(No Model.) 3 Sheets—Sheet 1.

F. H. RICHARDS.

AUTOMATIC WEIGHING MACHINE.

No. 548,850. Patented Oct. 29, 1895.

Fig. 3.

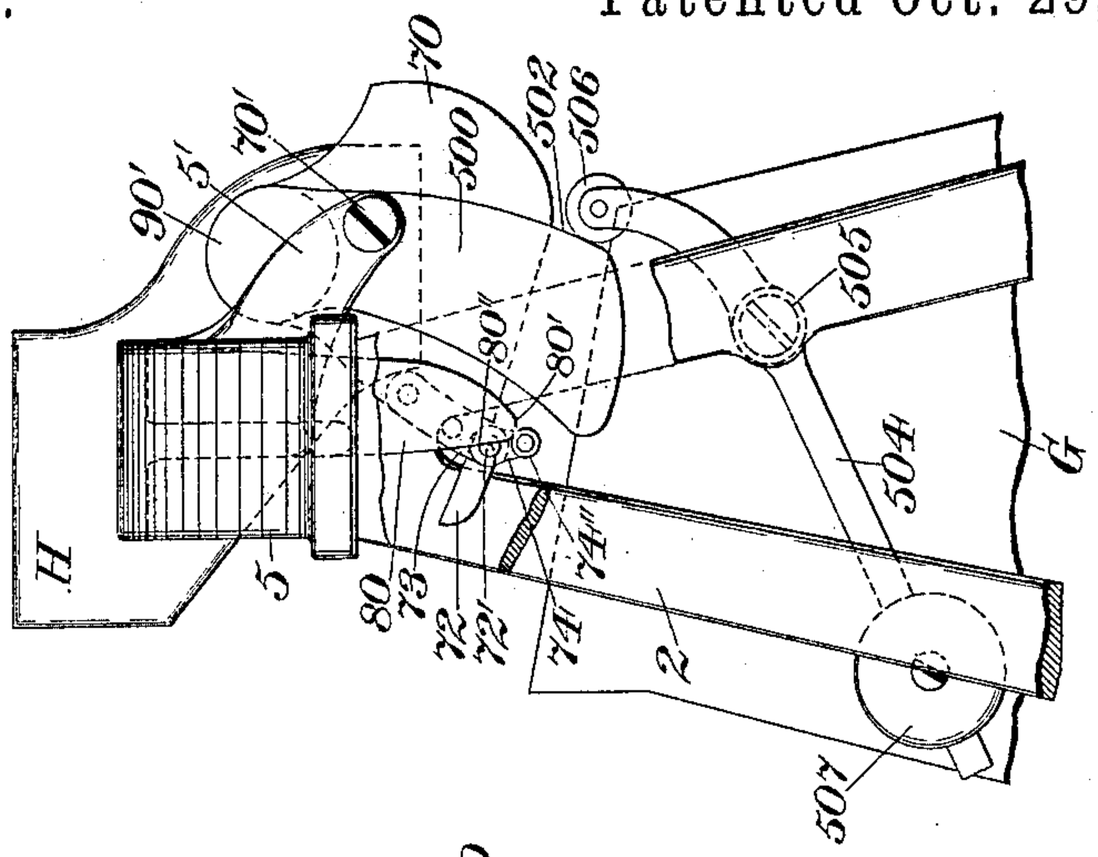


Fig. 2.

