No. 616,863. Patented Dec. 27, 1898.

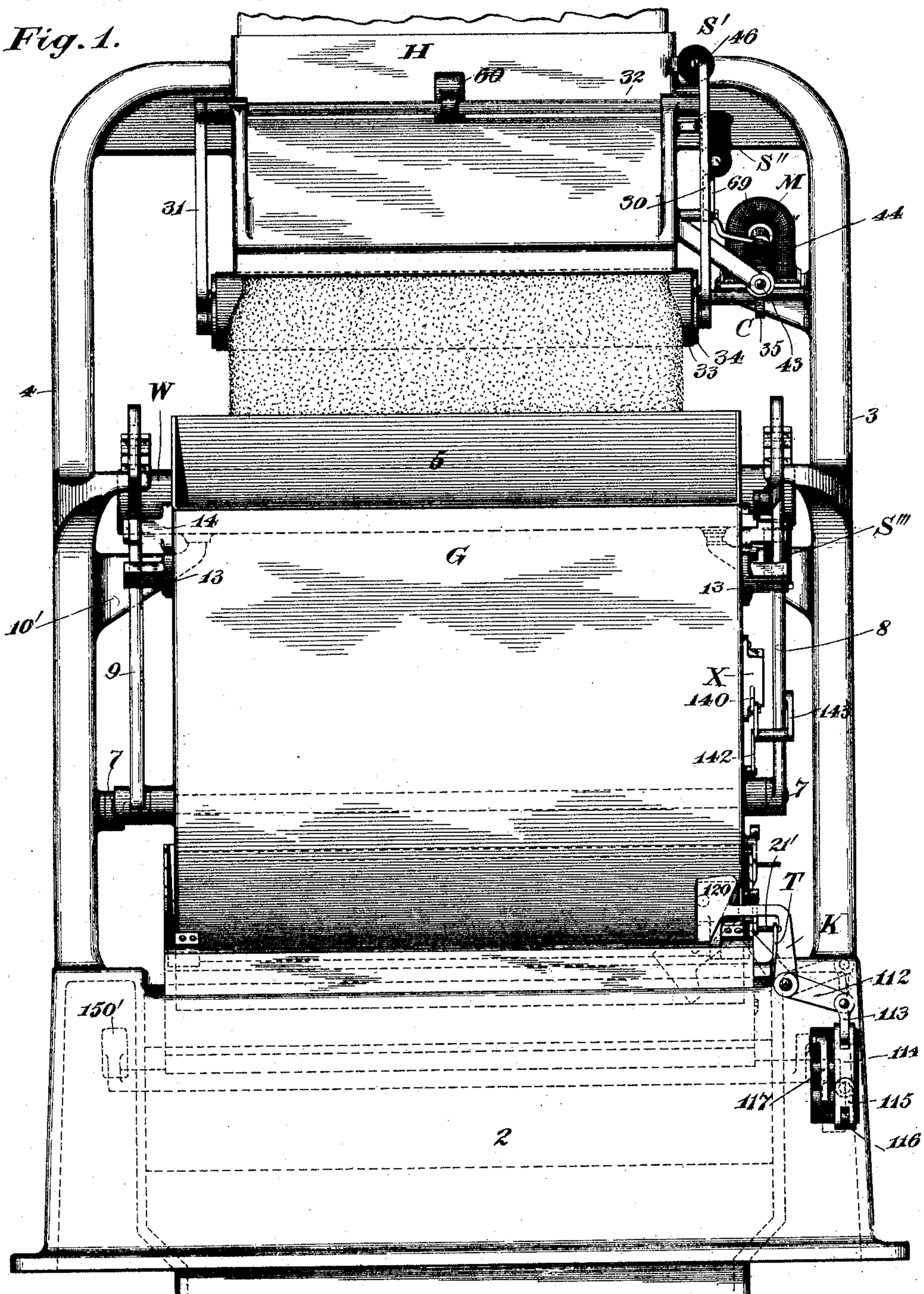
F. H. RICHARDS.

WEIGHING MACHINE.

(Application filed Dec. 15, 1897.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



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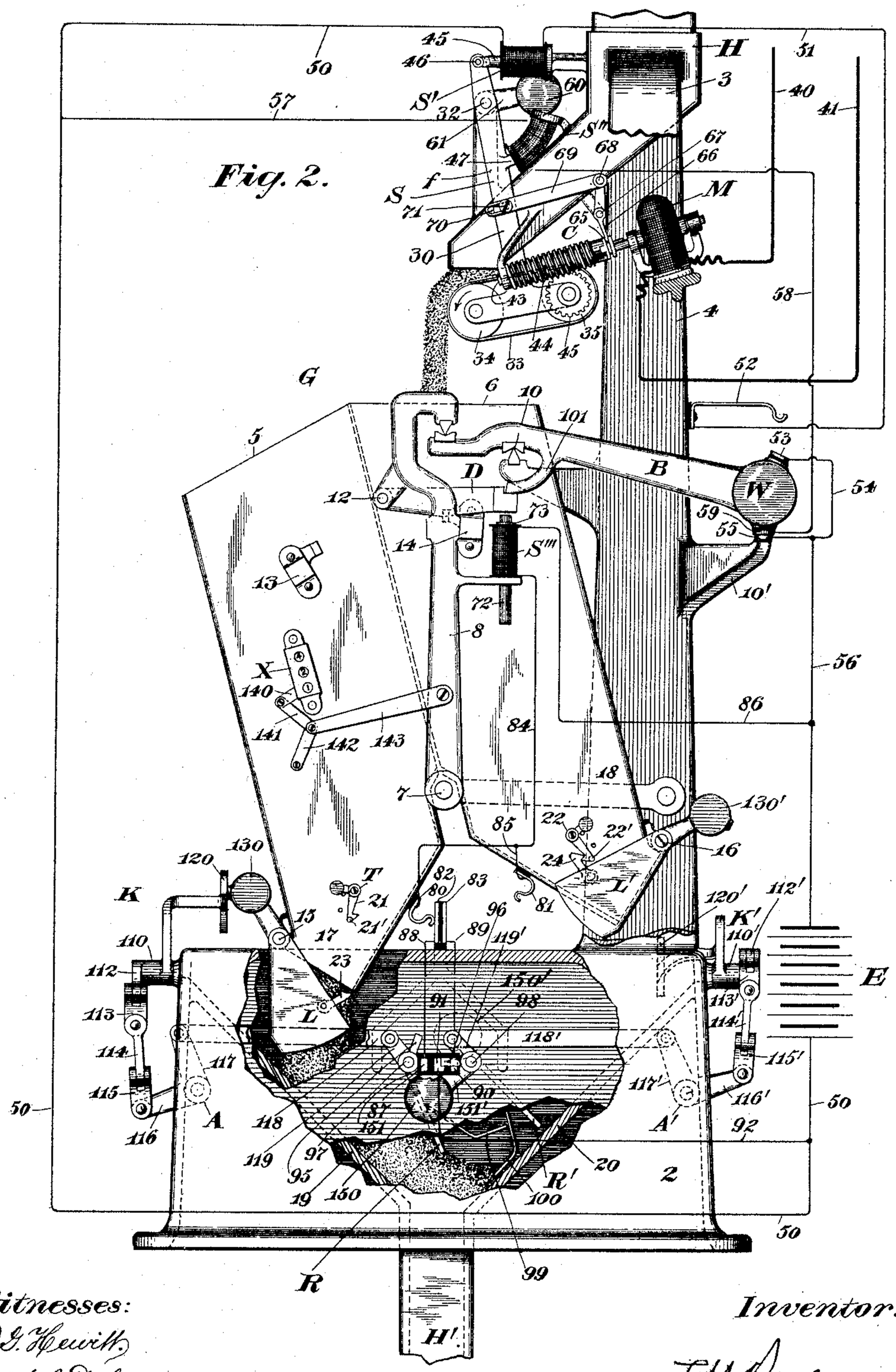
(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



