No. 607,477. Patented July 19, 1898.

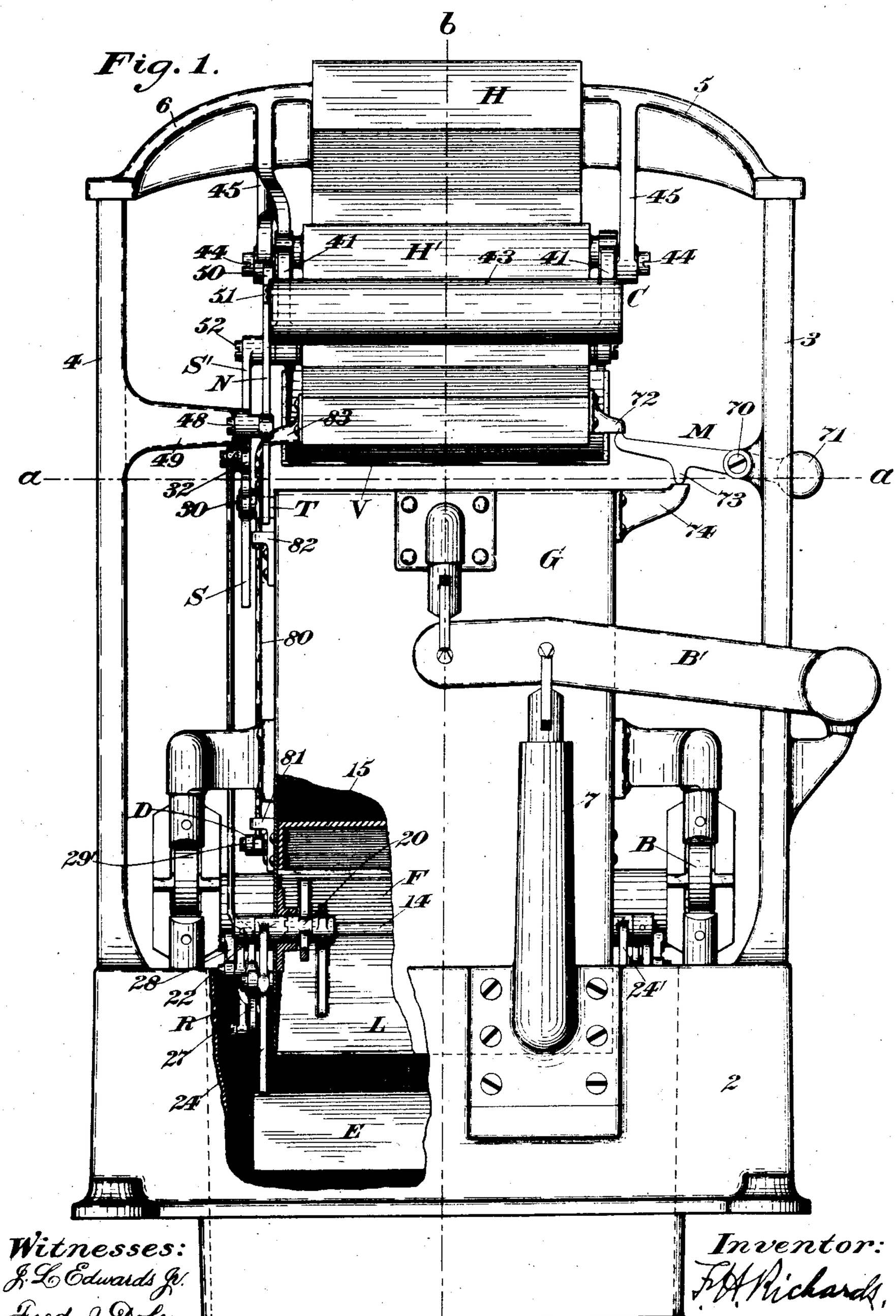
F. H. RICHARDS.

AUTOMATIC WEIGHING MACHINE.

(Application filed Oct. 28, 1897.)

(No Model.) 6 Sheets—Sheet 1.

Fig. 1.



