No. 786,152. PATENTED MAR. 28, 1905.

H. RICHARDSON.

WEIGHING MACHINE.

APPLICATION FILED DEC. 2, 1904.

3 SHEETS—SHEET 1.

Fig. 1.

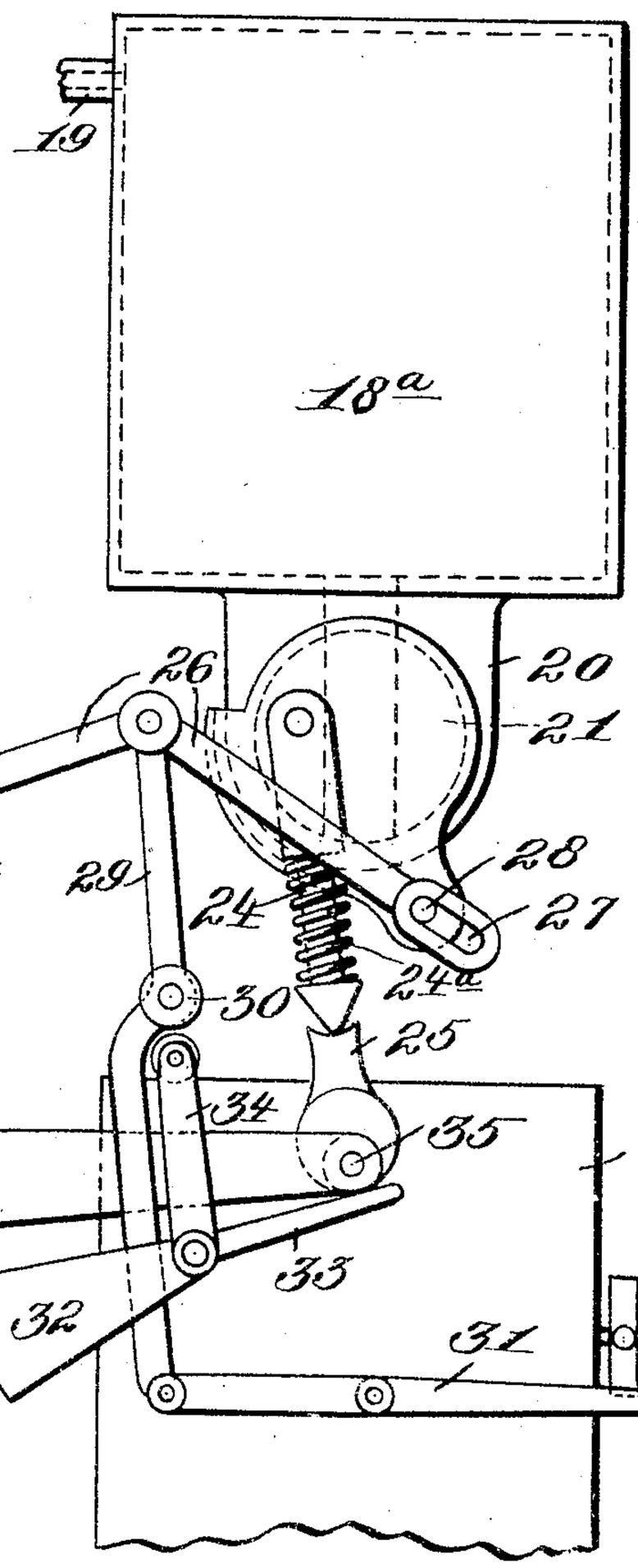


Fig. 5.

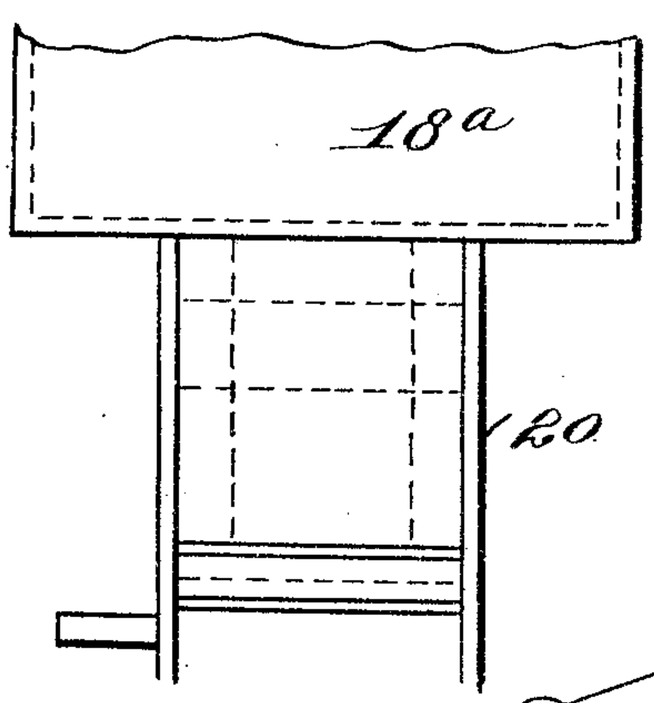
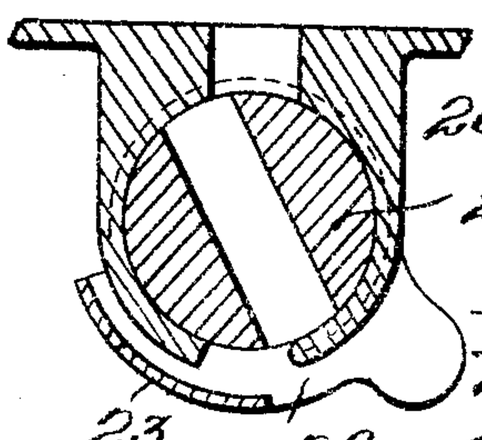


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 2.

