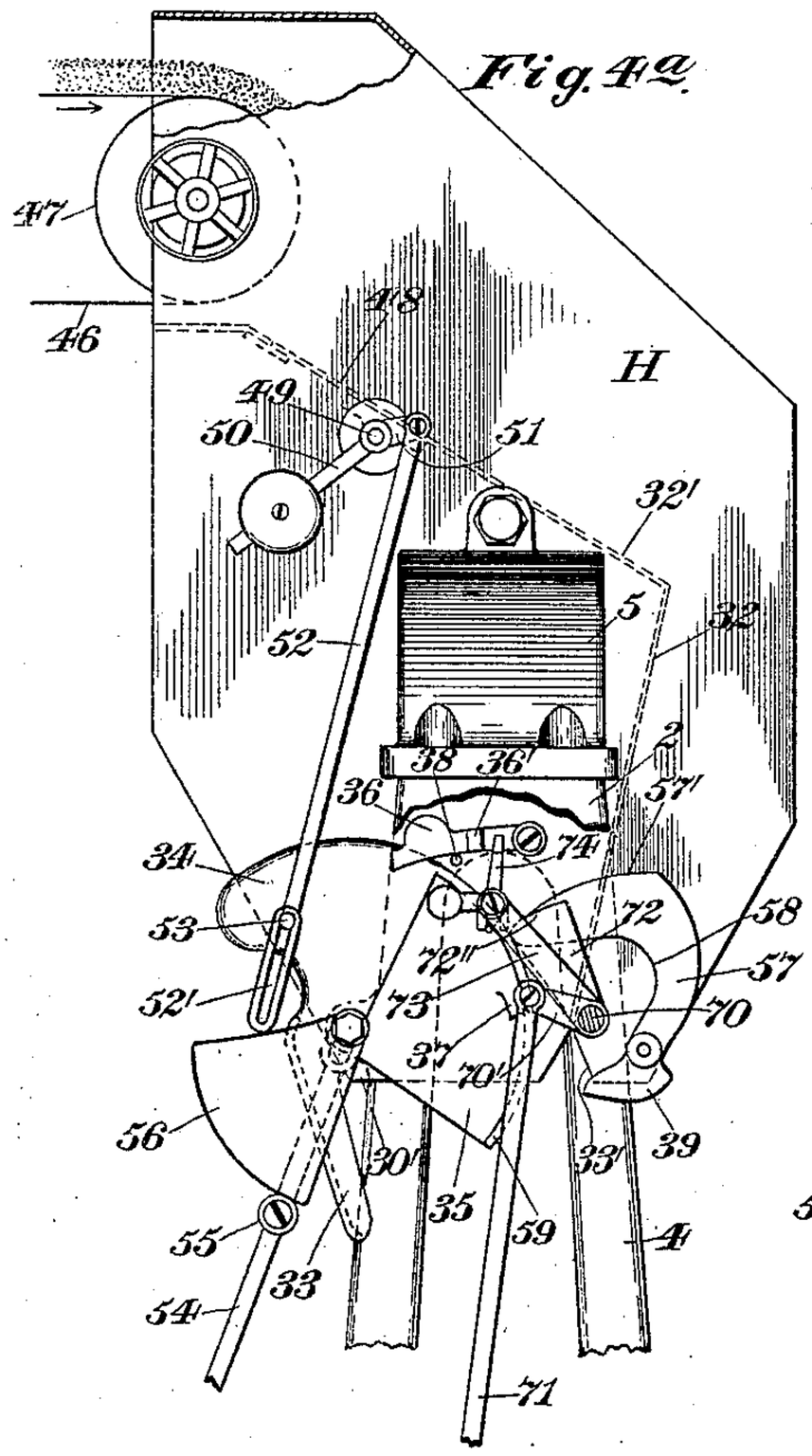
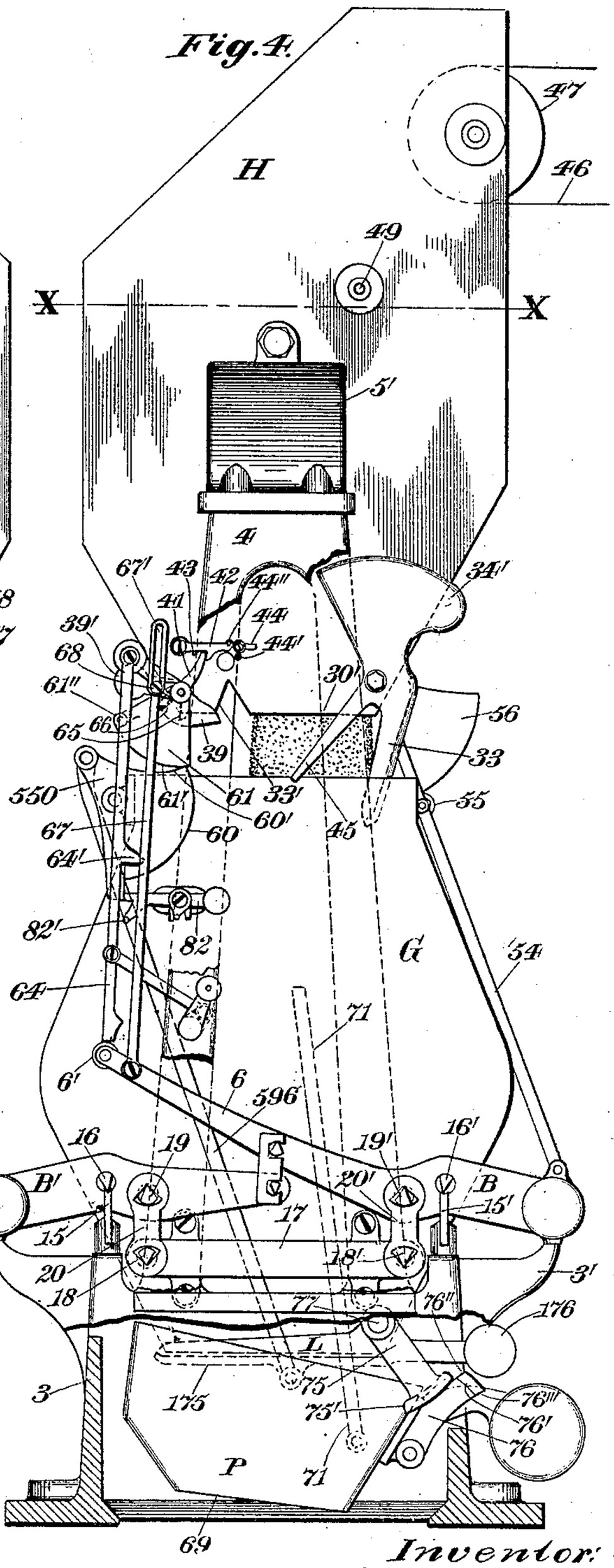


Fig. 4.



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WEIGHING MACHINE.

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Fig. 5a.