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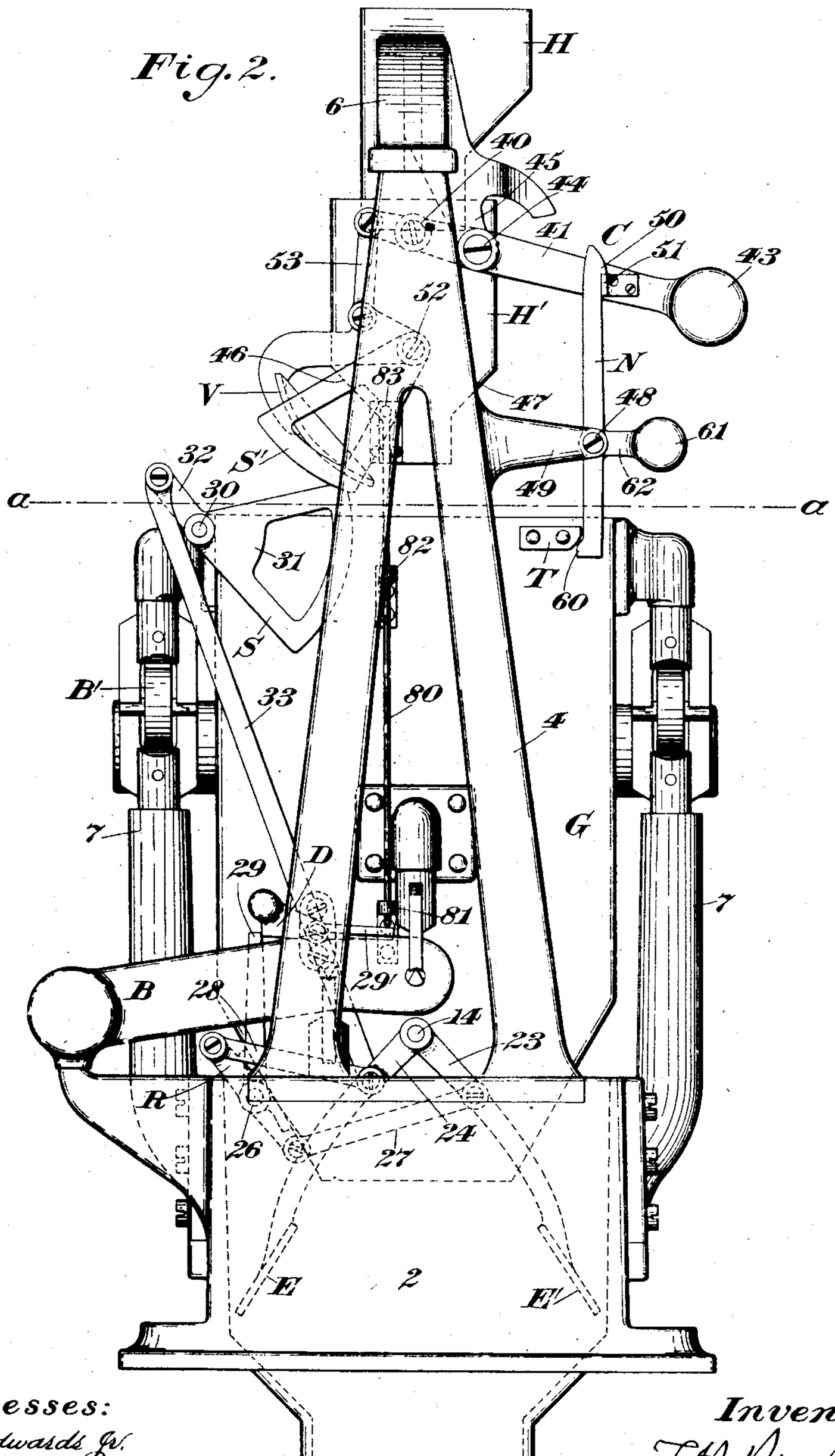
(No Model.) 6 Sheets—Sheet 2.

Fig. 2.



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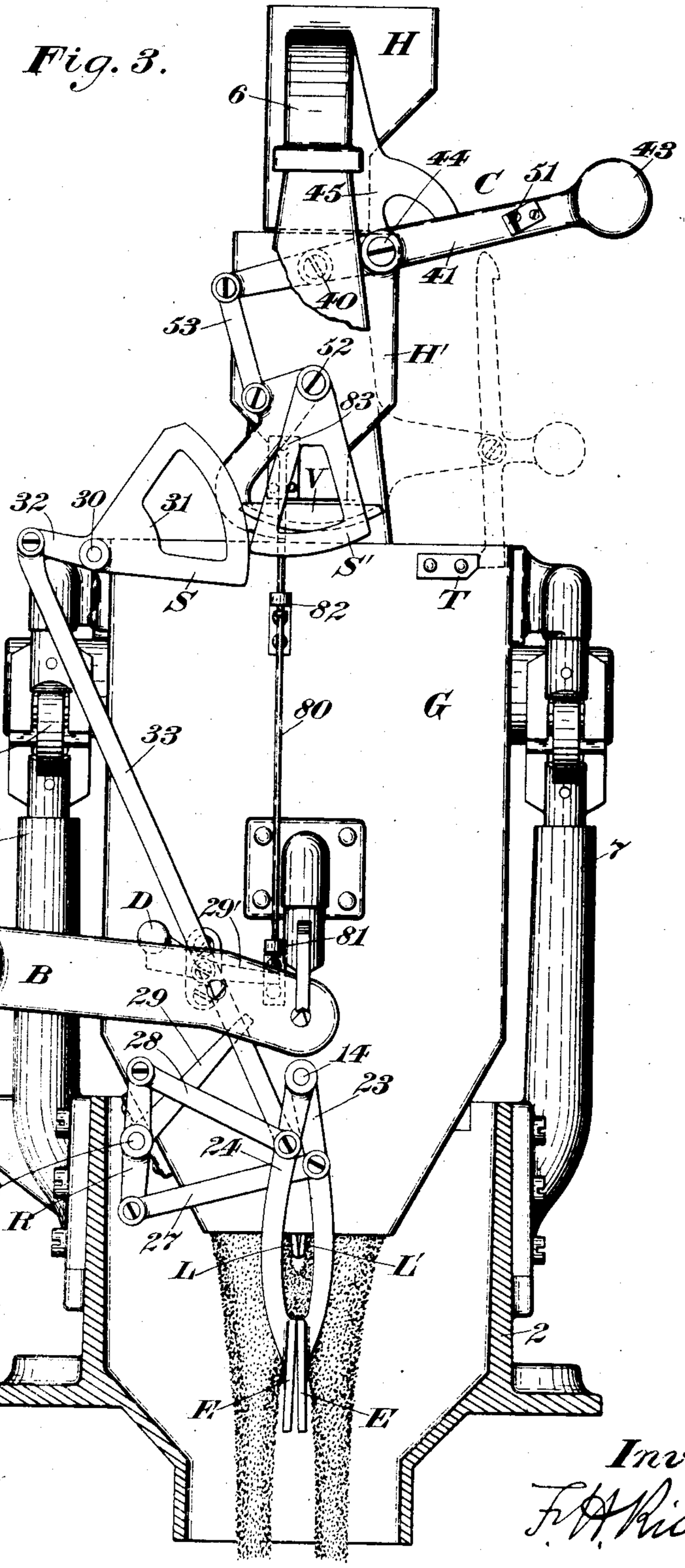
(No Model.) 6 Sheets—Sheet 3.

Fig. 3.