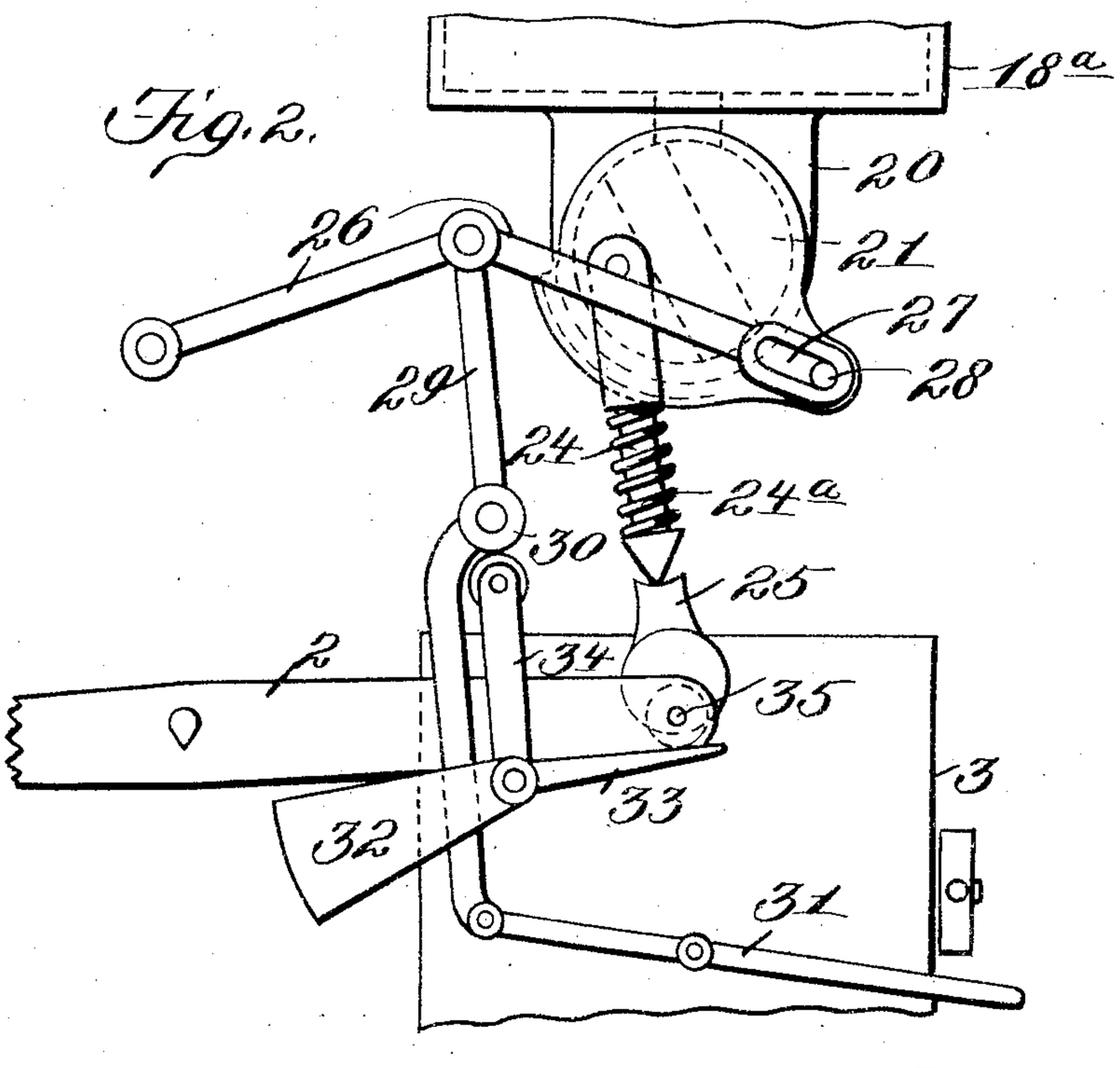
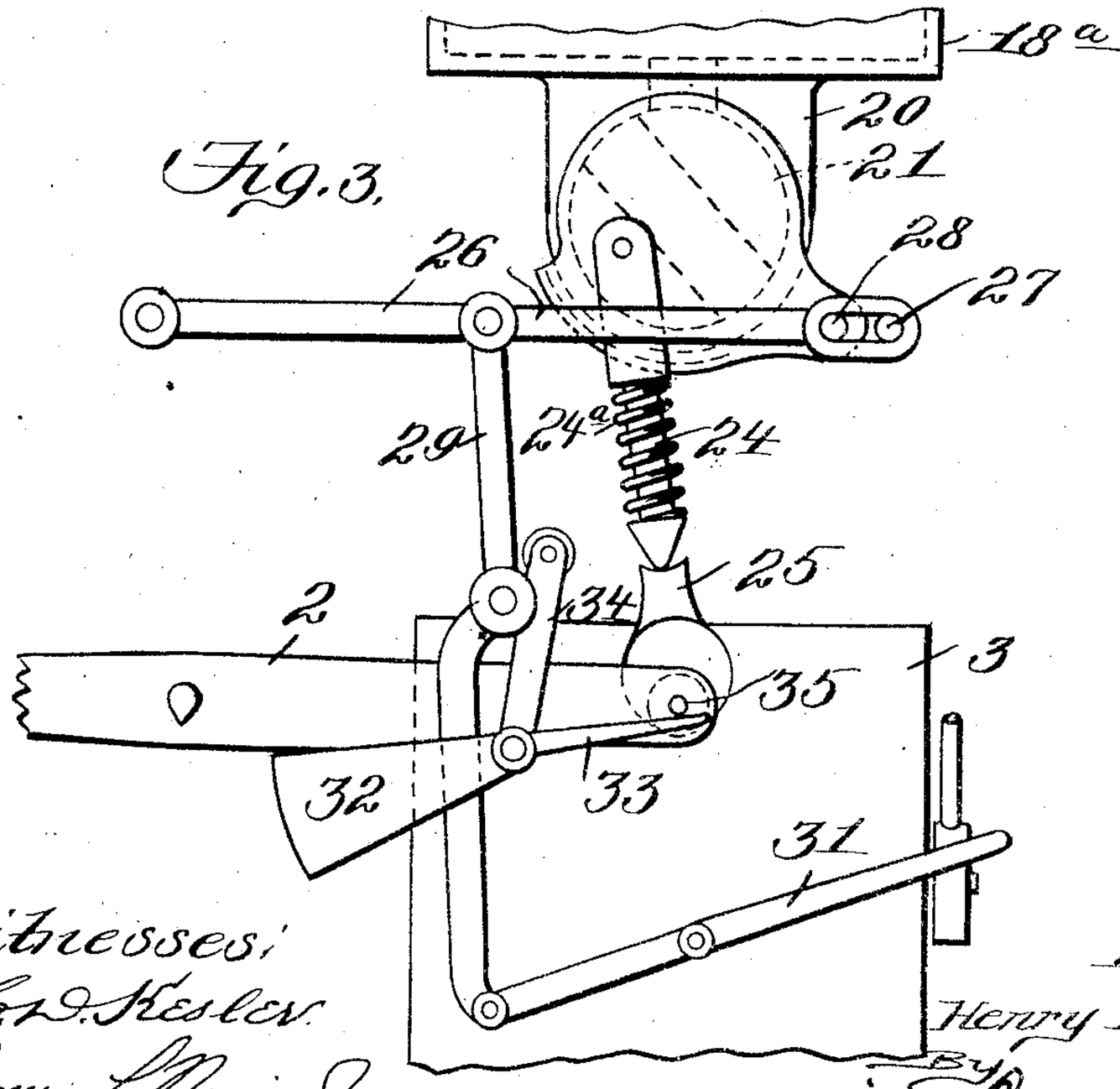