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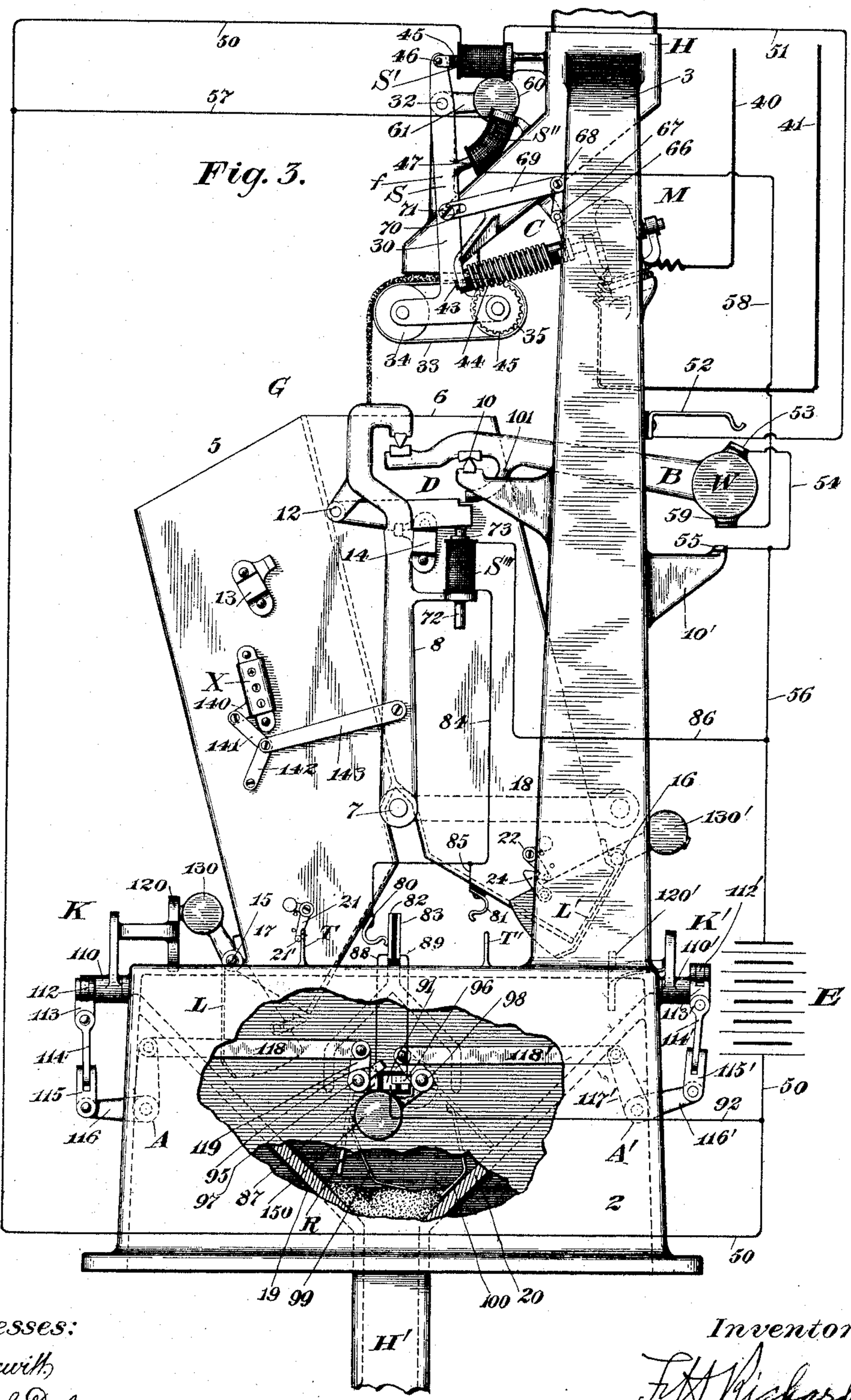
(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



