No. 616,857. Patented Dec. 27, 1898.

F. H. RICHARDS.

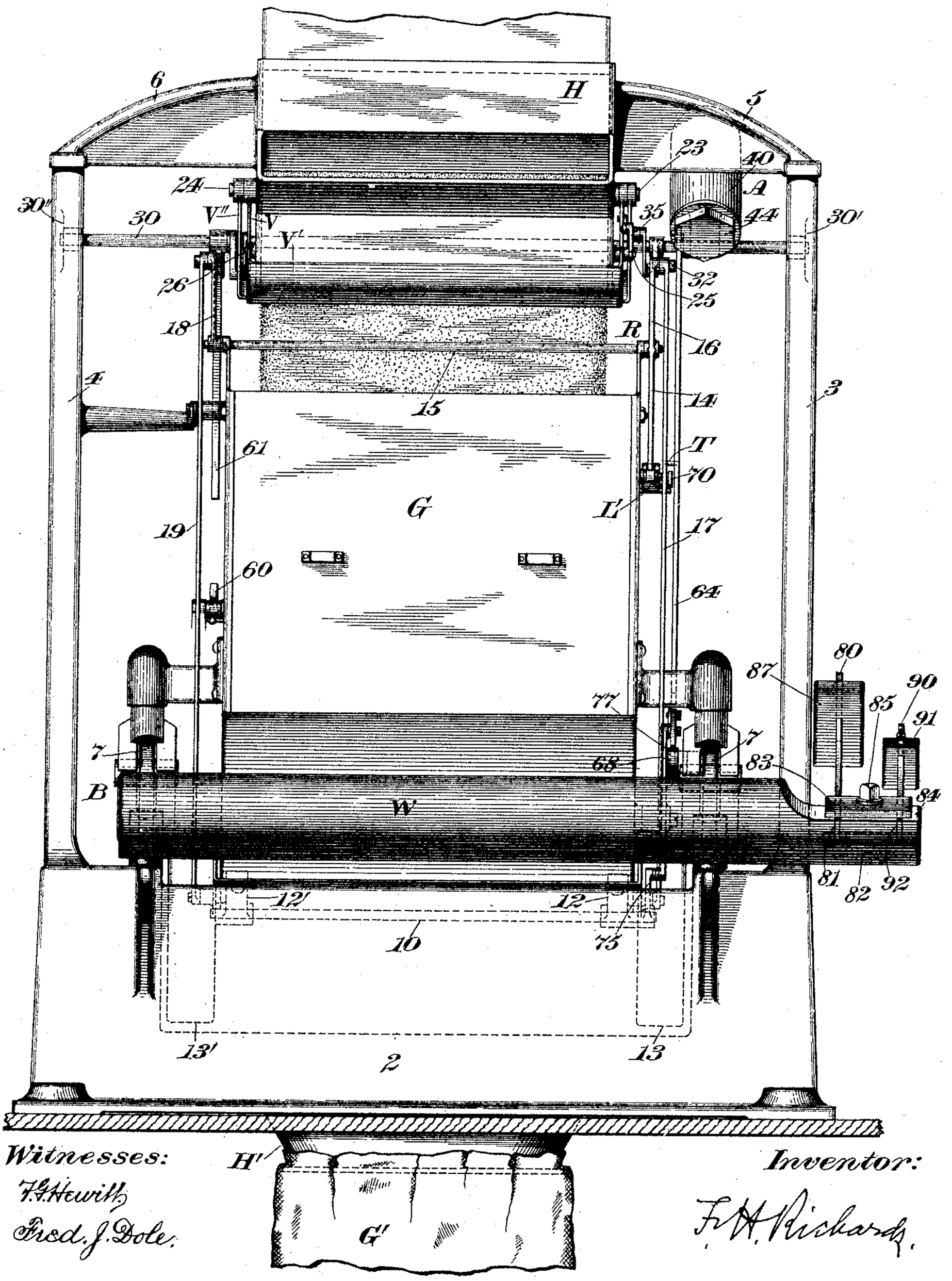
WEIGHING MACHINE.

(Application filed Feb. 8, 1898.)

(No Model.)

5 Sheets—Sheet 1.

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

Fig. 2.