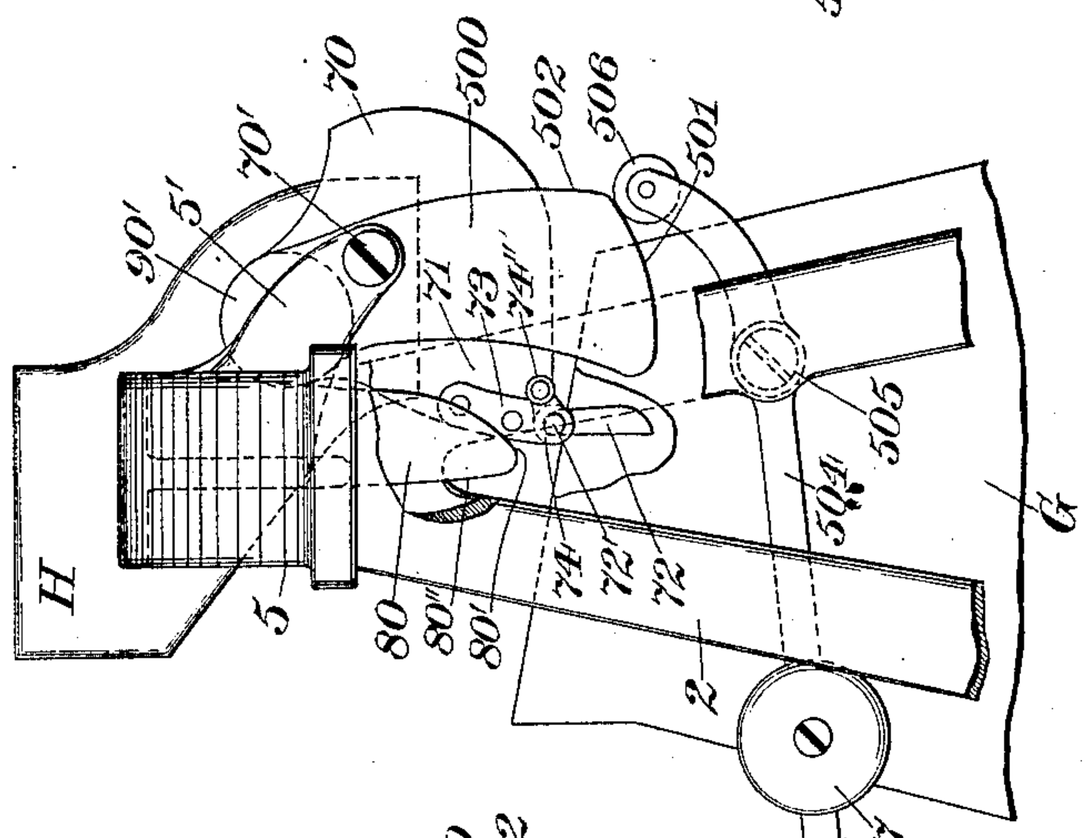
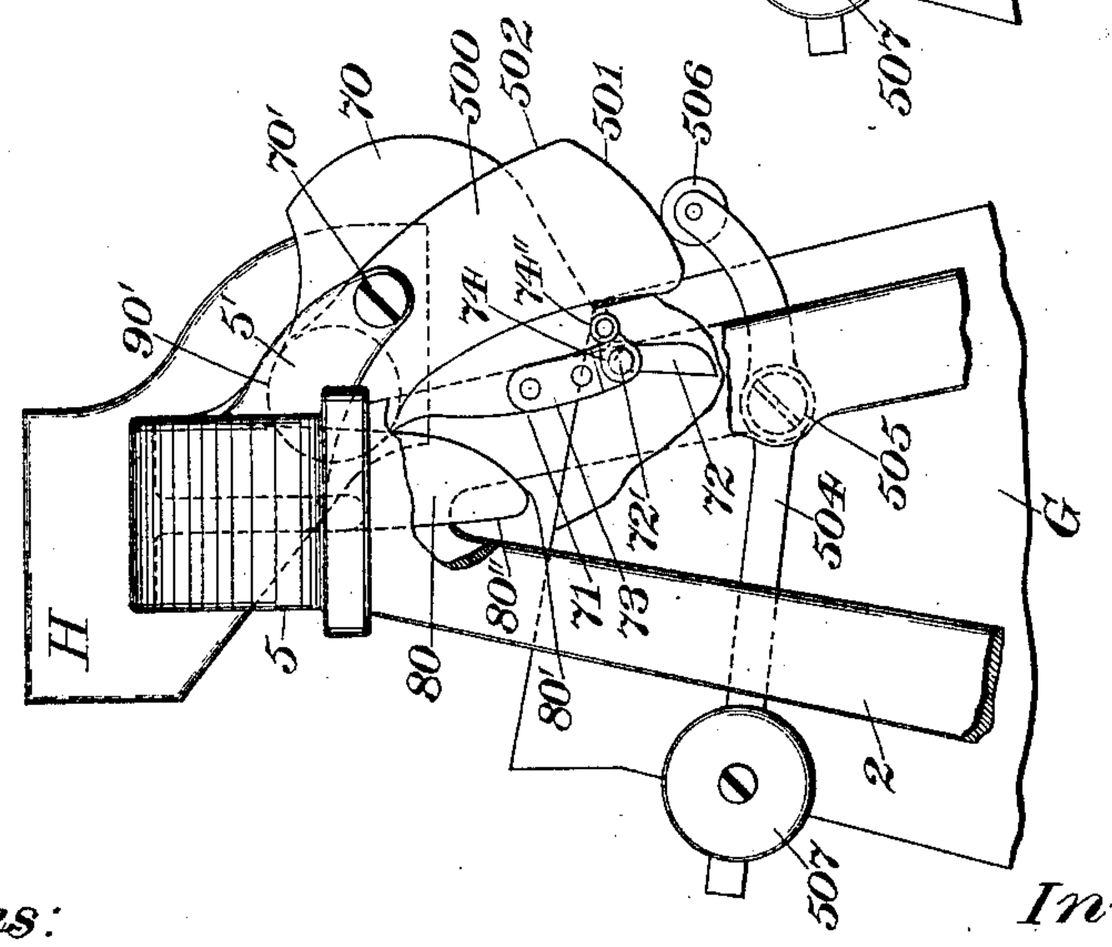


Fig. 1.



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(No Model.)

3 Sheets—Sheet 2.

F. H. RICHARDS.

AUTOMATIC WEIGHING MACHINE.

No. 548,850. Patented Oct. 29, 1895.

Fig. 4.