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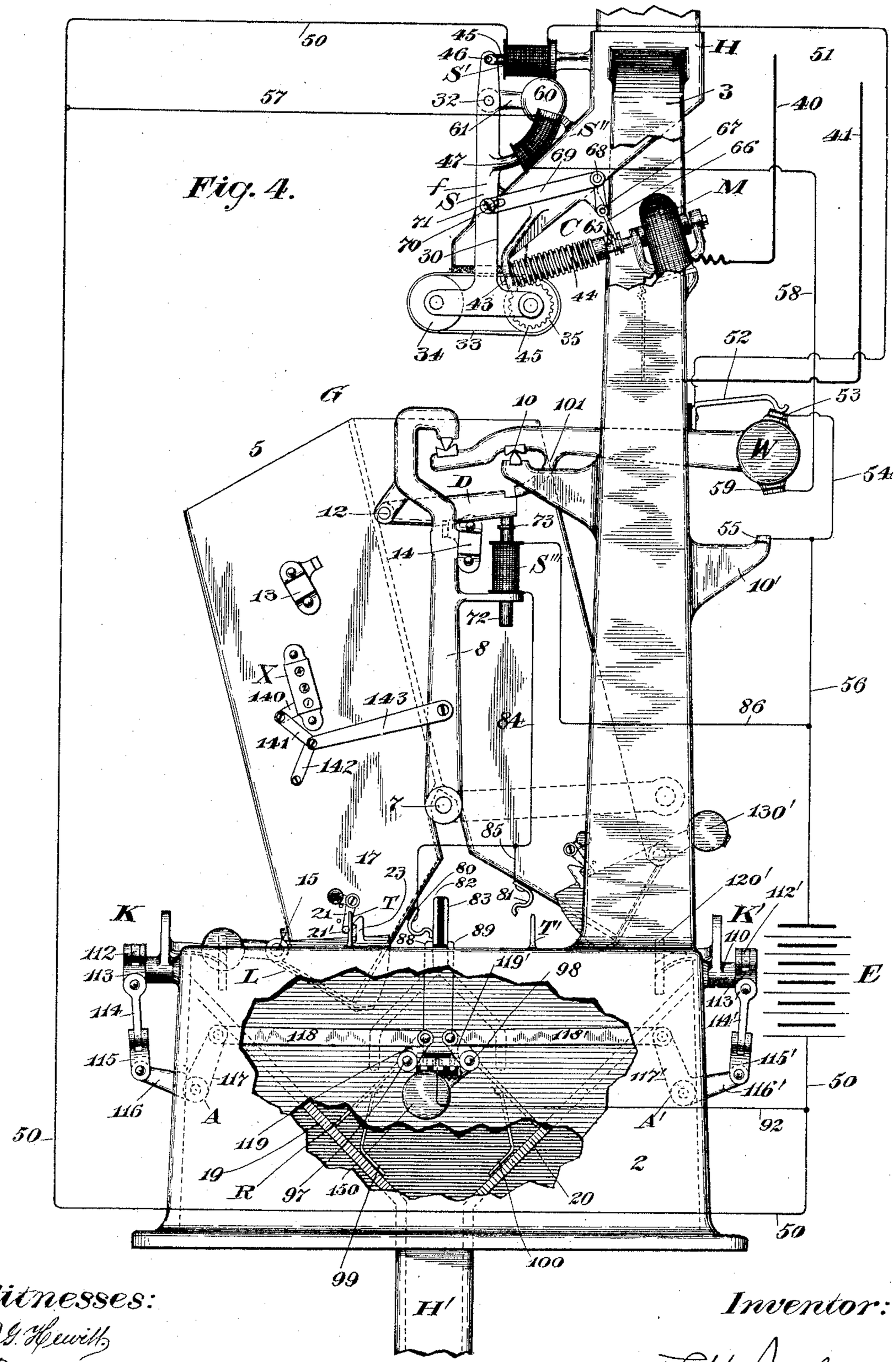
(No Model.) 5 Sheets—Sheet 4.

Fig. 4.



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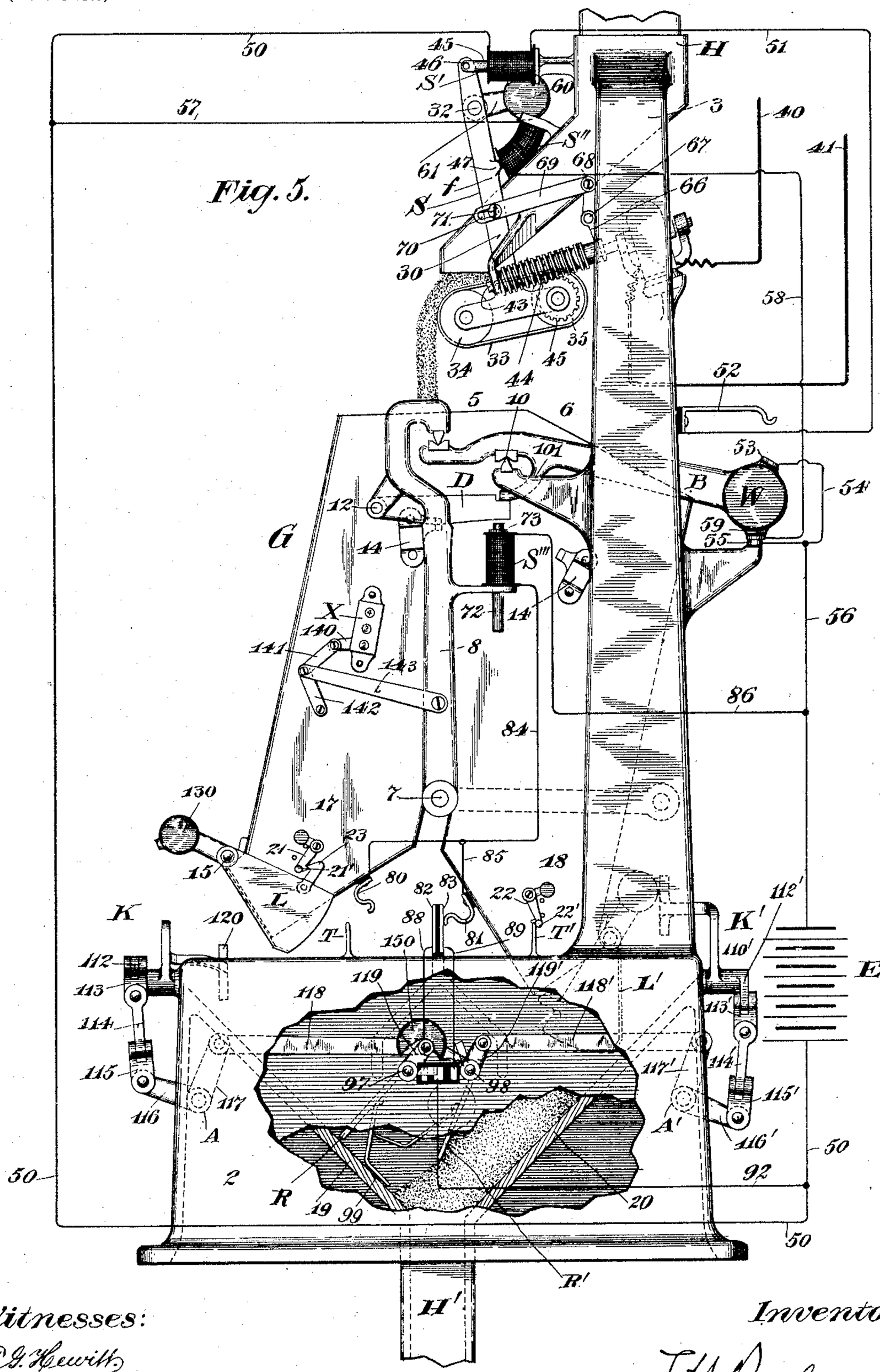
(No Model.) 5 Sheets—Sheet 5.

