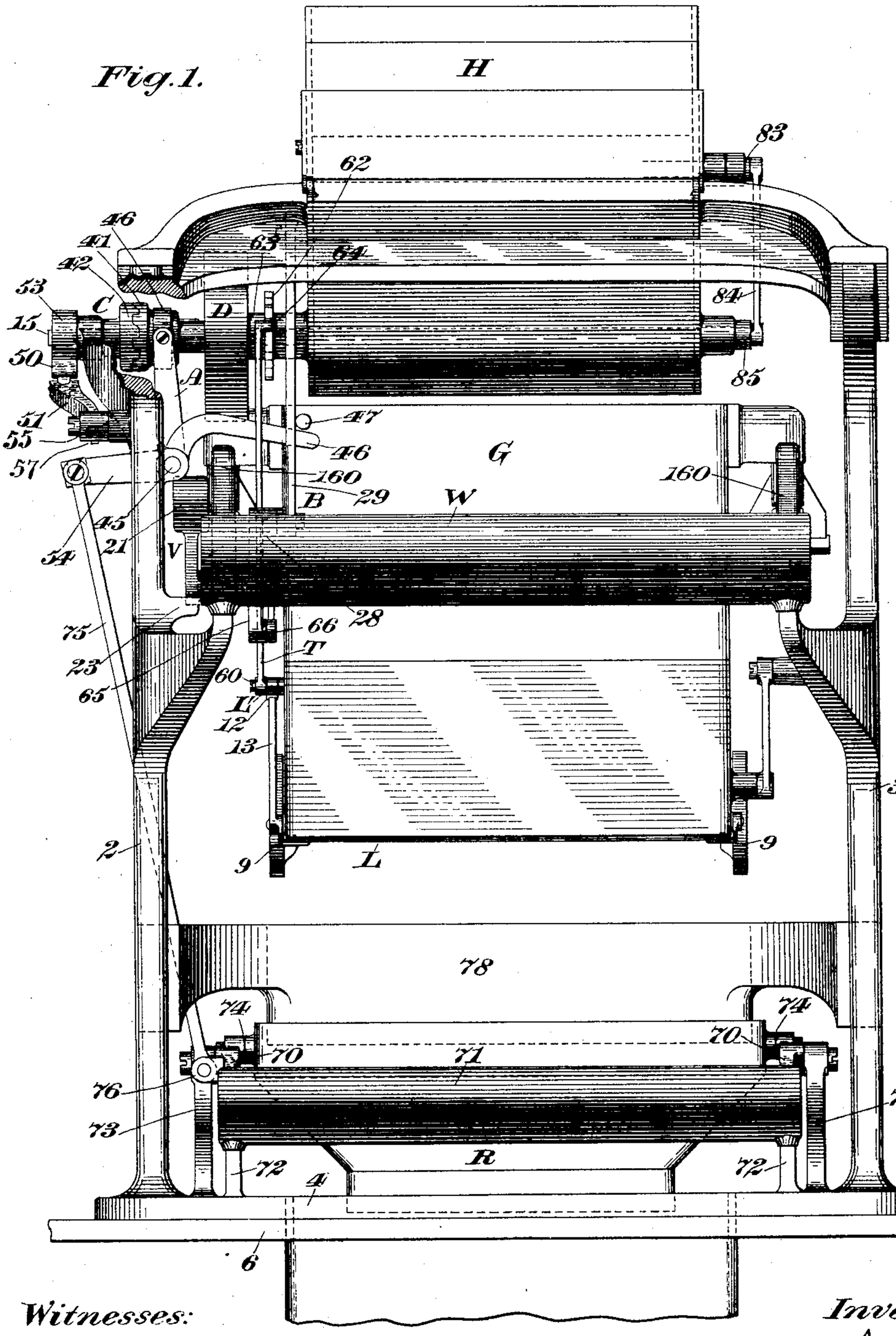
(No Model.) 4 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 589,297. Patented Aug. 31, 1897.