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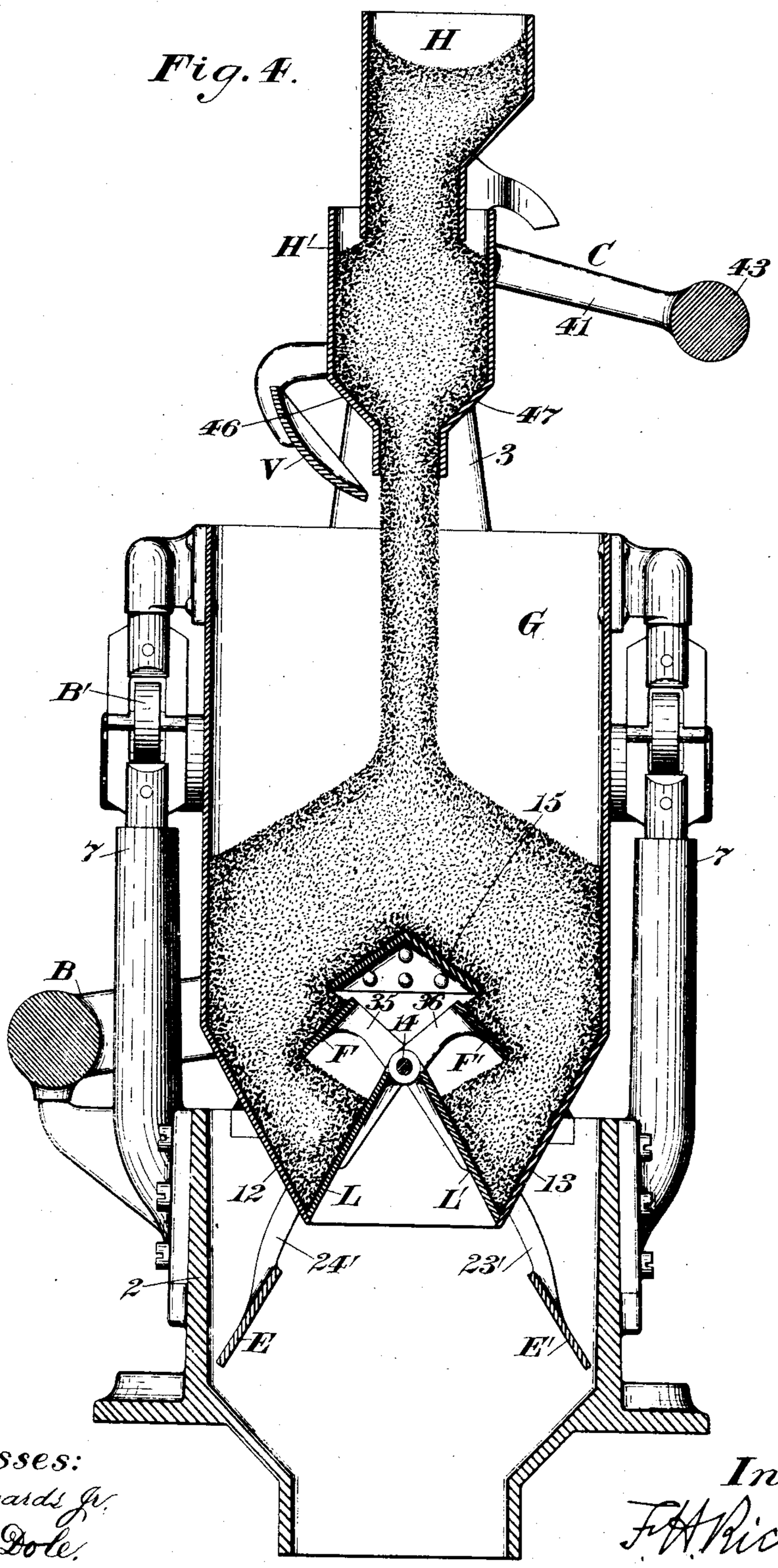
6 Sheets—Sheet 4.

Fig. 4.



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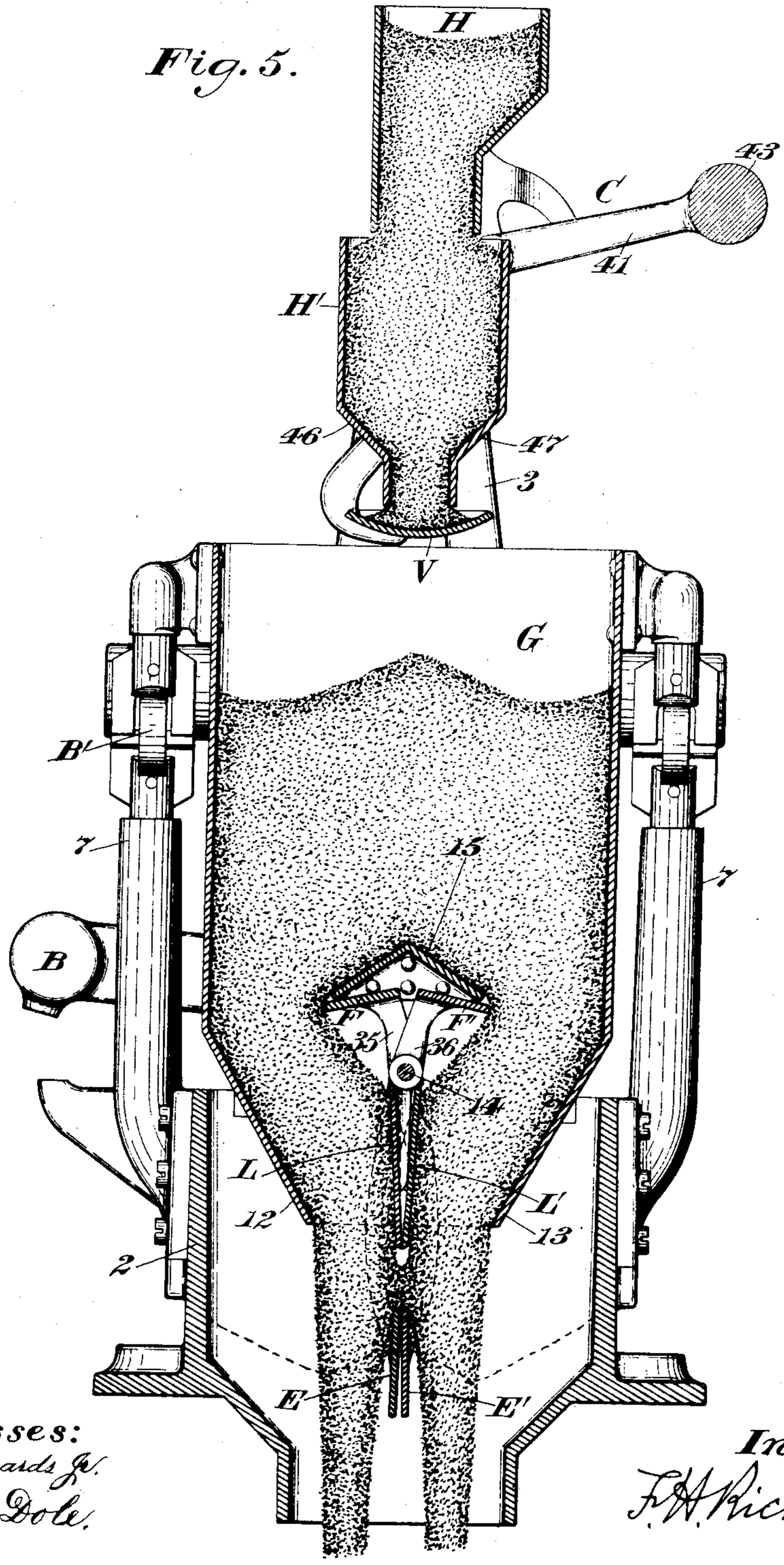
(Application filed Oct. 28, 1897.)