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 6.

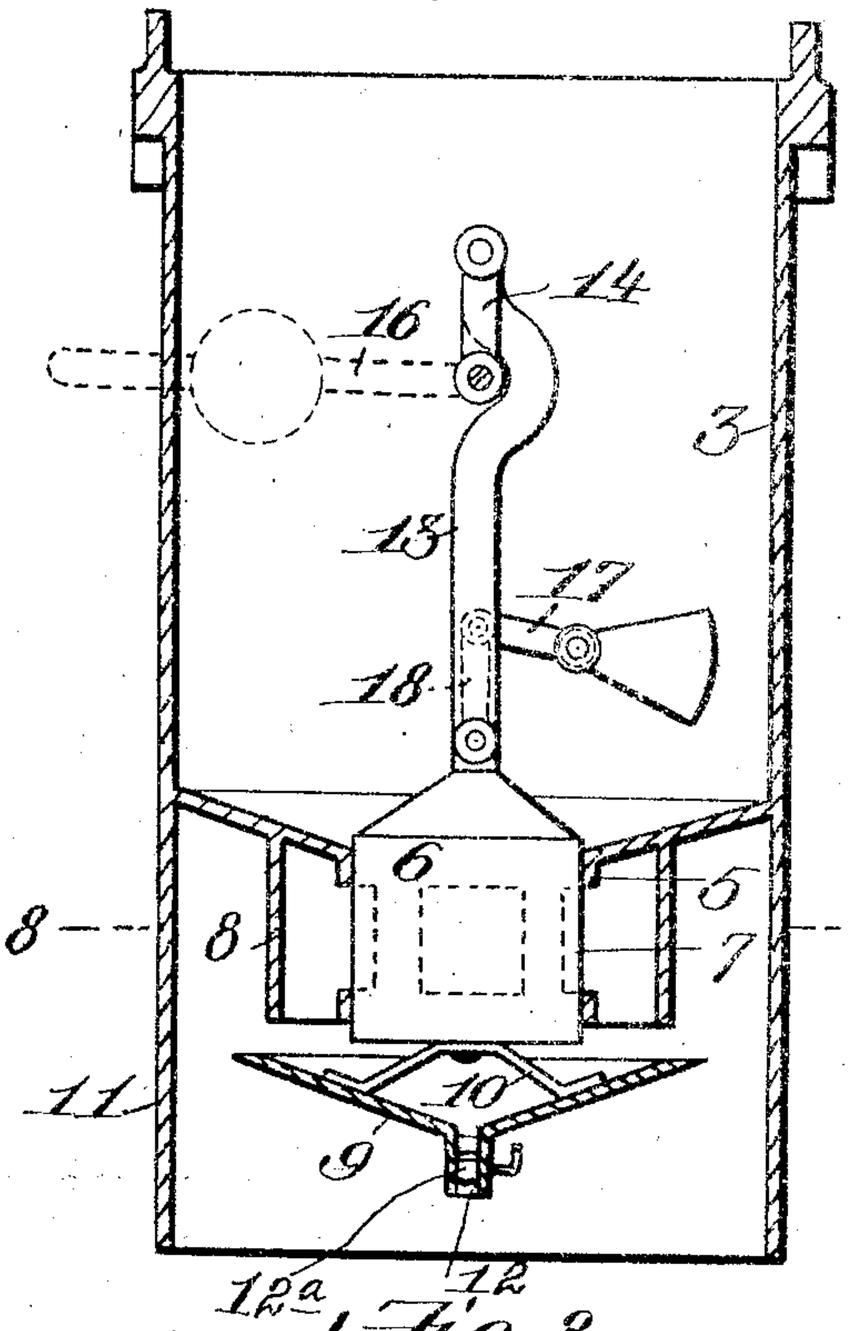


Fig. 8.

Fig. 7.