Fig. 5.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 616,863, dated December 27, 1898.

Application filed December 15, 1897. Serial No. 662,050. (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 for automatically weighing and delivering various kinds of materials.

The invention includes as one of its features and in connection with stream-supplying means a pivotally-suspended stream-controller adapted to swing back and forth below the discharge end of said stream-supplying means, a series of electrical devices adapted one to advance the stream-controller and the other to retract said stream-controller, and means preferably controlled by the weighing mechanism for successively energizing said electrical devices, so as to secure the proper operation of the stream-controller, and said electrical devices may consist of solenoids in circuit with a suitable source of electric energy, the circuit being preferably controlled by the scale-beam. This stream-controller consists, preferably, of a combined valve and force-feeder mounted for oscillation, mechanism being employed for effecting the movement of the working face of the force-feeder in different paths during the advancing movement of said stream-controller, the force-feeder being adapted when operated in one direction to assist in furnishing the supply and when operated in the opposite direction during the final movement of the stream-controller to hold back the material, thereby to prevent overloading of the weighing-machine.

Another feature of the invention resides, in connection with weighing mechanism involving a load-receiver, in means including a latch for governing the discharge of the load-receiver, a regulator supported independent of the weighing mechanism and shiftable by the loads intermittently discharged from said load-receiver, the latter being preferably of the oscillatory "double-chamber" type, an electric circuit involving a latch-operating device, and circuit-controlling means operative with the regulator.

The load-receiver carries a plurality of circuit-controlling devices each adapted when said load-receiver is in its respective shifted positions to be brought into circuit with the latch-operating device, the circuit being further controlled by the regulator or regulators, so that when the load-receiver is in one of its shifted positions and when a corresponding regulator is in its primary position the latch-operating device can be energized.

To prevent the oscillation of the load-receiver and the consequent discharge of a load except at the proper stage, a stop of suitable kind is provided to hold the latch against load-reducing movement for a predetermined time and while the latch-operating device is energized and said stop is preferably controlled by weighing mechanism, so that when released the latch becomes effective to release the load-receiver to cause the discharge of the load.

In the drawings accompanying and forming part of this specification, Figure 1 is a front elevation of a weighing-machine embodying my present improvements. Figs. 2 and 3 are side elevations of the machine, showing the full and drip supply, respectively, flowing into one of the compartments of the load-receiver, the closer for the opposite compartment being wide open in both of said views. Fig. 4 is a similar view showing the stream-controller having stopped the supply to the right-hand compartment and the positions occupied by the different parts at the instant before the load-receiver tilts to discharge such compartment, and Fig. 5 is a like view showing the right-hand compartment discharging its load and the full volume of the supply entering the left-hand compartment of the load-receiver.

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

The framework for supporting the different parts of the machine consists in the present case of the chambered base or bed 2, incasing the discharge-hopper H′, and the side frames 3 and 4, mounted upon the base and curved at their upper ends and fixed to the supply hopper or spout H, constituting a convenient means for delivering a stream of material to the load-receiver of the weighing mechanism.

The weighing mechanism includes a load-

receiver and a supporting-beam therefor, the load-receiver consisting in the present case of an oscillatory bucket G, having two chambers or compartments 5 and 6, in which loads are alternately built up.

The load-receiver G carries, in suitable bearings and below its center of gravity, the transverse shaft 7, whose opposite extremities are fixed in the lower ends of the hangers 8 and 9, depending from the usual arms of the scale-beam B, fulcrumed, as at 10, upon the framework, and the counterweighted beam being designated by W and resting normally upon the stops 10′, extending rearward from the framework of the machine.

The load-receiver is held in position to receive a supply of material alternately in its respective compartments by means, such as a gravity-latch D, pivoted at 12 to the hanger 8 and adapted alternately to engage the catches 13 and 14, respectively situated above the center of gravity of the load-receiver and at opposite sides of a vertical line intersecting said center.

In Fig. 4 the compartment 6 of the load-receiver is shown having received a load, the latch D being nearly tripped. When the latch is fully released from the offset 14, the weight of the load in the chamber or compartment 6 will cause the load-receiver to tilt to the right, thereby to effect the discharge of the load, the release of the load being secured by the opening of a closer covering the usual discharge-outlet.

A plurality of closers, such as L and L′, are provided, they being pivoted, as at 15 and 16, respectively, to the load-receiver and adapted to cover the outlets of the discharge-spouts 17 and 18, respectively, at the lower end of the load-receiver, the lower walls of the spout extending oppositely, so as to deliver the material against the oppositely-inclined walls 19 and 20, respectively, of the discharge-hopper H′. The closers are held shut by gravity-latches 21 and 22, respectively adapted to engage the catches 23 and 24, respectively, upon the closers L and L′.

The trippers for the latches are designated by T and T′, and they are fixed upon the framework, each consisting of a short post disposed in the path of its coöperating latch.

The latch 21 has a pin 21′, and the latch 22 has a pin 22′, adapted, on the oscillation of the load-receiver, one pin to strike the tripper T and the other pin to strike the tripper T′, thereby to disengage the latches from the catches 23 and 24, respectively, on the two closers. When a latch is tripped, the weight of the load in the compartment can force a closer open to cause the discharge of said load.

