(No Model.)

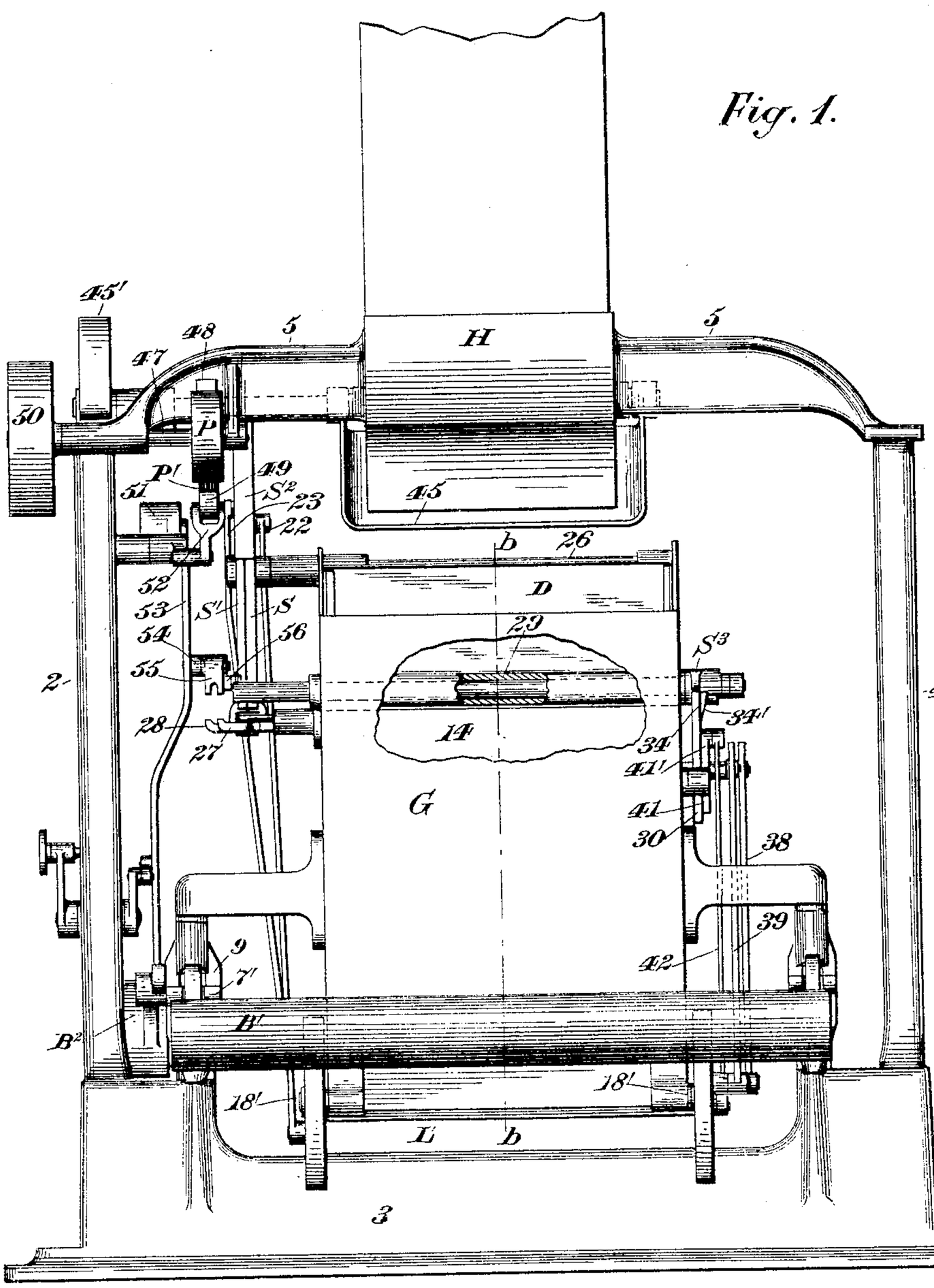
5 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 589,292. Patented Aug. 31, 1897.

Fig. 1.



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5 Sheets—Sheet 2.

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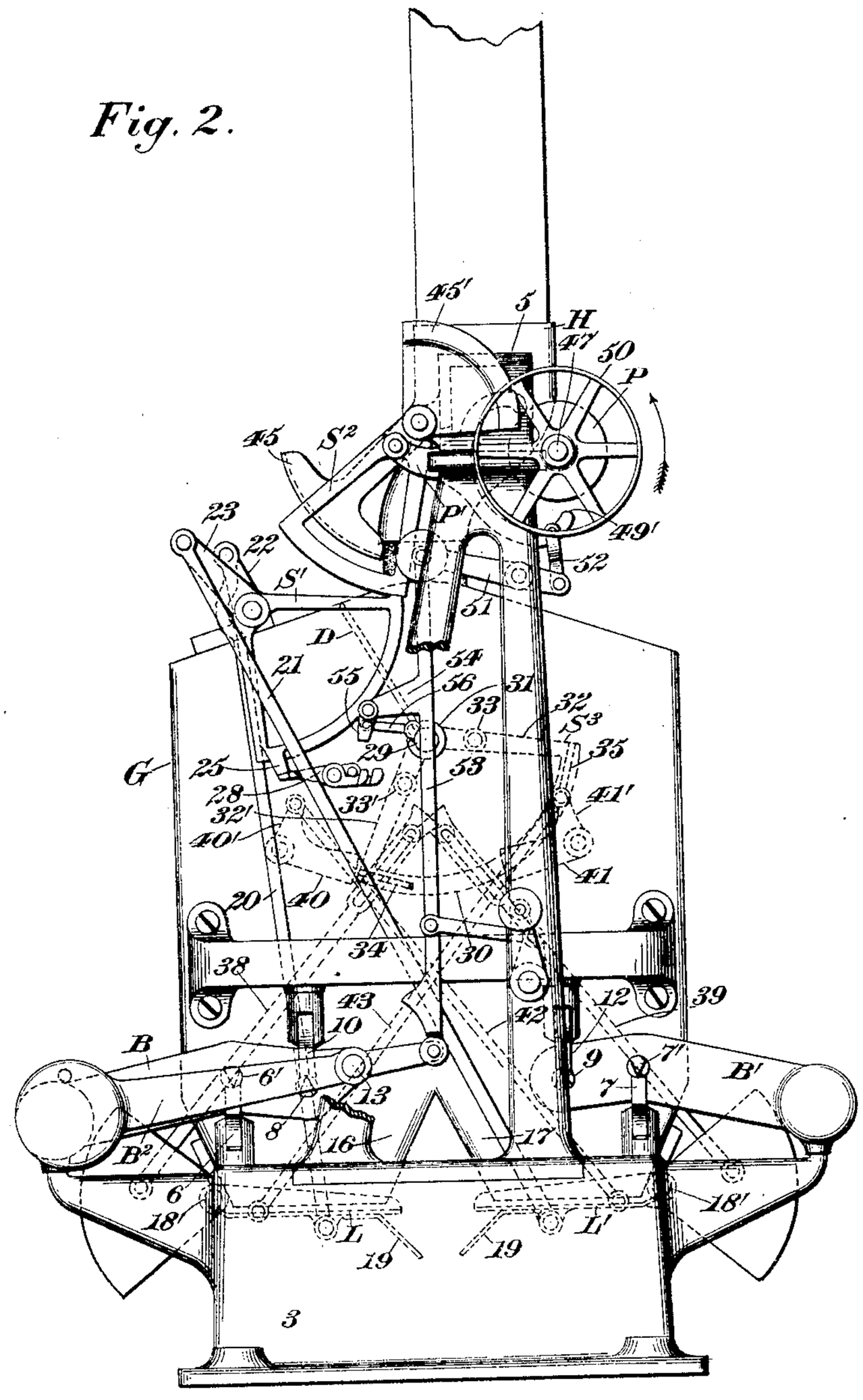
WEIGHING MACHINE.