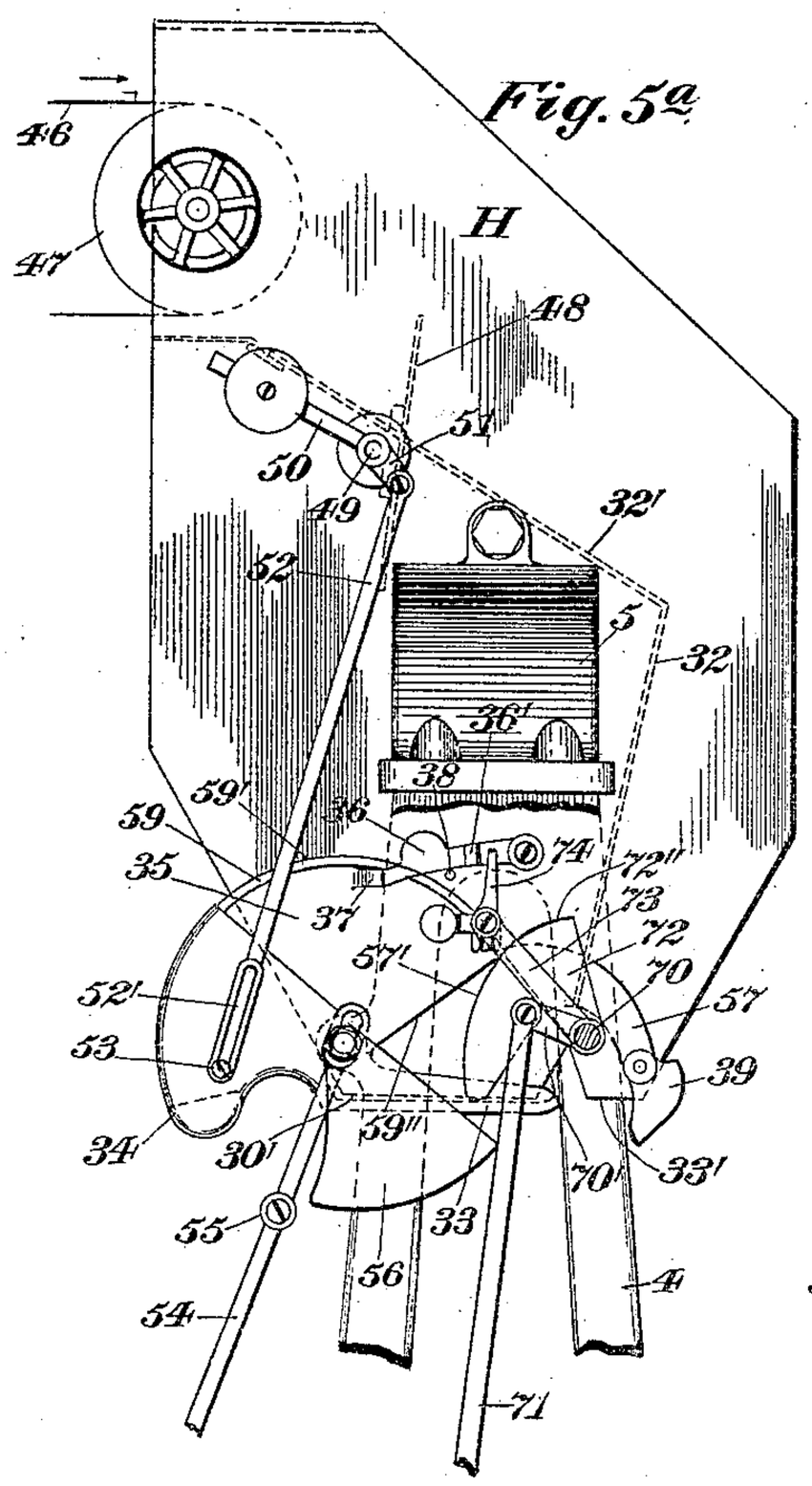


Fig. 5.

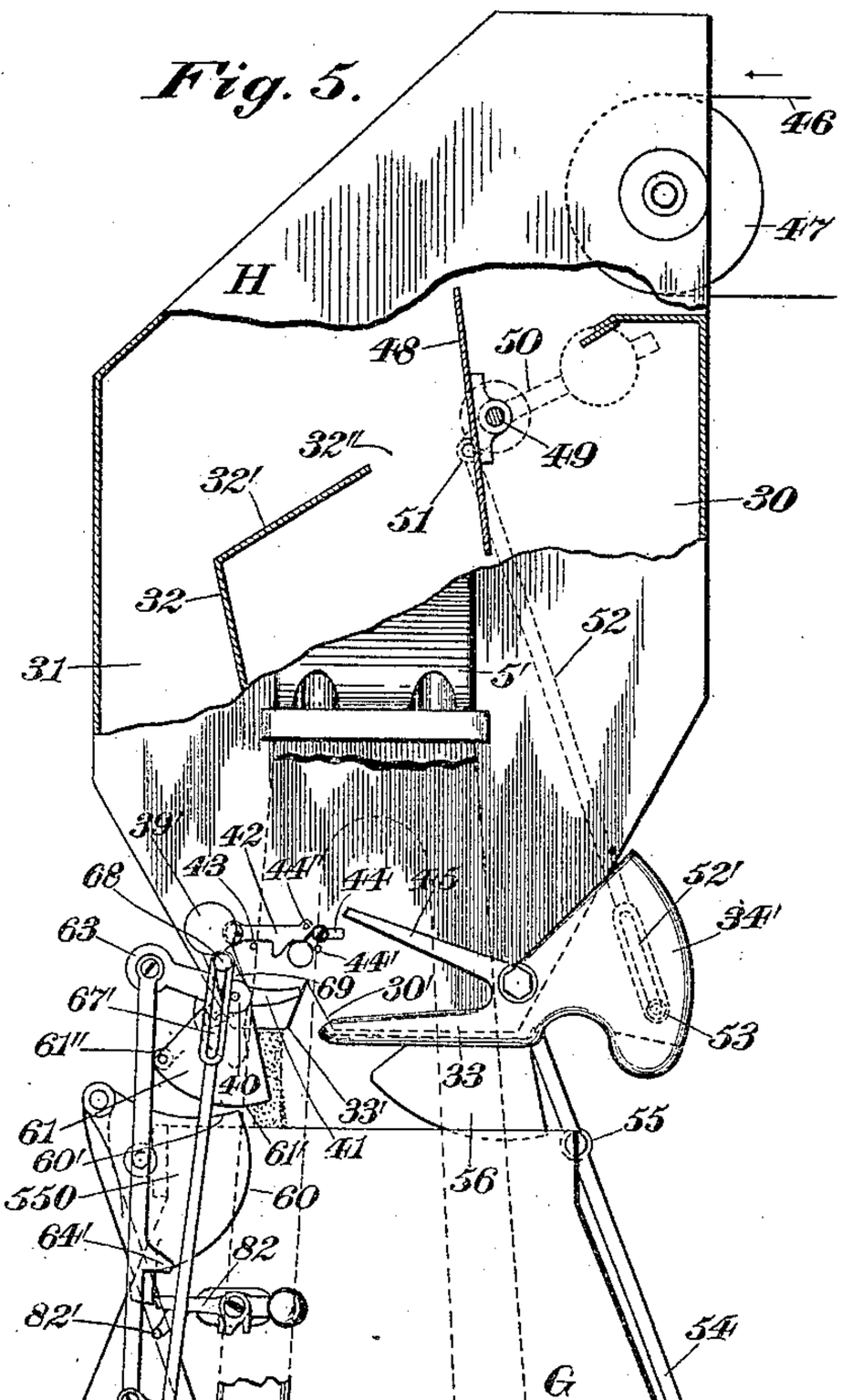
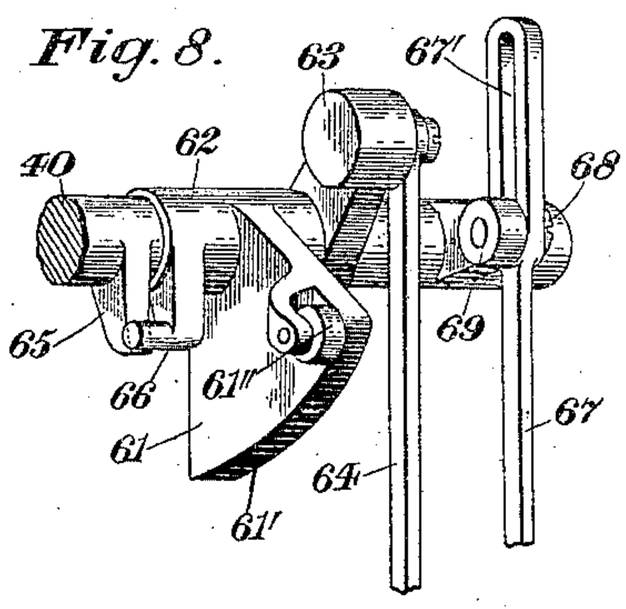


