(No Model.) 2 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 548,845. Patented Oct. 29, 1895.

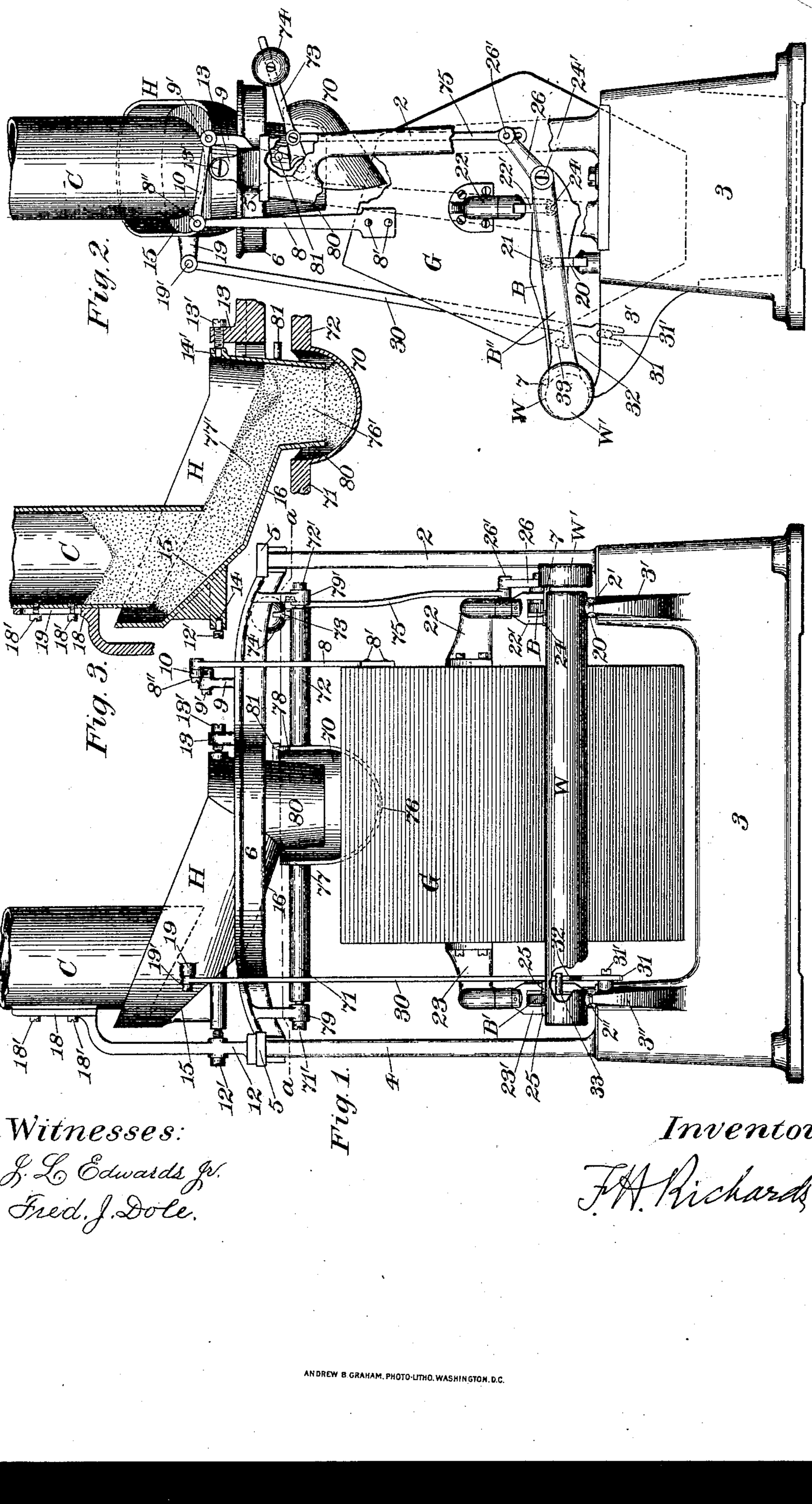

Fig. 1.

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Fred. J. Dole.

Inventor:
F. H. Richards.

(No Model.) 2 Sheets—Sheet 2

F. H. RICHARDS.

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Fig. 4.