(No Model.) 6 Sheets—Sheet 5.

Fig. 5.



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(No Model.) 6 Sheets—Sheet 6.

Fig. 6.

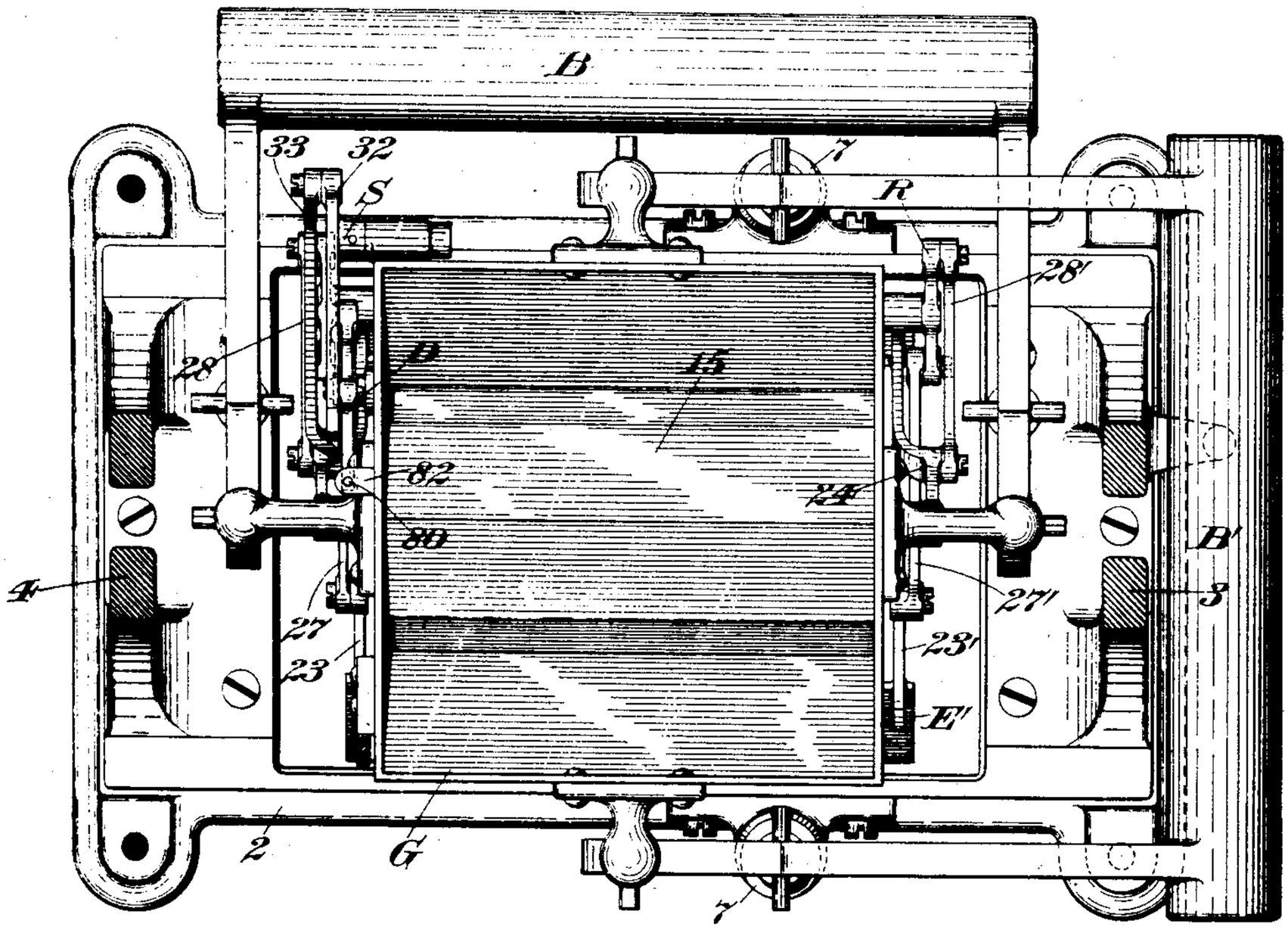
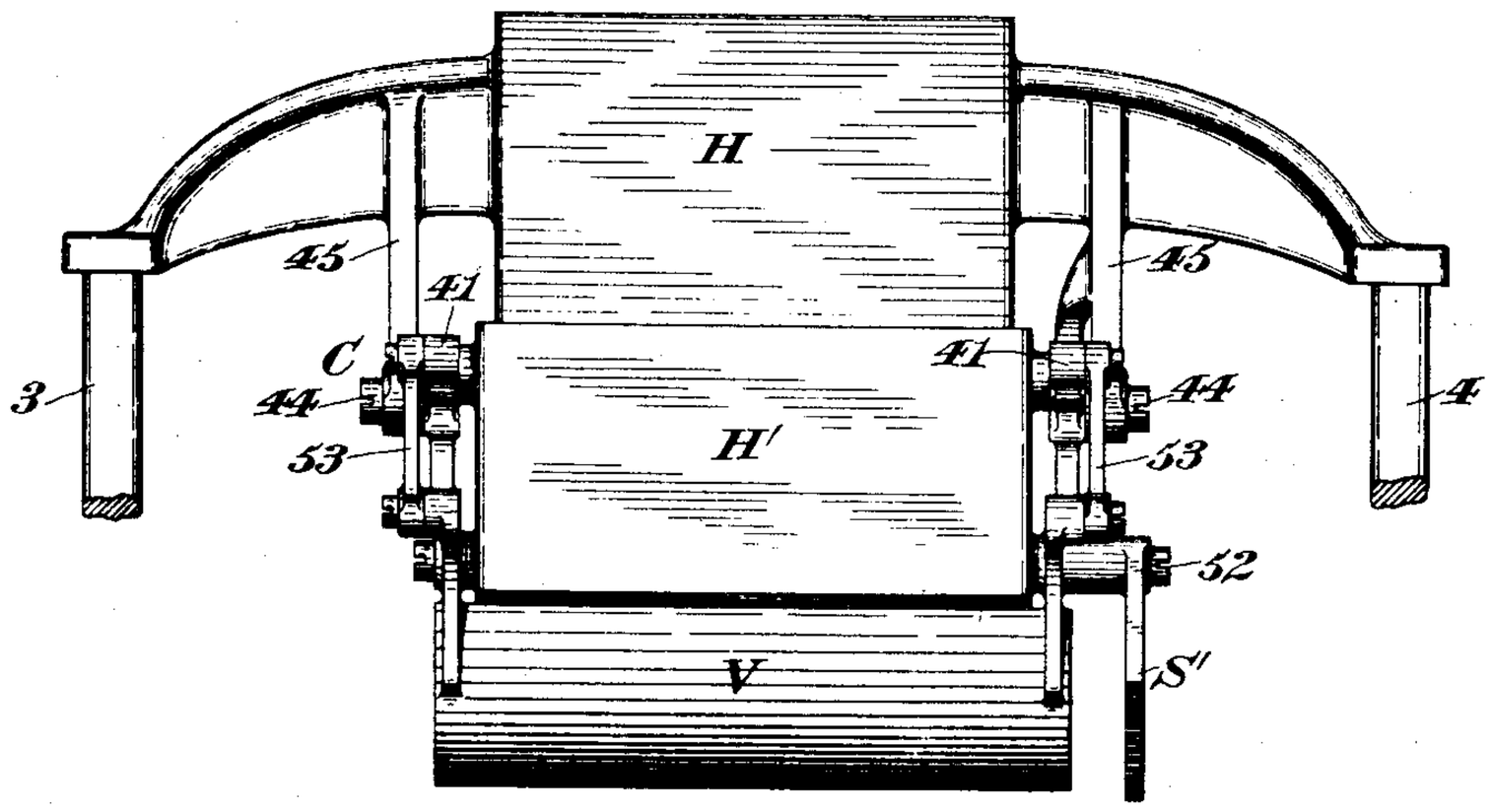


Fig. 7.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

AUTOMATIC WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 607,477, dated July 19, 1898.

Application filed October 28, 1897. Serial No. 656,690. (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 Automatic Weighing-Machines, of which the following is a specification.

This invention relates to weighing-machines, the object thereof being to provide an improved machine of this character for automatically weighing and delivering various kinds of materials.

My improved weighing-machine includes as one of its features a closer for controlling the discharge of the load-receiver and a device coöperative with the closer for sustaining part of the load. Said device is operable to aid in holding the closer shut; and it consists in the present case of a plate disposed at an angle to the closer and preferably situated within the load-receiver, whereby it serves to sustain part of the load, and being located as set forth it applies a force to the closer for holding the latter against its seat, the result being that the closer can be held shut by a minimum amount of power.

Another object of the invention is to furnish a stream-controller and a movably-mounted supply-hopper coöperative with and serving to actuate the stream-controller, a detent in position to be operated by the weighing mechanism being provided to hold said hopper in its primary position, whereby the supply can enter the load-receiver. The hopper in the present case is mounted for vertical reciprocatory movement, and the stream-controller consists of a valve movable beneath the outlet of and connected with said hopper, by reason of which when the hopper drops on the tripping of the detent it acts, through the intermediate means, promptly to shut the valve for cutting off the supply.

Another object of the invention is to combine, in connection with the supply apparatus, including a movably-mounted hopper, a device supported independently of the weighing mechanism and actuated thereby and adapted also to operate the movably-mounted hopper and so supported as to multiply the thrust applied by the weighing mechanism. This thrust-multiplying device is supported, preferably, upon the framework, and it is disposed in the path of the load-receiver, so as to be operated thereby and so that it can in turn lift the movably-mounted hopper to its primary position, where it may be held by a detent.