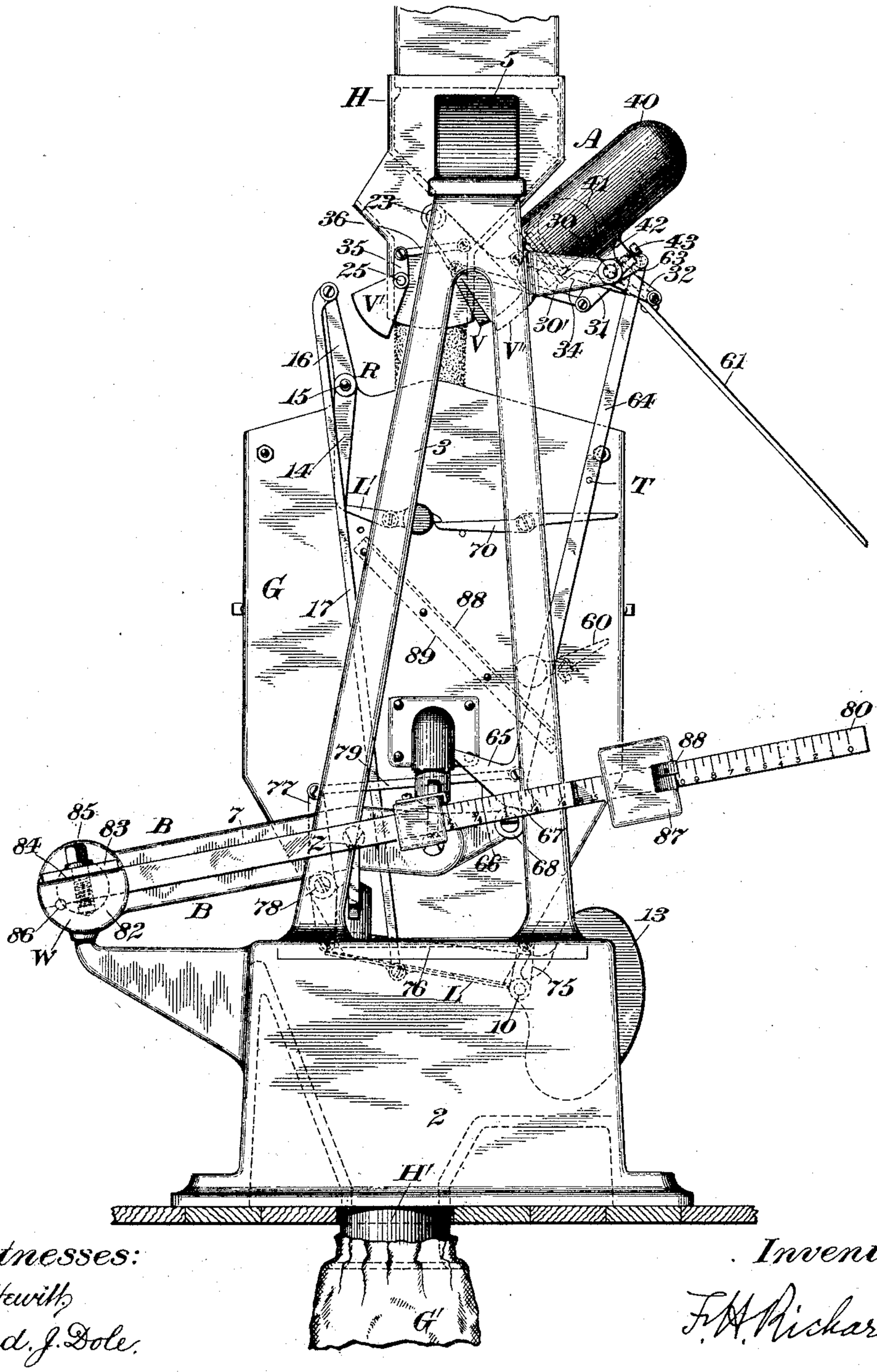

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Fig. 6.

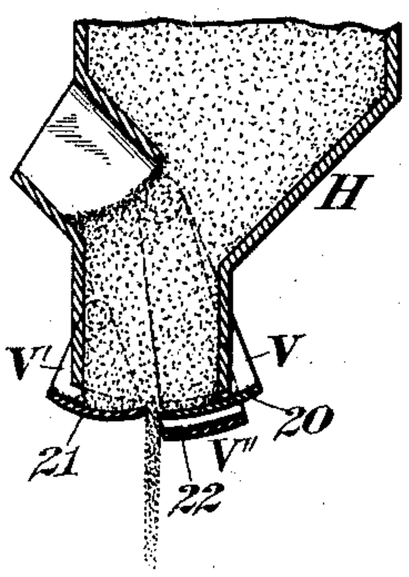
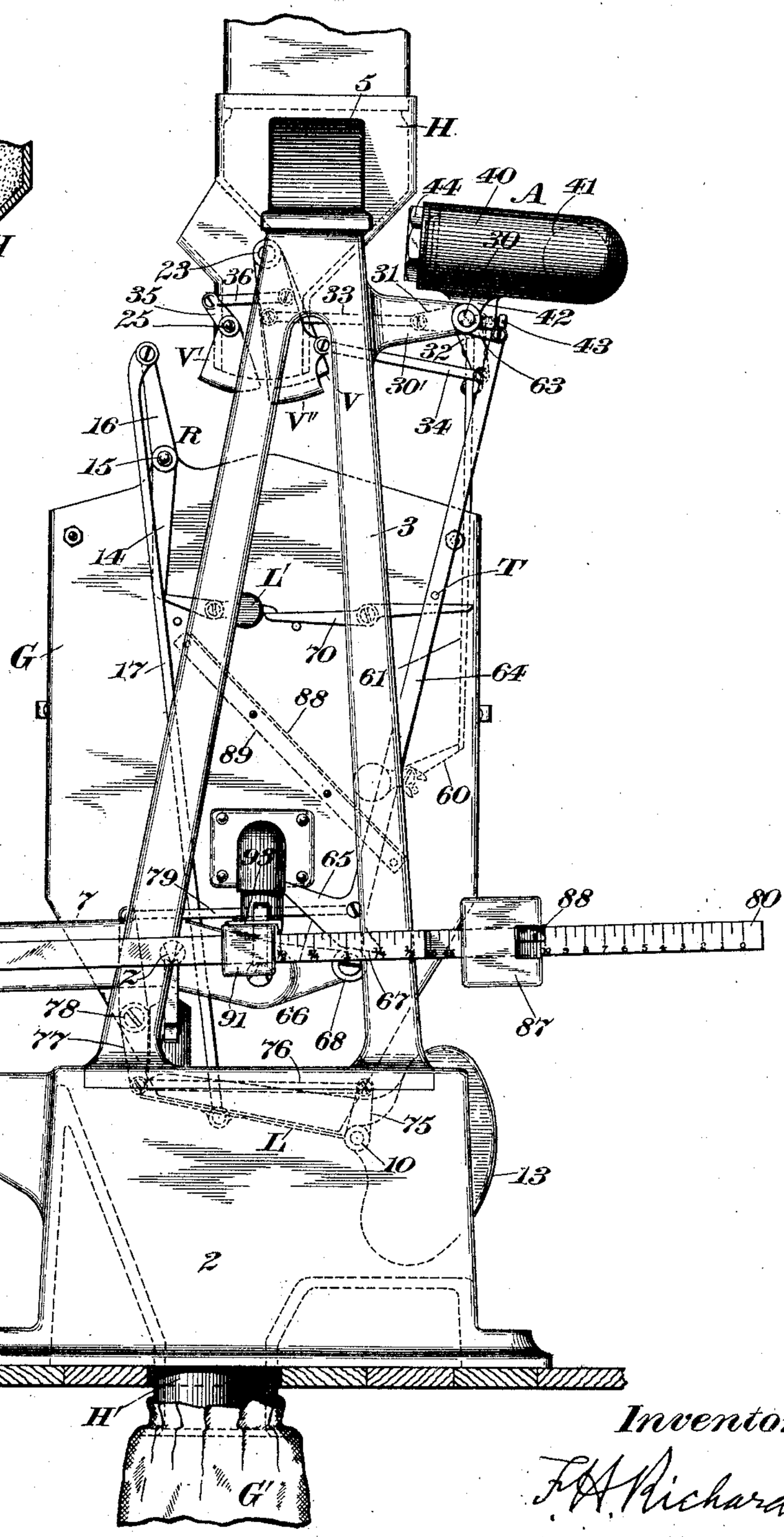