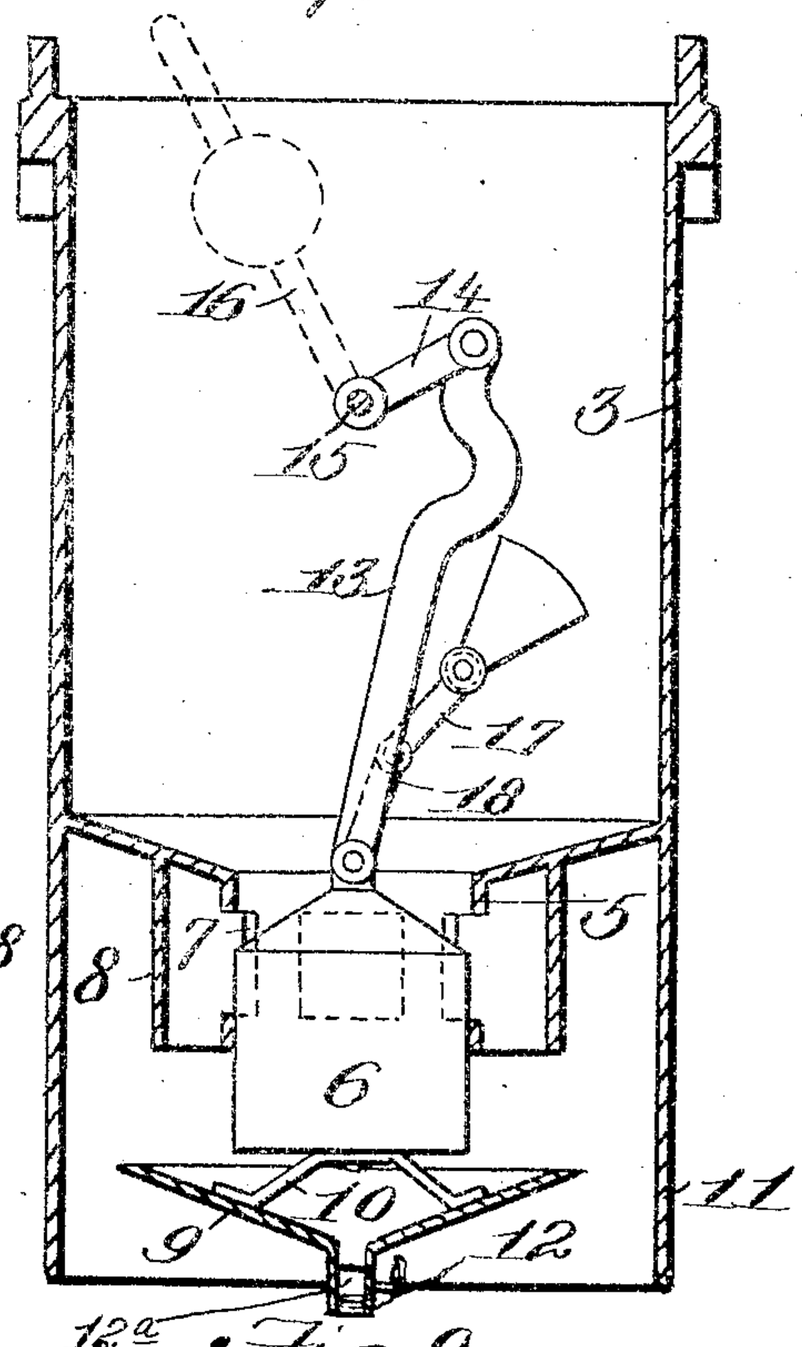
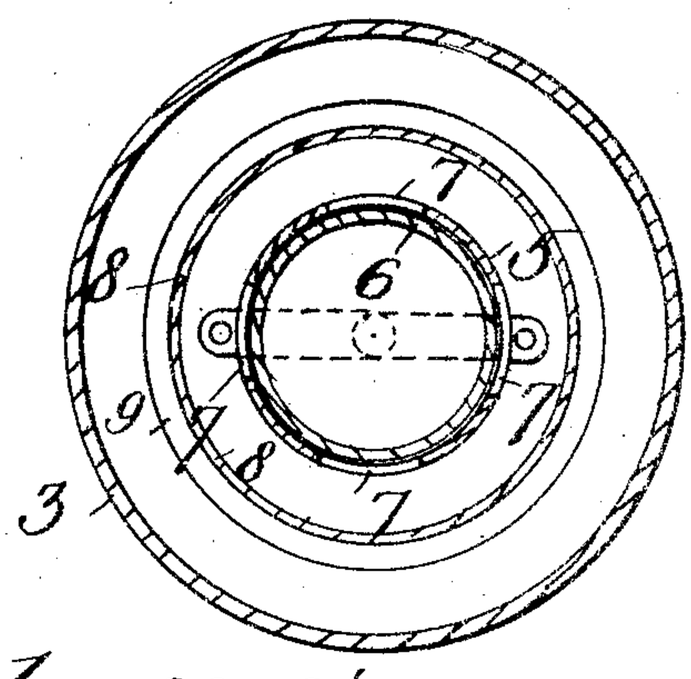
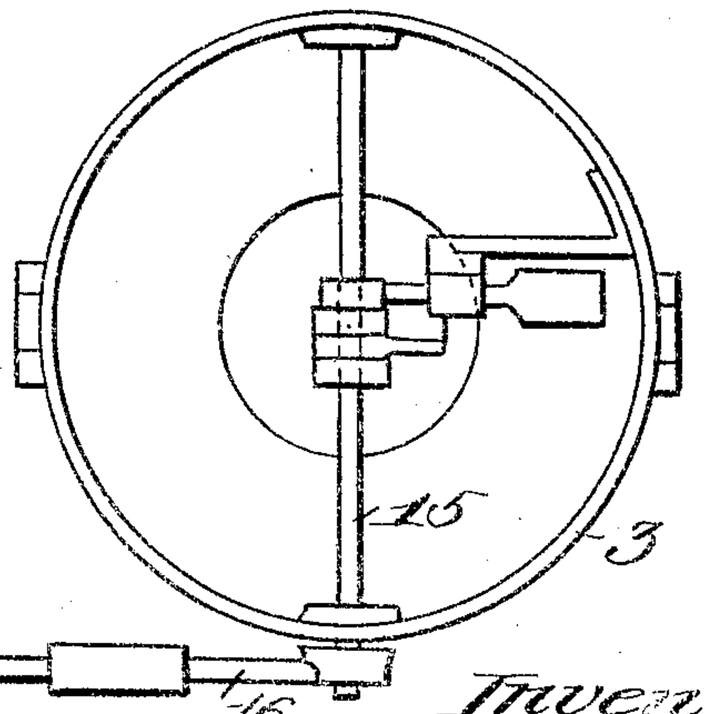