No. 589,292. Patented Aug. 31, 1897.

Fig. 2.



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(No Model.) 5 Sheets—Sheet 3.

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WEIGHING MACHINE.

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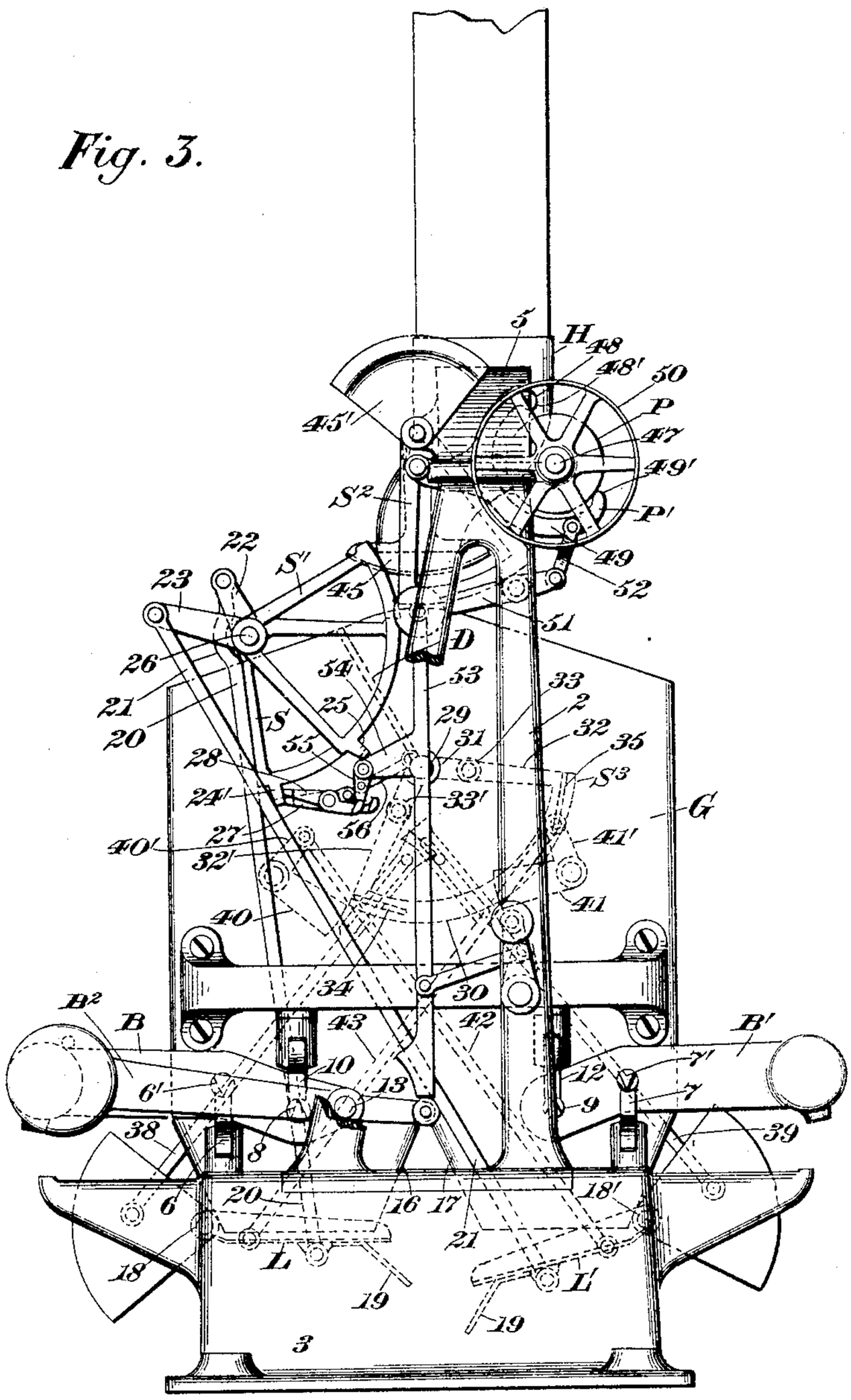
Fig. 3.



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(No Model.) 5 Sheets—Sheet 4.

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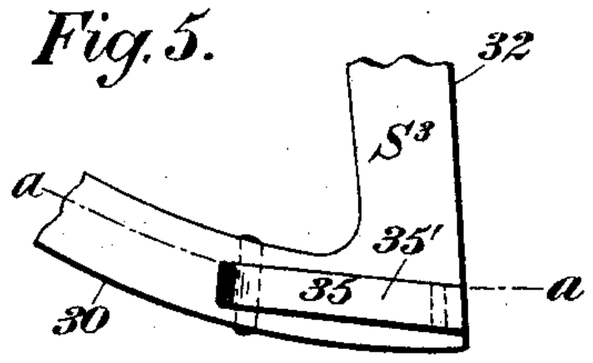
WEIGHING MACHINE.