Fig. 8.



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WEIGHING MACHINE.

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Fig. 6ª.

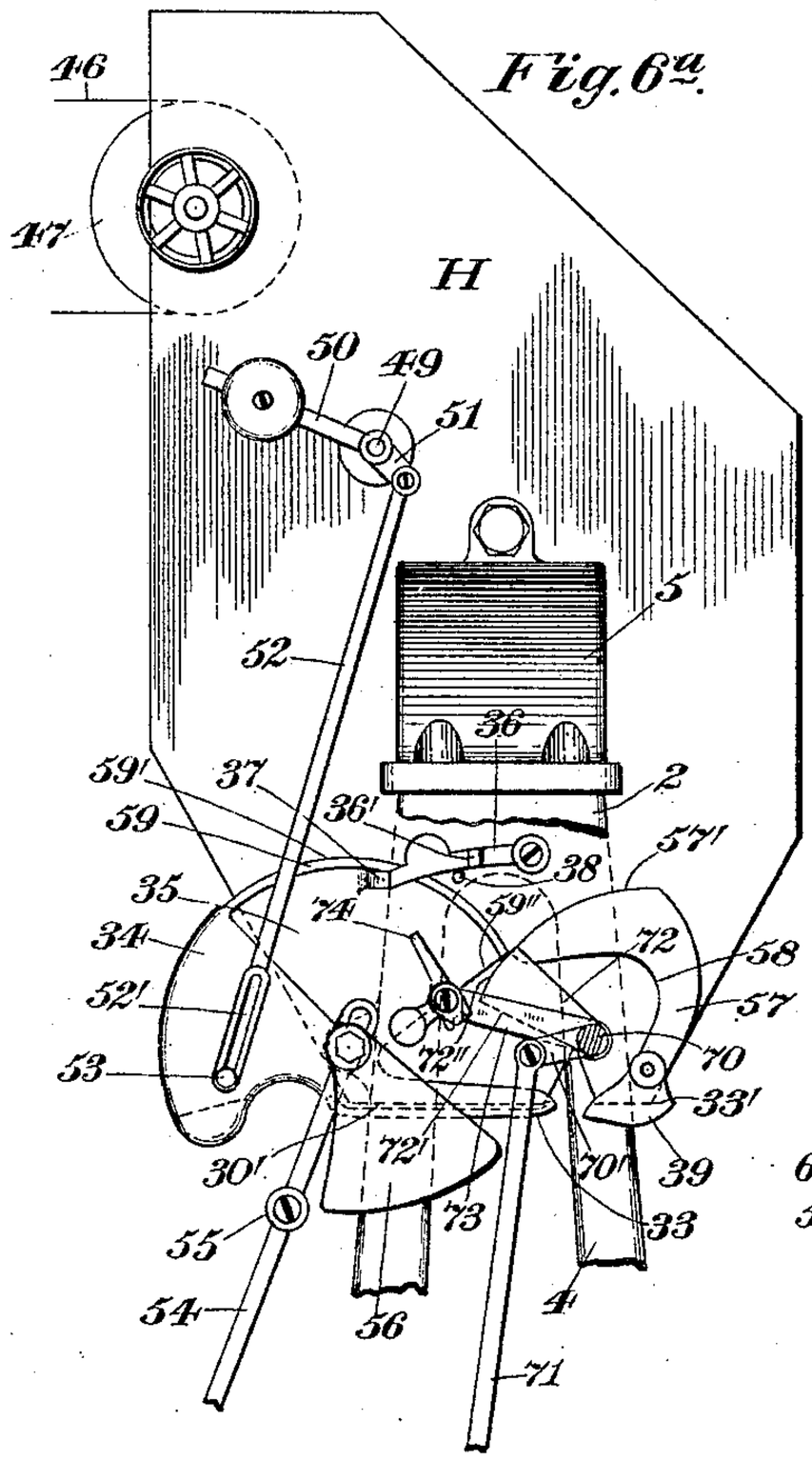


Fig. 6.