Fig. 9.





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No. 786,152. Patented March 28, 1905.

UNITED STATES PATENT OFFICE.

HENRY RICHARDSON, OF NEW YORK, N. Y.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 786,152, dated March 28, 1905.

Application filed December 2, 1904. Serial No. 235,223.

To all whom it may concern:

Be it known that I, HENRY RICHARDSON, a subject of the King of Great Britain, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Weighing-Machines, of which the following is a specification.

This invention relates to a weighing-machine, the object of the invention being to provide a device of this character which is simple in construction and which will weigh and deliver automatically and with accuracy and rapidity predetermined loads or charges of liquid.

In the drawings accompanying and forming a part of this specification I illustrate, in order to indicate the advantages of the machine, a simple adaptation involving my invention, and in which—

Figures 1, 2, and 3 are side elevations of the upper portion of the machine, showing the parts in different positions, the bucket in Fig. 1 being empty and the valve being wide open. In Fig. 2 the load is practically in the bucket, while the valve is nearly closed. In Fig. 3 the valve is closed and the bucket is shown in its lowest or load-discharging position. Fig. 4 is a cross-sectional elevation of the valve mechanism, the valve occupying its intermediate position. Fig. 5 is a front elevation of the valve mechanism. Figs. 6 and 7 are vertical sectional elevations of the bucket, showing the discharge-controlling valve in its closed and open positions, respectively. Fig. 8 is a sectional plan view, the section being taken on the line 8 8 of Fig. 6. Fig. 9 is a top plan view of the bucket.

Like characters refer to like parts throughout the several figures.

The machine includes in its makeup weighing mechanism consisting of a beam, as 2, and a bucket, as 3, the beam being suitably fulcrumed between its ends and supporting the bucket upon one of its branches, while a counterbalance 4 depends from the other branch of the beam, the counterbalance 4 being adapted to equal the weight of the bucket 3 and its adjuncts plus the predetermined load. The bucket 3 is represented as being of substantially cylindrical form and as having depending from the bottom thereof the tubular spout 5, in which the discharge-controlling valve 6 is arranged to vertically operate. When the valve is closed, as indicated in Fig. 6, it is adapted to cover one or more outlets, as 7, formed in the tubular depending spout. Depending from the bottom of the bucket 3 and surrounding the spout 5 is an annular flange 8, which checks or controls the lateral flow of the liquid flowing from the bucket 3 and insures its being guided into the pan 9, connected by arms 10 with the under side of the load-discharge-controlling valve 6, a space separating the bottom of the valve and the bottom of the pan 9. The liquid contents from the bucket, as will hereinafter appear, are delivered into said pan. The wall of the bucket 3 is continued down below the bottom thereof, as at 11, to provide a splasher-guard in order to prevent splashing of the liquid. The pan 9 has in its bottom a discharge orifice or outlet 12, the effective area of which may be regulated by a valve, as 12^a, as may be necessary to adapt the machine to the particular liquid being weighed.