Fig. 3.



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(No Model.) 5 Sheets—Sheet 4.

Fig. 7.

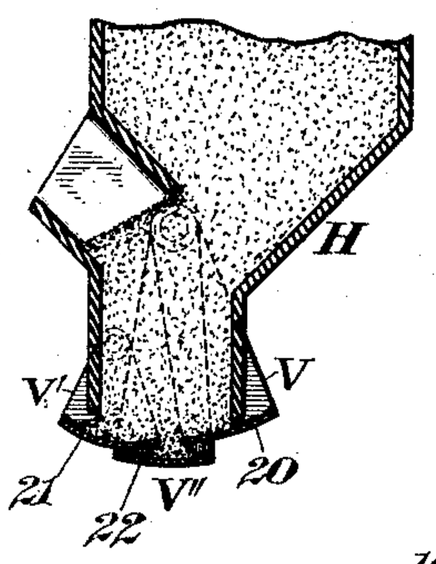

Fig. 4.

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(No Model.) 5 Sheets—Sheet 5.

Fig. 5.

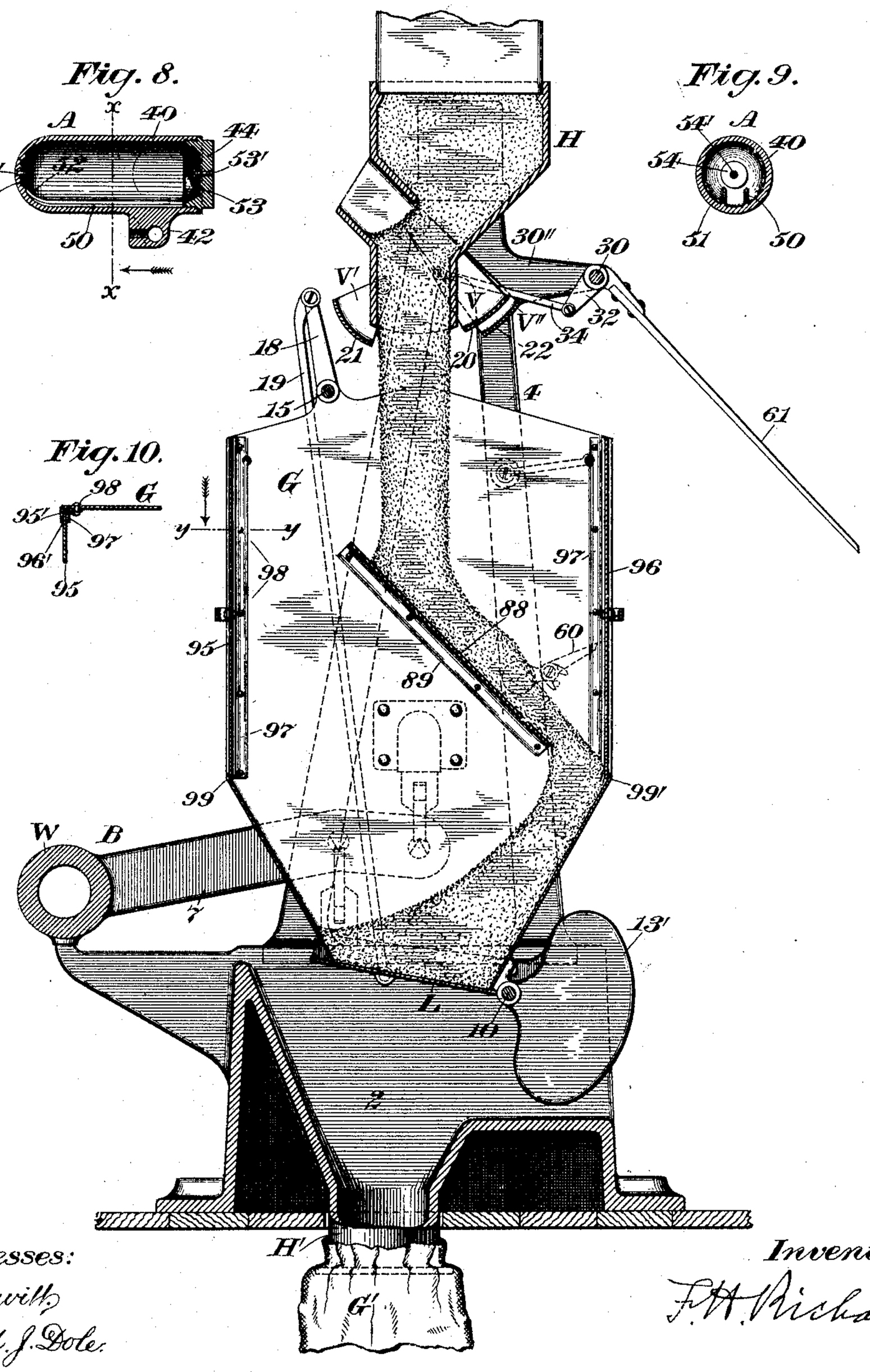

Fig. 8.