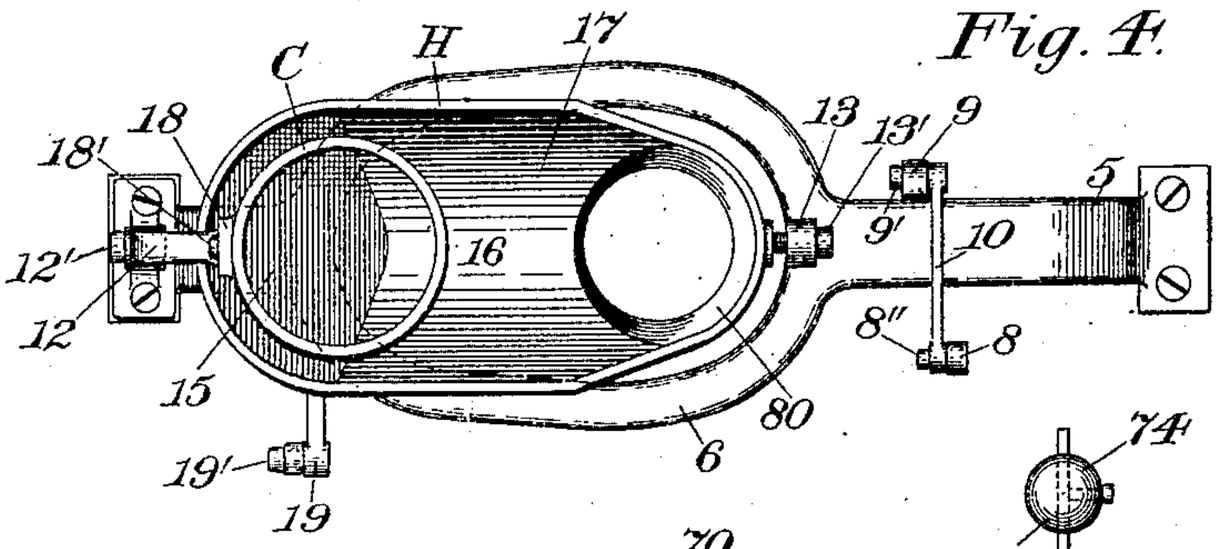


Fig. 5.

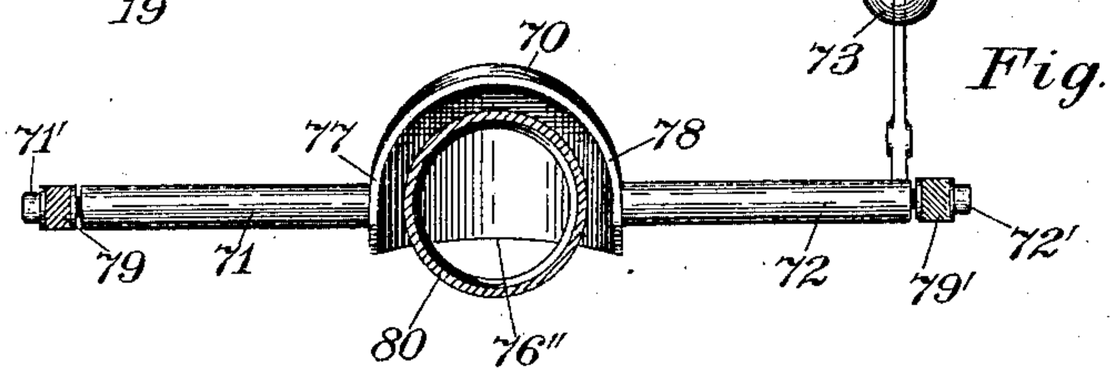


Fig. 6

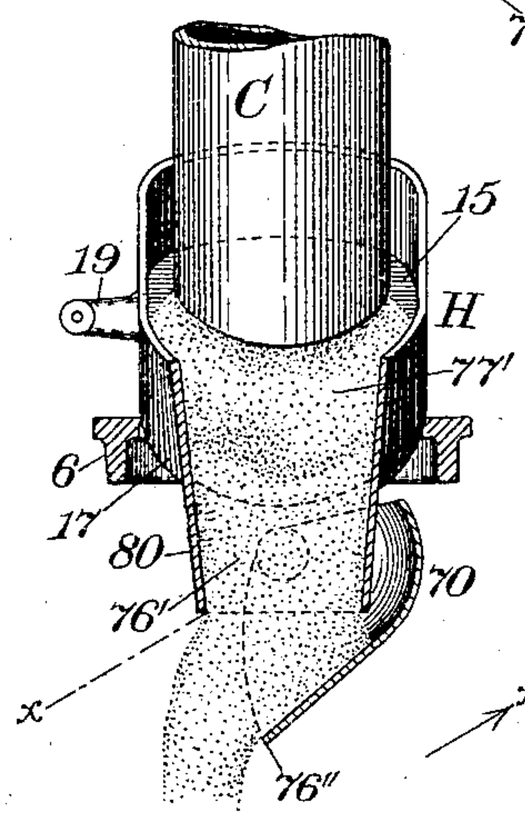


Fig. 7.