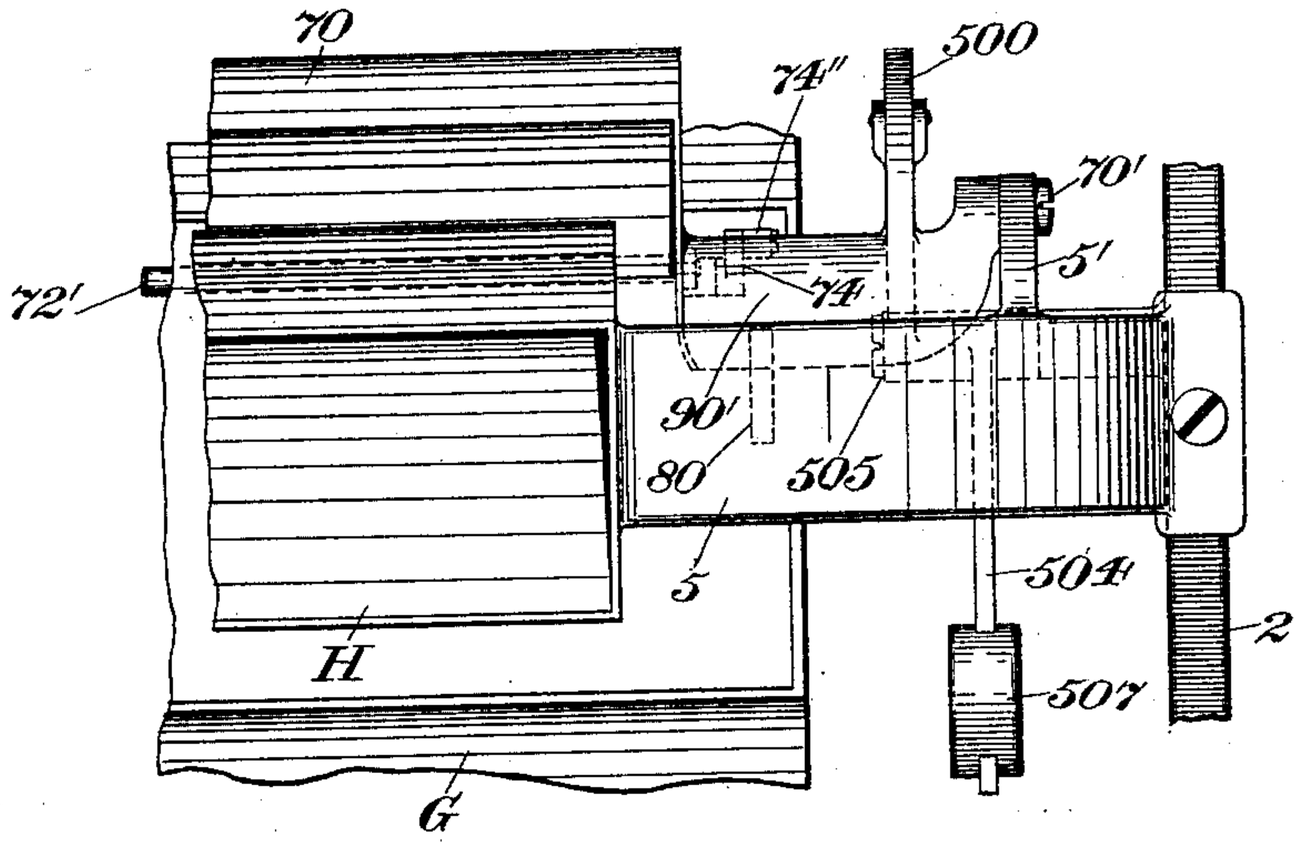
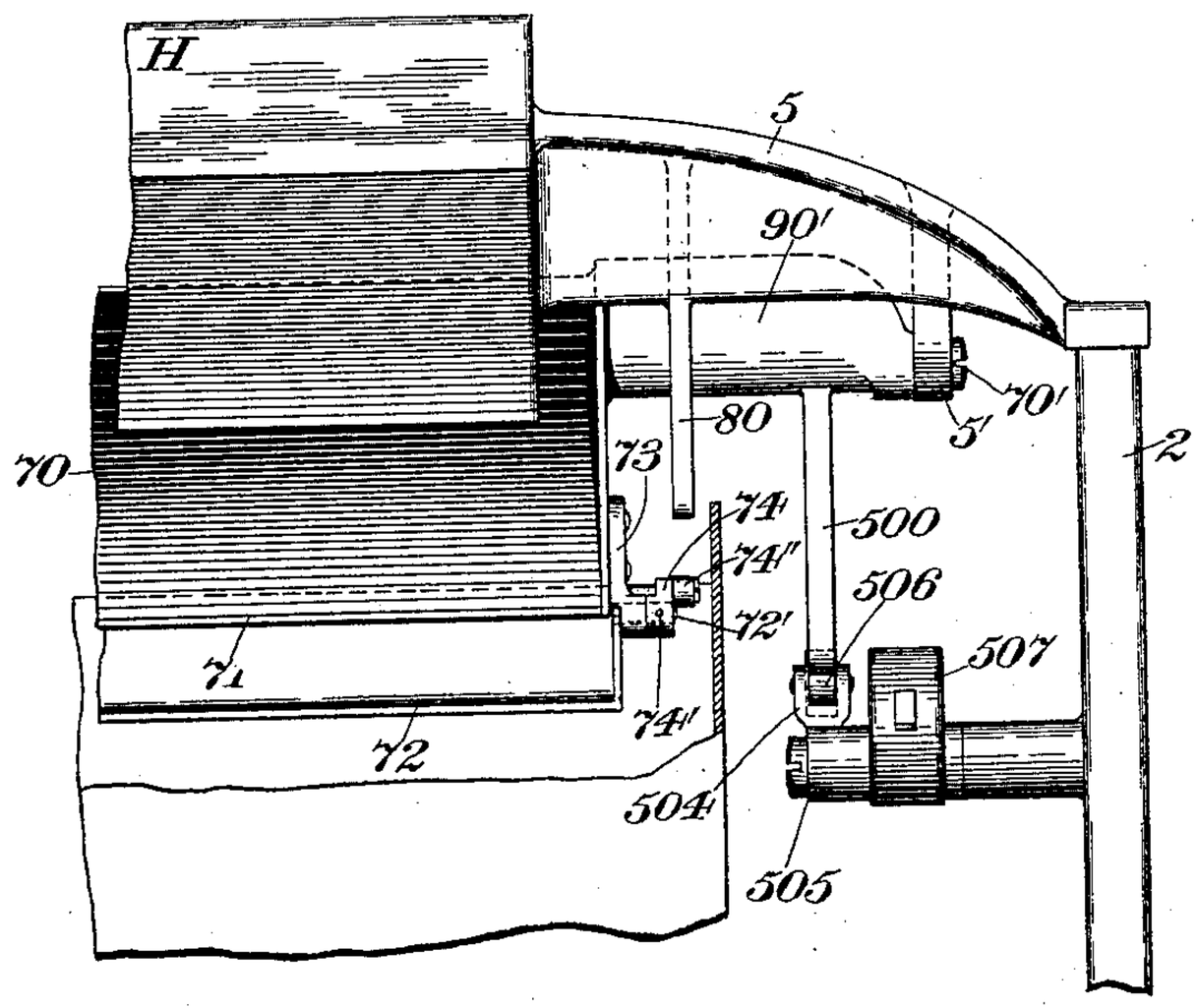


Fig. 5.