Fig. 9.

Fig. 10.

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Inventor:
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 616,857, dated December 27, 1898.

Application filed February 8, 1898. Serial No. 669,548. (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 improved machine of this character adapted more especially to be mounted on a counter and automatically to weigh and deliver into bags or other receptacles comparatively small charges of material, and it includes improved means for controlling the stream, said means involving a pair of stream-controllers, and means for advancing said stream-controllers simultaneously a predetermined distance and for retracting one and simultaneously advancing the other, by reason of which the mass sustained by the stream-controllers is loosened up to permit that stream-controller which stops the flow of material to the load-receiver to be advanced without undue resistance thereto.

My improved machine also includes, in combination with stream-supplying means, a pair of concentrically-reciprocatory stream-controllers, a rocker provided with projecting arms, and links connecting the arms with the respective stream-controllers, and the stream-supplying means may consist of a hopper having a series of stream-controllers at least two of which are operated in such a manner that they advance simultaneously to a certain point, during which period only one of the stream-controllers acts on the supply-stream and beyond which period the other stream-controller is advanced relatively to its companion to arrest the supply.

The stream-controllers consist, preferably, of pan-valves, and I have illustrated three of them, two of said valves serving to reduce the volume of the supply issuing from the hopper or similar device, while the third or supplemental valve cuts off the reduced or drip stream, and the mounting and operation of the several valves are such that the auxiliary valve does not come into contact with the material until the close of the drip period, or when the load is completed, so that a very slight resistance is offered to the rapid closure of said valve, and the effective stroke is consequently an exceedingly short one.

Another feature of the invention resides in means for actuating the stream-controller by power derived fron the closer, and to accomplish this result I provide, preferably, a power-transmitter and connect the same with the stream-controller and with the closer, said power-transmitter coöperating with the weighing mechanism and terminating, preferably, in a foot having two faces disposed at angles to each other. This foot is adapted to coact with the beam and with a projection at the poising end thereof, the idle face of said foot resting upon said projection during the flow of the supply-stream into the load-receiver, so that when the beam or poising end thereof falls it serves the usual purpose of controlling the action of the valve mechanism. On the opening of the closer to discharge a load the foot is shifted out of operative relation with the scale-beam, so that said beam can return to its primary position while the closer is open without operating a valve; but when the closer begins to shut the angular face or foot-piece is caused to ride upon the beam, which at this time is stationary, thereby forcing the power-transmitter upward to result in retracting the stream-controllers or valves.

Another feature of the invention consists of an improved beam mechanism including a main beam and an auxiliary beam fixed to said main beam at one side and extending beyond the axis of said main beam and graduated, commencing at O, near the end of said auxiliary beam farthest from the axis of the main beam, and a weight mounted to move upon the auxiliary beam and employed when weighing out loads of different sizes; and I prefer to employ a second auxiliary beam having thereon a movable weight, the purpose of which is to compensate for a bag, it being usual to weigh the bag as a part of the charge. The main beam is counterweighted at one end, and the load-receiver is suspended at the other end thereof, said beam being fulcrumed between the two points; and I prefer to secure the auxiliary beams to the counterweight, and they extend for some distance beyond the axis of the main beam, the load-weight being movable between said axis and the extreme end of the auxiliary beam, which is gradu-

ated between its free end to the axis of the main beam.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of my improved weighing-machine. Figs. 2, 3, and 4 are side elevations of the machine as seen from the right in Fig. 1 and show the positions occupied by the different parts during the making and discharging of a load. Fig. 5 is a longitudinal central section of the same. Figs. 6 and 7 are central views of the valve mechanism in its two final positions. Fig. 8 is a longitudinal central section of a valve-actuator. Fig. 9 is a transverse section taken in the line $x\,x$, Fig. 8, and looking in the direction of the arrow; and Fig. 10 is a sectional plan view taken in the line $y\,y$, Fig. 5.

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

The framework for supporting the different parts of the machine consists of the chambered base 2, in which the discharge-hopper II′ is located, the side frames or uprights 3 and 4, mounted on the base, and the brackets 5 and 6, resting on the uprights and extending oppositely from the supply-hopper II, serving as a convenient means for supplying a stream of material to the load-receiver of the weighing mechanism, and the discharge-hopper H′ is adapted to receive the loads intermittently discharged from said load-receiver, and it is substantially funnel-shaped, so that a bag-mouth can be placed over the reduced end thereof, as shown in the several figures of the drawings.

The weighing mechanism involves a load-receiver and a supporting scale-beam therefor and one or more auxiliary beams, preferably fixed to the main beam, and the load-receiver and the main scale-beam are preferably of the kind disclosed in Letters Patent No. 548,840, granted to me October 29, 1895, to which reference may be had. The load-receiver is designated by G, and the supporting-beam thereof by B, the load-receiver being mounted upon the poising end of said beam and the latter being fulcrumed, as at z, upon the base 2, and the two arms 7 of the beam being joined by the cylindrical weight W, which extends beyond one of the arms, as represented in Fig. 1, and such extended portion carries a pair of auxiliary beams, hereinafter referred to.