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 positions occupied by the different parts at the commencement of a weighing operation and discharge of the load, respectively. Figs. 4 and 5 are longitudinal central sections taken in line *b b*, Fig. 1, with the parts in positions corresponding, respectively, with Figs. 2 and 3. Fig. 6 is a sectional plan view taken in the line *a a*, Fig. 1; and Fig. 7 is a front elevation of the supply apparatus.

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, the side frames 3 and 4, and the brackets 5 and 6, extending oppositely from the hopper H, constituting part of the supply apparatus for delivering a stream to the load-receiver of the weighing mechanism.

The weighing mechanism may be of any suitable construction, and it is represented consisting of a load-receiver G and a plurality of supporting scale-beams, as B and B′. The beams are mounted at opposite sides of the center of gravity of the load-receiver and transversely to each other, so that the oscillation of said load-receiver during its descent and ascent is limited to the lowest possible extent.

The scale-beam B is supported upon the base 2, while the upper beam B′ is mounted upon the posts or uprights 7 on the base, the load-receiver being sustained at the poising or inner ends of the two beams.

The load-receiver is mounted upon the two beams, and these in turn are supported in a manner common in this art.

The load-discharging means includes closer mechanism involving one or more closers adapted to control the discharge of the load.

In connection with the closer mechanism I employ a device that is located to sustain part of the load and is operable to aid in holding the closer shut, thereby minimizing the stress exerted by the closer mechanism upon a latch or similar device employed to hold the closers shut.

In the drawings I have represented a plurality of closers for governing the discharge of the load, and they are designated, respectively, by L and L'. Said closers are adapted when shut to fit against the lower edges of the inwardly-sloping portions 12 and 13 of the front and rear walls, respectively, of the load-receiver, as shown in Fig. 4, and they oscillate in opposite directions about the same axis. The two closers are carried upon the shaft 14, located in the load-receiver and sustained by its opposite walls, the closer L being fixed to said shaft while the closer L' is loose thereon. The two closers are located below the inclined roof or guard 15, substantially inverted-**V** shape, secured to the opposite walls of the load-receiver, said roof or guard serving to prevent the entrance of material in the bearings of the transverse shaft 14 and also to sustain a part of the load, it being located at about the middle of the load-receiver.

The two closers are connected for simultaneous operation in opposite directions, they being obliquely diposed when shut, so that they can be readily opened or forced toward each other by the pressure of the material banked up against the same, and the means illustrated for securing the necessary simultaneous action of said members will now be set forth.

The closer L, as is understood, is fixed to the shaft 14, while the closer L' is loose thereon, the hub or sleeve 20 of said closer L' (see Fig. 1) being coupled to a similar sleeve 22 on that end of the shaft which extends beyond the load-receiver, and said sleeve 22 is equipped with the depending crank-arm 23. A similar crank-arm is shown at 24 secured to the extreme outer end of the transverse shaft 14, (see Figs. 1 and 2,) the two crank-arms being connected to the rocker R, secured at its middle to the stub-shaft 26, carried by a suitable bearing on the load-receiver. By reason of the construction described it will be evident that the two-crank-arms 23 and 24 move in a direction corresponding with the respective closers.

A pair of links is shown at 27 and 28 respectively pivoted at opposite ends of the rocker R and also to the crank-arms 23 and 24, respectively.

The stub-shaft 26 carries a fixed arm 29, the free end of which is in position to be engaged by the counterweighted latch or detent D, pivotally mounted on the load-receiver and operative in the usual manner, said latch being shown in its effective position in Fig. 2 to hold the closer shut. When the working end of the latch D is raised above the free end of the arm 29, the two closers will be released and the material within the receiver will force said closers toward each other, as shown in Fig. 5, to discharge the load.

For the purpose of retarding the shutting of the closers I provide regulator mechanism consisting, preferably, of a plurality of regulators, as E and E', coöperative with the respective closers L and L' and located substantially in alinement therewith, so that when the closers are opened the two regulators will be shifted therewith and across the path of the discharging streams from the load-receiver and in position to be acted upon by said streams, as shown in Fig. 3, and by thus blocking the action of the regulators E and E' the closers may be held open for a sufficient period to insure the complete discharge of the load.

The regulators consist of flat plates secured at their opposite ends to the crank-arms 24 and 23 and 23' and 24', the crank-arms 23' and 24' being connected with the two closers in a manner similar to the arms 23 and 24. As just stated, when the two closers are opened the regulator-plates will be shifted therewith across the paths of the discharge-streams from the load-receiver in position to be acted upon by the material to impede the shutting of the closers.

The stop S, pivoted upon the load-receiver, as at 30, constitutes a convenient means for returning the closers to their primary positions, (shown in Figs. 2 and 4,) said stop being weighted, as at 31. The stop S has the crank-arm 32, to which the longitudinal rod 33 is pivoted, said rod being pivoted at its lower end to the crank-arm 24. When the closers are opened by the pressure of the material, the stop S is elevated, as indicated in Fig. 3, and when the weight of the stop overcomes the pressure against the two regulators said stop can drop, and in doing so elevates the rod 33 for shutting the two closers through the intermediate connections.

For the purpose of minimizing the stress or weight applied to the latch D by the two closers means operable to sustain part of the load and to apply their effect to the respective closers are provided, the function of said means being to transmit a sufficient power to aid in holding the closers against their seats. The means shown for carrying out this object consists in the present case of the blades F and F', coöperative, respectively, with the closers L and L' and disposed transversely to and above the closers, such blades being secured at their opposite ends to the arms 35 and 36, extending from and secured to the closers. The two blades are preferably situated in the receiver G and are located outside of and below the opposite sides of the hood or roof 15, and by reason of their positions they sustain a part of the load, and acting oppositely to the two closers they serve to force the two closers against their seats. The two blades F and F' are narrower than

the closer-blades L and L', by reason of which the latter sustain a greater weight than the former, so that the closers can be opened by the lateral pressure of the material contained in the receiver. As said closers open the two blades F and F' are swung under the roof or hood 15, as indicated in Fig. 5, so as to be out of the path of the discharging material.