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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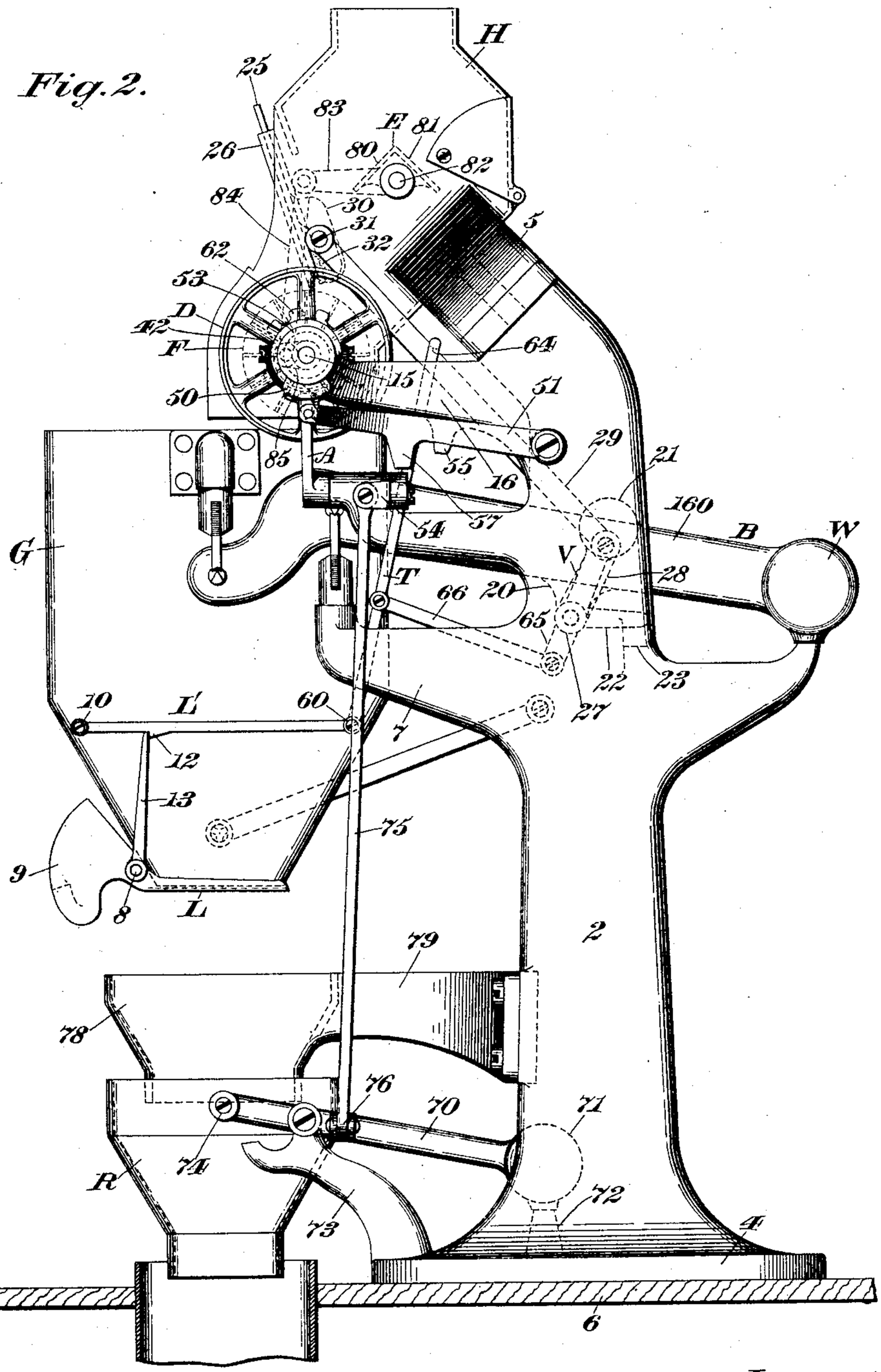
Fig. 2.