No. 589,292. Patented Aug. 31, 1897.

Fig. 5.



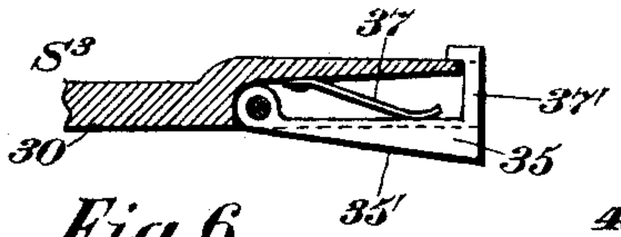


Fig. 6.

Fig. 4.

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(No Model.) 5 Sheets—Sheet 5.

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WEIGHING MACHINE.

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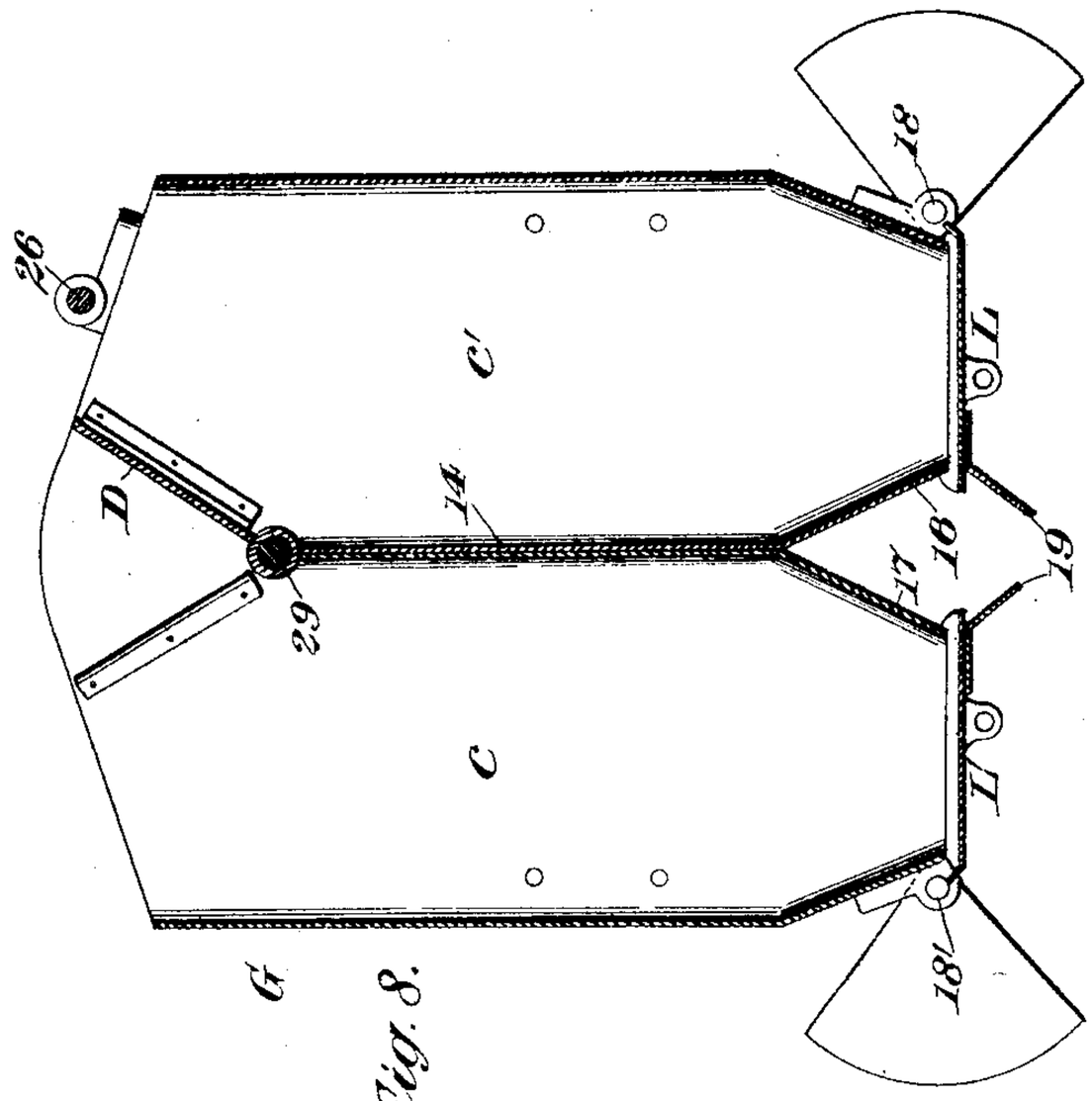

Fig. 8.

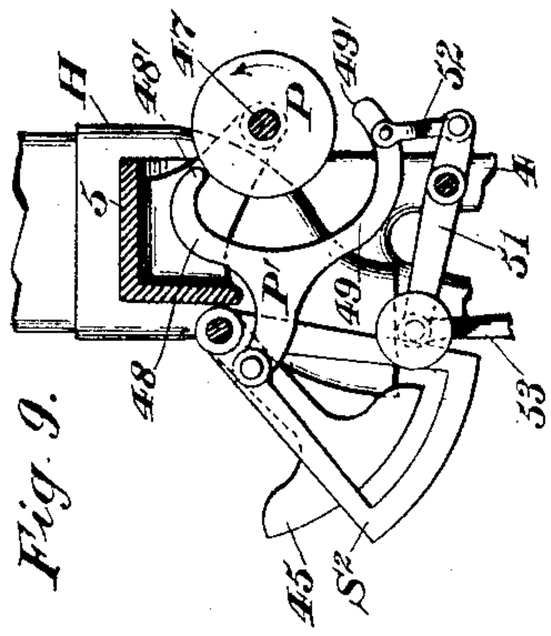

Fig. 9.