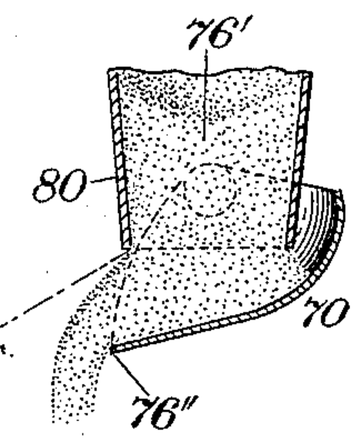


Fig. 8.

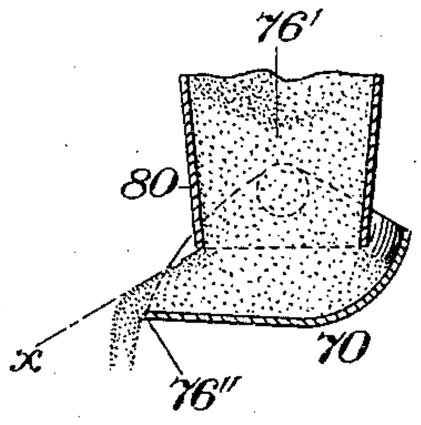


Fig. 9.

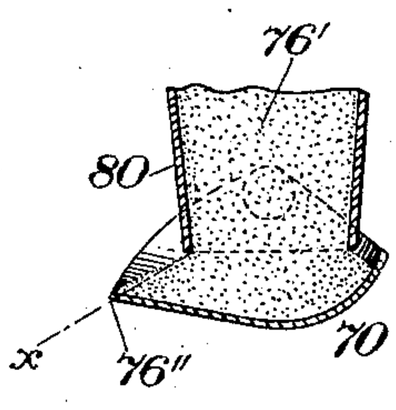


Fig. 10.

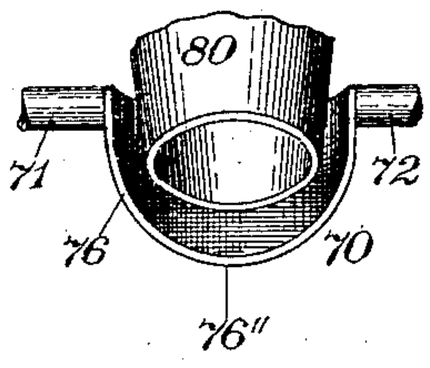


Fig. 11.

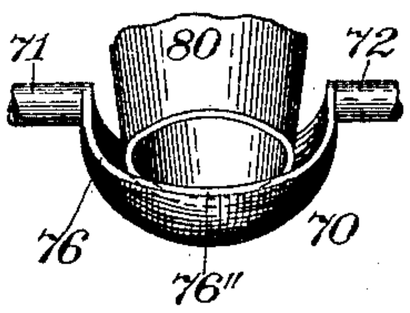


Fig. 12.

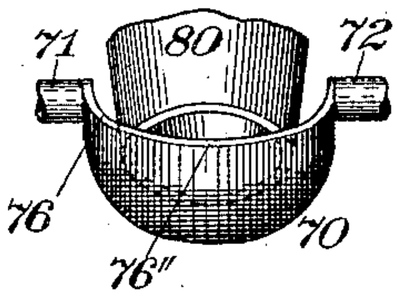
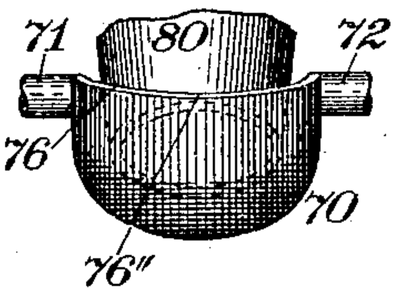


Fig. 13.



Witnesses:
L. L. Edwards Jr.
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. 548,845, dated October 29, 1895.

Application filed March 22, 1895. Serial No. 542,799. (No model.)