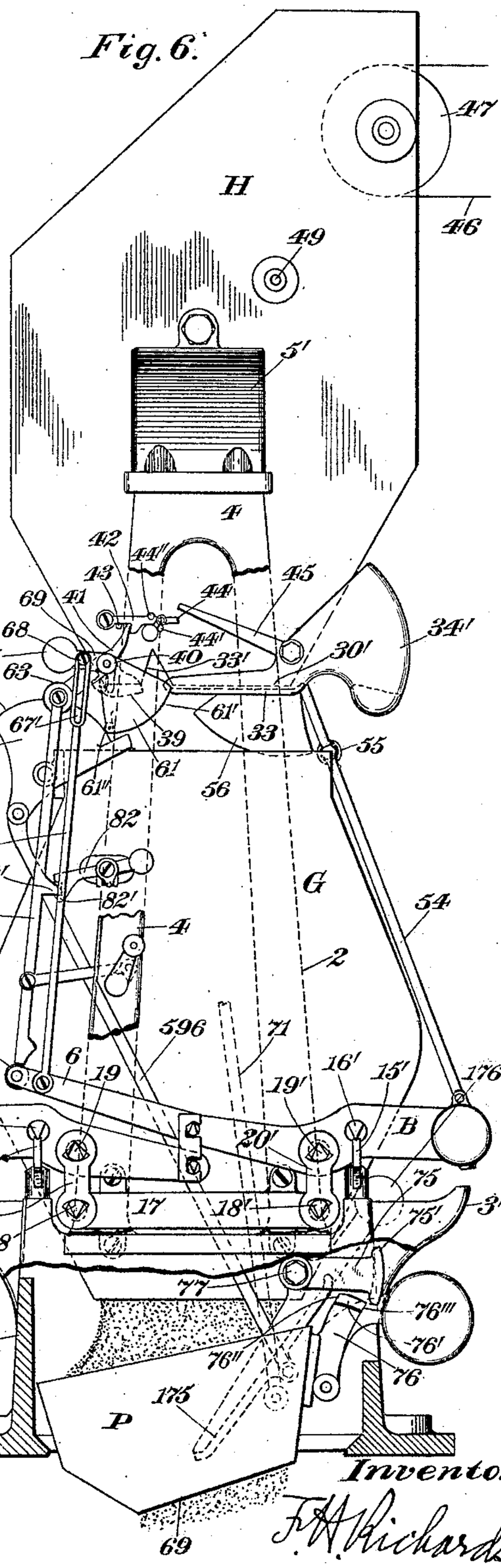
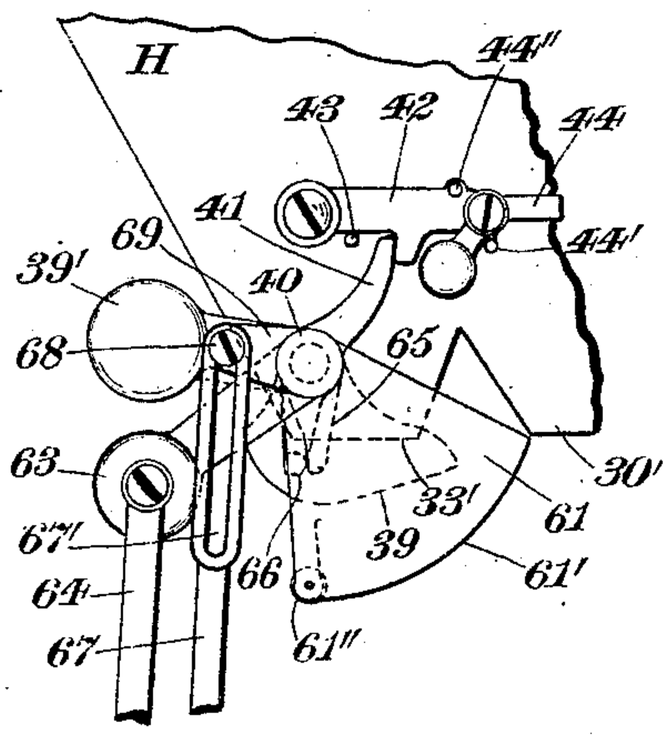


Fig. 7.



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Fred. J. Dole.

Inventor:
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 573,418, dated December 15, 1896.

Application filed June 3, 1896. Serial No. 594,168. (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, one of the objects being to provide an improved organization of mechanism for loading the bucket in a minimum space of time, whereby the capacity of the machine will be materially increased.

Another object of the invention is the provision of means for insuring the operation of the coacting parts in a regular or determined order, so that waste of the material at all points in the operation of the machine will be wholly obviated.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine comprehending my improvements in the preferred embodiment thereof. Fig. 2 is a sectional plan view of the machine, the section being taken in line *x x*, Fig. 4. Fig. 3 is a plan view of the bucket and parts below the same, the framing of the machine being in section. Fig. 4 is an end elevation as seen from the right in Fig. 1, illustrating the positions occupied by the operative parts at the commencement of operation. Fig. 4ª is an end elevation of the upper part of the machine as seen from the left in said Fig. 1, the parts being in positions corresponding with Fig. 4. Figs. 5 and 6 are views similar to Fig. 4, showing the machine at two succeeding points in its operation. Figs. 5ª and 6ª being views similar to Fig. 4ª, with the parts in positions corresponding, respectively, with Figs. 5 and 6. Fig. 7 is a detail view, on a slightly-enlarged scale, hereinafter more particularly described; and Fig. 8 is a detail view hereinafter referred to.

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

The framework for supporting the operative parts of the machine may be of any suitable or preferred form, and it is herein shown comprising the two side frames or columns 2 and 4, suitably mounted upon the chambered supporting-base 3, into which latter the loads of material are intermittently discharged from the bucket of the weighing mechanism.

A chute or hopper, to be hereinafter more particularly described, is shown at H, the pair of brackets 5 and 5′, secured to and laterally extending from the end walls thereof, and attached, respectively, to the side frames 2 and 4, constituting a convenient means for sustaining said chute.

As a means for supporting and balancing the bucket, which is designated by G, the beam mechanism illustrated may be employed, which comprises the oppositely-disposed scale-beams B and B′, respectively, one of the arms of the first-mentioned scale-beam being shown extended, as indicated in Figs. 4, 5, and 6, for a purpose to be hereinafter described.

The base 3 is illustrated carrying suitable beam-supports, these being in the present instance four in number, two of which are designated by 15 and 15′, and are shown as V-shaped bearings. (See Fig. 4.) The beam-arms, there being four, will be equipped with pivots or knife-edges, two of these being shown at 16 and 16′, resting on the V-shaped bearings 15 and 15′ on the base of the machine, and by which said beam mechanism is pivotally supported.

The bucket G is illustrated having rigidly connected to its opposite end walls the brackets or frames 17 and 17′, (shown most clearly in Figs. 3 and 4,) the longitudinal cross-piece of which may carry the pivots or knife-edges 18 and 18′ near the opposite ends thereof. The beam-arms will also carry intermediate the supports therefor suitable bucket-supports, two of the latter being shown in Fig. 5 as pivots or knife-edges 19 and 19′. The knife-edges 19 and 19′ and 18 and 18′ of the beam and bucket, respectively, are shown connected by the suspension-links 20 and 20′, preferably apertured adjacent to the extremities thereof, in which apertures may be formed V-shaped or other bearings, against which said pivots or knife-edges may play during the operation of the machine.

The bucket G is of the "single-chambered" type or class, and is located with its receiving mouth or orifice in position to receive a stream or streams of material from the chute or hopper H.

The closer for the bucket is designated in a general way by L, and is shown consisting of a flat plate 175, having the rearwardly-extending counterweighted arm or arms 176, the purpose of said arm or arms being to return the closer to its normal or shut position, as indicated in Fig. 4. The closer is also shown pivotally supported at 77 to the lower rearward side of the bucket G and adjacent to the discharge-outlet thereof.

As a means for supporting the closer the inverted toggle herein illustrated may be employed, said toggle consisting of the rocker 550, pivotally supported near the upper forward side of the bucket, and the connecting-rod 596, pivotally connected to said rocker and also to the closer in such a manner that when the latter is in its normal position the three toggle-pivots will be approximately in line, as indicated in Fig. 4, so that said rocker, when engaged by a suitable latch or detent device, may be held against movement by a minimum pressure, whereby the connected closer may be also held while such engagement continues. For thus maintaining the rocker against oscillatory movement on the bucket a latch 82 is herein illustrated, said latch being counterweighted and pivotally supported by the bucket. In the embodiment illustrated this latch swings upward to engage the rocker, the counterweight being preferably employed for effecting such an action.