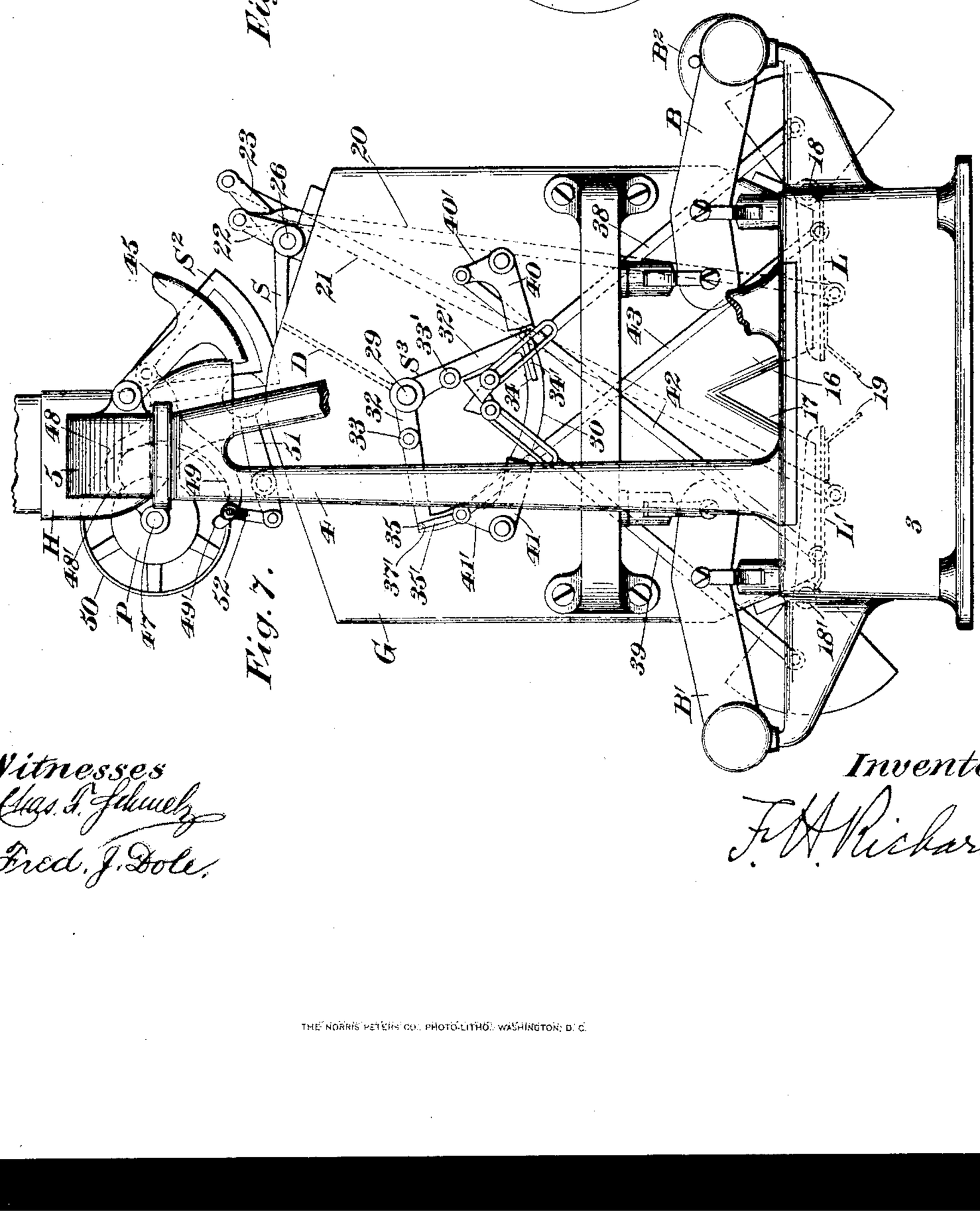

Fig. 7.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 589,292, dated August 31, 1897.

Application filed April 3, 1897. Serial No. 630,506. (No model.)

To all whom it may concern:

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

This invention relates to weighing-machines, one object of the invention being to furnish improved supply apparatus embodying a counterbalanced valve and improved valve-actuating means controlled by the weighing mechanism for imparting both opening and closing movements to the valve, and which valve-actuating mechanism embodies a normally continuously-rotating prime mover and a shiftable power-transmitter, the latter of which is in direct connection with the valve.

A further object of the invention is to furnish, in connection with weighing mechanism embodying a compartment load-receiver having a series of closers and in connection with supply apparatus embodying a stream-controller, an improved organization of coöperative interlocking stop devices and improved means for insuring proper relative movements of said stop devices.

A further object of the invention is to provide, in connection with a compartment load-receiver having a series of closers, an improved organization of stream-diverting devices comprehending a stream-diverter supported for oscillatory movement on the load-receiver, and actuating and interlocking elements in connection with and controlled by the closers.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear elevation of a weighing-machine embodying my present improvements, a part of the load-receiver being broken away. Fig. 2 is a side elevation of said machine as seen from the left in Fig. 1, the parts of the machine being shown in the positions they occupy when the supply-valve is fully open and the closers are locked in their closed positions. Fig. 3 is a similar side elevation of the weighing-machine, showing the supply-valve in its closed position and one of the closers of the load-receiver in a partially open position. Fig. 4 is a similar side elevation of the weighing-machine, showing one closer fully open, another closer shut and locked against opening movement, and the supply-valve in its fully-closed position. Fig. 5 is a side view of a portion of the stop member carried by the stream-diverter, showing the by-pass catch in connection therewith. Fig. 6 is a cross-sectional view of that portion of the stop member shown in Fig. 5, said section being taken in dotted line *a a* in said figure and showing the catch in its normal projected position. Fig. 7 is a side elevation of the weighing-machine as seen from the right in Fig. 1. Fig. 8 is a longitudinal section of the load-receiver, taken on a line corresponding with the dotted line *b b*, Fig. 1; and Fig. 9 is a side elevation of a portion of the supply apparatus, showing the valve and a portion of the valve-actuating mechanism in connection therewith.

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

The framework for supporting the operative parts of the machine comprises suitable frames or uprights 2 and 4, mounted upon the usual base 3 and connected at the upper end by a top plate or beam 5, which latter is shown carrying the supply chute or hopper H, said hopper being of any suitable general construction.