To all whom it may concern:

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

This invention relates to weighing-machines, the object being to provide an effective organization of co-operating devices peculiarly positioned and adapted for accurately weighing materials of a sluggish or slow-moving nature and in relatively-small quantities or measures, and to maintain such a continuous unbroken supply of material to the bucket of the weighing-machine that the blocking or packing of such materials at the valve will be prevented.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine embodying my present improvements. Fig. 2 is an end elevation of the machine as seen from the right hand in Fig. 1. Fig. 3 is a central vertical longitudinal section through the supply-spout, the inclined supply-chute, and the valve, the valve being shown in its closed position. Fig. 4 is a plan view showing the supply-spout and the inclined supply-chute (the valve not being shown) and the top beam of the framework. Fig. 5 is a cross-sectional plan view in the line *a a*, Fig. 1. Fig. 6 is a view looking from the right hand in Fig. 1, illustrating the supply-spout, the inclined supply-chute, the relatively-short feed-spout of the latter, and the valve in position thereunder. Figs. 7, 8, and 9 are central vertical sections of the relatively-short feed-spout of the inclined supply-chute, the valve being in position under said feed-spout. These views show the peculiar action of the valve on the relatively-short column of material in the feed-spout. Figs. 10, 11, 12, and 13 are views showing the peculiar action of the relatively-curved lip or edge of the valve in the act of closing.

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

The framework for carrying the operative parts of the machine may be of any suitable construction. It is shown in the drawings, Figs. 1 and 2, as comprising two side frames or uprights 2 and 4, mounted upon a base 3. These side frames or uprights 2 and 4 are shown connected at their top by a plate or beam 5, which is shown formed with an elliptical or open portion 6 to admit the inclined chute, as designated in a general way by H. (See Figs. 1, 2, and 4.)

The bucket is designated in a general way by G and is shown of the "single-chambered" type, it being shown suspended under the relatively-short feed-spout of the transfer-chute to receive a constant supply of material from said feed-spout.

While the bucket and beam mechanisms will be herein described with sufficient particularity to clearly set forth the operation of the same in connection with my present improvements, a more detailed description of these mechanisms may be had on reference to my application, Serial No. 511,087, filed March 9, 1895.

The base 3 is shown in the drawings, (see Fig. 2,) having formed thereon bearings provided with suitable beam-supports or V-bearings, such as 20, for supporting the scale-beams.

The beam-support 20 is shown bifurcated, and each of the bifurcations is shown provided with V-bearings to receive the knife-edges 21, formed on each side of the main scale-beams B and B′, respectively. A means for supporting the bucket is by counter-weighted beams (shown at B and B′) on each side of the bucket G and pivotally mounted on the beam-supports—as, for instance, by pivots or knife-edges 21. The main scale-beams B and B′ are shown connected at their rear by a weighted shaft or counterpoise, (designated by W.)

A supplemental beam is shown at B″, and shown secured at 24′ to the main beam B. This supplemental beam B″ is shown provided with a counterpoise, (designated by W′.)

Suitable means are provided for limiting the descent of the main and supplemental beams. There are shown projecting from the base 3 the arms 3′ and 3″, which are adapted to receive the stops 2′ and 2″ of the main counterpoise W. To limit the descent of the supplemental beam B″, its weight is shown provided with a stop-arm 7, formed on the inner face thereof, which, when the beam B″

has reached its lowermost limit, is received by the main weight or counterpoise W.

The bucket G is shown pivotally supported. It is shown provided with hangers or brackets 22 and 23, having secured therein bifurcated plates 22′ and 23′, which are shown provided with V-bearings in their lower edges. These V-bearings rest on pivots or knife-edges 24 and 25, formed on the scale-beams B and B′. The bucket G is supported upon an axis or knife-edge, which is shown substantially coincident with the center of gravity of the bucket, so that there shall not be a preponderance or excess of weight on either side of said center of gravity. This peculiar mounting tends to maintain the bucket in a true vertical position. Means are also provided for assisting in maintaining the bucket in a vertical position and for preventing lateral movement during its ascending and descending movements, effectively preventing any tendency on the part of the bucket to sway or rock during its operation. There is shown at 8 a relatively-extended vertical controlling arm or lever, suitably secured to the bucket 8′ by riveting, which arm co-operates with and is connected with a suitable guide or other means on the top beam or plate 5 of the framework. One form of guide connection is as follows: An arm is shown projecting at 9 from the top plate 5. This arm 9 is shown pivotally connected to a link, such as 10, and the pivot is shown at 9′. The opposite end of this link 10 is shown at 8″ pivotally connected to the vertical controlling arm or lever 8 of the bucket G. By means of the connections just described the bucket G is permitted to freely ascend and descend; but swaying movement of said bucket G is positively prevented. The peculiar suspension of the bucket reduces the strain on the link 10 to a minimum.