To the top of the conical upper portion of the valve 6 is pivoted a link 13, the link extending upward from the valve and being jointed at its top to the crank-arm 14, rigidly fastened to the rock-shaft 15, extending diametrically of and supported by the bucket. One end of the shaft, as will be clearly apparent upon an inspection of Fig. 9, extends beyond the bucket for a purpose that will hereinafter appear. When the valve 6 is closed, as indicated in Fig. 6, the centers of motion of the crank-arm 14 and the link 13 will be vertically alined, the link being somewhat cranked between its ends to assure this result, so that the valve will be locked closed by the toggle thus presented.

It will be remembered that the shaft 15 has been set forth as projecting at one end outside of the bucket 3. The projecting end is represented as furnished with a weighted arm 16, the weight of which serves to aid in bringing the toggle-centers into line after the discharge of a load. When the said centers are alined during the time the valve 6 is closed, the free end of the arm 16 is arranged for engagement

by a trip device, as will hereinafter appear. The act of throwing the free end of the said arm 16 upward from the position shown in Fig. 6 will at once move the toggle-centers out of line, whereby the valve 6 can be forced open by the weight of the liquid mass in the bucket.

Fulcrumed upon a bracket or arm in the bucket is a weighted lever 17, the inner or non-weighted arm of which is connected by a link, as 18, with the upper side of the valve 6. It will be assumed that a load of predetermined weight of liquid is in the bucket 3 and that the centers of the toggle, made up of the link 13 and crank-arm 14, have been thrown out of line. When this is done, the valve 6 will be released, so that it can be forced open to permit the contents of the bucket to escape therefrom by way of the outlet 7 and into the pan 9. The discharge from the pan 9 is very much slower than that of the bucket, so that the pan will trap a quantity of liquid sufficient to hold the valve 6 down and open a sufficient length of time to assure the complete emptying of the bucket. When the combined weights of the levers 17 and 16 overcome the effect of the valve 6 plus the added weight applied thereto, they will return to their normal positions to move said valve 6 upward to its closed position and also throw the centers of the toggle into line, whereby the valve will be again locked. Owing to the fact that the weighted lever 17 is mounted in the bucket, said weighted lever offers a less resistance to the opening of the valve than it would were it mounted outside of the bucket. When, however, the bucket is completely emptied, the said weighted lever can exert its maximum effect to move the valve 6 to its closed position and to aid the lever 16 in alining the toggle-centers. When the valve 6 is fully closed, there will be a small quantity of liquid in the pan 9; but this will flow therefrom before the next load is discharged by way of the outlet or discharge orifice 12. The annular flange 8, as previously indicated, guides the liquid squarely into the pan 9, while, by reason of the fact that the lower edge of the depending flange 11 of the bucket is located below the pan, said flange acts effectively as a guard to prevent splashing of the liquid when the load is discharged.

Mounted directly over the bucket is the supply-tank 18ª, the capacity of which is substantially the same as that of the bucket and which may be supplied with liquid by means of the pipe 19 leading thereinto, and which in practice will be provided with a valve. Depending from the bottom of the tank is a casing 20 for the valve 21, the latter being of rocking form and having a transverse port, which in Fig. 1 is shown as being in full registration with a passage through the casing 20. It will be understood that when the parts are in the relation shown in Fig. 1 the valve 21 is wide open, so that the full stream can flow from the tank 18ª into the empty bucket 3. The valve 21 rocks in a bore extending entirely through the casing, the ends of the valve extending beyond the bore and being provided with plates 22, connected to each other by the curved drip-plate 23, which is really in the nature of an auxiliary valve or one supplemental to the valve 21, for the curved plate or valve 23 is arranged to catch any drip from the casing or spout 20 after the valve 21 is fully closed, so that such drip will not fall into the bucket to form part of a made-up load. When, however, the valve 21 is opened to permit the supply of liquid into the empty bucket, the plate or valve 23 will be swung to such a position that the liquid thereon can pass into the bucket, the plate or valve 23 at this time assuming a steep incline. The plate or valve 23 is of a weight or mass sufficient to cause the closure of the valve 21 or the movement of the port of the valve out of register with the passage through the casing or spout 20, the two parts being carried out of register when the load is fully made up.