The base is shown carrying V-shaped bearings 6 and 7, which constitute supports for the beam mechanism which carries the load-receiver and subsidiary devices.

As a means for supporting the load-receiver, which is designated by G, a pair of oppositely-disposed counterweighted scale-beams are shown at B and B′, respectively, which scale-beams are furnished with knife-edges 6′ and 7′, mounted on the V-shaped bearings 6 and 7, and are also provided with knife-edge pivots 8 and 9, located intermediate the knife-edges 6′ and 7′ and the inner ends of said scale-beams.

The load-receiver is shown having at each side thereof two hangers furnished with knife-edge bearings 10 and 12, which are pivotally supported on the intermediate knife-edges 8 and 9 of the beams.

The construction, organization, and operation of the beam mechanism of my present machine is similar, in a general way, to the

beam mechanism described in Letters Patent of the United States No. 548,840, granted to me October 28, 1895, to which reference may be had, one of the beams, as B, of the beam mechanism being furnished with the usual counterweighted lever or auxiliary beam B^2, which is pivotally connected at 13 to the inner non-counterweighted end of one of the beam-arms.

The load-receiver is shown provided with a central vertical partition 14, which divides the same into two compartments *c* and *c'*, respectively, in which the loads of material are alternately made up. This partition is shown consisting of two attached plates, which are spread apart near the lower edge thereof to form inclined walls for the two compartments *c* and *c'*, the opposite walls of said compartments being also inwardly inclined to form, in connection with the first-mentioned walls, two discharge-spouts 16 and 17, which are open at their lower ends.

As a means for closing the openings of the discharge-spouts 16 and 17 I have provided two closers or discharge members which are designated by L and L', respectively, each closer being of substantially the same general construction as the closer shown and described in the patent hereinbefore referred to. Each closer in the form thereof shown in the accompanying drawings comprises a substantially flat plate flanged at the side edge thereof. The two closers L and L' are shown pivotally supported at 18 and 18', respectively, on the front and rear walls of the two discharge-spouts 16 and 17, respectively, near the lower edges thereof, and are furnished with counterweights for retaining said closers in their closed positions, (see Fig. 2,) and each closer is shown furnished at the inner non-counterweighted end thereof with a depending inclined guard-plate 19 for preventing the complete shutting of the closer until the load has been fully discharged.

As a means for sustaining the closers in their closed positions and for facilitating an independent movement of said closers I have shown two closer-supporting rods or links 20 and 21, pivotally connected at their lower ends to the closers L and L', respectively, and pivotally connected at their upper ends to crank-arms 22 and 23 on rockers or independent stop members S and S', respectively, which are in turn pivotally supported at 26 on a shaft journaled in a bracket fixed to the upper end of the load-receiver G, said rockers or stop members having projections 24' and 25, respectively, which are normally engaged by latches 27 and 28, pivotally supported on the load-receiver, said latches normally retaining tho stop members in position to keep the two closers shut. The means for actuating the latches will be hereinafter fully described.

As a convenient means for deflecting the material to the two compartments alternately and concurrently with the alternate opening movements of the two closers I have provided, in connection with the load-receiver, a stream-diverter (designated in a general way by D) and means controlled by the two closers on the alternate opening movements thereof for shifting the stream-diverter alternately in opposite directions to direct the stream first to one and then to the other compartment of the load-receiver, and I have also provided means controlled by the closers for locking the stream-diverter in one position when one closer is shut and for locking it in another position when another closer is shut and also for releasing the same at proper times for facilitating a movement thereof in a proper direction.

In the preferred form thereof shown most clearly in Figs. 7 and 8 of the drawings the stream-diverter is in the nature of a flat plate having a shaft 29 at the inner edge thereof, which extends transversely through and is journaled in bearings on the side walls of the load-receiver G, it being understood that the vertical partition 14 of the load-receiver terminates in juxtaposition to the lower edge of the stream-diverter, as shown in Fig. 8.

Fixed to one end of the shaft 29, to which the stream-diverter is secured, is a depending rocker or stop member S^3, which is shown as a segment-wheel comprising a rim 30, a hub 31, and two radial arms 32 and 32', connecting the hub to the opposite ends of the rim, respectively.

Extending outward from the two arms 32 and 32' of the stop member S^3 are abutments 33 and 33', respectively, which are located at opposite sides of the axis of movement of the diverter D, and pivotally supported on the rim 30 of the stop member near the opposite ends thereof are two by-pass catches 34 and 35, having the side faces 34' and 35', respectively, which are normally inclined with respect to and extend beyond the side face of the rim 30 of the stop member, as shown most clearly in Fig. 6 of the drawings.

Each by-pass catch, as 35, is shown having at the free end thereof a hook-shaped inwardly-projecting portion, as 37', for engaging over the outer end of the rim 30, as shown in Fig. 6, referred to. The catches 34 and 35 are so connected to the rim that their side faces will, when the catches are pressed inward, lie flush with the side faces of the rim 30 of the stop member S^3, a spring 37 being provided, in connection with the catch, for retaining the same normally with its side face extended beyond the side face of said rim for a purpose hereinafter more fully described.

The means for shifting the stream-diverter alternately in opposite directions is shown comprising two thrust-rods 38 and 39, pivotally connected at their lower ends to the counterweighted ends of the two closers L and L', respectively, and having their upper ends normally out of contact with but in position for engaging the abutments 33 and 33', respectively, on the stop member S^3, said thrust-

rods being shown slotted near their upper ends and guided in their movements by means of pins fixed to the side wall of the load-receiver and extended through said slots. On the opening movement of one closer, as L′, the thrust-rod 39, connected therewith, is forced upward against the abutment 33′ and shifts the stop member S^3, together with the stream-diverter, from the position shown in Fig. 3 to that shown in Fig. 4, and on the opening movement of the opposite closer L the thrust-rod 38 is forced upward against the abutment 33 and shifts the stop member S^3, together with the stream-diverter D, from the position shown in Fig. 4 to that shown in Fig. 3.