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4 Sheets—Sheet 3.

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WEIGHING MACHINE.

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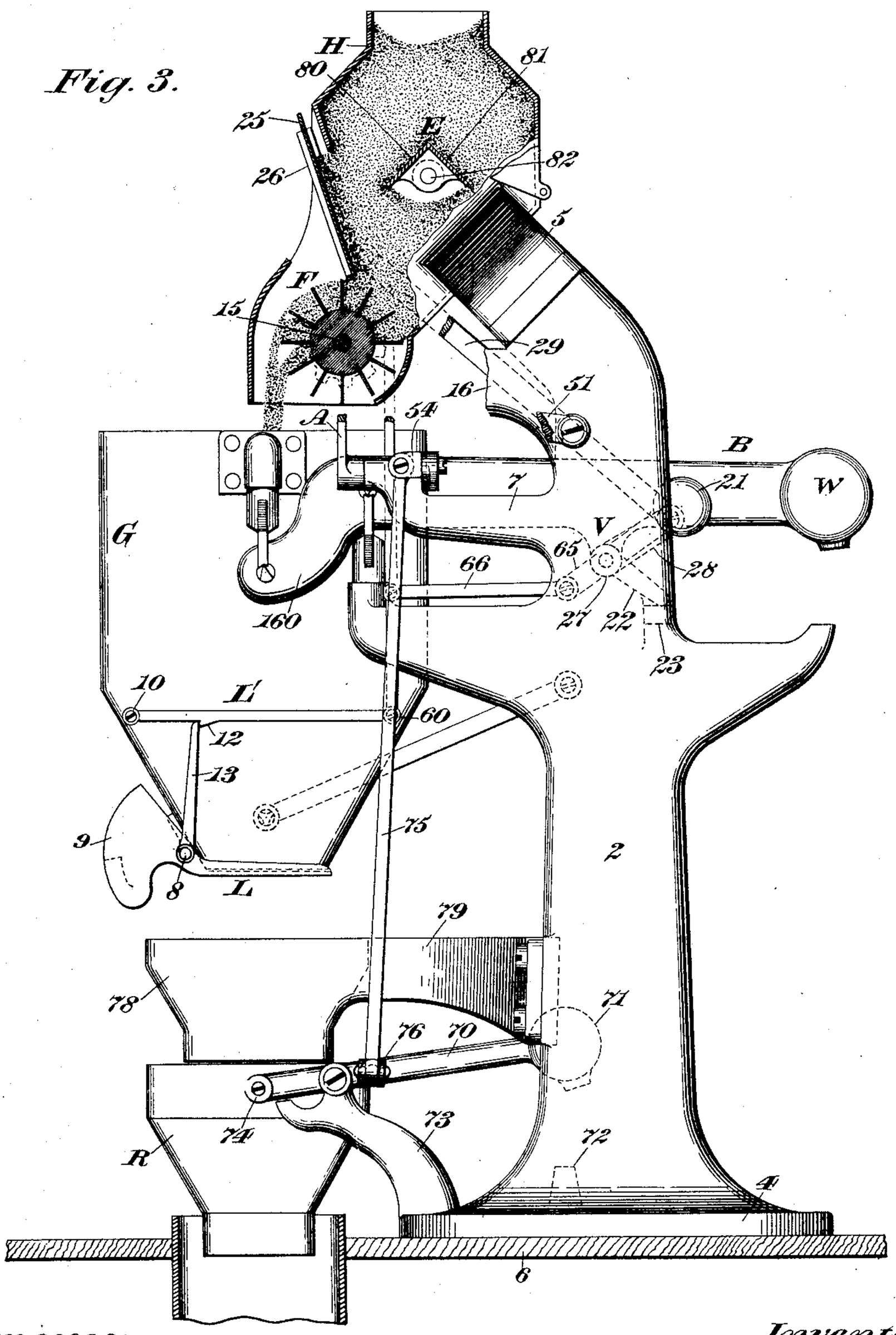
Fig. 3.



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(No Model.) 4 Sheets—Sheet 4.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 589,297. Patented Aug. 31, 1897.

Fig. 4.