The load-discharging means includes as a part thereof a closer, as L, adapted to cover the usual discharge-outlet in the load-receiver, and means including a latch for holding the closer shut. The closer is fixed to a rock-shaft 10, supported in bearings, as 12 and 12′, secured near the lower edge of the load-receiver, and it is shut by counterweights, as 13 and 13′, extending rearward therefrom.

The latch for holding the closer shut is designated by L′, and it is of the ordinary construction, it being adapted to engage the arm 14 of the rocker R, fixed at its middle to a rock-shaft 15 on the load-receiver, the opposite arm 16 of said rocker being connected by the longitudinal rod 17 with the closer L, and said shaft is provided at its opposite end with a crank-arm 18, connected by a rod 19 with the closer L, the rods 17 and 19 moving in parallelism as the closer opens and shuts.

The supply-hopper II is located over and in position to supply a stream of material to the load-receiver G, the supply being controlled, preferably, by a series of pan-valves, two of which coöperate during a predetermined period to reduce the volume of the supply-stream to a drip, which flows into the nearly-loaded bucket to complete or top off the load, after which the third or auxiliary valve is operated to cut off the reduced or drip stream.

The two reducing-valves are preferably oppositely reciprocative, and during the reducing period they move toward each other to reduce the size of the supply-stream, while the auxiliary valve closes under the space between the discharge edges of the two main valves to cut off the drip-stream on the completion of the load.

The main valves are designated by V and V′, and the auxiliary valve by V″, and although I have shown two main or reducing valves it is obvious that one of them might be dispensed with. In the present case the valves V and V″ are concentrically reciprocative, they moving forward simultaneously for a predetermined distance, beyond which point the auxiliary valve has an advancing movement for cutting off the drip-stream, while the main valve V is slightly retracted, thereby tending to loosen up the supply and reduce as far as possible the resistance to the final closure of the auxiliary valve, which during the first period of operation of the valve mechanism does not come in contact with the supply-stream. Therefore it will be evident that my invention involves as a feature thereof a stream-controlling means including a pair of steam-controllers and means for advancing said stream-controllers simultaneously a predetermined distance and for subsequently retracting one and advancing the other simultaneously beyond this point.

Each of the valves V, V′, and V″ includes a cut-off portion or valve proper consisting of blades 20, 21, and 22, and the valves V and V″ are supported for oscillation upon the pivots or studs 23 and 24, (see Fig. 1,) extending oppositely from the supply-hopper, while the valve V′ is suspended from a similar pair of studs 25 and 26.

The several valves are operated by power applied to the rock-shaft 30, journaled in brackets 30′ and 30″, extending rearward from the uprights 3 and 4, respectively, and provided with the rock-arms 31 and 32, and to which are pivoted the links 33 and 34, likewise attached at their opposite ends to the valves V and V″, respectively, and the two rock-arms are disposed substantially at right

angles to each other and form, in effect, with the two links, toggles for operating, when the shaft 30 is actuated, the three stream-controllers or valves.

The valve V′ is furnished with a crank-arm 35, connected with the valve V by the link 36, by reason of which when the valve V is operated by the shaft the valve V′ will be moved toward or from the companion reducing-valve.

In Fig. 2 the parts are represented occupying their primary positions, the full volume of the supply being shown as entering the empty load-receiver and the several valves being wide open. When the load-receiver has received a certain quantity of material, it will descend, thereby permitting the three valves, which are gravity-valves, to shut for a short distance and until an actuator becomes effective to impart a further and accelerated movement thereto, and the positions of the two rock-arms 31 and 32 and the connecting-links 33 and 34 are such that on the initial motion of the shaft 30 the valves V and V″ will be moved simultaneously under the outlet of the hopper H, while the valve V′ moves from the opposite direction under said spout and toward the first-mentioned two valves; but it will be seen that the cut-off blade 22 is under the cut-off blade 20, whereby the first-mentioned part does not come in contact with the supply-stream. At the commencement of the poising period or when the load has been nearly completed the final movement of the several valves will be interrupted by a suitable device for a sufficient length of time to permit the reduced or drip stream to enter the load-receiver through the space between the discharge edges of the valves V and V′. When the load is completed, the valve mechanism is released, at which point an actuator becomes effective for rocking the shaft 30, so that the valve V″ is advanced by thrusting the link 34 to the left, and at the same time the pivotal point between the rock-arm 31 and the lever 33 is slightly elevated, and the link 33 is drawn for a short distance to the right, whereby the valve V is moved in a corresponding direction or retracted, which results in loosening up the material sustained thereby, so that during the final movement of the valve V″ the resistance to the rapid closure thereof is reduced very materially and the retraction of the valve V′ necessarily follows at this time.

As hereinbefore stated, the several valves are advanced by their own weight up to the drip period, beyond which point they are operated by an actuator mounted, preferably, upon the shaft 30 and designated by A, said actuator consisting of a casing, as 40, and a ball or sphere 41, mounted to roll from end to end of the casing and serving as the power to operate the valve mechanism on its second stage of movement.

The casing 40 has on its under side the lug or ear 42, apertured to receive the shaft 30 and held in place by the set-screw 43, passing through the same and engaging the shaft. The extreme rear end of the casing is closed, while the opposite or forward end thereof is furnished with a removable cap or plug 44, preferably in threaded engagement therewith, by reason of which the ball or roll-weight 41 may be inserted or removed from the casing, and when the cap or plug 44 is in place dust or dirt is positively excluded from the inside of said casing, so that free movement of the ball is assured.