While I have represented a hopper for alternately supplying a stream of material to the respective compartments of a load-receiver as said compartments are brought into line with the stream, it is obvious that other means could be substituted therefor without departure from the scope of the invention.

The stream-controller is designated by S, and it is in the nature of a combined valve and force-feeder suspended for oscillation and adapted to swing below the discharge end of the hopper H to control the supply-stream. The stream-controller S involves a frame, as *f*, composed of two inverted-T-shaped sections 30 and 31, fixed to and depending from the transverse rock-shaft 32, carried by suitable bearings on the front side of the hopper. The frame *f* constitutes a carrier for the combined valve and force-feeder and includes in its construction an endless feed-belt 33, carried around the supporting-rolls 34 and 35, respectively, whose shafts are journaled in the opposite ends of the inverted-T-shaped frame-sections 30 and 31, respectively.

The endless feeder 33 is swung under the outlet of the spout or hopper H by suitable means to reduce the volume of the supply-stream and subsequently to cut off said stream and to assist in feeding the material into the load-receiver. The upper run of the endless feeder is driven forwardly or in the direction of the arrow, Fig. 2, so as to force the material into the load-receiver; but on the final movement of the valve the motion of said belt is reversed, so that it serves to hold back the material adjacent to its discharge edge to prevent said material entering the loaded receiver.

The means shown for effecting the working movement of the feed-belt 33 consists of worm-gearing driven from the electromotor M, of ordinary construction, connected by wires 40 and 41 with a generator. (Not shown.) The worm-shaft 43 is driven from the motor M, and it is sustained by suitable bearings upon the framing of the machine, the worm 44 on said shaft meshing with a worm-gear 45, fixed to the shaft of the feeder-roll 35.

In Fig. 2 the stream-controller S is shown in its retracted position, during which time the upper run is advanced in the direction of the arrow to aid the feed of the material passing from the hopper H, said feeder being operated by the motor M, working through the intermediate gearing described. At a predetermined point the feed-belt is thrown out of action relatively to the primary driver or motor M and is advanced by suitable means, and as it advances the movement of the upper run of the feeder is reversed as the worm 45 is carried upon a stationary support. The final movement of the stream-controller is an accelerated one, and as it moves toward the end of its working stroke the upper run of the feeder, through the gear, as just specified, will be moved rapidly rearward to prevent the material at the delivery end of the feeder from entering the loaded load-receiver.

The stream-controller is operated in opposite directions by a plurality of electrical devices, such as solenoids S′ and S″, respectively fixed upon the hopper H adjacent to said stream-controller and located at opposite sides of its axis. The solenoid S′, when

energized, serves to advance or close the stream-controller, and the solenoid S″, when energized, serves to retract or open said stream-controller, and said solenoids are preferably successively energized by means controlled by weighing mechanism, the circuit in which they are located being preferably closed by a circuit-controller operative with the scale-beam B. The core 45 of the solenoid S′ is pivoted, as at 46, to the upper end of the frame-section 30, the core 47 of the solenoid S″ being rigid with said frame-section. The wire 50 leads from a source of energy or battery E to the solenoid S′, a second wire 51 being connected with said solenoid and with the spring contact-arm 52, extending rearward from the frame 3. The contact-arm 52 coöperates with the contact 53, fixed to and insulated from the beam-weight W, said contact-piece 53 being connected by the wire 54 with the contact-piece 55, fixed to the support 10′ and being also connected by the wire 56 with the battery E. The solenoid S″ is connected by the wire 57 with the wire 50 and also by the wire 58 with the contact-piece 59 on the under side of the beam-weight W.

At the commencement of operation, as shown in Fig. 2, the circuit in which the stream-controller-retracting solenoid S″ is located is established as follows: from the battery E to the wire 50, wire 57 and solenoid S″, from solenoid S″ to wire 58, to contact-piece 59, contact-piece 55 to wire 54, and wire 56 to battery E. The circuit being completed the solenoid S″ is energized and is adapted to hold the stream-controller open, so that the full volume of the supply can enter the empty compartment 6 of the load-receiver. When the major part of the load has been received, the weight W will be elevated, and as soon as the contact-piece 59 is raised from the coöperating contact-piece 55 the circuit in which the solenoid S″ is located is broken, thereby permitting the valve to be advanced to the position in which it is shown in Fig. 3 by the weight 60, secured to the arm 61, extending rearward from the shaft 32, so as to permit a reduced stream to enter the load-receiver. As the drip-stream flows into the load-receiver said load-receiver will farther descend, thereby lifting the weight W until, when the load is completed, the contact-piece 53 on said weight strikes the spring contact-arm 52, thereby completing the circuit in which the solenoid S′ is located, as follows: from the battery E to the wire 50, solenoid S′, wire 51, to contact-arm 52, to contact-piece 53, to wire 54, to wire 56, and then to battery E. As soon as the solenoid S′ is energized the core 45 will be drawn inward, and said core being connected with the stream-controller the feed-belt 33 will be rapidly swung under the discharge end of the supply-hopper H to arrest the supply and to prevent the material adjacent the delivery end of the belt from entering the loaded compartment, and the movement of the upper run on said belt will be reversed during the final stroke of the stream-controller. This effect I secure by throwing the worm 44 out of operative relation with the motor M, and said worm being stationary the worm-gear 45 will be rotated in a direction reverse to that followed on the initial movement of the stream-controller, so that the upper run of the feed-belt 33 will be driven rearward.

The shaft 43 carries a clutch, as C, of ordinary construction which is operated from the stream-controller S to throw the feeder 33 out of action with relation to its driving mechanism at a predetermined point in the advancing movement of the stream-controller.

The clutch member 65 receives in the usual peripheral groove the working end of the shipping-lever 66, pivoted at 67 on the framework, the opposite end of said lever being pivoted, as at 68, to the link 69, having at its other extremity the loop 70, embracing the stud 71 on the stream-controller frame *f*.