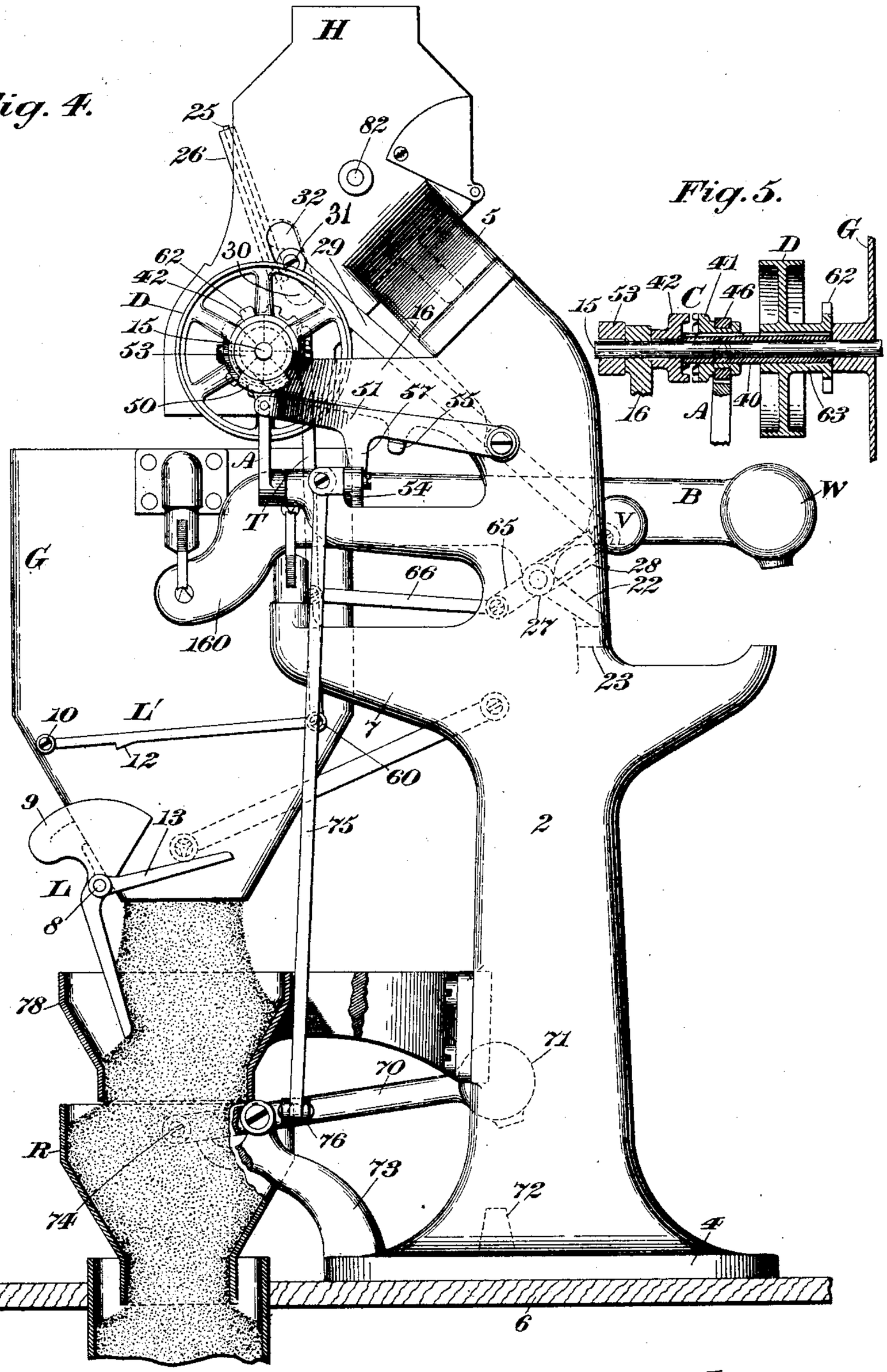

Fig. 5.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 589,297, dated August 31, 1897.

Application filed April 20, 1897. Serial No. 632,918. (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 main object being to provide an improved machine of this character for automatically weighing and delivering granular and pulverulent materials of various sorts with rapidity and precision.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear elevation of my improved machine. Figs. 2, 3, and 4 are side elevations of the machine as seen from the left in Fig. 1 and show the positions occupied by the respective parts during the making and discharging of a load, portions of Figs. 3 and 4 being broken away to illustrate more clearly certain features of the invention; and Fig. 5 is a detail in section of part of the feeder-controlling means.

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

The framework for sustaining the various sets of mechanism consists in the present case of the standards or uprights 2 and 3, which rise from the base or bed plate 4, and the beam 5, connected to said columns at the top, the base or bed plate being conveniently set upon a floor or bracket, as 6.

The weighing mechanism may be of any suitable type, it comprising in the present case a load-receiver G in the form of a hopper-shaped receptacle and the counterweighted scale-beam B, which preferably supports said load-receiver, said beam consisting of a pair of arms, as 160, joined by the cylindrical counterweight W, said beam or the two arms thereof being pivotally supported on forwardly-extending brackets 7 on the two columns 2 and 3, and the load-receiver being preferably pivotally suspended from the poising ends of said beam-arms.

The mounting of the load-receiver and the scale-beam being the same as illustrated in Letters Patent No. 548,840, granted to me October 28, 1895, to which reference may be had, a detailed description of the same is not deemed necessary.

The load-receiver G has the usual discharge-outlet, through which the weighed loads can intermittently gravitate, said outlet being normally covered by a suitable closer or flap, such as L, which preferably consists of a flat plate pivoted to the load-receiver, as at 8, said closer having suitable counterweights, as 9, for shutting the same on the discharge of a load.

The means for controlling the discharge of a load includes a latch, such as L′, which consists of an elongated lever pivoted to the load-receiver at 10 and having the shoulder 12, which is normally engaged by the coöperative arm 13, fixed to the closer L.

As a convenient means for delivering material to the load-receiver I prefer to employ a positive feed device, such as the feeder F, which is supported for rotative movement within the feed-case or hopper H, secured to the top plate or beam 5, whereby a supply of material, and more especially that of a slow-running nature, to the load-receiver can be had.

The feeder F, which is located in the line of feed of the gravitative body of material within the feed-case or hopper H, may be of any suitable construction, it consisting in the present case of a bucket-wheel or propeller keyed or otherwise fixed to the transverse power-shaft 15.

The shaft 15 is preferably journaled in opposite end walls of the feed-case or hopper H, an extended end of the shaft being carried by a suitable bracket or bearing, such as 16, on the end frame 2 and being preferably provided with a driver, such as D, by which the feeder F can be rotated to deliver the necessary supply of material to the load-receiver G.

The driver D may consist of any of the well-known forms of power-transmitting devices, it being in the present case a pulley of suitable size connected by belting with a motor. (Not shown.)