The supply apparatus in the present case consists of the stationary hopper H and movably-mounted hopper H', located below and in alinement with the stationary hopper, and the valve V, controlling the discharge of material from the hopper H', said valve being reciprocatory below the said hopper H' either to cut off the stream or permit its entrance into the load-receiver G.

The hopper H' is supported for vertical reciprocatory movement, it being pivoted, as at 40, between the arms 41 of the carrier C, said arms being joined at the rear by the counterweight 43 and being pivoted, as at 44, to the lugs 45 on the brackets 5 and 6, the weight 43 acting to balance the empty hopper H'.

The front and rear walls of the hopper H' slope toward each other, as at 46 and 47, thereby to produce a reduced outlet to confine a body of material in said hopper, and the weight of the material can bear the hopper H' down at the proper stage and thereby effect the closure of the valve V to cut off the supply, said valve being preferably connected with the hopper to carry out this operation.

The hopper H' is maintained in its uppermost or primary position by a suitable detent, as N, consisting of a lever pivoted, as at 48, to the arm 49 on the framework, the detent or lever N having a hook or shoulder 50 at its upper end, adapted to engage the offset 51 on the carrier C, thereby to hold the hopper in its highest position. When the hook is disengaged from the offset of the carrier, the hopper is free to drop, and in doing so it acts through intermediate means to shut the valve V. The valve is pivoted, as at 52, upon the load-receiver and is connected by the link 53 with an arm 41 of the hopper-carrier C, and by reason of said connection when the hopper drops the valve will be immediately shut.

The hopper H' is maintained in its primary position until the load is completed, it being understood that by reason of the intervening connections the valve is held wide open, and for effecting the release of these two parts I provide a tripping device operative with the weighing mechanism for actuating the detent or latch N when the load is completed.

The tripper for actuating the detent N is designated by T, and it consists of a projection upon the load-receiver G, adapted to strike the projecting portion 60 at the lower end of the detent N, thereby to swing the hook 50 off from the projection 51 of the hopper-carrier C, which results in freeing the hopper, so that said hopper can drop and in doing so can shut the valve to stop the supply.

The detent N is held in engagement with the hopper-carrier C by the counterweight 61 at the end of the detent-arm 62.

The necessary power for operating the hopper H', and consequently the valve V, to return them to their primary positions is furnished by the weighing mechanism, the load-receiver G in the present case accomplishing this function, and for the purpose of multiplying the thrust applied by the load-receiver I employ a device mounted independent of the weighing mechanism and in position to be operated by one of the members thereof, and in turn to elevate the hopper to its uppermost or primary position, where it may be held by the detent N.

The thrust-multiplying device is preferably supported upon the framework, (see Fig. 1,) it being designated by M and consisting of a lever pivoted, as at 70, to the side frame 3 and counterweighted, as at 71. The inner end of the lever M works against the lug 72 on the hopper, and said lever is furnished with a protuberance 73, resting on the arm or projection 74 near the upper end of the load-receiver. When the load-receiver descends, the projection 74 will move away from the protuberance 73 on the thrust-multiplying lever M, the inner end of which is held against the lug 72 on the hopper by the counterweight 71. When the hopper drops, as hereinbefore specified, the lever M is forced downward therewith until the protuberance 73 abuts against the projection 74 of the load-receiver. When the empty load-receiver rises, it will act upon the lever between its fulcrum and the point at which it applies its effect to the hopper, whereby the inner end of the lever is caused to travel through a greater distance than the ascending load-receiver, the working arm of the lever being of such length as to impart the necessary stroke to the hopper H' for returning it to its primary or uppermost position.

The tripper for disengaging the latch D from the arm 29 to effect the release of the closer mechanism consists of a longitudinal bar 80, carried by the keepers or guide-brackets 81 and 82 upon the load-receiver and fixed at its upper end, as at 83, to one side of the reciprocatory hopper H', the parts being so organized that when the hopper is released and when the supply is cut off the lower end of the bar 80 will strike the free arm 29' of the latch, thereby raising the opposite arm of the latch to release the closers, which are then opened in the manner hereinbefore set forth.

A valve-operative stop is shown at S' secured to the valve V in some convenient manner and coöperative with the stop S in a manner familiar in this art.

The operation of the hereinbefore-described machine, briefly set forth, is as follows: In Fig. 2 the parts are shown occupying their

normal positions, the closers L and L' being shut and being held in such position by the latch D and the hopper H' and the valve V being in their primary positions, where they are held by the detent N in engagement with the hopper-carrier C, the valve V being wide open to permit the full volume of the supply to enter the empty load-receiver G. When a certain part of the load has been received, the load-receiver will descend, the projection 74 falling away from the lever M, and when the load is fully completed the tripper T will strike the projection 60 at the lower end of the detent and will disengage said detent from the offset 51 on the carrier C, thereby releasing the hopper H', by reason of which the hopper will be lowered by the weight of the material contained therein, and the valve V will be simultaneously closed or swung under the outlet of said hopper to entirely cut off the supply. When the hopper drops and after the supply has been cut off by the supply-valve V, the lower end of the tripper-bar 80 will strike the latch 29', thereby disengaging said latch from the arm 29 to effect the release of the closers L and L'. When the two closers are released, they are forced open by the pressure of the material in the receiver and are held open until the load is completely discharged by the regulators E and E'. When the two closers are shut, they are again held by the latch D. As the empty receiver G rises the projection 74 thereof will lift the lever M, which is in contact with the lug 72 on the hopper H', whereby said hopper is elevated until it is engaged by the detent N, which is thrown into working position by the counterweight 61. When the hopper rises, the valve V is swung open to repeat the operation.

Having described my invention, I claim—

1. In a weighing-machine, the combination, with a load-receiver, of a closer, and a device which constitutes no part of the closer proper and which is operated upon by a portion of the load being weighed to aid in holding the closer shut.