Heretofore in this art it has been customary to control the supply-stream by a cut-off valve or valves in position approximately in a vertical plane under said supply-spout, which has rendered necessary the employment of a relatively-small supply-spout. In the old forms of weighing-machines, where a comparatively-large supply-spout has been used, there has been a decided tendency of the material to block or pack at the valve, particularly where the material was sluggish or slow moving. My present improvements contemplate conducting such material as it leaves the supply-spout over a transfer-chute to a relatively-short feed-spout laterally therefrom and in position over the valve. It will be obvious that by this organization when the valve cuts off the supply-stream (see Fig. 9) said valve will support, free of a packing-load, a relatively-short column of material, which is formed in the short feed-spout. This column or mass of material will be thoroughly agitated immediately on and solely by the opening movement of the valve, and this peculiar result will be accomplished whether the transfer-chute or the feed-spout be oscillatory, as shown in the drawings, or non-oscillatory. The agitation and loosening of the valve-supported and feed-spout-formed column of material in turn agitates and loosens the mass lying in the transfer-chute, so that when the valve is opened a free flow of the supply-stream will be insured. It necessarily follows, then, that the valve itself constitutes in this particular organization the sole means for loosening and agitating the feed-spout-formed and valve-supported column of material. This peculiar organization has demonstrated in practice marked efficiency in insuring a free uninterrupted flow of the supply-stream to the bucket immediately on and by the valve-opening movement.

There are shown formed on the top plate 5 arms or risers 12 and 13, adapted to receive the pivots of a supply or transfer chute. As hereinbefore stated, this chute (in combination, as shown) is an important feature of the present improvements, since by means of it a relatively-large supply-spout can be used. The material is conducted from the supply-spout over said chute to a relatively-short feed-spout positioned relatively remote from the supply-spout.

The transfer-chute is shown at H relatively inclined and pivotally mounted, with its receiving end positioned to receive material from the supply-spout, (designated by C.) By reason of the pivotal mounting of the inclined chute H it is adapted to receive an oscillatory or rocking motion on its pivots, which, when effected, loosens the material and causes its downward flow. This oscillatory or rocking motion is beneficial in weighing materials of an extremely sluggish character, and even in such cases it is necessary to impart but a very slight oscillatory motion to the inclined chute H to cause a free flow of such materials.

Cylindrical pointed screws are shown at 12′ and 13′ seated in the arms 12 and 13 of the top plate 5, which serve as a convenient means for pivotally mounting the inclined chute H. These screws are shown entering suitably-formed sockets or pivot-openings (shown formed at 14 and 14′) in the inclined chute H. The inclined chute H is so balanced that there shall not be an excess of weight either above or below its pivots or axis.

The portion of the inclined chute immediately under or opposite the supply-spout is shown having a relatively-greater inclination than the remaining inclined portion of said chute. The relatively-greater inclined portion is shown at 15. By this construction the material as it issues from the supply-spout is given a substantially-flat formation, which tends to evenly distribute said material over the entire surface of said flat portion, and also gives it an initial velocity at this point. The bore or diameter of the supply-spout C is shown relatively large, which keeps the

nclined chute constantly supplied with material.

The relatively-lesser inclined portion of the chute is shown at 16, which inclination is shown at about the angle of repose of the material as it issues from the supply-spout C, so that on the spreading of the material by the flat portion 15, and when the material has started on its downward flow, it will not be too greatly accelerated to interfere with a proper and accurate working of the valve.

In cross-sectional form the inclined chute H is shown at 17 substantially concave, which construction leaves a relatively-deep central portion for the small supply-stream.

A relatively-short feed-spout is shown at 80, connected and co-operating with the inclined chute H. This spout is shown relatively remote laterally from the supply-spout C and is substantially in a parallel vertical plane with said supply-spout C.

The valve is shown at 70 and is mounted and operated similarly to the valve described and claimed in my Letters Patent No. 535,727, dated March 12, 1895. The valve is shown provided with lateral or pivot arms 71 and 72.