In connection with the weighing mechanism a suitable device will be employed for retarding the downward action of the load-receiver sufficiently to prevent its being carried below the poising-line prematurely, the disadvantage in this event being the discharge of an underload. Said resistance device is preferably mounted on the weighing mechanism,

it having a variable efficiency, which increases as the load-receiver descends. Said variable-efficiency device is designated by V, and it consists of a counterweighted lever pivoted to the depending lug 20 on the scale-beam B, whereby the center of gravity of the weight 21 will be caused to move away from the axis of oscillation of the beam and to approach the axis of the counterweight W, so that the necessary increased resistance will be applied to the load-receiver for preventing the premature descent of the same.

The arm 22 of the variable-efficiency device D is adapted to rest upon a stop 23, that extends inward from the column 2, whereby as the load-receiver G descends from its highest to its lowest position, as represented, respectively, in Figs. 2 and 4, the counterpoised side of the beam B, or that part thereof to the right of its axis of oscillation, will be raised, so that the lug or stop 23, acting as a resistance device, will cause the counterweight 21 of the variable-efficiency device V to drop, whereby the center of gravity of said weight will approach the axis of the counterweight W, thereby increasing the resistance applied to the load-receiver.

In conjunction with the feeder F, I provide a supply-reducer of suitable construction, it preferably consisting of a cut-off slide, such as 25, situated within the feed-case or hopper H above the feeder F and preferably movable toward the latter during the weighing of a load, whereby the supply delivered to the feeder can be graduated with nicety.

The supply-reducer or cut-off slide 25 may be mounted in any suitable manner, such as in the guideways 26, secured to the inside faces of the opposite walls of the feed-case, said guideways being set at an angle, whereby the stream-reducer or cut-off slide 25 will be caused to move in an oblique path to render it more easily operable.

The supply-reducer or cut-off slide can be operated in any suitable manner, it being preferably connected to the counterweighted lever V for operation. The hub 27 of said lever is provided with a rigid arm 28, to which is pivoted the connecting-rod 29, said rod being likewise attached at its opposite end to an elongated ear 30 on the cut-off slide 25, the pivot 31 between the rod and cut-off slide passing through a longitudinal slot 32 in the feed-case, as shown in Figs. 2 and 4.

The ear 30 constitutes a guard, it being made of such a length as to cover the longitudinal slot 32 when the slide is at the limit of its respective strokes, so that the passage of material through said slot is prevented.

It will be apparent that on the descent of the load-receiver and the opposite movement of the counterpoised side of the scale-beam B the counterweight 21 of the lever V will drop, the arm 28 swinging in a corresponding direction and drawing the rod 29 therewith, so that the cut-off slide will be pulled downward from its highest position (shown in Fig. 2) to that illustrated in Fig. 4, whereby the amount of material supplied to the feeder F for delivery to the load-receiver will be progressively reduced as said load-receiver descends, the stream supplied being a very attenuated or reduced one at the commencement of the poising period, so that the load can be properly completed. On the ascent of the empty load-receiver the lever V will be returned to its initial position, whereby the rod 29 will be thrust upward to elevate the slide 25.

The feeder F will be preferably thrown out of action on the completion of each load, whereby the supply to the load-receiver will be stopped, and for obtaining this result the driver or pulley D, which is continuously operative, will be intermittently coupled to the shaft 15 through the intervention of a suitable clutch, as C. (See Figs. 1 and 5.) The pulley or driver D is keyed to an elongated sleeve 40, which is loose on the feeder-shaft 15, the slidable member 41 of the clutch C being also keyed to said sleeve. The fixed member 42 of the clutch C is secured to the shaft 15 by keying or otherwise.

The actuator for the clutch is designated by A, and consists of an arm suitably secured to the rock-shaft 45, which is supported by the end frame 2, said actuator or arm being forked at its working end and the branches of the fork being suitably connected to the split ring or equivalent part 46, that lies in a peripheral channel in the clutch member 41.

For operating the clutch-actuator A to throw the feeder out of action means controlled by the weighing mechanism will be preferably provided, so that the feeder can be stopped at the proper stage.

The rock-shaft 45, which carries the actuator A, has affixed thereto the preferably curved rock-arm 46, disposed in the path of movement of the projection 47 near one corner of the load-receiver, so that when the load is almost completed the projection 47 will impart a sudden blow to the rock-arm 46, whereby the actuator A will be rocked to slide the clutch member 41 along the sleeve 40 to uncouple said clutch member from the clutch member 42.

For the purpose of instantly arresting the motion of the feeder F on the completion of the load I employ in connection therewith any suitable brake, that shown being of the "friction" kind and consisting of the segmental brake-shoe 50, pivoted to the brake-lever 51, fulcrumed to the column 2, said brake-shoe being coöperative with the disk or wheel 53, secured to the feeder-shaft 15, the brake-lever being operated by suitable means to throw the brake-shoe 50 against the periphery of the wheel or disk 53, the arm 54, extending laterally from the rock-shaft 45, constituting a suitable medium for thus operating the brake-lever. The brake-lever 51 normally rests upon the stop 55 on the frame 2,

as shown in Fig. 2, with the brake-shoe 50 adjacent to, but not in contact with the wheel or disk 53.