As a means for locking the stream-diverter in its different positions I have provided two oppositely-disposed locking devices or latches 40 and 41, which are pivotally supported on the load-receiver at opposite sides the longitudinal axis thereof in position for engaging the catches 34 and 35, respectively, said locking devices having crank-arms 40′ and 41′, respectively, which are pivotally connected with the non-counterweighted portions of the two closers L′ and L, respectively, by means of connecting-rods 42 and 43, the construction and organization of the locking devices or latches 40 and 41 and the connecting means between the closers and latches being such that on the alternate opening movements of the closers the latches 40 and 41 will be alternately thrown out of engagement with the catches 34 and 35, respectively, and into positions to facilitate the movement of the stop member S^3 of the stream-diverter D, as will be readily understood by a comparison of Figs. 3, 4, 5, and 6 of the drawings. For instance, on the opening movement of the closer L′ the connecting-rod 42 will be drawn downward to shift the latch 40 out of engagement with the catch 34 on the stop member S′ of the stream-diverter, and immediately upon the release of the catch 40 the thrust-rod 39 will be thrown upward into engagement with the abutment 33′ on said stop member and through the continued opening movement of the closer shifts said member, together with the stream-diverter D, from the positions shown in Figs. 2 and 3 to that shown in Fig. 4. During this movement of the stop member S^3 the locking device 41 will be in position to engage the opposite catch 35, which catch will be depressed to bring the outer face thereof flush with the outer face of the rim of the stop member as said catch rides along the inner face of the locking device 41 and will spring outward immediately after passing the catch-engaging end of the locking device and prevent a return movement of the stream-diverter until this locking device is released from engagement with the outer end of said catch by the opening movement of the opposite closer L.

As a means for controlling the supply of material to the load-receiver I have provided a valve 45, which is shown as a "scoop-valve," pivotally supported intermediate its ends on the framework in position for covering the discharge-opening of the supply-chute II and having a weight 45′ in position for counterbalancing said valve and rendering said valve dependent upon extraneous mechanism for operation in either direction.

Fixed to the pivot-arm of the valve 45 is a parti-circular stop member S^2, whose working face will be located, when the valve is in its partially or fully open position, in position to coact with and intercept the movements of one or both of the stop members S and S′ and prevent the opening movement of one or both of the closers L and L′, the stop members S and S′ being supported side by side with their working faces in concentric relation and with their axes preferably coincident.

As a means for imparting opening and closing movements to the valve 45 I have provided in operative relation with said valve an actuator, which in the preferred form thereof shown most clearly in Figs. 1, 2, and 9 of the drawings comprises a driving member or prime mover P, shown in the nature of a friction-drum mounted on a shaft 47, journaled in suitable bearings on the framework, (see Fig. 1,) a power-transmitter or driven member (designated in a general way by P′) shown in the nature of a yoke having a forwardly-extending arm pivotally secured at its outer end to the stop member S^2, which is in turn fixed to the pivot-arm of the valve, the yoke comprising two concentrically-disposed arms 48 and 49, having inward projections 48′ and 49′, respectively, at their outer ends located in position to engage diametrically opposite peripheral portions of the drum or prime mover P.

The shaft 47 of the drum or prime mover is furnished at one end thereof with a driving-pulley 50, which may be rotated continuously from any suitable source of power, (not shown,) said drum during the operation of the machine being continuously rotated in one direction, as indicated by the arrow in Fig. 2.

For the purpose of shifting the power-transmitter or yoke, so that the projections 48′ and 49′ will alternately engage opposite peripheral portions of said drum, a counterweighted lever 51 is pivotally supported on one of the uprights of the frame in proximity to the lower arm of the yoke or transmitter P′ and is connected at its non-counterweighted end by means of a link 52 to said arm, and pivotally secured to the counterweighted end of said lever is a thrust-rod 53, which rests at its lower end upon the non-counterweighted end of the auxiliary beam B^2, so that on the movement of the beam in one direction one arm of the yoke or power-transmitter will be thrown into operative engagement with one peripheral portion of the drum to move the valve in one direction and upon a movement of the beam in another direction the opposite arm of the power-transmitter will be thrown into operative engagement with the opposite

peripheral portion of the drum to move the valve in an opposite direction, these movements occurring simultaneously with the ascending and descending movements of the auxiliary beam B′, which is controlled in so far as one movement thereof is concerned by the movements of the beam mechanism and is controlled in so far as another of its movements is concerned by the interlocking devices in connection with the closer.

The lever 51, which constitutes the actuating-connector between the thrust-rod and the power-transmitter, is so counterweighted that the normal tendency thereof is to force the thrust-rod downward and force the lower arm of the power-transmitter upward toward the axis of the prime mover or drum P.

The axis of the prime mover or drum is located somewhat below and considerably at one side of the axis of the valve 45. Assuming the valve 45 to be in the position illustrated in Fig. 2, the descending movement of load-receiver, after a load has been made up, will cause the thrust-rod 53 to descend, which tilts the non-counterweighted end of the transmitter-actuating lever and the power-transmitter connected therewith upward, bringing the projection 49′ on the arm 49 in engagement with the under side of the drum or prime mover P, when said power-transmitter will partake of the movement of the prime mover and close the valve 45, this operation being reversed on the ascending movement of the load-receiver.

The two latches 27 and 28, which coöperate with the stop members S and S′ to prevent a premature opening movement of the closers L and L′, respectively, are set with their inner ends one slightly in advance of the other, as shown in the drawings, and as a means for actuating the two latches alternately I have provided, in connection with the thrust-rod 53, an outwardly-extending arm 54, on which is pivoted a latch-actuator 55, which is connected by means of a link 56 to the stream-diverter, slightly at one side the axis of movement thereof, the organization of the latch-actuator and connections being such that on a movement of the stream-diverter in one direction said actuator will be shifted into a position for engaging and actuating one latch on the descending movement of the thrust-rod 53 and will, when the stream-diverter is shifted to an opposite position, be carried to a position to actuate the other latch on the next descending movement of the thrust-rod.

By the construction and organization of weighing mechanism as hereinbefore described it will be seen that the stream-diverter D will, immediately upon the opening movement of a closer, be shifted to a position for directing a stream into a closed compartment, so that any material which may accidentally pass the valve after a latch has been released to facilitate an opening movement of the closer will be diverted away from a complete load and disposed of by directing it into the next adjacent compartment, which compartment is not filled to form a second load until the first load has been disposed of.