The ball 41 is of slightly less diameter than the interior of the cylindrical casing 40, so that it can roll freely from end to end thereof, and to guide said ball in a straight path I preferably mount it upon a track consisting of the rails 50 and 51, disposed in parallelism on the floor or bottom of the casing and upturned at its outer end, as at 52, so that when the lower end of the casing falls, as shown in Fig. 4, the result will be gradually to arrest the movement of the rolling weight and to protect the same from injury, and said weight preferably abuts against buffers, as 53 and 54, secured to the opposite ends of the casing and constructed, preferably, of leather or other similar material, the buffers being in the form of disks held against the plug and the closed end of the casing, respectively, and riveted in place, as at 53′ and 54′.

In Fig. 2 the several valves are shown wide open and the rolling weight 41 is represented against the inner end or removable plug 44 of the casing. When a certain proportion of the load has entered the load-receiver, it descends, as before stated, and as it does so the valves V, V′, and V″ are permitted to advance by their own weight to their secondary positions, (represented in Fig. 3,) or until a device operative with the valves strikes a stop upon the weighing mechanism, which stop arrests the further progress of the valves until the load is completed, and it will be observed on inspection of said Fig. 3 that the floor of the casing is disposed slightly below a horizontal line, commencing at the inner end thereof, so that when the horizontal line is crossed by the floor of the casing the ball 41 can drop to the right or from end to end of the casing, whereby when the valve mechanism is released the shaft 30 will be rocked by the weighted end of the casing 40 to operate the valve mechanism in the manner aforesaid.

The means for arresting the operation of the valve consists, preferably, of a stop, as 60, of the "by-pass" type, mounted upon the load-receiver and disposed in the path of the rod or bar 61, fixed to and depending from the rock-shaft 30. At the commencement of the drip period the free end of the by-pass 60 will be engaged by the rod 61, so as to block temporarily the movement of the three valves. On the completion of the load the by-pass 60 will pass off the rod 61, thereby releasing the

valve-actuator A, whereby the weighted end thereof can drop to impart to the valves their final movements.

The operation of the several valves is controlled partly by the beam B and partly by the closer L in the following manner: The rock-shaft 30 carries a crank-arm 63, to which the rod 64 is pivoted, said rod terminating in a foot 65, having angular faces 66 and 67, constituting what might be termed the "working" face and the "idle" face, respectively, and during the normal operation of the machine the face 67 is held in contact with the projection or antifriction-roll 68 at the poising end of the beam B.

As before stated, the angular face 67 of the foot 65 is held in engagement with the antifriction-roll 68 by means preferably connected with the closer for a purpose that will hereinafter appear. As the beam descends from its highest to its lowest position (shown in Figs. 2 and 3, respectively) the antifriction-roll falls away from the angular face 67, and consequently permits the operation of the valve mechanism.

The means for effecting the discharge of the load consists of a tripper T in the form of a pin on the reciprocatory rod 64, which strikes the end of the lever 70, pivoted to the load-receiver, and which in turn lifts the weighted end of the closer-latch L′, as shown in Fig. 4, and disengages said latch from the rocker R, thereby releasing the closer, which is then forced open by the weight of the mass in the load-receiver, the load then being discharged into the hopper and thence into the bag, as G′, the mouth of which has been placed beneath the delivery end of said hopper.

The closer L furnishes the power for operating the valve mechanism, the power developed being transferred through the rod 64 to the several valves. On the opening of the closer the foot-piece 65 is shifted thereby relative to the projection 68, so that the upper end of the working or angular face 66 is carried opposite said projection, as shown in Fig. 4, and the beam B can return to its normal position without operating the rod 64. When, however, the closer is shut, the angular face 66 is drawn up on the antifriction-roll 68 by the closer, thereby thrusting the rod 64 upward, and consequently rocking the shaft 30 in a direction reverse to the movements imparted thereto by the actuator A, whereby the several valves controlling the supply-stream are opened.

The closer-supporting shaft 10 is provided with a rock-arm 75, to which the link 76 is pivoted, said link being likewise attached at its opposite end to the rocking lever 77, pivoted, as at 78, to the load-receiver and connected at its opposite end to the lower extremity of the rod 64 by the link 79.

When the latch L′ is tripped, the closer is forced open, and on this operation the link 76 is moved to the left, thereby oppositely throwing the link 79, and consequently moving the angular face 67 out of contact with the antifriction-roll and shifting the foot-piece 65 until the extreme inner end or highest point of the inclined working face 66 is opposite said roll. When the closer is opened, the mass is of course discharged, and the load-receiver being lightened the beam returns to its primary position; but it cannot, as before stated, apply any thrust to the rod 64. On the shutting of the closer by the counter-weight 13, this motion being a rapid one, the angular faces 66 and 67 are caused to ride upon the antifriction-roll 68 by reason of the connections between the said closer and foot-piece, so that the rod 64 is elevated to open the several valves and permit the supply to enter the load-receiver.

To prevent the closer L being forced open by the inflowing stream, I prefer to mount in the receiver the angular plate 88, flanged at its opposite ends, as at 89, said flanges being secured by rivets or other convenient means to the opposite sides of the load-receiver, and this plate is of such width as to receive the full volume of the supply, as shown in Fig. 5, on the opening of the several valves, thereby to prevent the application of an undue pressure upon the closer during its final shutting movement.

My improved machine is especially adapted for store use, where it can be mounted upon a counter for weighing out loads of material in comparatively small quantities, and I provide means whereby loads of different weights can be automatically weighed out and delivered into bags, &c.