At the conclusion of the weighing operation and when the rock-arm 46 is struck by the projection 47 on the load-receiver G the rock-arm 54 will be oppositely oscillated and carried into contact with the lug 57 on the brake-lever 51 to elevate the latter and to force the shoe 50 tightly against the periphery of the wheel 53, whereby the motion of the feeder F will be promptly stopped, it being understood that during the first part of this operation the members of the clutch C are uncoupled, so that the feeder is thrown out of operative relation for the time being with its driver D.

The tripper for the closer-holding latch is designated by T, and in the present case it is shown pivoted to said latch, as at 60, means being provided to throw the tripper into engagement with a continuously-operative device, such as the toothed wheel 62, which is preferably secured to the hub 63 of the driver or pulley D, the tripper being preferably connected with the shifting lever V, whereby it may be caused to engage the toothed wheel 62 at the proper time.

The tripper T, which consists of a rod, has at the upper end thereof the inwardly-extending projection or pin 64, Fig. 1, and it is also connected at a suitable point with the arm 65 of the lever V by a link 66, which is pivoted, respectively, to these parts. When the load-receiver descends, the weight 21 will swing downward, thereby oppositely moving the arm 65, the link 66, and consequently the tripper T, whereby on the completion of a load the projection or pin 64 will be thrust between the teeth of the wheel 62, so that the latter, being continuously rotative, can actuate the tripper T for raising the latch L′ to disengage said latch from the coöperating arm 13 of the closer, so that the said closer can be forced open by the load in the receiver G.

In connection with the feeder-driving mechanism I provide a shiftable regulator, as the hopper R, which is supported for reciprocation beneath the load-receiver G to control the feeder and to receive the loads intermittingly discharged by said load-receiver. The regulator is coöperative with the feeder to throw the same into operative relation with its driver, whereby the feeder cannot be started when the load-receiver rises until the hopper reaches its primary position.

The regulator R is carried by the counterweighted lever 70, the weight 71 of said lever normally resting upon the supports 72 on the base or bed plate 4. The weight 71 is cylindrical, the arms of the latter extending forward therefrom and being pivoted to the risers 73 on the said base-plate, the regulator being pivoted, as at 74, between the two arms of the regulator-carrying lever 70.

The regulator-hopper R is connected with the rock-arm 54 by the intermediate rod 75, which is pivoted to the outer end of said arm, said rod being connected by a swivel-joint, as at 76, with the lever 70, the joint being at a point located to the right of the axis of movement of said lever.

When the oppositely-extending arms 46 and 54 on the rock-shaft 45 are operated by the projection 47 on the load-receiver, the rod 75 will be elevated, thereby depressing or lowering the regulator-hopper, and almost simultaneously with this action the charge from the load-receiver is emptied into said regulator to hold it in its lowest position, and the regulator is of such capacity as to retain sufficient of the material to keep it in its depressed position, even after the load-receiver is completely empty, in the interval the closer L having been shut.

When the regulator is nearly empty, the weight 71 will overbalance the same and elevate it, so that the rod 75, and consequently the rock-arm 54, will be lowered, the shaft 45 being simultaneously rocked, whereby the slidable clutch member 41 can be caused to engage its companion 42 to again start the feeder F, it being apparent that the brake-shoe 50 is also disengaged from the wheel 53 on the feeder-shaft 15 by the dropping of the lever 51.

A stationary discharge-hopper is shown at 78, it being situated below the load-receiver to receive a charge therefrom and to deliver it into the reciprocatory regulator-hopper, so that scattering of the material is prevented. Said discharge-hopper is provided with the brackets 79 at each side thereof, which are suitably secured to the two frames 2 and 3.

A deflector is represented at E, it being situated at or about the middle of the hopper or feed-case H and consisting of two oppositely-inclined plates 80 and 81, connected to form an angle, whereby the descending mass of material is directed against said plates and the force or impact thereof is materially modified.

For the purpose of insuring the free feed of the supply to the load-receiver means will be provided for vibrating the deflector E, whereby the mass in the hopper will be agitated or loosened up to such an extent as to assure this result.

The deflector is suitably secured to the transverse shaft 82, which is journaled in the end walls of the feed-case, one end of said shaft being extended beyond the case and having affixed thereto the crank-arm 83, to which is connected the rod 84, similarly jointed to the crank-arm 85 on the end of the shaft 15. When the members of the clutch are coupled as hereinbefore specified, the shaft 15 will be rotated, and it is operable, through the two crank-arms 85 and 83 and connecting-rod 84, to rock the shaft 82, and consequently the deflector E, for agitating

the supply. When the two clutch members are disengaged, the movement of the deflector will cease.