Brackets 79 and 79′ are shown projecting downwardly from the top plate or beam 5, and in said brackets are shown seated the pivot-screws 71′ and 72′, which enter suitably-formed pivot openings or sockets formed in the arms 71 and 72 of the valve 70. A convenient means for closing the valve is shown, comprising a weighted lever secured to an arm of the valve. It is obvious that other means may be used for normally closing the valve—such, for instance, as suitably-connected cam mechanism. A valve-operating lever is shown at 73, secured to the lateral arm 72 of the valve 70, the free end of this valve-lever being shown provided with an adjustable weight 74 to adapt the valve to varying conditions. For opening the valve an arm is shown at 26, extending forwardly from the beam B″ and being loosely pivoted to a thrust-rod, such as 75. By reason of the peculiar connections just mentioned the weight 74 of the lever 73 serves a dual function that of normally closing the valve 70 and forming a part of the main counterpoise of the machine.

On reference to Fig. 3 of the drawings, which view shows the valve 70 normally closed, it will be noted that when the valve is normally closed a relatively-short column of material 76′ is shown resting on the valve and within the relatively-short feed-spout 80. This is an important feature of the present improvements, as when the valve is opened by its co-operating mechanisms this action will positively agitate such column 76′ and the adjacent portion 77′, which rested in the inclined chute H, to loosen the same and cause a free flow of the material to the bucket G. By reason of the relatively-short feed-spout 80 the column 76′ of material formed thereby is greatly less than if the valve 70 were in position immediately under the supply-spout C.

In consequence of this peculiar construction a relatively-large supply-spout may be used, as when the material issues from the supply-spout it does not immediately rest on the valve when normally closed, being conducted to the feed-spout 80 over a suitable transfer-chute H, (shown relatively remote from the supply-spout C.)

The relatively-small weight of material resting on the valve 70 when it is closed renders it less liable to derangement during the operations of the machine and insures the loosening of said relatively-short column in the feed-spout 80 and the adjacent portions of the material in the inclined chute on the opening movement of the valve.

The construction of the valve 70 (shown in the drawings) is a peculiar one. The forward edge of the plate of the valve is shown on a curved line, vertically disposed with relation to the feed-spout 80, as at 76. (See Figs. 1, 10, 11, 12, and 13.) By reason of this curvature no angles or corners are offered to the material as it issues from the feed-spout 80, in which lumps of the material might become jammed or lodged, thereby somewhat affecting the successful operation of the machine or the flow of the material.

Another peculiar advantage possessed by the valve, owing to its substantial curvature, is that during the closing movements of the valve this curvature co-operates with the circularly-formed feed-spout 80, and as the valve closes it will be seen that the effective opening between the valve and spout, looking in a direction opposite to that of the supply-stream, is of an oval form, best adapted for offering the least resistance to the drip-stream.

Figs. 10, 11, 12, and 13 show the peculiar co-operation between the feed-spout 80, which is shown substantially circular in cross-section, (see Fig. 5,) and the valve 70, which is shown with its lip or forward edge 76 of its plate on a curved line. By reason of this construction it is possible for the bucket to receive a full and accurate weight.

As the valve gradually closes, the flow of the material is not suddenly checked; but it will be apparent that the material enters the bucket by reason of the co-operation of the circularly-disposed valve with the similarly-disposed feed-spout in substantially oval formation, which gradually reduces in size until the valve has nearly closed the feed-spout, when the drip-stream continues to flow until the full weight is in the bucket.

The line of the angle of repose of the material as it issues from the feed-spout is indicated by *x*, Figs. 7, 8, and 9. It will of course be understood that the material is not wholly cut off until the extreme forward edge 76″ of the valve has crossed or intersected the angle of repose.

In the old forms of weighing-machines it

often happened that occasionally, when the machine was at rest, relatively small quantities entered the spouts from above and in descending would, when the valves were closed, pass out of the openings left at the sides and front between the valve and spout, such valve being constructed to merely cut off the main and drip streams, the material passing out of these openings causing more or less waste. By my improved valve this waste is prevented, as when the valve is closed, the machine being at rest, the forward edge of the valve extends relatively beyond and above the angle of repose, and the sides projecting upwardly no openings are offered for the escape of the relatively small quantities.

The side walls of the valve are shown at 77 and 78, projecting sufficiently high to prevent an overflow of the material when the valve is closed.