An auxiliary or load beam is represented at 80, it consisting of a longitudinal arm fitted at one end in a notch 81 in the extended portion 82 of the beam-weight W and held in the notch by a cap or flat plate 83 and against the upper flat face 84 of the weight and maintained in place by the set-screw 85, in threaded engagement with the beam-weight, said auxiliary beam being held against longitudinal movement by the pin 86, disposed in a bore in the weight W and fitting in a keyway in said auxiliary beam. The auxiliary beam extends considerably beyond the axis *x* of the main beam B and is graduated, commencing at "0" at the end farthest from said axis, the graduations indicating pounds and half-pounds, and said auxiliary beam carries for sliding movement a load-weight 87, adapted to be held in an adjusted position by the index 88, secured to said weight and fitting in notches on said auxiliary beam.

When the index 88 of the load-weight 87 is in the notch corresponding with "0," the load-receiver and the beam mechanism will be exactly balanced.

The range of movement of the weight 87 is between the zero-point at the right end of the beam 80 and the axis *z* of the main beam B.

When the weight 87 is moved from the zero-point toward the left, it adds to the efficiency of the beam-weight W, and the variation is

indicated in pounds on the scale of said auxiliary beam.

In the several figures of the drawings the weight 87 is upon the "10" mark. When the weight is moved to the right, the efficiency of the weight W is decreased.

It is customary in weighing out goods such as flour, sugar, &c., to include the bag as part of the weight, and I have represented a device for compensating for the bag, which is not placed upon the weighing mechanism, the means consisting of an auxiliary beam 90, graduated at its right end and carrying the bag-weight 91, said auxiliary beam being fitted in the notch 92 on the main weight W and being in parallelism with the auxiliary beam 80 and held in place by the means which secures said beam 80. Said bag-weight is provided with an index 93, fitting in notches in line with the graduations of the auxiliary beam.

Should it be desired to weigh out a ten-pound package, the auxiliary or load weight 87 is moved along the beam 80 until the index 88 fits in the notch therein opposite the "10" mark, and the weight 91 is moved along the beam until it is opposite the half-pound mark, thereby subtracting from the efficiency of the weight W and consequently adding in effect a half-pound to the load-receiver, so that in reality the load of material discharged is nine and one-half pounds.

For the purpose of facilitating the cleansing of the load-receiver I prefer to make the front and rear walls 95 and 96 thereof removable, said walls being adapted to slide in guideways, as 95', formed by the bent-over portions or flanges 96' of the front and rear walls of the load-receiver and one portion of the right-angular plate 97, fixed in the load-receiver by a series of rivets, as 98.

The lower ends of the removable walls fit over the upper ends of the inclined portions 99 and 99' of the fixed portion of the load-receiver, and by removing either one of said sliding walls 95 and 96 gives ready access to the interior of the load-receiver.

The operation of the hereinbefore-described machine, briefly stated, is as follows: In Fig. 2 the parts are shown occupying their normal positions, the angular face 67 of the rod 64 being in contact with the antifriction-roll 68 of the main beam B and the valves V', V, and V'' being wide open, while the closer L is held shut by the latch L' engaging the rocker R.

When a predetermined portion of material has been received by the load-receiver, this descends, and the antifriction-roll 68, falling away from the rod 64, will permit the valves V, V', and V'' to close by gravity, or until the rod 61, which is operated by the valves during the first period of their motion, strikes the by-pass 60, at which time the bottom of the casing 40 will have passed below a horizontal line, permitting the weight 41 to roll to the outer end of the casing, as shown in Fig. 3. With the parts in the positions shown in said figure the valves will be held so that a drip-stream can flow between the discharge edges of the valves V and V' and into the load-receiver to complete the load.

When the load is completed, the by-pass 60 will pass off the rod 61, thereby releasing the actuator A, so that the weighted end thereof can drop to impart an accelerated movement to the valves V, V', and V'' to swing the last-mentioned under the other two, the valves V and V' being slightly retracted to loosen up the supply. On the final movement of the valve the tripper T strikes the lever 70, which in turn disengages the latch L' from the rocker R, thereby releasing the closer L, which is forced open to discharge the load into the hopper H' and from thence into the bag G'. On the opening of the closer the rod 64 is shifted out of operative relation with the beam B by reason of its connections with said closer and the beam returns to its primary position. On the shutting of the closer the valve mechanism is opened in the manner hereinbefore specified and the closer L is latched, when the operation is repeated.

Having described my invention, I claim—

1. The combination, with weighing mechanism including a load-receiver, of stream-supplying means; a pair of stream-controlling valves one of which operates as a reducing and the other as a cut-off valve; a rocker provided with projecting arms; links connecting said arms, respectively, with said valves; and means controlled by the weighing mechanism for operating said valves.

2. The combination, with stream-supplying means, of a pair of concentrically-reciprocative stream-controllers; a rocker provided with projecting arms; links connecting the arms, respectively, with the stream-controllers; and a casing having a rolling weight, said casing being connected with the rocker.

3. The combination, with stream-supplying means, of a pair of concentrically-reciprocative valves one of which serves as a reducing and the other as a cut-off valve; a rocker provided with projecting arms; links connecting the arms, respectively, with the valves; an actuator for said valves; and a second reducing-valve coöperative with the first-mentioned reducing-valve and operated by said actuator.

4. The combination, with stream-supplying means, of a pair of concentrically-reciprocative valves one of which serves as a reducing and the other as a cut-off valve; a shaft provided with projecting arms; links connecting the arms, respectively, with the two valves; and a second reducing-valve connected with the first-mentioned reducing-valve.