Connected eccentrically with one of the plates 22 is the upper end of a longitudinally-yieldable pendant 24, the lower end of said pendant being adapted to engage a projection 25, fastened to the bucket 3. This pendant is represented as consisting of two telescopically-united sections and a push-spring 24ª, interposed between the same, which spring keeps the said telescopically-associated sections stretched apart. When the bucket 3 descends, the projection 25 will fall away from the pendant 24, thereby permitting the closure of the valve 21 by the weight of the plate or auxiliary valve 23, such closure, however, being controlled by means hereinafter described. When the bucket 3 rises empty by the falling of the counterbalance 4, the projection 25 will impart an upward thrust to the pendant, or, rather, directly to the lower section thereof, thereby compressing the spring 24ª in order that when the valve 21 is released by the locking means hereinafter described the opening of said valve may be secured. A toggle composed of two links 26 coöperates with the valve, one of the links being connected with the framework of the machine at 26ª, while the other link has an elongated slot 27 to receive a pin or lug 28 on one of the valve-plates 22. During the first stage of the closing movement of the valve 21 the pin or lug 28 travels from the left end of the said slot 27 (see Fig. 1) to the right end thereof, (see Fig. 2,) further closing movement of the valve being thus prevented in order to permit the flow of a reduced stream into the bucket to complete the load therein. At the joint between the links 26 of the toggle is connected a third link 29, which depends from the toggle and has a projection or anti-friction-roll, as 30, between its ends, the func-

tion of which will hereinafter appear. To the extreme lower end of the link 29 is jointed a rocking lever 31, fulcrumed between its ends, and the free end of which is adapted to coöperate with the weighted lever 16 in effecting the release of the discharge-controlling valve 6, as will hereinafter appear.

Fulcrumed independently of the bucket 3 is a three-arm lever, the arms of which I will designate by 32, 33, and 34, respectively, the arm 32 being weighted, while the arm 33 is arranged in the path of a trip device, as a pin 35, carried upon the inner end of the beam 2. Said trip device or pin 35, when the bucket is up and empty, will be located above and out of contact with the arm 33, so as to permit the free motion of the beam during the first stage of operation in weighing. Upon the completion of the load the trip device is carried quickly against the arm 33 by the movement of the beam in order to actuate the said three-armed lever to bring about the release of the load in the bucket in the manner hereinafter set forth. The arm 34 has an antifriction-roll or equivalent projection at its upper end, adapted to engage under the projection or antifriction-roll 30 on the link 29, in which position it is held by the weighted arm 32, outward motion of the arm 34 being limited by the link 29 itself, which is somewhat cranked for this purpose.

The operation of the machine is as follows: In Figs. 1 and 6 the parts are represented as occupying their initial positions, the bucket 3 at this time being empty and the valve 6 thereof being locked closed, while the valve 21 is wide open, the links 26 at this time being flexed and the upper end of the arm 34 being under the projection or antifriction-roll 30. The pin 28 will be at the inner end of the slot 27, while the counterbalance 4 will be down. It therefore follows that the supply of liquid in the tank 18 will be caused to flow therefrom and into the bucket. When a certain amount of liquid has been received in the bucket, the latter will descend, thereby permitting the closure of the valve 21 by the weight of the plate 23. The valve will be practically wholly closed when the load is nearly made up, as indicated in Fig. 2, the pin 28 at this time being against the outer end of the slot 27. When the valve is in its nearly-closed position, a reduced stream of liquid will flow from the tank 18ª into the bucket 3 in order to complete the load. During the time the valve 21 is in its nearly-closed position, in which position it is maintained by the engagement of the pin 28 against the forward end of the slot, the toggle-links 26 will be still flexed, being held in this relation by the arm 34, which really acts as a latch for this purpose. When the load is fully completed, the bucket will descend farther, and the same will apply to the inner side of the beam 2, whereby the pin or trip device 35 on the beam will be carried against the arm 33 to swing said arm 33 downward and the arm 34 outward and from under the projection or anti-friction-roll 30, thereby releasing the toggle-links 26 and the valve 21, so that the valve can be fully closed by the weight of the drip-catching plate 23. When the valve completes its final closing movement, the centers of the toggle-links 26 will be horizontally alined, so as to lock the valve 21 against accidental opening movement. Upon the alining of the centers of the toggle-links 26 a downward thrust is imparted to the link 29 in order to rock the lever 31 and cause it to engage the lever 16 to effect the release of the valve 6. On the release of the valve 6 the liquid contents of the bucket will press said valve open and will pass from the bucket into the pan 9, which, it will be remembered, is connected with said valve and has a central discharge-orifice in its bottom. The area of this orifice is much less than that of the discharge-opening of the bucket. When, therefore, practically the whole load has been discharged from the bucket, there will still be a portion of liquid in the pan, the weight of which is sufficient to hold the valve 6 open until the complete load has been discharged from the bucket. As the pan 9 commences to empty, the valve 6 may be slowly closed by the weighted lever 17, and as the valve closes any liquid that may be in the bucket flows into the pan, the result being that when the valve is fully closed the centers of the toggle members 13 and 14 will be vertically alined to hold the valve closed. As the bucket 3 rises during the emptying of the liquid contents therefrom the valve 6 will of course be held open, as just set forth, to assure the complete emptying of the load. When, however, the load is completely discharged, the weighted portion of the lever 17 can drop, so as to vertically aline the centers of the toggle members 13 and 14, and during such motion the free portion of the weighted lever 16 will impinge against the outer end of the lever 31 and will force said outer end downward, so as to impart an upward thrust to the link 29 in order that the valve-locking toggle, composed of the links 26, can be upwardly flexed to release the supply-valve 21, so that said supply-valve can be opened through the agency of the pendent element 24. When the said supply-valve is opened, the latching-arm 34 will be swung under the antifriction-roll 30 by the dropping of the weight 32 to again hold the valve open, after which point the operation is repeated.