The supply-spout is shown at C and in position and adapted to keep the inclined chute constantly supplied with material. By reason of the positioning of the feed-spout 80 relatively remote from the supply-spout C and conducting the material thereto over a transfer chute a relatively-large supply-spout can be used. The supply-spout C is shown adjustably secured to the portion 18 of the arm 12, formed on the top plate 5. The adjusting means (shown in the drawings) comprises screws 18′, passing through a longitudinal slot in the portion 18 of the arm 12 and seated in the supply-spout C.

By reason of the adjustment of the supply-spout C the machine is better adapted for varying conditions, as by raising or lowering said supply-spout the angle of repose of the material as it issues therefrom may be varied.

Means are provided for oscillating or rocking the inclined chute H alternately by the scale-beam and the opening movement of the valve. This rocking or oscillatory motion is relatively slight, just sufficient to loosen the mass of material resting in the inclined chute should it be packed solidly, as might be the case with materials which are quite sluggish in their character—such, for example, as oats and other materials which are slow moving.

A projection or arm is shown at 19, formed in the inclined chute H, which projection is shown having pivoted thereto at 19′ a relatively-long actuating-rod 30. To maintain this rod in its operative position, it is shown provided at its free end with a notch 31, which is shown passing over a screw or other strap (shown at 31′) on the projection 3″ of the base 3. The movement of this rod 30 is relatively limited. It is further shown with a detent 32 relatively near its notch portion 31, which detent is in the path of a suitable arm (shown at 33) formed on the scale-beam B′. Let it be assumed that the scale-beams are slightly above the position in which they are shown in Figs. 1 and 2 and in the act of descending. On the further descent of the beams B and B′ the detent 32 is given a sudden blow by the arm 33 of the beam B′, which although sudden is of relatively-short duration and thoroughly loosens the material resting in the inclined chute H sufficiently to cause its free flow. As stated, means are also provided for rocking or oscillating the inclined chute on the full opening movement of the valve.

The feed-spout 80 is shown provided with an arm 81, projecting therefrom and adapted to be engaged by the valve 70 on its full opening movement. The blow given is sufficient to shake the contents in the inclined chute and to cause the free flow thereof, and, like the blow given on the descent of the scale-beam, is of relatively-short duration. The arm 81 may be formed either integral with the feed-spout or made removable, and it is shown situated at a point below the axial line of the inclined chute H.

By reason of the location of the arm 81 below the pivots of the inclined chute H, when the arm 81 is engaged by the valve on its full opening movement the upper portion of the inclined chute H is carried to what is shown as the right hand, Fig. 2. This operation will raise the actuating-rod 30 through its connection with the inclined chute and bring its detent 32 into the path of the arm 33 of the scale-beam.

When the scale-beams B and B′ descend, the arm 33 engages the detent 32, which pulls the rod 30 downwardly, and consequently, by reason of the connection of said rod 30 to the inclined chute H, the detent 32 oscillates the inclined chute to the left above its pivots, as shown in Fig. 2, oscillating the inclined chute, so that its arm 81 may be engaged by the valve on its full opening movement.

Should it be desired to operate the machine without the oscillatory motions, it is only necessary to remove the arm 81 and the pivot-screw 19′ of the rod 30. By removing the pivot-screw 19′ the rod 30 may be disconnected from the inclined chute, and by reason of its notched connection with the stop 31′ it may be readily removed therefrom. By tightening the screws 12′ and 13′ the rocking motion of the inclined chute, which might naturally follow during the operation of the machine, is reduced to a minimum.

I do not wish to limit my invention to the particular inclination of the inclined chute H, (shown in the accompanying drawings,) nor to making it of two different inclinations, as the machine will operate as effectively by increasing or decreasing the inclination or making it of one continuous inclination from the supply-spout to the feed-spout.

Having thus described my invention, I claim—

1. In a weighing-machine, the combination with a relatively-short feed-spout; a valve separate from and in position and adapted for cutting off the stream from said feed-spout,

and for supporting a column of material formed in said feed-spout; of a supply-spout relatively remote, laterally, from the feed-spout; and a chute in position and adapted for conveying material from the supply-spout to the feed-spout, whereby when the valve has cut off the stream, the feed-spout will be supplied with a relatively-short column of material supported on the valve and free of a packing-load, and whereby the valve-supported and feed-spout-formed column of material will be agitated and loosened on, and by, the valve-opening movement, substantially as specified.

2. In a weighing-machine, the combination with a combined oscillatory feed-spout and transfer-chute for the feed-spout; of a supply-spout of relatively-large bore, as compared with the bore of the feed-spout, and located relatively remote, laterally, from the feed-spout, and over the transfer-chute; a valve in position and adapted for cutting off the stream from the feed-spout; and means actuated by the power of the valve for oscillating the combined feed-spout and transfer-chute, substantially as specified.