The chute or hopper H comprises a measuring chamber or compartment 30, in which is made up the major part of a bucket-load, which is discharged bodily or in bulk through the relatively wide outlet 30′ into the bucket G. Said hopper is also provided with a drip-chamber 31 adjacent to said measuring-chamber and separated therefrom by the angular partition or septum 32, said drip-chamber leading to the outlet 33′.

In weighing-machines as generally constructed it is customary to make up nearly the complete bucket-load with what is termed the "main stream," said stream being at the commencement of operation of relatively large volume, which flows into the bucket for a considerable period of time, it being gradually reduced. On the cut-off of the main stream a drip or relatively fine stream is directed or supplied to the bucket for completing the load therein. Through the agency of the measuring chamber or meter 30, as hereinbefore stated, the major part of the load will be made up therein and dumped or discharged bodily or in bulk into the bucket, and when the major part of the load has been made up by said bulk of material a drip-stream will be caused to flow into the bucket from the drip chamber or compartment 31 to complete the partial bucket-load. By virtue of such an organization it is possible materially to increase the capacity of the machine intended for accurate weighing, as will be readily apparent.

The outlet 30′ of the measuring-chamber is shown provided with a valve or flap 33, pivotally supported at one side thereof and which exceeds in area that of the said outlet. The valve or flap 33 is shown provided with the preferably integral end plates 34 and 34′, which are suitably counterweighted, said counterweights serving as a means for returning said flap or valve to the closed position thereof, as indicated in Figs. 5ª and 6ª. Said flap or valve 33 will be normally maintained in a closed position by suitable means, and when released the weight of the mass of material in the measuring-chamber is adapted to force the same open instantly to cause the contents of the measuring-chamber to be directed or gravitate into the empty bucket, and when the mass has passed below the lower edge or lip of said flap or valve the latter is free to be quickly closed by the counterweighted end plates thereof. The end plate 34 is shown having the segmental extension-plate 35, which serves in one of its functions as a stop device, as will be hereinafter specified.

For maintaining the valve 33 in its normal or closed position, as indicated in Fig. 5ª, a counterweighted latch or detent device 36 is herein illustrated, said latch being shown pivotally supported on one end of the chute or hopper H and being adapted to engage a detent 37, formed on the outer face of the segmental plate 35, when the valve 33 is in its closed position. The chute H will be furnished with a suitable device, such as the pin 38, for limiting the downward movement of the counterweighted latch 36. The action of these parts will be obvious from an inspection of the drawings. When the latch 36 is raised, the detent 37 will be disengaged therefrom, so that the weight of the mass in the measuring chamber or meter 30 may instantly force said valve open.

As a means for controlling the stream which flows from the drip-chamber 31 a valve 39 is herein illustrated, it being of the "scoop" type and having a swinging movement under the outlet 33′ of said drip-chamber. The drip-valve 39 is shown supported for oscillatory movement by a rock-shaft consisting of two sections 40 and 40′, which extend laterally from the end walls of the valve and are journaled in suitable bearings formed in the side frames 2 and 4, respectively. The drip-valve 39 will be preferably a balanced valve, so that it has in itself no tendency to either open or close, the balance-weight 39′, secured to the valve at one side of its axis of movement, being illustrated for this purpose.

The drip-valve 39 will be normally maintained in a closed position, and when released at a predetermined point in the operation of the machine the mass of material within the drip-chamber 31 may force said valve open to cause the flow of the drip-stream into the bucket.

For maintaining the drip-valve 39 in its closed position the following means may be

employed: The rock-shaft section 40 is shown provided with the preferably integral upwardly-curved arm 41, which is adapted to be engaged by a suitable latch, as 42, (see Fig. 7,) said latch resting on the pin 43, extending from the chute H, and by which the downward movement of said latch 42 is limited. For tripping said latch on the closing movement of the valve 33, whereby the drip-valve 39 may be released and forced open, means operative with the meter-valve will be preferably employed. The latch 42 at the free end thereof is shown pivotally supporting a by-pass device, the action of which is limited by pins 44′ and 44″, extending from said latch. The valve 33 is furnished with the forwardly-extending latch-tripping arm 45, herein shown as formed integral with the end plate 34′. On the opening movement of the valve 33 this arm will have a movement into engagement with the by-pass device 44 and will move the same ineffectively about its axis. When the arm 45 has passed the by-pass device, the latter, being weighted, will be caused to drop against the pin 44′. On the closing movement of the valve 33 the arm 45 will engage the by-pass device 44, and the latter being against the pin 44′ said latch will be raised and disengaged from the curved arm 41, whereby the valve 39 may be forced open to permit the flow of the drip-stream into the bucket.

The chute or hopper will be supplied with material in some suitable manner, a part of an ordinary conveyer being herein shown for this purpose, and consisting of the belt or apron 46, passed around the roll 47 and also connected with a complementary roll which may be driven by a suitable motor. (Not shown.)

The stream of material will be normally supplied to the drip chamber or compartment 31, it being periodically directed by suitable means to the measuring-chamber or meter 30. For thus changing the course of the descending stream of material from the conveyer a stream-diverting valve or plate 48, operable through an opening 32″ in the inclined portion 32′ of the partition 32, is herein illustrated. This stream-diverter is supported approximately centrally thereof by the rock-shaft 49, the extremities of which latter work in suitable journal-openings formed in the end walls of the chute or hopper. One of the ends of said shaft is shown extended beyond a chute-wall for a purpose to be hereinafter specified. This stream-diverter is adapted to be shifted into alinement with the upper inclined portion 32′ of the partition 32, and when in such position the upper faces of these parts will be flush, as indicated, so that the stream of material to which reference has been made may flow down said inclined portion of the partition 32, over the diverter 48, and into the drip-chamber 31, from whence the drip-stream may flow into the bucket of the weighing mechanism.

For closing the stream-diverter or for moving it into alinement with the upper part of the partition 32 the counterweighted arm 50, secured to the diverter-supporting shaft 49, is herein illustrated, the action of the counterweighted arm, as will be evident, being normally to maintain said blade in alinement with the portion 32′ of the partition 32, which action takes place on the opening movement of the valve 33. The rock-shaft 49 is also shown having formed thereon the relatively short arm 51, to the outer end of which is pivotally connected the rod or link 52, which is also in sliding engagement with the valve 33, the lower end of said rod having a loop or longitudinal slot 52′, which takes over a pin or stud 53, projecting from the valve-plate 34. The action of these parts will be apparent from an inspection of Figs. 4ª and 5ª of the drawings.