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(No Model.) 3 Sheets—Sheet 3.

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AUTOMATIC WEIGHING MACHINE.

No. 548,850. Patented Oct. 29, 1895.

Fig. 6.

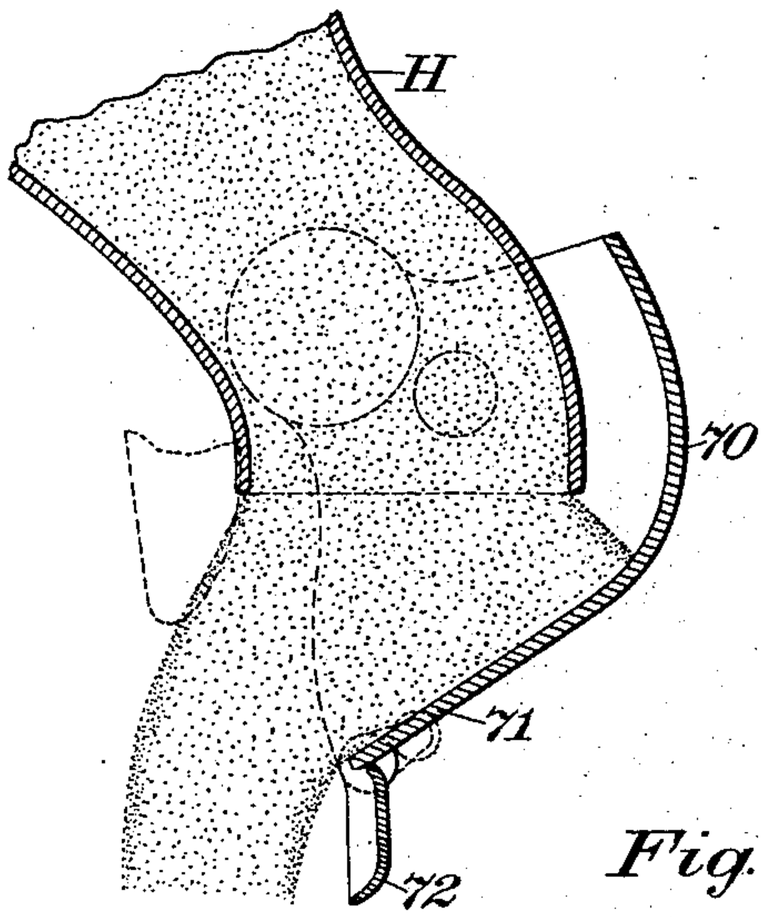


Fig. 7.

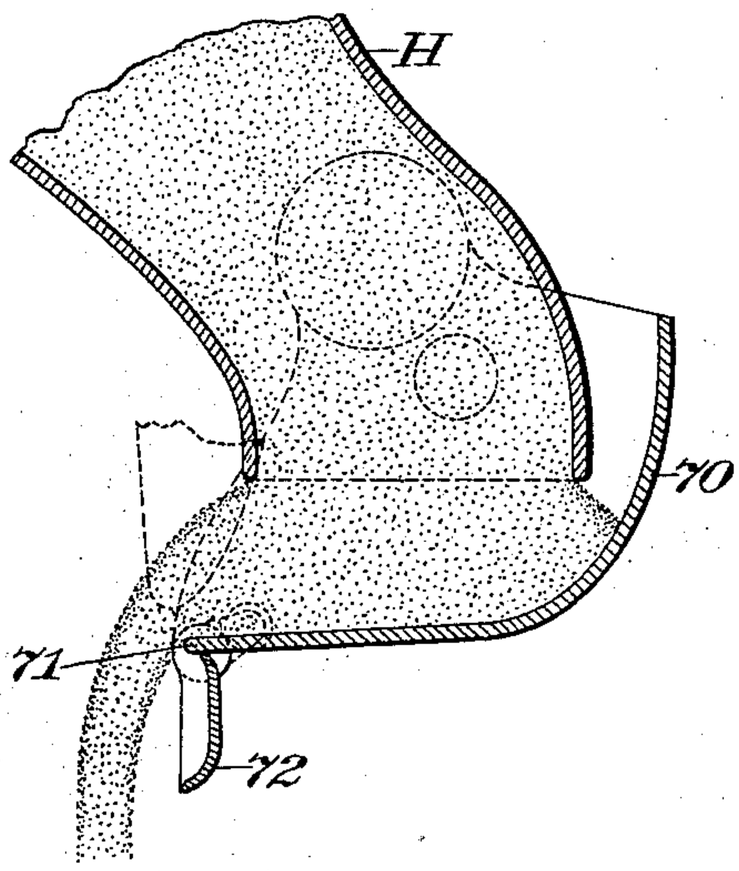


Fig. 8.

Fig. 9.