At the commencement of the operation the stud 71 will be against the inner end of the loop 70, the two members of the clutch C being in engagement, so that the upper run of the feed-belt is driven forward to assist the feed of material. On the initial movement of the stream-controller, or until it reaches the position represented in Fig. 3, the stud 71 will strike against the outer end of the loop 70, and on the final movement of said stream-controller the link 69 will be drawn to the left, so that the lever 66 can move the clutch member 65 out of engagement with its companion member 65, thereby to stop the forward movement of the feed-belt, and when the clutch members have been uncoupled the direction of movement of the upper run of the feed-belt will be reversed, as hereinbefore specified. Subsequent to this period the latch D will be raised to permit the load-receiver to tilt and discharge its contents, and when a load is being discharged the load-receiver will be returned to its uppermost position by the falling beam-weight W, which when it strikes its support 10′ will establish a circuit, as hereinbefore specified, to energize the solenoid S″, so as to retract the stream-controller S and at the same time drive the feed-belt 33 forward. The latch D is tripped by the solenoid S‴, the core 72, which has an annular shoulder 73 to hold it in place, and the upper end of said core coöperates with the free end of the latch, so as to raise said latch and thereby disengage it from one or the other of the offsets 13 and 14 to permit the load-receiver to tilt when one of the compartments thereof is loaded.

The energization of the latch-tripping solenoid S‴ is secured by the simultaneous closing of the circuit in which said solenoid is located by circuit-controlling means on the load-receiver and regulator mechanism, respectively, said regulator mechanism includ-

ing a pair of regulators shiftable alternately by the loads discharged from the compartments 5 and 6.

The load-receiver carries below its center of movement the spring circuit-makers 80 and 81, electrically connected with the battery E and adapted alternately to engage with the contact-pieces 82 and 83, respectively fixed to the base 2 and insulated from each other, the contact-maker 80 being connected with the solenoid S''' by the wire 84 and the wire 85 being connected with the contact-maker 81 and the wire 84. The solenoid S''' is also connected by the wire 86 with the wire 56, which, it will be remembered, is connected directly with the battery E. The contact-piece 82 is connected with the contact-piece 87, secured in and insulated from the base 2 by the wire 88, the companion contact-piece being connected by the wire 89 to the contact-piece 90, also secured within the base and insulated therefrom and also from the contact-piece 87. A third contact-piece is shown at 91, intermediate and insulated from the contact-pieces 87 and 90, the middle one being connected by the wire 92 to the wire 50, which, it will be understood, is directly connected to the battery.

The contact-pieces 87 and 91 or 90 and 91 are alternately bridged by the circuit-closers 95 and 96, respectively operative with the regulators R and R', said regulators being fixed to the shafts 97 and 98, supported within the base 3, and said circuit-makers being secured, respectively, to the regulator-shafts. The two regulators R and R' when in their primary positions fit against the oppositely-inclined walls 19 and 20 of the discharge-hopper H', at which time the circuit-closer 95 bridges the contacts 87 and 91, while the circuit-closer 96 bridges the contacts 90 and 91, respectively, as shown in Fig. 4. When the regulators are in their primary positions stated, they form in the base with the hopper-walls 19 and 20, respectively, pockets into which the loads from the two compartments 5 and 6 of the load-receivers can be alternately discharged to shift one or the other of said regulators. When a regulator is shifted, its cooperating circuit-closer 95 or 96 thereof is moved from the coöperating contact-pieces, thereby to break the solenoid-circuit, so that the core 72 of the solenoid, and consequently the latch D, can drop.

For the purpose of holding the regulators in their shifted positions for a comparatively long period each is equipped with an angular blade, (designated, respectively, by 99 and 100,) against which the material after it passes from the regulator is adapted to act, as indicated in Fig. 3. Just before the discharge of a load from one of the compartments of the load-receiver G the circuit-makers 95 and 96, respectively, will be in contact with the contacts 87 and 91 and 90 and 91, respectively, as represented in Fig. 4, and one of the circuit-closers 80 and 81 will be in contact with a coöperating contact-piece 82 or 83.

In Fig. 4 the circuit-maker 80 is against the contact-piece 82, so that the solenoid S'' is energized as follows: from the battery E, wire 50, wire 92, contact-piece 91, circuit-maker 95, contact-piece 87, wire 88, contact-piece 82, circuit-maker 80, wire 84, solenoid S''', wire 86, and wire 56 to battery E, and when said solenoid is energized the core 72 thereof is raised, thereby to operate the latch D; but to prevent the complete disengagement of the latch from the offset until the load is completed in the compartment 6 a stop operative, preferably, with the weighing mechanism is provided, said stop consisting in the present case of the curved arm 101, fixed to and depending from the scale-beam B at a point a short distance to the rear of the axis of said beam.

During the greater period of the loading operation the stop 101 will be disposed in the path of the latch D, so that in case the solenoid is energized the latch cannot be raised sufficiently high to release the partially-loaded load-receiver or until the working end of the stop 101 has crossed the path of oscillation of the latch D. When this action takes place, however, the solenoid S''' being energized, the latch will be promptly raised out of contact with one off the offsets 13 and 14, so as to permit the load-receiver to tilt to bring the empty compartment into position to receive the supply-stream.

In Fig. 4 the load in the compartment 6 of the load-receiver is completed, the said load-receiver and the poising end of the beam B descending so that the stop 101 will be caused to cross the path of oscillation of the latch D, at which time the said latch is raised, and the weight of the load in the compartment 6 will cause the load-receiver to tilt, thereby moving the circuit-closer 80 out of contact with the contact-piece 82 and the circuit-closer 81 into contact with the contact-piece 83, as represented in Fig. 5, and during the oscillation of the load-receiver the closer-holding latch 24 is tripped, as hereinbefore specified, to permit the closer L' to open, the contents of the compartment 6 being discharged against the regulator R to shift the same, thereby forcing the circuit-maker 96 out of contact with the contact-points 90 and 91, so as to break the latch-tripping solenoid-circuit, and thereby to permit the core 72 to drop, and consequently cause the latch D to engage the offset 13.

In connection with the closers L and L', I provide blocking devices operated by the regulators R and R' and thrown into position alternately by the coöperating regulators to block the proper closers. The closer-blocking devices are designated, respectively, by K and K', and each consists of an angular lever pivoted, as at 110 and 110', to the opposite sides of the supporting-base 2, and

each lever has an angular extension or arm 112, connected by the swivels 113 and 113′ with the short links 114 and 114′, said links being likewise connected at their lower ends with similar swivels 115 and 115′, connected with the arms 116 and 116′ of the two angle-levers A and A′, pivoted upon the base, the other arms 117 and 117′ of said angle-levers being pivoted to the links 118 and 118′, which are jointed to the crank-arms 119 and 119′ upon the regulator-shafts 97 and 98, respectively.