I deem it important to state that the capacity of the supply-tank 18ª equals that of the bucket 3, so that no extra pressure will be developed during the supply of the final part of the stream to the bucket or during the final part of a weighing operation. The time taken to supply the tank 18ª is equal to the time required to fill and empty the bucket

3, whereby accuracy and effectiveness of operation are assured.

It will be understood, of course, that by the described construction it will not be possible for the valves 6 and 21 to be simultaneously open, notwithstanding the fact that during the discharge of the bucket it will be rising.

Having thus described my invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a weighing-machine for liquids, the combination of a bucket having a discharge-spout, a valve arranged for movement in said spout, the latter having an outlet controlled by the valve, means for locking the valve closed, and a weighted lever in the bucket, connected with the valve for closing the same.

2. In a weighing-machine, the combination of a bucket having a discharge-spout, a valve arranged for movement in said spout, the latter having an outlet controlled by the valve, means for locking the valve closed, a weighted lever in the bucket, connected with the valve for closing the same, and a pan connected with and located below said valve, said pan having a discharge-orifice.

3. In a weighing-machine, the combination of a bucket having a discharge-spout, a valve arranged for movement in said spout, the latter having an outlet controlled by the valve, means for locking the valve closed, a weighted lever in the bucket, connected with the valve for closing the same, and a pan connected with and located below said valve, said pan having a discharge-orifice and the bucket having a flange extending below its bottom and surrounding said pan and spout.

4. In a weighing-machine, the combination of a bucket having a discharge-spout depending from its bottom, and a flange surrounding said spout, also depending from said bottom, and a valve arranged for movement in said spout, the latter having an outlet controlled by the valve, means for locking the valve closed, a weighted lever in the bucket, connected with the valve, for closing the same, a pan connected with and located below said valve, said pan having a discharge-orifice and the bucket having a flange below the bottom thereof and surrounding said other flange and pan.

5. In a weighing-machine, the combination of a bucket having a discharge-spout, a valve arranged for movement in said spout, the latter having an outlet controlled by the valve, a link connected with the upper side of the valve and extending upward therefrom, a rock-shaft supported by the bucket and extending diametrically thereof, a crank-arm on the rock-shaft, jointed to said link and constituting with the latter a toggle for locking the said valve closed, and a weighted lever in the bucket, connected with the valve, for closing the same.

6. In a weighing-machine, the combination of a bucket having a discharge-spout, a valve arranged for movement in the spout, the latter having an outlet controlled by the valve, a toggle for locking the valve closed, a weighted lever mounted in the bucket, and a link pivotally connected with the weighted lever and valve, the weighted lever serving, through the link, to close the valve.

7. In a weighing-machine, the combination of a bucket having a discharge-spout, a valve arranged for movement in said spout, the latter having an outlet controlled by the valve, means for locking the valve closed, a weighted lever in the bucket, connected with the valve, for closing the same, a supply-spout having a valve, a scale-beam for supporting the bucket, the scale-beam controlling the closing of the second valve, and means, coöperative with the second valve, for effecting the release of the first valve.

8. In a weighing-machine, the combination of a scale-beam and a bucket, the latter having a discharge-spout, a valve arranged for movement in said spout, the latter having an outlet controlled by the valve, a rock-shaft supported by the bucket and extending therefrom, a crank-arm in the bucket, connected with said shaft, a link connecting the crank-arm and valve and constituting, with said crank-arm, a toggle for locking the valve closed, a weighted lever in the bucket, a link connecting the weighted lever and valve, a weighted lever outside the bucket, connected to said crank-shaft, a supply-spout having a valve, means coöperative with the bucket for controlling the closing of said second valve, and means coöperative with the second valve for operating the lever connected with said rock-shaft to throw the toggle-centers out of line.

9. In a weighing-machine, the combination of a bucket, a liquid-discharge-controlling valve for the bucket, means for locking the valve closed, and a weighted lever in the bucket, connected with the valve, for closing the same.

10. The combination of weighing mechanism including a bucket and a beam, a tank having a valve-casing, a valve in said casing, the opposite ends of the valve projecting outside of the casing, plates connected with the projecting ends of the valve, a plate connecting the other plates and constituting a means for catching drip from the valve when the latter is closed, and means coöperative with the weighing mechanism for controlling the closing of said valve.

11. The combination with weighing mechanism including a bucket and a beam, a tank having a valve-casing, a valve in said casing, the opposite ends of the valve projecting outside the casing, plates connected with the projecting ends of the valve, a curved plate connecting the other plates and constituting a

means for catching the drip from the valve when the latter is closed, and also weighted to cause the closing of said valve, and means coöperative with the weighing mechanism for controlling such closing.

12. The combination of weighing mechanism including a bucket and a beam, a tank having a valve-casing depending therefrom and provided with a vertical passage, and with a bore entirely through the same, a valve in said bore and projecting at its opposite ends therefrom, the valve having a transverse port to register with said passage, plates connected with the projecting ends of the valve, a curved plate connecting the other plates, constituting a means for catching drip from the valve when the latter is closed, and serving to also close the valve, and means for controlling such closing.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

HENRY RICHARDSON.

Witnesses:
E. F. SMITH,
H. G. GODFREY.