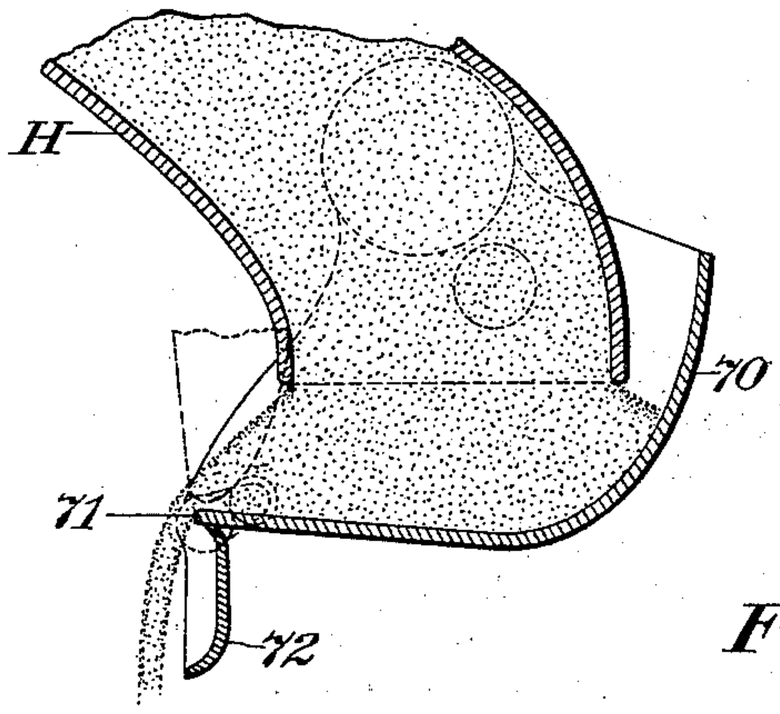
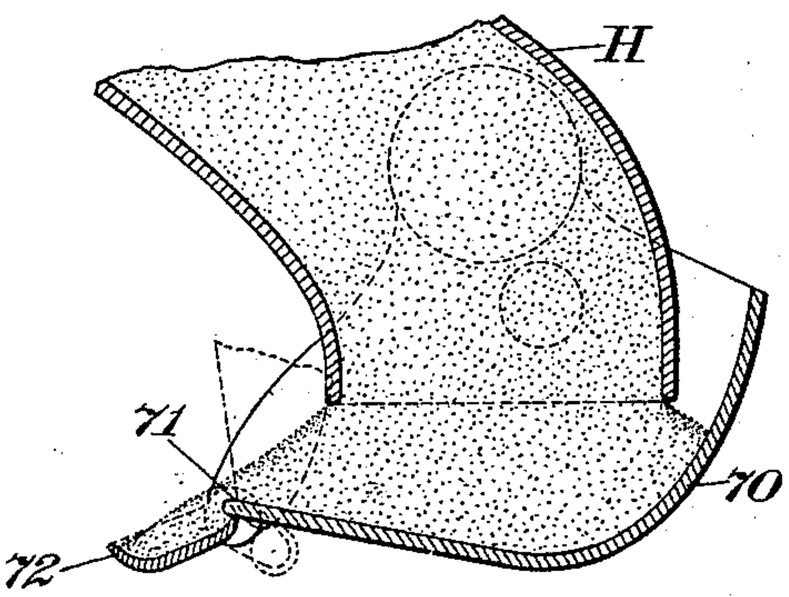
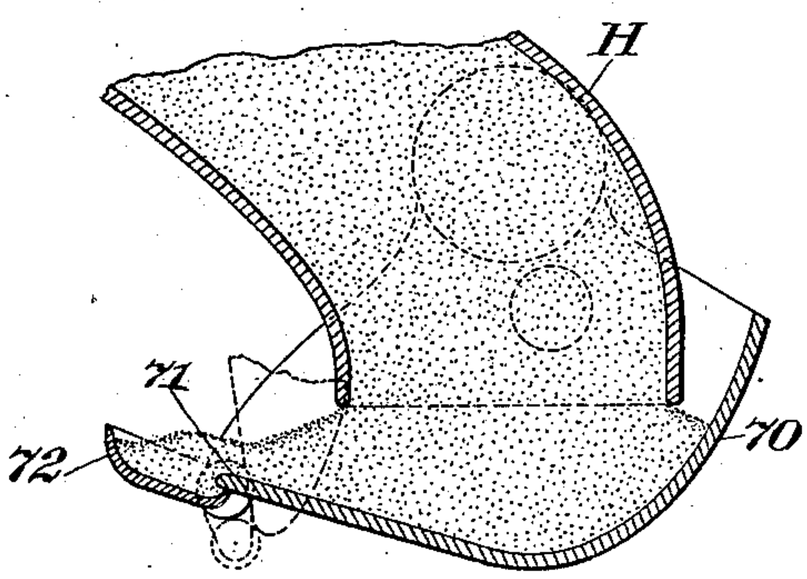


Fig. 10.





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Inventor:
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

AUTOMATIC WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 548,850, dated October 29, 1895.

Application filed June 7, 1895. Serial No. 551,947. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Automatic Weighing-Machines, of which the following is a specification.

This invention relates to valve mechanism, the object being to provide an improved valve mechanism especially adapted for use in connection with weighing-machines, said valve mechanism having a main valve, and also having a supplemental valve carried by and movable relatively to the main valve. The primary function of the valve mechanism when employed in connection with weighing-machines is to secure a perfect control of the supply-stream and to positively prevent overloading of the bucket by preventing the flow into the loaded bucket of relatively small portions of the mass sustained on the forward edge of the valve when this has cut off the supply-stream, which portions have heretofore been frequently dislodged and shaken off by the jarring of the valve mechanism during the operation of the machine after a load has been made up and before the bucket is ready to receive a new load.