In my present machine when the load is completed in one chamber or compartment the closer of such chamber is unlatched, and the stream-diverter quickly thrown over so as to direct any drip material just passed the valve into the other compartment, the closer of the last-mentioned compartment having been previously shut. Thus it will be seen that while the "remnant," so to speak, of the drip-stream, which remnant is always of uncertain quantity, is directed away from the completed load into the next adjacent compartment, such compartment not being filled to form a second load until the first compartment has been completely emptied, and by thus preventing the filling of one compartment until the opposite compartment has been loaded, registered, and discharged the possibility of a false record is entirely obviated.

Having described my invention, I claim—

1. The combination, with weighing mechanism including a reciprocatory load-receiver and with stream-supply means including a pivotally-supported counterbalanced valve located above said load-receiver, of a power-driven valve opening and closing actuator in operative connection with the valve and embodying a normally continuously-rotative driving member and a reciprocatory driven member; and means controlled by the weighing mechanism, for intermittently shifting the driven member into operative engagment with diametrically opposite peripheral portions, alternately, of the driving member, to thereby effect alternate opening and closing movements of said valve.

2. The combination, with oscillatory beam mechanism and with a load-receiver supported thereon, of stream-supply means including an oscillatory valve located above the load-receiver; a continuously-rotative power-driven member; a power-transmitting lever pivotally connected to the valve; and means controlled by the beam mechanism, on the ascending and descending movements thereof, for shifting the lever into engagement with diametrically opposite peripheral portions of the power-driven member, to thereby effect a movement of such lever in opposite directions, alternately, and impart opening and closing movements, alternately, to said valve.

3. The combination, with weighing mechanism including a load-receiver and with a supply apparatus located above said load-receiver and including a valve, of a drum supported at one side the axis of the valve; means for rotating said drum; a power-transmitter pivotally connected at one end to the valve and having a yoke at the opposite end thereof, the ends of which are located in position to engage diametrically opposite peripheral portions of the drum; and means

controlled by the weighing mechanism, for intermittently shifting the power-transmitter into engagement with opposite peripheral portions, alternately, of the drum, to effect intermittent and alternate opening and closing movements of the valve.

4. The combination, with stream-supply means including a valve, of valve-actuating mechanism embodying a drum; means for rotating said drum; a power-transmitter connected with the valve and having oppositely-disposed arms in position to engage diametrically opposite peripheral portions of the drum; and means for actuating the transmitter to bring the opposite arms, alternately, into engagement with the drum, whereby opening and closing movements will be imparted, alternately, to the valve.

5. In a weighing-machine, the combination, with beam mechanism and with a load-receiver supported thereon, of a supply-chute having a discharge-opening located above the load-receiver; a counterbalanced valve supported for oscillatory movement in operative relation with the discharge-opening of the supply-chute; a friction-drum supported at one side the axis of the valve; means for continuously rotating the friction-drum during the weighing operation; a shiftably-supported power-transmitter pivotally connected at one end to the valve and having projecting arms in position for engaging diametrically opposite peripheral portions of the drum; and transmitter-actuating instrumentalities controlled by the weighing mechanism, for shifting the power-transmitter into engagement with diametrically opposite peripheral portions of the drum, alternately, to thereby effect alternate opening and closing movements of the valve.

6. The combination, with beam mechanism and with a load-receiver carried thereby, of a supply-chute; a counterbalanced valve pivotally supported for reciprocatory movements in operative relation with the chute; a valve opening and closing actuator in operative connection with the valve and comprising a drum; means for continuously rotating said drum; a power-transmitter one end of which is pivotally connected to the valve and the other of which is bifurcated and is adapted for engaging diametrically opposite peripheral portions of the drum; and means connecting the transmitter and beam mechanism and effective for shifting said transmitter into working engagement with diametrically opposite peripheral portions, alternately, of the drum, to impart opening and closing movements, alternately, to the valve.

7. The combination, with a scale-beam having a lever connected therewith, of a valve; a drum; means for rotating said drum; a yoke pivotally connected to the valve and having means for engaging diametrically opposite portions of the drum; and a yoke-actuator in pivotal connection at its upper end with the yoke and supported at its lower end on the lever.

8. The combination, with a scale-beam having a pivotally-connected auxiliary beam and with a load-receiver carried on the scale-beam, of a supply-chute above the load-receiver; a valve in operative relation with the supply-chute; a drum; means for rotating said drum; a yoke pivotally connected to the valve and having means for engaging diametrically opposite portions of the drum; and a yoke-actuator in operative connection with the yoke and auxiliary beam and adapted, on a movement of the beam in one direction, for shifting the yoke into engagement with one portion of the drum, to effect an opening movement of the valve, and on a movement of the beam in the opposite direction for shifting said yoke into engagement with an opposite portion of the drum, to effect a closing movement of said valve.

9. The combination, with a scale-beam having a pivotally-connected auxiliary beam and with a load-receiver carried on said scale-beam, of a fixed supply-chute above the load-receiver; a counterbalanced valve pivotally supported in operative relation with the supply-chute; a drum supported at one side the axis of movement of the valve; means for rotating the drum; a yoke pivotally connected to the valve and adapted for engaging diametrically opposite peripheral portions of the drum; and a yoke-actuator in operative connection at its upper end with the yoke and supported at its lower end on the auxiliary beam in such manner that a movement of the beam in one direction will cause the yoke to be thrown into engagement with one portion of the drum and effect an opening movement of the valve, and a movement of the beam in an opposite direction will cause the yoke to be thrown into engagement with an opposite portion of the drum and effect a closing movement of the valve.

10. The combination, with a scale-beam having a pivotally-connected auxiliary beam, of an oscillatory valve; a rotative valve-actuating drum located at one side the axis of movement of said valve; a yoke pivotally connected at one end to the valve and having means for engaging diametrically opposite peripheral portions of said drum; a counterweighted lever pivotally connected at its non-counterweighted end to the yoke and tending normally to throw the yoke toward a position for engaging one portion of the drum; and a thrust-rod pivotally connected at its upper end to the counterweighted end of the lever and supported at its lower end on the auxiliary beam.

11. The combination, with beam mechanism and with a load-receiver supported thereon and having a series of closers, of a series of concentrically-disposed stop members each of which is connected to an independent closer; latches for normally locking the stop

members in their closer-shutting positions; and means controlled by the load-receiver, on the descending movement thereof, for releasing the latches.