Each of the closer-blocking devices has a stop or transverse head (designated, respectively, by 120 and 120′) shiftable into the path of the closer-actuating weights 130 and 130′, so as to hold the proper closers open for a sufficient length of time to insure the complete discharge of a load.

Just prior to the discharge of a load the stop 120 will occupy the position shown in dotted lines in Fig. 1. On the discharge of the load the regulator will be thrown down and the stop 120, through the intermediate connections, will be moved upward into engagement with the closer-actuating weight 130, and the parts will remain in such position so long as the regulator is shifted, thereby to hold the closer L open until the complete load is discharged. When the regulator assumes its normal position, the stop 120 will be also below the path of the actuating-weight 130, so that said weight can drop to effect the shutting of the closer L, the closer being latched in its shut position by the latch 21 when the empty load-receiver has reached a predetermined point in its ascent. The same operation will follow with respect to the regulator R and closer-blocking device K′ on the discharge of a load from the chamber 6.

The regulators are provided with weights 150 and 150′, respectively fixed to the crank-arms 151 and 151′ on the shafts 97 and 98, said weights serving to return the regulators, and consequently the stops 120 and 120′, to their primary positions.

I mount upon the load-receiver at a convenient place the register X, having the usual actuator 140, to which the toggle-link 141 is connected, the other link 142 of the toggle being pivoted to the load-receiver. The toggle is connected with the hanger 8 by the link 143, pivoted, respectively, to said parts, so that as the bucket oscillates the register X, through the link 143 and toggle, will be operated.

The operation of the hereinbefore-described machine is as follows: In Fig. 2 the full volume of the supply-stream is flowing from the hopper H into the empty compartment 6 of the load-receiver, the beam-weight W resting on its support, so as to energize the solenoid S″ in the manner hereinbefore specified and hold the stream-controller S in its retracted position, and when said stream-controller is in such position the motor M will serve, through the intermediate instrumentalities, to drive the upper run of the feed-belt 33 forward. When the greater part of the load has been delivered to the compartment 6, the weight W will be raised, thereby breaking the circuit in which the solenoid S″ is located and permitting the weight 60 to advance the stream-controller a short distance or to the position shown in Fig. 2, during which motion the feed-belt 33 is thrown out of action with relation to its motor, as hereinbefore specified. When the stream-controller is in the position shown in Fig. 3, a reduced stream will enter the compartment 6 to complete the partial load, and on the completion of the load the contact-piece 53 on the beam-weight will strike the spring contact-piece 52 on the framing, thereby causing the energization of the solenoid S′, so as to impart an accelerated advancing movement to the stream-controller S, the direction of movement of the feed-belt 33 being reversed on the final operation of said stream-controller.

In Fig. 4 the load is shown completed, at which time the circuit in which the latch-tripping solenoid S‴ is included is closed, so that said solenoid is energized to lift the latch D and disengage said latch from the offset 14 on the load-receiver when the stop 101 on the scale-beam crosses the arc of oscillation of said latch, at which time the latch is raised clear of the offset 14, so that the load in the compartment 6 will cause the load-receiver to tilt to the right, thereby carrying the latch-pin 22 against the fixed tripper T′, so as to release the closer L′, as shown in Fig. 5, thereby discharging the contents from the compartment 6 against the regulator R′, which is shifted to break the latch-tripping solenoid-circuit, so that the latch can drop to engage the offset 13, as shown in Fig. 5. When the beam-weight W reaches its normal position, (shown in Fig. 2,) the solenoid S″ will be energized, as hereinbefore set forth, to retract the stream-controller, after which the operation is repeated, the loads from the compartments being alternately discharged.

Having described my invention, I claim—

1. The combination, with stream-supplying means, of an oscillatory stream-controller adapted to swing back and forth below the discharge end of said stream-supplying means; a series of electrical devices adapted respectively to advance and to retract said stream-controller; means for successively energizing said electrical devices; and means for operating the stream-controller during its advancing movement independent of said electrical devices to loosen up the material thereon thereby to effect a free feed of said material.

2. The combination, with stream-supplying means, of an oscillatory stream-controller adapted to swing back and forth below the discharge end of said stream-supplying means; a series of electrical devices adapted respectively to advance and to retract said stream-controller; an electric motor adapted to operate a part of the stream-controller thereby

to effect a free feed of the material thereon; and means for throwing the stream-controller out of operative relation with the electric motor when said stream-controller is near the limit of its advancing movement.

3. The combination, with stream-supplying means, of a pivotally-suspended stream-controller adapted to swing back and forth below the discharge end of said stream-supplying means and including a force-feeder; a series of electrical devices adapted respectively to advance and retract said stream-controller; means including a motor mounted independently of the stream-controller for operating the force-feeder thereof; means for successively energizing said electrical devices; and means for throwing the force-feeder out of operative relation with the motor when the stream-controller is near the end of its advancing movement.

4. The combination, with stream-supplying means, of an oscillatory stream-controller adapted to swing back and forth below the discharge end of said stream-supplying means and including a force-feeder; a series of electrical devices adapted respectively to advance and to retract said stream-controller; means for successively energizing said electrical devices; and instrumentalities controlled by the action of the stream-controller for operating the force-feeder in reverse directions during the advancing movement of the stream-controller.

5. The combination, with stream-supplying means, of an oscillatory stream-controller adapted to swing back and forth below the discharge end of said stream-supplying means and including a force-feeder; a series of electrical devices adapted respectively to advance and retract said stream-controller; means for successively energizing the stream-controller-actuating devices; driving mechanism for the force-feeder involving a clutch; and a clutch-operating device connected with, and actuated by, the stream-controller.

6. The combination, with stream-supplying means, of a pivotally-suspended stream-controller adapted to swing back and forth below the discharge end of said stream-supplying means; a series of electrical devices adapted one to advance the stream-controller and the other to retract said stream-controller; means for successively energizing said electrical devices; and a device independent of the electrical devices for also advancing said stream-controller.