In the drawings accompanying and forming part of this specification, Figure 1 is an end elevation of the upper portions of a weighing-machine as seen from the right in Fig. 5 and illustrates the machine as embodying my improved valve mechanism. Figs. 2 and 3 are similar views of the same portions of the machine, showing the valve mechanism in different positions. Fig. 4 is plan view, and Fig. 5, a front elevation of the portions of the machine illustrated in the three preceding figures. Figs. 6, 7, 8, 9, and 10 are similar cross-sectional views of the supply spout or chute of the weighing-machine illustrated in the other views, and also show my improved valve mechanism, the said supply spout and valve mechanism each being illustrated on a relatively large scale, the valves being in successive positions for correspondingly controlling the stream. Fig. 6 illustrates both valves in a position for permitting the flow of the full stream to the bucket of the weighing-machine. Fig. 7 illustrates the main valve as having reduced somewhat the supply-stream. Fig. 8 illustrates the main valve as partially closed, showing, also, the continued flow of the stream, but reduced in volume considerably for forming the drip-stream. Fig. 9 shows the main valve as having wholly cut off the supply-stream and the supplemental valve as having partially oscillated for causing a partial shift of the last part of the stream; and Fig. 10 illustrates the main valve and the supplemental valve each as having advanced slightly from the position illustrated by Fig. 9, the supplemental valve in Fig. 10 being illustrated as having come to the end of its oscillatory movement, thereby wholly cutting off the stream.

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

My improved valve mechanism embodies a supply-chute and a supply-valve therefor, the latter comprising a main valve and a supplemental valve carried by the main valve, which latter will be shiftable relatively to the main valve to thereby increase and decrease the projection of the supply-valve beyond the supply-chute.

The improved valve mechanism shown in the accompanying drawings may be used in connection with any weighing-machine. For example, it may be employed in connection with the improved weighing-machine described and claimed in my application for patent, Serial No. 541,087, filed March 9, 1895, in connection with which machine the improvement is shown in the accompanying drawings.

The operative parts of a weighing-machine are generally carried by some suitable framework. The machine, partially illustrated in the accompanying drawings, comprises two side frames connected at their upper ends by a top plate or beam. Only a portion of one of the side frames is shown, and it is designated by 2, and the top plate (illustrated as being in the form of a T in cross-section) is designated by 5. The top plate 5 is illustrated as carrying in some suitable manner a supply spout or chute, (designated in a general way by H.)

The bucket (designated in a general way by G) is illustrated as being of the "single-chambered" type or class, and is supported

under the supply spout or chute for receiving a constant supply of material in the form of a stream from the supply spout or chute.

The main stream-controlling valve may be of any suitable construction. It is shown in the drawings as being substantially similar to the improved valve described and claimed in Letters Patent No. 535,727, granted to me March 12, 1895. Such a valve is shown at 70 as pivoted for oscillatory movement between arms or brackets 5′, depending from the top plate or beam 5, but one of said arms or brackets 5′ being shown. The pivot or axis of movement of the valve is designated by 70′. The valve employed is also illustrated as located substantially below the mouth of the supply spout or chute, and as extending sufficiently far beyond the forward edge of the supply-spout to support the descending column or stream when the valve is closed. This valve is preferably balanced, so as to have normally no tendency either to open or close, the balance-weight being shown herein as a shaft 90′, extending from opposite ends of the valve-pan.

As a means for actuating the valve to close the same, a lever is shown at 504 as pivoted to the frame at 505 and as having at its forward end a friction-roller 506, adapted to engage the cam-faces 501 and 502 of a cam and to oscillate said cam and thereby the valve itself. This cam, also termed a "main" cam, is shown at 500 as a depending arm secured to the shaft 90′ and movable with the valve and having a reducing cam-face 501 and a cut-off cam-face 502. The lever 504 is shown as weighted at its forward end at 507, the weight preferably being adjustable along the forward arm of the lever.

It will be obvious that by reason of the riding up of the roller 506 on the cam-faces 501 and 502 of the arm 500 a progressively-decreasing leverage will be exerted on the valve for actuating the same during the closing movement thereof, and that by reason of the peculiar curvature of the cam-faces the force exerted by the weight 507, acting through the lever 504, will be applied to the valve in a peculiar ratio of decreasing efficiency, it being obvious that the cut-off cam-face will have a relatively greater efficiency than the reducing cam-face, and that therefore the valve-closing actuator will be effective to close the valve quickly as soon as the friction-roller passes off the reducing cam-face of the cam.

For opening the valve any suitable mechanism may be employed. For example, that described and claimed in the Letters Patent first hereinbefore referred to may be used.

The improved valve mechanism herein shown and described performs an important function in connection with weighing-machines. It comprises a main and a supplemental valve, the latter being carried by the main valve. The main valve is intended for gradually cutting off and reducing in volume the supply-stream until it is reduced to a drip or relatively small stream, which continues to flow into the bucket until a complete load is made up therein, when the final portion of the stream is cut off. The supplemental valve is preferably of concaved or dished form, and it performs an important function.

In weighing-machines as constructed with a valve of the type shown and described in my aforementioned Letters Patent when the valve cuts off the supply-stream the sustained mass is supported thereon, usually in the form of an inclined bank, and it will be obvious that on the continued movement of the valve certain small portions of the mass at the forward edge of the valve are liable to become dislodged and be shaken into the bucket after the load has been completed. Moreover, these particles of the mass are frequently dislodged by the jarring occasioned during the operation of the machine after the load is made up and before the bucket is discharged.

By my improved valve mechanism the supplemental valve is actuated on the cutting off of the supply-stream and tends to hold back the last portion of the drip-stream, so that it cannot enter the bucket after a complete load is made up therein. To insure certainty of operation, I make the supplemental valve dished or concaved, as before stated, so that the natural tendency of the particles of the mass to flow off of the forward edge of the valve will be reversed.