The operation of the hereinbefore-described machine, briefly stated, is as follows: Figs. 1 and 2 represent the positions occupied by the various parts at the commencement of operation, the closer L being shut and held in such position by the latch L′, engaging the closer-arm 13, and the two members of the clutch C being coupled the continuously-rotative pulley D will be also coupled to the feeder-shaft 15, whereby the feeder F will be driven to conduct the necessary supply of material to the load-receiver G to build up the load therein. When a certain percentage of the load has been received, said load-receiver will descend, thereby elevating the counterpoised side of the beam B, whereby the counterweight 21 of the variable-efficiency device or lever is permitted to drop and to approach the axis of the beam-counterweight W, the rod 29 and the slide 25 being drawn downward by the device V, whereby said slide is operable to reduce the supply of material delivered to the feeder F and hence to the load-receiver. It will be understood that as the lever V thus shifts, the link 66, and consequently the tripper, will be thrust to the left, whereby on the completion of the load the projection or pin 64 at the upper or free end of said tripper will be caused to enter the spaces between the continuously-running toothed wheel 62, thereby to elevate the tripper T, and consequently the latch L′, for releasing the closer L. At an instant preceding the tripping of the latch L′ the pin 47 on the load-receiver will strike the arm 46 on the shaft 45, so that the actuator A can be operated to slide the clutch member 41 along the sleeve or tube 40 to disengage it from the clutch member 42. When the closer L is thus released, it will be forced open and the mass will be emptied into the stationary hopper 78, and from thence will pass into the reciprocatory regulator-hopper R, which had been previously depressed by the raising of the rock-arm 54 and the rod 75. As soon as all of the material passes from the closer L it will be shut by its counterweighted end plate 9, and the empty load-receiver G will rise to receive a new load. When sufficient of the material has passed from the regulator-hopper R, so that the weight 71 thereof will overbalance the same, said weight, by dropping, will pull the rod 75 and the rock-arm 54 downward, whereby the actuator A will couple the clutch member 41 to the clutch member 42 to again start the feeder F, when the operation will be repeated.

Having described my invention, I claim—

1. The combination, with weighing mechanism including a load-receiver, of a hopper; a feeder located within said hopper; a slide disposed in the hopper above the feeder; means controlled by the weighing mechanism, for moving said slide toward the feeder during the weighing of a load; mechanism for driving said feeder; instrumentalities, coöperative with the load-receiver, for stopping the feeder when the load-receiver reaches a predetermined point; a regulator-hopper positioned to receive a load discharged from the load-receiver and to be lowered thereby; and means connected with the regulator-hopper, for starting the feeder in operation.

2. The combination, with weighing mechanism including a load-receiver, of a hopper having a longitudinal slot; a feeder situated within the hopper; a reciprocatory slide located in the hopper above the feeder and having an ear of a length to cover the slot when the slide is at the limits of its respective strokes; a connector between the ear and the weighing mechanism, said connector being pivoted at one end to said ear and the pivot passing through the longitudinal slot in the hopper; and means controlled by the weighing mechanism, for regulating the action of the feeder.

3. The combination, with a load-receiver, of a counterweighted scale-beam therefor; a variable-efficiency device shiftably mounted on the scale-beam; and means whereby said device will be caused automatically to approach the counterweight of the scale-beam during the descent of the load-receiver.

4. The combination, with a load-receiver, of a counterweighted scale-beam therefor; an oscillatory variable-efficiency device carried by the scale-beam; and means whereby said variable-efficiency device will be caused automatically to approach the counterweight during the descent of the load-receiver.

5. The combination, with a load-receiver, of a scale-beam therefor; a counterweighted lever pivoted to the scale-beam; and a stop on the framework, upon which one of the arms of the lever is adapted to rest, whereby on the descent of the load-receiver the weight of said lever will be caused to approach the counterweight of the scale-beam.

6. The combination, with weighing mechanism including a load-receiver, of a variable-efficiency device supported by the scale-beam; a hopper; a slide disposed in said hopper; and a connection between said slide and the variable-efficiency device.

7. The combination, with weighing mechanism embodying a load-receiver, of a hopper having a longitudinal slot; a reciprocatory slide located within said hopper, said slide having an ear of a length to cover said slot when the slide is at the limit of its respective strokes; and a connector between said ear and the weighing mechanism, said connector being pivoted at one end to said ear, and the pivot passing through the longitudinal slot in the hopper.

8. The combination, with weighing mechanism including a load-receiver, of a feeder; a driver for said feeder; a regulator in position to receive and to be lowered by the material discharged from the load-receiver;

means operative independently of the regulator, for throwing the feeder out of working relation with its driver; and means coöperative with the regulator, for throwing the feeder into working relation with its driver on the ascent of the regulator.