7. The combination, with stream-supplying means, of an oscillatory stream-controller including a force-feeder; a gear carried by the stream-controller; a coöperating gear on the framework; a motor for driving said last-mentioned gear; means for advancing the stream-controller; and means for throwing the motor out of operative relation with the gear on the framework during the advancing movement of the stream-controller.

8. The combination, with stream-supplying means, of an oscillatory stream-controller including a force-feeder; a gear carried by the stream-controller; a coöperating gear on the framework; a motor for driving said last-mentioned gear; means for advancing the stream-controller; and means coactive with the stream-controller for throwing the motor out of operative relation with the gear on the framework during the advancing movement of the stream-controller.

9. The combination, with stream-supplying means, of a stream-controller including a force-feeder; means for advancing said stream-controller; mechanism including meshing gearing for operating the force-feeder, one of the members of the gearing being mounted on the framework; a motor for driving the gearing; a clutch between the gearing and the motor and coöperative with said parts; and means connected with the stream-controller for uncoupling the parts of the clutch at a predetermined point in the advancing movement of the stream-controller.

10. The combination, with stream-supplying means, of a stream-controller including a force-feeder; two independent electrical devices serving respectively to advance and to retract the stream-controller; means for successively energizing said electrical devices; driving mechanism for the force-feeder including a clutch; and means connected with the stream-controller for uncoupling the clutch parts at a predetermined point in the advancing movement thereof.

11. The combination, with stream-supplying means, of an oscillatory stream-controller including a force-feeder; a worm-gear carried by the stream-controller; a worm on the framework, for operating said worm-gear; a motor for driving the worm; means for advancing said stream-controller; and means for throwing the worm out of operative relation with the motor during the advancing movement of the stream-controller.

12. The combination, with weighing mechanism including a load-receiver, of means involving a latch for governing the discharge of the load-receiver; a regulator supported independently of the weighing mechanism and shiftable by the load; an electric circuit including a latch-operating device; and circuit-controlling means operative, respectively, with the load-receiver and with the regulator.

13. The combination, with weighing mechanism including an oscillatory load-receiver, of means involving a latch for holding the load-receiver in its load-receiving position; a regulator shiftable by the load; an electric circuit involving a latch-operating device; circuit-makers carried by the load-receiver and circuit-controlling means operative with the regulator.

14. The combination, with weighing mechanism consisting of a scale-beam and a load-receiver, of means involving a latch for governing the discharge of the load-receiver; a

regulator supported independently of the weighing mechanism and shiftable by the load; an electric circuit involving a latch-operating device; circuit-controlling means operative with the regulator; and a stop on the scale-beam for normally holding the said latch.

15. The combination, with a load-receiver, of a supporting scale-beam for the load-receiver; means involving a latch for governing the discharge of the load-receiver; a regulator supported independently of the load-receiver and shiftable by the load; an electric circuit involving a latch-operating device; means operative with the regulator for closing said circuit; and a stop on the beam, for normally holding the latch against action.

16. The combination, with weighing mechanism including a load-receiver, of means involving a latch for governing the discharge of the load-receiver; an electric circuit involving a latch-operating device; circuit-closing means; and a device operative with the weighing mechanism for holding the latch against load-releasing movement for a predetermined time and while the electric latch-operating device is energized.

17. The combination, with weighing mechanism including an oscillatory load-receiver having a plurality of compartments, of a series of regulators shiftable by loads discharged from the respective compartments; stream-supplying means; a latch adapted to hold the load-receiver in position to receive the supply-stream in its respective compartments; an electrical latch-tripping device; a series of circuit-makers fixed to the load-receiver; circuit-makers operative with the regulators; and means operative with the weighing mechanism for controlling the latch.

18. The combination, with a scale-beam, of an oscillatory load-receiver carried by hangers suspended from said scale-beam to hold the load-receiver in position alternately to receive a load of material; a plurality of regulators shiftable alternately by the loads discharged from said load-receiver; a latch-tripping solenoid; circuit-making means operative, respectively, with the load-receiver and with the regulators; and a stop on the scale-beam, for holding the latch against movement for a predetermined length of time and while said solenoid is energized.

19. The combination, with a scale-beam, of an oscillatory load-receiver; hangers for the load-receiver; a register carried by the latter and having an actuator; a toggle the members of which are pivoted, respectively, to the register-actuator and to the load-receiver; and a link connecting the toggle with a hanger.

20. The combination, with weighing mechanism including a load-receiver, of a closer for said load-receiver; an actuator for shutting the closer; a regulator shiftable successively by the loads discharged; and a closer-blocking device operated by the regulator and thrown into working position to engage the closer-shutting actuator on the shifting movement of the regulator.

21. The combination, with weighing mechanism including a load-receiver, of a closer pivoted to the load-receiver and having a counterweighted actuator for shutting the same; a regulator shiftable successively by the loads discharged from the load-receiver; and a closer-blocking device operated by the regulator and thrown into working position to engage the closer-shutting actuator on the shifting movement of the regulator.

22. The combination, with weighing mechanism including a load-receiver, of a closer pivoted to the load-receiver and provided with a counterweighted actuator for shutting the same; a regulator shiftable successively by the loads discharged; and a closer-blocking device connected with the regulator and thrown into working position on the shutting movement of the regulator, said blocking device being mounted on the framework and having a stop portion adapted to engage the counterweight of the closer.

23. The combination, with weighing mechanism including a load-receiver, of means involving a latch for governing the discharge of the load from said load-receiver; a regulator supported independently of the weighing mechanism and shiftable successively by the loads discharged from the load-receiver; an electric circuit including a latch-operating device; circuit-controlling means operative with the regulator; and a shiftable stop adapted to hold the latch against load-releasing movement for a predetermined length of time and while the electric latch-operating device is being energized.

24. The combination, with weighing mechanism including a load-receiver, of a closer for said load-receiver; a regulator shiftable successively by the loads discharged; an angular plate secured to the regulator; a closer-blocking device; and connections between the regulator and the closer-blocking device for opening the latter on the shifting movement of the closer.

25. The combination, with weighing mechanism including a load-receiver, of a closer for said load-receiver; a discharge-hopper having an inclined wall; a regulator supported for oscillation and fitting against the inclined wall; an angular plate fixed to the regulator; a closer-blocking device; and connections between the regulator and the closer-blocking device for operating the latter on the shifting movement of the regulator.

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