The purpose of the main valve (shown in the accompanying drawings) is to gradually reduce and cut off the supply-stream, so reducing the volume of size of said supply-stream as to form a drip-stream, which flows into the bucket until a predetermined load is made up therein, after which the supplemental valve comes into play, it being actuated by some suitable mechanism for controlling or reversing the movement of the last portion of the drip-stream, whereby excess in weight or overloading of the bucket is prevented on each successive operation of the machine, thereby preventing waste. This waste, though in itself relatively small on each operation of the machine, will, it is obvious, cause a relatively considerable error in weighing after a long period of operation of the machine.

The main valve 70 is illustrated as provided at the discharge side 71 thereof with a supplemental valve 72, which, it will be apparent, extends the discharge side and increases the effective width of said main valve.

The main and the supplemental valves, as hereinbefore stated, constitute a supply-valve, and the supplemental valve is shown pivotally supported at the discharge edge of the main valve. It will be observed, also, that the discharge edges of the main and the supplemental valves are shown facing in the same direction and that the supplemental valve is so movable relatively to the main valve as to throw the discharge edge of said supplemen-

tal valve into and out of action. The main valve 70 is also illustrated as being provided with a bracket 73, which is duplicated at the other side of said valve. These brackets are each provided with journal-openings for the reception of trunnions, one of the latter being illustrated at 72′ and as preferably formed integral with the supplemental valve 72. This trunnion 72′ is duplicated at the other side of the supplemental valve.

The outer end of the trunnion 72′ is illustrated as provided with a crank-arm 74, which is shown as fixedly secured thereto, the function of the crank-arm being to receive motion from a suitable actuator for oscillating the supplemental valve 72, reversing the flow of the last portion of the drip-stream. The crank-arm 74 is shown provided with a pin 74′ for maintaining it in fixed relation with the trunnion 72′.

As a means for actuating the supplemental valve through the connections just described, I prefer to employ a fixed actuator. Such actuator is illustrated at 80 as a cam in the form of an arm depending from and rigidly secured to the web portion of the T-shaped top plate or beam 5 and having cam-faces. The crank-arm 74 is shown provided at its free end with a friction-wheel 74″, which performs its well-known function.

The stationary or fixed cam 80, in addition to serving as a suitable means for actuating the supplemental valve, also serves as a stop for preventing rearward oscillation of the supplemental valve when this has shifted the last portion of the drip-stream. The fixed cam 80 is disposed in the path of the friction-wheel 74″ of the crank-arm 74, and said fixed cam is provided with a cam-face 80′ and a stop-face 80″.

It will be apparent that as the valve is closing the friction-wheel 74″ comes into contact with the cam-face 80′ of the supplemental cam 80 and rides over said cam-face 80′, thereby turning said crank-arm 74, and, through the connection of said crank-arm 74 with the trunnion 72′, rocks said trunnion and its mate in the brackets 73, thereby oscillating the supplemental valve for carrying the forward edge of said supplemental valve in an upward direction for reversing the flow of the drip-stream.

The supplemental valve is preferably made concave, so that when said valve is oscillated for shifting the last portion of the stream no portion of the valve-sustained mass will be shaken of by the jarring of the machine and carried over the forward edge of said supplemental valve.

The operation of the present improvement, briefly described, is as follows: On reference to Fig. 6, which shows the two valves in a position for permitting the full stream to enter the valve, it will be observed that the supplemental valve does not affect or reduce the flow of the full stream, it being disposed approximately at a right angle to the main valve. The main valve, it will be assumed, is being gradually closed through the valve-closing actuating mechanism hereinbefore described, and said valve is oscillated until the supply-stream is materially reduced, as shown in Fig. 7, the supplemental valve being still shown as approximately at a right angle to the main valve in a position for offering no obstruction to the free flow of the main stream. When the valve is in the position shown in Fig. 7, the friction-wheel 506 of the valve-closing actuator has nearly passed beyond the reducing cam-face 501 of the main cam 500. The valve is projected still farther in the position in which it is shown in Fig. 8, the drip-stream being reduced to about one-half of its normal size. This reduced drip-stream continues to flow into the bucket and is gradually reduced in volume, the friction-wheel 506 of the main actuator still being on the reducing cam-face 501 of the main cam 500, but having nearly passed beyond the same. Simultaneously with the riding up of said friction-wheel 506 on the cut-off cam-face 502 the valve is closed quickly and the friction-wheel 74″ of the supplemental-valve-actuating mechanism is brought into engagement with the cam-face 80′ of the supplemental cam 80, and this friction-wheel rides over said cam-face 80′, thereby oscillating the supplemental valve for reversing the flow of the last portion of the drip-stream. The supplemental valve 72 is shown in Fig. 9 as having caused a partial shift of this last portion of the stream. The friction-wheel 74″ of the supplemental-valve-actuating mechanism will then have nearly passed beyond the cam-face 80′ of the supplemental cam 80. When it has passed wholly beyond this cam-face 80′ it will come in contact with the stop-face 80″ of the supplemental cam 80, thereby preventing a rearward oscillation of the supplemental valve 72. This position of the supplemental valve is shown in Fig. 10, in which the greater portion of the stream is illustrated as cut off by the main valve, while the last portion of the stream has been shifted and entirely cut off by the supplemental valve.