5. The combination, with stream-supplying means, of a pair of concentrically-reciprocative valves; a rock-shaft provided with projecting arms; links connecting the arms, respectively, with the two valves; an actuator

connected with the shaft; and a third valve connected by a link with one of the first-mentioned valves.

6. The combination, with stream-supplying means, of a pair of concentrically-reciprocative valves one of which serves as a reducing and the other as a cut-off valve; a rocker provided with projecting arms connected, respectively, with the two valves; an actuator mounted upon the rocker; and a second reducing-valve provided with a crank-arm connected by a link with the first-mentioned valves.

7. The combination, with stream-supplying means, of a pair of concentrically-reciprocative valves; a rocker provided with projecting arms connected, respectively, with said valves; an actuator mounted on the rocker and involving a rolling weight; weighing mechanism including a load-receiver; and connections between the weighing mechanism and said rocker.

8. The combination, with a pair of stream-controllers, of means for advancing said stream-controllers simultaneously a predetermined distance, and for subsequently retracting one and simultaneously advancing the other.

9. The combination, with a reducing-valve and a cut-off valve each embodying a plate or valve proper, the plate or valve proper of the reducing-valve being above the corresponding part of the other valve, of means for advancing said valves simultaneously a predetermined distance, and subsequently for retracting the reducing-valve and simultaneously advancing the cut-off valve.

10. The combination, with a pair of stream-controllers, of means for advancing said stream-controllers simultaneously a predetermined distance, and subsequently advancing one stream-controller and for retracting the other stream-controller during said period of advancing movement.

11. The combination, with a pair of concentrically-reciprocative stream-controllers, of means for advancing said stream-controllers simultaneously a predetermined distance, and subsequently for advancing one and simultaneously retracting the other stream-controller.

12. The combination, with stream-supplying means, of valve mechanism for controlling the stream; and means for operating the valve mechanism, including a longitudinal casing, a rolling weight in said casing, a track in the casing upon which said weight rolls, a removable cap closing one end of the casing, and buffers, one of which is secured to the cap and the other of which is secured to the outer end of the casing.

13. The combination, with stream-supplying means, of valve mechanism; a rocker connected with the valve mechanism; a swinging casing connected with the rocker and having a removable cap at one end and containing a rolling weight, and a track upon which the weight is adapted to roll; a bar connected with the casing; weighing mechanism including a load-receiver; and a stop carried by the weighing mechanism and disposed in the path of said bar.

14. The combination, with stream-supplying means, of a pair of stream-controllers; means for advancing said stream-controllers simultaneously a predetermined distance and subsequently for retracting one and simultaneously advancing the other; and means for arresting the movement of the stream-controllers at a predetermined point.

15. The combination, with weighing mechanism involving a load-receiver, of stream-supplying means therefor; a pair of stream-controllers; means for advancing said stream-controllers simultaneously a predetermined distance, and for subsequently retracting one and simultaneously advancing the other; and means operative with the weighing mechanism for temporarily arresting the movements of the stream-controllers.

16. The combination, with weighing mechanism involving a load-receiver having a closer and a scale-beam, of stream-supplying means; a stream-controller; a power-transmitter connected with the stream-controller and adapted to coöperate with one of the members of the weighing mechanism; and connections between said power-transmitter and the closer for shifting said power-transmitter on the opening of the closer, and for transferring the power of the closer to the power-transmitter, and through the latter to the stream-controller, for operating said stream-controller on the shutting of the closer.

17. The combination, with weighing mechanism involving a load-receiver having a closer and a scale-beam, of stream-supplying means; a stream-controller; a projection on the weighing mechanism; a power-transmitter connected with the stream-controller and having a foot the face of which is angular and is adapted to coöperate with said projection; and means operative with the closer for shifting said power-transmitter.

18. The combination, with weighing mechanism involving a load-receiver having a closer and a scale-beam, of stream-supplying means; a stream-controller; a power-transmitter connected with the stream-controller and terminating in a foot having two angular faces; a projection on the weighing mechanism, adapted normally to coöperate with one of said angular faces; and means operative with the closer for shifting said power-transmitter.

19. The combination, with weighing mechanism involving a load-receiver having a closer and a scale-beam, of stream-supplying means; a stream-controller; a projection operative with the weighing mechanism; a power-transmitter connected with the stream-controller and having an angular face adapted to coöperate with said projection; and a lever upon the load-receiver, connected, respec-

tively, with the closer and with the said power-transmitter.

20. The combination, with weighing mechanism involving a load-receiver having a closer and a scale-beam, of stream-supplying means; a stream-controller; a power-transmitter connected with the stream-controller and having an angular face adapted to engage the scale-beam; and means connecting the closer and power-transmitter for shifting the latter on the movement of the closer.

21. The combination, with a load-receiver having a closer, of a scale-beam supporting the load-receiver; stream-supplying means; a stream-controller; a power-transmitter connected with the stream-controller and having an angular face coöperative with the scale-beam; a lever mounted on the load-receiver; and links connecting the lever with the power-transmitter and the closer, respectively.

22. The combination, with weighing mechanism involving a load-receiver having a closer and a scale-beam, of a rod connected with the stream-controller and having a foot-piece provided with an angular face adapted to rest upon the scale-beam; and connections between the rod and the closer, for shifting said rod on the movement of the closer.

23. The combination, with a load-receiver, of an oscillatory counterweighted main beam sustaining the load-receiver, the counterweight having a notch; an auxiliary beam fitted in said notch; a key seated in the bore in the counterweight and fitting in a recess in the auxiliary beam; a plate fitted upon the weight and serving to hold the auxiliary beam in place; and a screw in threaded engagement with the weight and adapted to maintain the plate in position.

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Witnesses:
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