12. The combination, with a load-receiver having a series of independently-operable closers; of a series of independently-operable stop members having coincident axes of movement, and each stop member of which is directly connected to an independent closer; and means for controlling the movements of said stop members.

13. The combination, with a reciprocatory load-receiver having a series of closers; of a series of independently-operable stop members having coincident axes of movement, and each stop member having a crank-arm; closer-sustaining rods in pivotal connection with the crank-arms of the stop members and the closers, respectively; independently-operable latches normally holding the stop members in their closer-shutting positions; and means controlled by the load-receiver, for actuating the latches.

14. The combination, with beam mechanism and with a two-chambered load-receiver supported thereon, each chamber having a discharge-opening; of two counterweighted closers in operative relation with the discharge-openings of the two chambers of the load-receiver; two independent concentrically-movable stop members pivotally connected to the two closers, respectively; independently-operable latches for engaging the independent stop members, to normally retain the closers in their closed positions; and means, effective on successive corresponding movements of the load-receiver, for actuating the latches successively to facilitate alternate opening movements of the closers.

15. The combination, with beam mechanism and with a load-receiver supported thereon and having a series of chambers, each chamber having a discharge-opening; of a series of counterweighted closers in operative relation with the discharge-openings of said chambers; a series of independent concentrically-movable stop members pivotally connected to the series of closers, respectively; a supply-chute located above the load-receiver; an oscillatory valve in operative relation with the supply-chute; a stop member operative with said valve and coöperating with the series of concentrically-movable stop members, for normally holding the closers in their closed positions; means for imparting closing movements to the valve; a series of latches for engaging the concentrically-movable stop members; and means controlled by the beam mechanism, for actuating the latches to successively release the stop members simultaneously with the complete closing movements of the valve, to facilitate opening movements of the closers successively.

16. The combination, with beam mechanism and with a load-receiver having a series of independently-operable closers, of a series of concentrically-disposed stop members each having a crank-arm; a series of rods or links each of which is pivotally connected at its lower end to a closer and at its upper end to a stop-member crank-arm; a latch in operative relation with each stop member; a shiftable latch-actuator operable with the load-receiver; and means for shifting the latch-actuator in operative relation with the different latches, successively.

17. The combination, with beam mechanism and with a load-receiver having a series of closers, of a supply-chute; a valve in operative relation with the supply-chute; means controlled by the beam mechanism, for imparting opening and closing movements, alternately, to the valve; a stop member carried by the valve; a series of concentrically-movable stop members each of which is operatively connected to an independent closer, and which latter stop members coöperate alternately with the valve stop member, for preventing an opening movement of the valve when a closer is open; means for locking one or more closer stop members against movement when one or more closers are open; and means controlled by the load-receiver for successively releasing the closer stop members to facilitate successive opening movements of the closers simultaneously with the successive closing movements of the valve.

18. The combination, with a load-receiver having two independently-operable closers and with stream-supply means having an oscillatory stream-controller; of reciprocally-effective stop devices one of which is operative with the stream-controller and comprises a single oscillatory stop member, and the other of which comprises two concentrically-disposed stop members operative with the two closers, respectively, and which alternately coöperate with the stop device of the stream-controller, for locking said stream-controller against opening movement when either closer is in its open position.

19. The combination, with a compartment load-receiver having a closer; of a stream-diverter pivotally supported on the load-receiver, and having a stop member; means controlled by the closer, on the opening movement thereof, for shifting the stream-diverter; and a second stop member coöperating with the stop member of the stream-diverter and effective for locking the same normally in one position; and means controlled by the closer, on the opening movement thereof, for actuating the second stop member to release the stream-diverter.

20. The combination, with a compartment load-receiver having two independently-operable closers, of stream-supply means located above said receiver; a stream-diverter pivotally supported on the load-receiver and operable for directing a stream to the different compartments, alternately, and having a stop member shiftable therewith; two independent locking devices effective, on the closing

movements of the two closers, for locking the stream-diverter in different positions alternately; and means controlled by the two closers, on the opening movements thereof, for releasing the locking devices alternately and for simultaneously shifting the stream-diverter from one to another position.

21. The combination, with a compartment load-receiver having independently-operable closers, of stream-supply means located above the load-receiver; an oscillatory stream-diverter supported on the load-receiver in position to direct the stream to one or the other compartment; means controlled by the closers for shifting the stream-diverter in opposite directions, alternately; and reciprocally-effective stop devices operative with the stream-diverter and closers, respectively, and effective for locking the stream-diverter, first, in one, then in another, position, and for simultaneously locking one or the other closer against opening movement.

22. The combination, with a compartment load-receiver having two independently-operable closers, of a stream-diverter pivotally supported on the load-receiver and operable for directing the stream to different compartments, alternately, and having a stop member shiftable therewith; two stop members alternately operable, on the alternate closing movements of the closers, for engaging the stream-diverter stop member, to thereby lock the stream-diverter, first, in one, and then in another, working position; and means controlled by the closers, on the opening movements thereof, for releasing the last-mentioned stop members, alternately, and for simultaneously shifting the stream-diverter to a different position.

23. The combination, with a compartment load-receiver supported for reciprocatory movements and having two independently-operable closers, and with stream-supply means; of two independently-operable closer-stops in operative connection, respectively, with the two closers; two independently-operable latches normally engaging the two closer-stops; a shiftable stop-actuator movable with the load-receiver into and out of operative relation with the latches; a stream-diverter pivotally supported on the load-receiver; means controlled by the closers, on the opening movements thereof, for shifting the stream-diverter, first, in one, and then in an opposite, direction; and means carried by the stream-diverter actuator, on the oscillatory movement thereof, for shifting the latch-actuator into position for engaging one or the other latch.

24. The combination, with a compartment load-receiver having two independently-operable counterweighted closers and with stream-supply means located above the load-receiver, of a stream-diverter supported for oscillatory movement on the load-receiver in position to direct the stream to one or the other compartment of the receiver; and two oppositely-disposed thrust-rods pivotally secured at their lower ends to the counterweighted ends of the two closers, respectively, and having their upper ends normally out of engagement with, but in position to engage, the stream-diverter at opposite sides, respectively, of the axis thereof and impart opposite oscillatory movements, alternately, to the stream-diverter on alternate opening movements of the closers.

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