In Fig. 4ª the valve 33 is illustrated as open and having just delivered a measured charge of material from the chamber 30 to the bucket, the stud 53 being shown in contact with the upper short wall of the slot 52′. When the valve 33 is closed by the counterweighted end plates 34 and 34′, respectively, the pin or stud 53 will be instantly thrust downward into contact with the lower short wall of the longitudinal slot 52′, and on the continuation of such movement the rod 52 will be drawn downward, the rock-arm 51 and rock-shaft 49 being moved in correspondence therewith, the diverter being also shifted out of alinement with the upper portion of the partition 32, or opened, as indicated in Fig. 5ª, so that the stream of material from the conveyer may be directed into the measuring-chamber 30.

Means will be provided for locking or checking the action of the beam mechanism during a portion of the load-supply period. This stoppage of the action of the beam mechanism will preferably occur during the descent of the measured load from the chamber 30, whereby the bucket mechanism and connected parts may be also held against movement during this period. The means herein shown for effecting this peculiar result will now be described. A relatively long rod is shown at 54, pivoted to the counterweight of the scale-beam B and in sliding connection with the pivot of the valve 33, which serves as a guide for said rod, or some other suitable device may be used for the purpose, whereby the said rod may have free ascending and descending movements at the proper period in the operation of the machine. The rod 54 is provided with a projection 55, herein shown as an antifriction-roll, which serves its well-known office. The valve 33 is furnished with the cam 56, which is oscillatory therewith and suitably secured to one of the pivots thereof, the working surface of the said cam being adapted to ride in contact with the roll 55. The operation of these parts will be readily apparent upon an examination of Figs. 6 and 4, which illustrate the valve 33 in its closed and open

positions, respectively. On the opening of the valve 33 to permit the discharge of the contents of the chamber 30 into the empty bucket G the cam 56 will be moved in unison therewith and swung rearward, the surface of said cam riding in contact with the roll 55, so that any tendency of the counterweight of the scale-beam B to rise will be effectually resisted by the cam 56, which practically serves as a fixed abutment, the force of the thrust being directed against the pivot of the valve 33. When the valve 33 has nearly closed, the surface of said cam 56 will pass out of contact with said roll 55, thereby relieving the beam, so that its weight may ascend, and the counterpoised side of said beam, with the bucket G, may descend below the poising-line on the completion of the bucket-load.

The drip-valve is provided with means for positively maintaining the meter-valve in its closed position while said first-mentioned valve is open and the drip-stream is flowing into the bucket, thereby guarding against opening movement of said meter-valve should the holding-latch 36 therefor be maliciously or accidentally tripped, the meter-valve being similarly equipped with a safety device.

The means herein shown for effecting this operation consists of the segmental plate 57, having the recess 58, by which a free movement of said plate about its axis is insured, said plate preferably forming an integral extension of the valve 39, and hence being oscillatory therewith. The plate 57, which serves as a stop device, is shown having the curved face 57′ defined by an arc struck from its center of movement. The segmental blade 35, operative with the valve 33, to which reference has been hereinbefore made as constituting a stop device, is shown flanged at 59. On the opening movement of the valve 33 the curved face 59′, which is concentric with the axis of movement of said valve, will ride in contact with and along the free end or point of the plate 57, as indicated in Fig. 4ª, so that any tendency of said plate 57 to oscillate about its pivot, whereby the drip-valve 39 might be accidentally opened, will be effectually resisted by the stop device 35. When the valve 33 is closed, the stop-face 59′ will have passed out of contact with the point of the plate 57, as indicated in Fig. 6ª, so that the latter may swing about its axis and the drip-valve 39 be forced open. On the opening movement of said drip-valve 39 the curved face 57′ of the stop device 57 may ride in contact with the straight face 59″ of the segmental plate 35, so that the oscillation of said stop device 35 will be prevented while these two faces are in contact, the valve 33 thereby being held against opening movement should its latch 36 have been tripped.

From the preceding description it will be evident that in connection with a chute having two valves reciprocally effective stops are employed, each of which is operative with one of said valves, and each of which constitutes a stop device for the other.

In connection with a valve and with a closer reciprocally effective stop devices are herein illustrated, these last-mentioned members being operative, respectively, with the valve and with the closer, whereby the valve will be maintained in its closed position while the closer is open, and vice versa. The rocker 550, to which reference has been hereinbefore made, constitutes the closer-operative stop and is shown having the stop-faces 60 and 60′, the first-mentioned of which is a curved face concentric with the axis of movement of said member. The valve-operative stop is shown at 61, it being preferably sleeved to the drip-valve-supporting shaft or the section 40 thereof, as shown in Fig. 1, suitable means being provided for holding said stop member against movement about its supporting-shaft at a predetermined point in its operation, whereby it constitutes in effect a fixed part of said shaft. The stop 61 is shown consisting of a segmental plate preferably formed integral with the sleeve or collar 62, which is loosely movable about a reduced portion of the shaft-section 40 of the drip-valve. The stop member 61 is shown having two faces 61′ and 61″, the first mentioned of which is a curved face concentric with the axis of movement thereof and the other of which is an antifriction-roll. The sleeve or collar 62 is shown having rigidly formed thereon the rearwardly-extending counterweighted arm 63, to the counterweight of which is illustrated, pivoted, the downward depending rod 64, which normally rests on the projection or antifriction-roll 6′ of the extended beam-arm 6.

The shaft-section 40 is shown having formed thereon the boss 65, against which, at a predetermined point in the operation of the machine, the curved projection 66 of the sleeve 62 is adapted to impinge, for a purpose to be hereinafter described.

A valve-actuating rod is illustrated at 67, it being also pivoted to the extended beam-arm 6 and provided at its upper extremity with a longitudinal slot 67′, which is adapted to take over a headed screw or stud 68, extending from the rock-arm 69 of the shaft-section 40. The action of the valve and closer-operated stops and adjacent parts is as follows: Fig. 4 represents the positions of the parts at the commencement of operation, the counterweight of the beam B resting on the support 3′, the valve 33 having been just opened, and the measured load from the chamber 30 being shown as discharging into the empty bucket. When the valve 33 opens, the cam 56 will be swung rearward with its working face in peripheral engagement with the projection 55, so that the action of the beam, and hence the bucket, will be temporarily checked. When the said cam-surface passes out of contact with the projection 55, the poising side of the beam-arm 6 is per-

mitted to descend, the bucket settling therewith. As said poising side of the beam B descends the rod 67 will be drawn downward for a short distance, the rod 64 being caused to move in unison therewith by the counterweighted arm 63, which action carries the projection 66 against the boss 65 of the shaft-section. At about the close of this operation the valve 33, through the medium of the devices hereinbefore described, will release the drip-valve 39, so that it may be instantly forced open by the weight of the material within the drip-chamber 31. On the opening movement of the drip-valve 39 the shaft-section 40 will be rocked, the short arm 69 being moved in correspondence therewith, and the stud 68 will be carried against the upper short wall of the longitudinal slot of the rod 67. During this movement the rod 64, through its connection with the sleeve 62, which is moved with the shaft-section 40, will also be raised from the projection 6′ of the scale-beam B.