9. The combination, with weighing mechanism including a load-receiver, of a feeder; a driver for said feeder; a regulator in position to receive and to be lowered by the material discharged from the load-receiver; a lever supported by the framework and carrying said regulator; means operative independently of the regulator, for throwing the feeder out of working relation with its driver; and means connected with said regulator, for throwing the feeder into working relation with its driver.

10. The combination, with weighing mechanism including a load-receiver, of a feeder; a continuously-operative driver for said feeder; a regulator-hopper in position to receive and to be lowered by the material discharged from the load-receiver; a counterweighted lever mounted on the framework and connected with the regulator; a connector joined to said lever; and instrumentalities between said connector and the feeder, for throwing the latter into working relation with its driver on the ascent of the empty regulator.

11. The combination, with weighing mechanism including a load-receiver, of a regulator located to receive the contents discharged from the load-receiver; a feeder; a driver for said feeder; a clutch situated between and cooperative with the feeder and its driver; an actuator for the clutch; means operative with the load-receiver, for operating the clutch to uncouple the feeder and its driver; and connections between said actuator and the regulator, for coupling the clutch members.

12. The combination, with weighing mechanism embodying a load-receiver, of a regulator positioned to receive the contents discharged from said load-receiver; a feeder; a driver for the feeder; a clutch coöperative, respectively, with the feeder and its driver; a shaft having a clutch-actuator and also having two arms; a projection on the load-receiver, adapted to strike one of said arms; and a connection between the other arm and the regulator.

13. The combination, with weighing mechanism embodying a load-receiver, of a hopper; a feeder and a slide situated in said hopper; connections between said slide and the weighing mechanism; a driver for the feeder; a regulator situated to receive a load discharged by the load-receiver; and means coöperative with the regulator, for controlling the feeder.

14. The combination, with weighing mechanism including a load-receiver, of a feeder; a driver; a clutch coöperative, respectively, with the driver and the feeder; a shaft provided with an actuator for said clutch; a regulator located to receive the contents discharged from the load-receiver; a counterweighted lever for supporting said regulator; a pair of arms extending from said shaft; a projection on the load-receiver, adapted to engage one of said arms; and a rod connected, respectively, with the other arm and with said lever.

15. The combination, with weighing mechanism, of a feeder; means for driving said feeder; instrumentalities for throwing the feeder out of action; a regulator in position to receive and to be lowered by the material discharged from the weighing mechanism; a wheel carried by the shaft on the feeder; a brake; and means connected with the regulator, for operating said brake.

16. The combination, with weighing mechanism, of a feeder; means for driving said feeder; instrumentalities for throwing the feeder out of action; a wheel carried by the shaft of the feeder; a brake; a lever carried by the framework upon which the brake is mounted; a regulator in position to receive and to be lowered by the material discharged from the load-receiver; and means connected with the regulator, for actuating said lever to carry the brake into engagement with said wheel.

17. The combination, with weighing mechanism including a load-receiver, of a supply-hopper; a deflector situated within the hopper, to break the force of impact of the descending material therein; and means operative independently of the weighing mechanism, for vibrating said deflector during the descent of the load-receiver.

18. The combination, with weighing mechanism including a load-receiver, of a feeder; driving mechanism for said feeder; a deflector situated within the hopper and adapted to break the force of impact of the descending column of material therein; and means connected with the feeder-driving mechanism, for vibrating said deflector.

19. The combination, with weighing mechanism including a load-receiver, of a hopper; a deflector carried by a shaft and mounted in the hopper, said deflector being adapted to break the force of impact of the descending column of material in said hopper; a power-shaft; crank-arms affixed to the respective shafts; and a link connecting said crank-arms.

20. The combination, with weighing mechanism comprehending a shiftable load-discharge member, of a latch operable to hold the same normally against action; a continuously-operative toothed wheel; a tripper for the latch; and means for throwing the tripper into engagement with said toothed wheel.

21. The combination, with weighing mechanism including a load-receiver provided with a closer; of a latch on the load-receiver, adapted to hold the closer shut; a tripper for the said latch; a continuously-rotative toothed wheel; and means for throwing the tripper into engagement with said toothed wheel.

22. The combination, with a load-receiver

provided with a closer, of a latch pivoted to the load-receiver and adapted to hold its closer normally shut; a tripper pivoted to the latch; a continuously-operative toothed wheel; and means for throwing the tripper into engagement with said toothed wheel.

23. The combination, with weighing mechanism including a load-receiver provided with a closer, of a feeder; a shaft; a continuously-operative driver mounted on said shaft, the hub of which is provided with a toothed wheel; a clutch; an actuator for the clutch; a latch for holding the closer against movement; a tripper for said latch; and means for throwing the tripper into engagement with the toothed wheel.

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