From the foregoing description it will be obvious that by my present improvements a two-part or duplex valve is provided for successfully controlling the supply-stream issuing from the supply-spout, the main valve serving as a means for reducing and cutting off said stream, and the supplemental valve being adapted, when the stream is so reduced, to be oscillated for shifting or holding back the last portion of the drip-stream, thereby preventing the same from flowing into the bucket, and also for preventing the entrance into the bucket of those portions of the mass sustained upon the forward side of the ordinary oscillatory valves, which would frequently be dislodged by the jarring of the machine when in operation.

The improved valve mechanism has, in connection with weighing-machines now in suc-

cessful operation, practically demonstrated superior ability by increasing the efficiency of the machines through the obtainment of true and accurate weights of predetermined quantities of material.

It will be evident from the preceding description that the supply-chute is provided with a main valve carrying a supplemental valve which is shown shiftable thereon for increasing and decreasing the projection of the main valve beyond the chute. Hence it will be obvious that the supplemental valve is normally non-movable relatively to the main valve, it being shown disposed below normally and out of the path of the supply-stream until the close of the cut-off period or the final closing movement of the main valve, when the supplemental valve will be shifted for holding back the final portion of the drip-stream.

Having thus described my invention, I claim—

1. The combination with a supply-chute; of a supply-valve therefor comprising a main-valve and a supplemental-valve supported on the main-valve and for movement relatively thereto, and having the discharge-edges of said valves facing in the same direction.

2. The combination with a supply-chute; of a supply-valve therefor comprising a main-valve and a supplemental-valve supported on the main-valve for movement relatively thereto, and having the discharge-edge of said supplemental-valve concaved.

3. The combination with a supply-chute; of a supply-valve therefor comprising a main-valve and a supplemental-valve carried by, and normally located out of line with, and below, the main-valve; and means for shifting the supplemental-valve transversely of, and into line with, the main-valve to thereby increase the effective width of said supply-valve.

4. The combination with a supply-chute; of a supply-valve therefor comprising a main-valve and a supplemental-valve supported by the main-valve at the discharge-edge thereof for movement relatively to said main-valve and independently thereof.

5. The combination with a supply-chute; of a supply-valve therefor comprising an oscillatory main-valve and a supplemental-valve pivoted to the discharge-side of the main-valve; means for oscillating the main-valve to close the same; and independent means for oscillating the supplemental-valve relatively to the main-valve to thereby increase and decrease the effective width of said supply-valve.

6. The combination with a supply-chute; of a two-part supply-valve therefor comprising a main-valve and a supplemental-valve, and having the discharge-edges facing in the same direction, one said edge on the main-valve, and the other said edge on the supplemental-valve, and having the supplemental-valve supported at the discharge-side of the main-valve, and so movable relatively to the main-valve as to throw said second discharge-edge into and out of action.

7. The combination with a supply-chute; of a supply-valve therefor, comprising a main-valve and a supplemental-valve; means for actuating the main-valve to close the same; and an actuator in position and adapted for shifting the supplemental-valve relatively to, and during the final-closing movement of, the main-valve to thereby increase the projection of said supply-valve beyond the supply-chute.

8. The combination with a supply-chute; of a supply-valve therefor comprising a main-valve and a supplemental-valve carried by the main-valve; means for closing the main-valve; and an independent fixed actuator in position and adapted for shifting the supplemental-valve independently of, and relatively to, the main-valve to thereby increase the projection of said supply-valve beyond the supply-chute.

9. The combination with a frame-work; of a main-valve for the supply-chute; a supplemental-valve carried by the main-valve; an oscillatory-actuator carried by the frame-work and adapted for actuating the main-valve; and an independent fixed actuator also carried by the frame-work and adapted for actuating the supplemental-valve relatively to the main-valve during the final closing movement of the main-valve to thereby increase the projection of said main-valve beyond the supply-chute.

10. The combination with a supply-chute, and with a main-valve therefor; of a supplemental-valve carried by and normally non-movable relatively to the main-valve; a main-cam operatively connected with the main-valve; an actuator adapted for imparting to said cam a thrust for closing the main-valve; and an independent actuator adapted for actuating the supplemental valve relatively to the main-valve during the final closing movement of the main-valve to thereby increase the projection of the main-valve beyond the supply-chute.

11. The combination with a supply-chute, and with a main-valve therefor; of a supplemental-valve carried by the main-valve; a main-cam depending from and operable with the main-valve; an oscillatory-actuator adapted for imparting to said cam a valve-closing thrust; and an independent actuator for actuating the supplemental-valve relatively to the main-valve during the final closing movement of the main-valve to thereby increase the projection of the main-valve beyond the supply-chute.

12. The combination with a supply-spout; of a main-valve for said spout; an oscillatory supplemental-valve carried by the main-valve; a main-cam operatively connected with the main-valve; an oscillatory-actuator in position and adapted for actuating the main-cam to close the main-valve; and a fixed cam

in position and adapted for oscillating the supplemental-valve relatively to the main-valve.

13. The combination with a supply-spout; of a valve therefor comprising a main-valve and a supplemental-valve; and having the supplemental-valve carried by the main-valve; an actuator for the main-valve; an actuator for the supplemental-valve, and comprising a fixed cam having a combined cam-face and stop-face, and having said cam-face in position and adapted for oscillating said supplemental-valve in one direction, and for preventing oscillation of said supplemental-valve in the opposite direction.

14. The combination with a supply-spout; of a valve for said spout, and comprising a main-valve, and a supplemental-valve pivotally supported on the main-valve for oscillation, and said supplemental-valve having a crank-arm; an actuator for the main-valve; and a supplemental actuator for the supplemental-valve, consisting of a fixed cam having a combined cam-face and stop-face, and having said cam-face in position and adapted for engaging said crank-arm for oscillating said supplemental-valve, and for preventing rearward oscillation of the said supplemental-valve.

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