The valve 39 having been opened, the drip-stream may flow into the nearly-loaded bucket to complete the load. When the drip-valve 39 is in its closed position, as indicated in Fig. 4, the stop-face 60′ of the stop 550 will be in contact with the curved face 61′ of the stop 61, so that any tendency of the member 550 to oscillate about its pivot will be positively checked by the member 61 so long as this relation continues. Just preceding the opening movement of the drip-valve 39 the projection 66 will be carried into engagement with the boss 65 through the connections with the scale-beam B in the manner previously described, the two rods 64 and 67 being caused to move downward, the rod 67 during this action slightly oscillating the stop 61 to what is herein illustrated as the "right," the rod 64 of course being caused to move in unison therewith, the two stop-faces 60′ and 61′ being still in contact. On the completion of the load by the drip-stream the bucket and beam mechanism will pass below the poising-line, and during this movement the beam B will draw the rod 67 downward, this action oscillating the valve 39 to cause the closure of the same. On this closing movement of the valve the stop member 61 will be swung to the right, so that the antifriction-roll 61″ will cross the plane of curvature of the stop-face 60. When this action has taken place, the member 550 is free to oscillate about its pivot, provided the latch 82 has been depressed, it being shown in such position in Fig. 6, the stop-face 60 being in engagement with the roll 61″, so that any tendency of the valve 39 to open prematurely will be positively prevented by the stop member 550 while the curved face 60 is in contact with the roll 61″, as indicated in Fig. 6.

It will be remembered that a latch 82 has been described as normally operative for holding the closer L against opening movement by engaging the rocker or stop 550, as indicated in Fig. 4. For depressing the latch the rod 64 is illustrated furnished with the projection 64′, adapted to be thrust downward and into contact with the latch-pin 82′, near the end of the closing movement of the valve 39, which action will depress said latch and release it from the rocker 550, the closer being then free to be forced open by the weight of the bucket contents.

The bucket-loads of material will be intermittingly discharged into the hopper P, which temporarily confines the mass, said mass acting against the open closer and tending to impede or retard the shutting or return movement of the latter. When the mass has gravitated or passed from said hopper through the discharge-outlet thereof, the closer L will be released and may be instantly shut.

The hopper P is shown pivoted between the end walls of the chambered base 3, it being depressible by the weight of the mass of material received from the bucket G, and said hopper will be provided with a counterweight or other convenient means for returning it to its normal or uppermost position, as indicated in Fig. 4, said counterweight slightly overbalancing the empty hopper.

Means operative, respectively, with one of the valves and with said hopper will be provided for positively preventing the premature operation of said hopper. A relatively short rock-shaft is shown at 70, its ends being journaled in suitable bearings formed in the chute H and the framing of the machine, said shaft having suitably formed thereon the rock-arm 70′, to the end of which latter is pivoted the connecting-rod 71, the lower end of said rod being likewise attached to the hopper P at a point to the left of its axis of movement. (See dotted lines, Fig. 4.) The rock-shaft 70 is also shown provided with a segmental blade 72, constituting a stop device and which coacts with the flanged stop device 35, to which reference has been hereinbefore made. The action of these coacting members 35 and 72 is as follows: The latch 36, which holds the valve 33 normally against opening movement, having been tripped, and preferably by means connected with the tilting hopper P, said valve will be forced open by the weight of the mass within the chamber 30. When the valve is in its closed position, the straight face 71′ of the segmental blade 72 will be at one side and nearly in contact with the periphery of the flange 59, so that the valve 33 may be swung open. As the valve opens said periphery will run in contact with the straight face 72′, as indicated in Fig. 4ª, so that the depression of said hopper will be positively prevented, the oscillation of the blade 72 being limited by the stop device 35 while the peripheries of said flange and the straight stop-face 72′ are in contact, as just stated. When these pass out of contact, the hopper is free to be oscillated, and when this last-mentioned operation takes place the part 72 will be oscillated in correspondence there-

with and the curved stop-face 72″ will ride in contact with the flange 59, so that the opening movement of the valve 33 will be prevented while the hopper P is in its depressed position.

As hereinbefore stated, means operatively connected with the depressible hopper P will be employed for effecting the tripping movement of the latch 36. The rock-shaft 70 is shown having the arm 73, carrying a by-pass device 74 at its upper end. The latch 36 is shown having a projection 36′ disposed in the path of movement of said by-pass device, so that when the hopper P has nearly reached its normal position the by-pass will engage said projection 36′ and, raising it, will disengage it from the detent 37, suitable means being provided for holding said by-pass device 57 against movement on its support 73 when this action takes place. On the depression of the hopper P by a load of material received from the bucket and the consequent movement of said arm 73 the by-pass will be engaged by the projection 36′ and simply oscillated ineffectively about its pivot on the arm 73.

The invention contemplates the provision of means operative with the closer for preventing the ascent of the hopper P until the former has reached its closed position. The pivot of the closer L is shown having the segmental blade 75 provided with a flange 75′, the opposite curved faces of which are concentric with the axis of movement of said closer. The hopper P is shown having a similarly-connected member 76, the flange of which is designated by 76′. The flange 75′ is shown extending inward, while the flange 76′ extends outward. The operation of these coacting devices is as follows: Fig. 4 represents the normal positions of the closer L and hopper P, the former being locked in shut position and the latter shown at the limit of its ascending movement. On the opening of the closer the outer curved face of the flange 75′ will ride along the straight face 76″ of the part 76, and when said flange has passed out of contact therewith the hopper P may be depressed by the weight of the bucket contents, the device 76 being swung to the left. As the part L closes the straight face 76‴ of the flange 75′ will be contiguous to the inner curved face of the flange 76′, so that the return movement of the hopper P will be prevented so long as these faces are in contiguity. When they have passed out of contact, due to the shutting of the closer, the hopper P may be returned to its normal position through the medium of the counterweight thereof and the latch 36 tripped by the hereinbefore-described device connected to said hopper and the valve 33 opened.

The operation of the hereinbefore-described weighing-machine is as follows: The closer L is locked shut, as shown in Fig. 4, the drip-valve being closed and the meter-valve 33 open to permit the descent of a measured charge of material from the chamber 30 into the bucket, the action of the beam mechanism and bucket being temporarily restrained by the cam 56, which rides in contact with the projection 55 on the rod 54 on the opening of said valve 33. When said cam has passed out of contact with the roll 55 on the shutting of the valve 33, the counterpoised side of the beam B is permitted to descend and will draw the rod 67 instantaneously downward, at the close of which movement the short wall of the slot 67′ will be in contact with the stud 68, connected to the valve 39 at a point to the rear of its center of movement. Immediately succeeding this action the latch 42 will be tripped by the arm 45 on the meter-valve 33, so that the drip-valve 39 may be instantly forced open by the weight of the contents in the drip-chamber 31. At this point the beam mechanism and coacting parts will occupy the position shown in Fig. 5. On the flow of the drip-stream into the bucket G the latter will slowly descend, which action will cause the simultaneous descent of the scale-beam B, pulling down on the rod 67, which is connected to the valve 39, so that on the continuation of such movement of said beam the closure of the drip-valve 39 will be positively effected. During the descending movement of the bucket, the beam, and the rod 67, the rod 64 will have a movement in unison therewith, so that the projection 64′ on said rod 64 may be thrust into contact with the pin 82′ of the latch 82, whereby the depressiom of said latch will be obtained. When said latch is depressed, it is disengaged from the rocker 550, this action also freeing the bucket-closer L, so that the latter may be forced open by the weight of the contents in the bucket.