3. In a weighing-machine, the combination with a feed-spout, and with a stream-controlling valve in position and adapted for cutting off the stream from the feed-spout; of an oscillatory transfer-chute in position and adapted for conveying the material from the supply-spout to the feed-spout; and means for oscillating the transfer-chute independently of the valve-opening movement, substantially as specified.

4. In a weighing-machine, the combination with a feed-spout, and with a stream-controlling valve in position and adapted for cutting off the stream from said feed-spout; of an oscillatory transfer-chute for conveying the material from the supply-spout to the feed-spout; means for oscillating the transfer-chute in one direction; and independent means for oscillating said transfer-chute in the opposite direction, substantially as specified.

5. In a weighing-machine, the combination, with a supply-spout; of a feed-spout relatively remote therefrom; an inclined oscillatory-chute for conveying material from the supply-spout to the feed-spout; connections coacting with said chute, and adapted to be operated by the scale-beam for oscillating said chute; a valve controlling said feed-spout; and means for normally closing said valve, substantially as described.

6. In a weighing-machine, the combination, with a supply-spout; of a feed-spout; an inclined oscillatory-chute for conveying material from the supply-chute to the feed-spout; a valve for controlling said feed-spout; means for normally closing said valve; and means in position and adapted for co-operating with the valve and inclined-chute, to cause an oscillation of said chute by the opening movement of said valve, substantially as described.

7. In a weighing-machine, the combination with a feed-spout; of a supply-spout relatively remote from said feed-spout; an inclined oscillatory-chute for conveying material from the supply-spout to the feed-spout; a chute-actuating rod operatively connected with said chute; a scale-beam adapted for engaging said rod for oscillating the chute in one direction; an arm on the feed-spout; and a valve located under said feed-spout and in position and adapted for engaging the arm on the feed-spout on the opening movement of said valve, for oscillating the chute in the opposite direction, substantially as specified.

8. In a weighing-machine, the combination with a bucket; of a tubular feed-spout circular in cross-section, and in position and adapted for supplying a stream of material to the bucket; a stream-controlling valve for said feed-spout and in position and adapted for cutting off the supply-stream from said feed-spout, and having a continuously-curved discharge-edge, whereby, when the valve is cutting off the supply-stream, the stream will be presented to the bucket in oval form of progressively-decreasing volume, substantially as specified.

9. In a weighing-machine, the combination with a feed-spout, and with a valve adapted for controlling said feed-spout and for supporting a column of material in said feed-spout; of a chute adapted for conveying a stream of material to the feed-spout; and a supply-spout adjustable transversely of the line of the stream of material in the chute, whereby the line of the normal angle of repose of material issuing from said supply-spout may be varied, substantially as specified.

10. In a weighing-machine, the combination with a feed-spout, and with a valve adapted for controlling said feed-spout and for supporting a column of material therein; of a supply-spout relatively remote, laterally, from the feed-spout; and a transfer-chute adapted for conveying material from the supply-spout to the feed-spout and having its material-conveying portions of two different inclinations with the relatively-greater inclination located approximately opposite the supply-spout, whereby the material, as it issues from the supply-spout, is given an initial velocity on striking the relatively-greater inclined portion of the transfer-chute, substantially as specified.

11. In a weighing-machine, the combination with a feed-spout, and with a valve for controlling said feed-spout; of an oscillatory transfer-chute having a pair of arms, one located above and at one side of the center of movement of said oscillatory transfer-chute, and the other located below and at the opposite side of the center of movement; actuating devices for actuating said arms, and adapted, one for oscillating the inclined chute in one direction, and the other for oscillating the inclined chute in the opposite direction; and a supply-spout located relatively remote,

laterally, from the feed-spout, substantially as specified.

12. In a weighing-machine, the combination with a feed-spout, and with a valve for controlling said feed-spout and for supporting a column of material therein; of a supply-spout relatively remote, laterally, from the feed-spout; and a transfer-chute adapted for conveying material from the supply-spout to the feed-spout, and having its material-conveying portion of two different inclinations with the portion of relatively-greater inclination substantially flat, and located approximately opposite the supply-spout, whereby the material, as it issues from the supply-spout is spread and evenly distributed over said flat portion, and is given an initial velocity on striking this relatively-greater inclined material-conveying portion of said transfer-chute, substantially as specified.

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