2. In a weighing-machine, the combination, with a load-receiver, of a closer, and a device connected with the closer and operated upon by a portion of the load being weighed to aid in holding the closer shut, said device forming no part of the closer proper.

3. In a weighing-machine, the combination, with a load-receiver, of an oscillatory closer provided with a device which constitutes no part of the closer proper and which is operated upon by a portion of the load being weighed to aid in holding the closer shut.

4. In a weighing-machine, the combination, with a load-receiver having an inwardly-sloping wall, of a closer fitting, when shut, against the lower edge of said wall and provided with a device which constitutes no part of the closer proper and which is operated upon by a portion of the load being weighed to aid in holding the closer shut.

5. In a weighing-machine, the combination, with a load-receiver, of a transverse shaft in the load-receiver; a closer carried by said shaft and provided with a device which constitutes no part of the closer proper and which is operated upon by a portion of the load being weighed to aid in holding the closer shut.

6. The combination, with a load-receiver, of a closer controlling the discharge of the load-receiver; a hood situated in the load-receiver and above the closer; and a device co-operative with the closer and sustaining part of the load, said device being situated beneath the hood and being operable to aid in holding the closer shut.

7. In a weighing-machine, the combination, with a load-receiver, of a closer; closer-holding means embodying a latch; and a device coöperative with, but forming no part of, the closer proper, said device being operated upon by a portion of the load being weighed and serving to aid in holding the closer shut.

8. The combination, with a load-receiver, of a closer provided with a plate which constitutes no part of the closer proper and which is operated upon by a portion of the load being weighed to aid in holding the closer shut.

9. In a weighing-machine, the combination, with a load-receiver, of a closer provided with a plate disposed transversely to the closer and which constitutes no part of the closer proper, said plate being operated upon by a portion of the load being weighed and serving to aid in holding the closer shut.

10. In a weighing-machine, the combination, with a load-receiver, of a closer provided with a plate situated in the load-receiver and disposed at an angle to the closer and constituting no part of the closer proper, said plate being operated upon by a portion of the load being weighed to aid in holding the closer shut.

11. The combination, with a load-receiver, of a plurality of oppositely-oscillatory closers provided with means in the load-receiver above the closers and constituting no part of the closers proper, said means being operated upon by a portion of the load being weighed to aid in holding the closers shut.

12. In a weighing-machine, the combination, with a load-receiver, of a closer controlling the discharge of the load-receiver and provided with a device which constitutes no part of the closer proper and which is operated upon by a portion of the load being weighed to aid in holding the closer shut, and a regulator coöperative with the closer.

13. The combination, with a load-receiver, of a closer controlling the discharge of the load-receiver; a device coöperative with the closer and sustaining part of the load, said device being operable to aid in holding the closer shut; and a closer-retarding regulator coöperative with the closer and in parallelism therewith.

14. The combination, with a load-receiver, of a closer controlling the discharge of the load-receiver; a device coöperative with the closer and sustaining part of the load, said device being operable to aid in holding the closer shut; a shaft for supporting the closer; a crank-arm secured to said shaft; and a closer-retarding regulator fixed to said crank-arm.

15. The combination, with a load-receiver, of a closer controlling the discharge of said load-receiver; a device coöperative with the closer and sustaining part of the load, said device being operable to aid in holding the closer shut; a shaft to which the closers are fixed and loose, respectively; crank-arms connected with the shaft; a rocker mounted on the load-receiver; connections between the rocker and the two crank-arms; a stub-shaft for supporting the rocker and provided with an arm; and a latch adapted to engage said arm.

16. The combination, with a load-receiver, of a closer controlling the discharge of the load-receiver; a shaft to which one of the closers is fixed and upon which the other one is loose; a sleeve on the loose closer, extending through the load-receiver; a second sleeve loose on the shaft and connected with the first-mentioned sleeve and having a crank-arm; a second crank-arm fixed to said shaft; a rocker; a stub-shaft on the load-receiver, for carrying the rocker and having an arm; links pivoted to the opposite ends of the rocker and also to said crank-arms; and a latch for engaging the arm of said stub-shaft.

17. The combination, with weighing mechanism embodying a load-receiver, of a supply apparatus including a movably-mounted device, and means supported independently of the weighing mechanism and actuated thereby, and adapted also to operate said movably-mounted device and so supported as to multiply the thrust applied to the weighing mechanism.

18. The combination, with weighing mechanism embodying a load-receiver, of a supply apparatus including a movably-mounted hopper, and a device supported independently of the weighing mechanism and actuated thereby, and adapted also to operate the movably-mounted hopper and so supported as to multiply the thrust applied by the weighing mechanism.

19. The combination, with weighing mechanism embodying a load-receiver, of a supply apparatus including a movably-mounted hopper; a stream-controller operated by the hopper; and a device supported independently of the weighing mechanism and actuated thereby, and adapted also to operate the movably-mounted hopper and so supported as to multiply the thrust applied by the weighing mechanism.

20. The combination, with weighing mechanism embodying a load-receiver, of a supply apparatus including a movably-mounted device, and a lever supported independently of the weighing mechanism and actuated thereby, and adapted also to operate the movably-mounted device and so supported as to multiply the thrust applied by the weighing mechanism.

21. The combination, with weighing mechanism embodying a load-receiver, of a supply apparatus including a movably-mounted device, and a counterweighted lever supported by the framework and in position to actuate the movably-mounted device and to be operated by the weighing mechanism and so supported as to multiply the thrust applied by the weighing mechanism.

22. The combination, with weighing mechanism embodying a load-receiver, of a supply apparatus including a movably-mounted hopper; a lever supported upon the framework and coöperative with said hopper; and a projection on the load-receiver, adapted to engage said lever between its fulcrum and the point at which it is in contact with said hopper on the ascent of said load-receiver.

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