Having described my invention, I claim—

1. The combination with a bucket, of a meter adapted to discharge bodily a measured charge of material into said bucket; a valve for controlling the supply of material to said meter; means for supplying a drip-stream to the bucket; and a drip-valve.

2. The combination with a bucket, of a hopper comprising two chambers having discharge-outlets leading to said bucket, one of said chambers constituting a measuring-chamber in which a mass of material may be accumulated and from which said mass may be bodily discharged into said bucket, and the other constituting a drip-chamber; means for alternately directing a stream of material to said chambers; and valve mechanism coöperating with said measuring and drip chambers.

3. The combination with a bucket, of a hopper separated into two chambers by a partition having an opening, one of said chambers constituting a meter-chamber and the other a drip-chamber; stream-supply means for said hopper; and a stream-diverter operable in said opening and for shutting off the supply to said meter-chamber on the flow of

the drip-stream from the drip-chamber; and valve mechanism coöperating with said chambers.

4. The combination with a bucket, of a hopper separated by a partition into two chambers constituting, respectively, a meter-chamber and a drip-chamber, said partition having an opening; a stream-diverter operable in said opening and for shutting off the supply of material to said meter-chamber when the drip-stream is flowing from the meter-chamber; and valve mechanism operatively connected to said stream-diverter.

5. The combination with a bucket, of a hopper separated into two chambers by a partition having an inclined portion provided with an opening; a relatively-flat plate shiftable into and out of alinement with said inclined portion; actuating means for said plate; and valve mechanism.

6. The combination with a bucket, of a hopper separated into two chambers by a partition; a stream-diverter provided with a counterweighted arm for shifting the same in one direction; means for oppositely shifting said stream-diverter; and valve mechanism.

7. The combination with a bucket, of a hopper separated into two chambers by a partition; a stream-diverter provided with a counterweighted arm; and valve mechanism operatively connected to said stream-diverter.

8. The combination with a hopper having a partition provided with an opening, of a stream-diverter operable in said opening and having a supporting rock-shaft; a counterweighted arm connected to said rock-shaft; a valve; and a rod attached to said counterweighted arm and slidingly connected to said valve.

9. The combination with a bucket, of a meter adapted to discharge bodily a measured charge of material into said bucket; means for supplying a drip-stream to the bucket; a pair of valves; and reciprocally-effective stop devices operative, respectively, with said valves.

10. The combination with a chute, of a pair of valves therefor; instrumentalities for normally holding one of said valves in its closed position; and means carried by and operative with the other of said valves for causing an opening movement of the first-mentioned valve.

11. The combination with a hopper, of a pair of valves therefor; means comprising a latch for holding one of said valves against opening movement; and a device operative with the other valve for tripping said latch.

12. The combination with a hopper, of a pair of valves therefor; means comprising a latch provided with a detent, for holding said valve against movement; and means operative with the other valve for tripping said latch.

13. The combination with a hopper, of a pair of valves therefor; means comprising a latch for holding one of said valves against movement; and an arm rigidly connected to the other valve for tripping said latch.

14. The combination with a bucket having a closer, of a valve, and reciprocally-effective stop devices operative, respectively, with said valve and closer, one of said stops being loosely movable about its support.

15. The combination with a bucket having a closer, of a valve, and reciprocally-effective stop devices operative with the valve and with the closer, and having the valve-operative stop device loosely movable independently of the valve about its support.

16. The combination with a bucket having a closer, of a valve and its supporting-shaft provided with a boss; a stop device sleeved on said shaft and provided with a projection adapted to engage said boss; and a coacting stop device operatively connected with said closer.

17. The combination with a bucket provided with a closer and with a chute and its valve, of means embodying a latch for holding said closer against opening movement; and a sleeve on the support for said valve, having a latch-tripping device.

18. The combination with a bucket provided with a closer and with a chute and its valve, of means embodying a latch for holding said closer against movement; a sleeve on the valve-support; and a rod having a latch-tripping device, said rod being connected to said sleeve.

19. The combination with a bucket provided with a closer and with a chute having a valve, of means embodying a latch for holding said closer against movement; a sleeve on the valve-support provided with a counterweight; and a rod operatively connected to to said counterweight, said rod having a latch-tripping device.

20. The combination with a bucket provided with a closer and with a chute and its valve, of means embodying a latch for holding said closer against movement; a sleeve provided with a stop device on the valve-support; a latch-tripping device connected to said sleeve; and a stop device operative with the closer and coacting with said first-mentioned stop device.

21. The combination with a chute, of a valve, said valve being so supported as to be opened by the force of a descending mass of material in said chute; means normally holding said valve against opening movement; independent releasing device for said valve; and means for closing said valve.

22. The combination with a chute, of a valve; a shiftable member; and a rod operative with said shiftable member and in sliding connection with said valve.

23. The combination with a suitably-supported valve, of a sleeve on the support of said valve; a stop device connected to said sleeve; a shiftable member; a connection between said shiftable member and valve-support; a bucket having a closer; and a stop device op-

erative with said closer and coacting with said first-mentioned stop device.

24. The combination with a valve and a supporting-shaft therefor and with a bucket provided with a closer, of means embodying a latch for holding said closer against movement; a sleeve on the valve-support and having a latch-tripping device connected thereto and also provided with a stop device; a scale-beam; a rod operatively connected to said scale-beam and in sliding connection with the support for said valve; and a stop device operative with said closer and coacting with said first-mentioned stop device.

25. The combination with a chute having a valve, of means for normally holding said valve against movement; a bucket; a depressible hopper located to receive a load of material discharged by said bucket; and means operatively connected with said hopper for releasing said valve.

26. The combination with a chute, of a valve; means embodying a latch for holding said valve against movement; a bucket; a depressible hopper located to receive a load of material discharged by said bucket; and a rock-shaft operatively connected to said hopper and having a rock-arm provided with a by-pass device for engaging said latch.

27. The combination with a bucket having a closer, of a depressible hopper located to receive a load of material from said bucket; and means operative with said closer for limiting the movement of said hopper.

28. The combination with a bucket, of a closer therefor; a depressible hopper located to receive a load of material discharged by said bucket; and segmentally-flanged coacting stop devices operative, respectively, with said closer and hopper.

29. The combination with a bucket and a supporting scale-beam therefor, of a valve; a rod operatively connected to said scale-beam and having a projection thereon; and a cam connected to said valve in position for riding in contact with said projection on the opening movement of said valve.

30. The combination with a bucket and a supporting scale-beam therefor, of a valve; a rod operatively connected to said scale-beam and having a projection thereon; a cam connected to said valve in position for riding in contact with said projection on the opening movement of said valve; and a guide for said rod.

31. The combination with a bucket and with weighing mechanism supporting the same, of a valve; a rod operatively connected to said weighing mechanism and having a projection thereon; and means connected to the valve and in position for riding in contact with the projection of said rod on the opening movement of the valve.

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Witnesses:
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