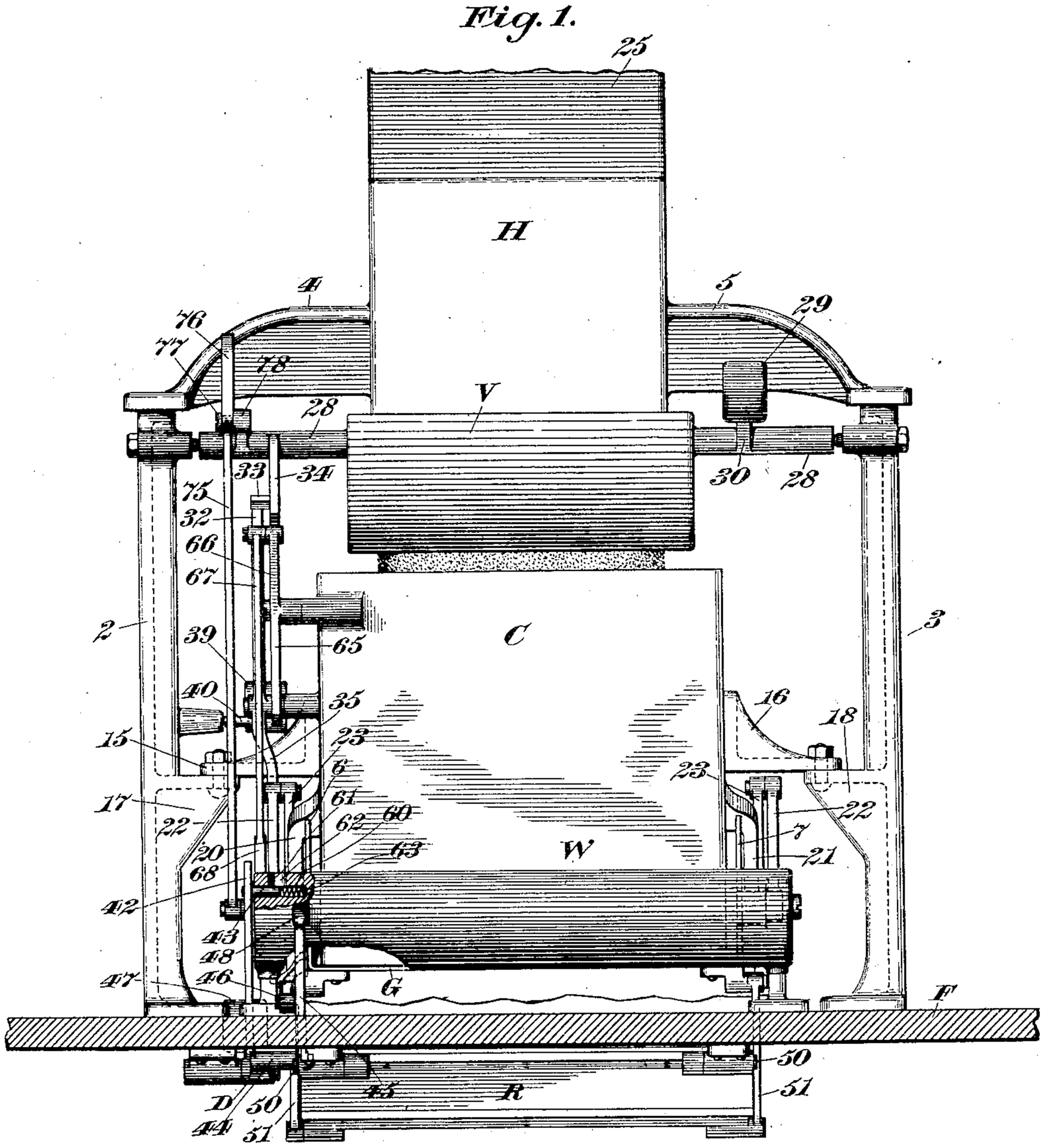
(No Model.) 3 Sheets—Sheet 1.

F. H. RICHARDS.

WEIGHING MACHINE.

No. 600,023. Patented Mar. 1, 1898.

Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2.

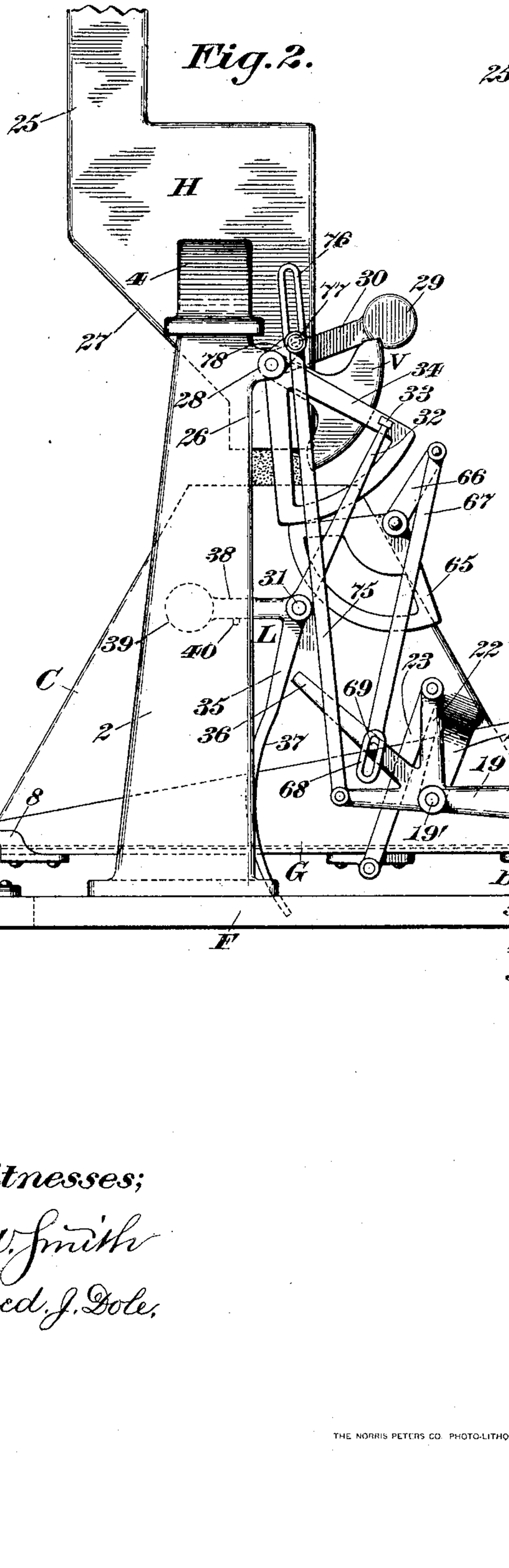
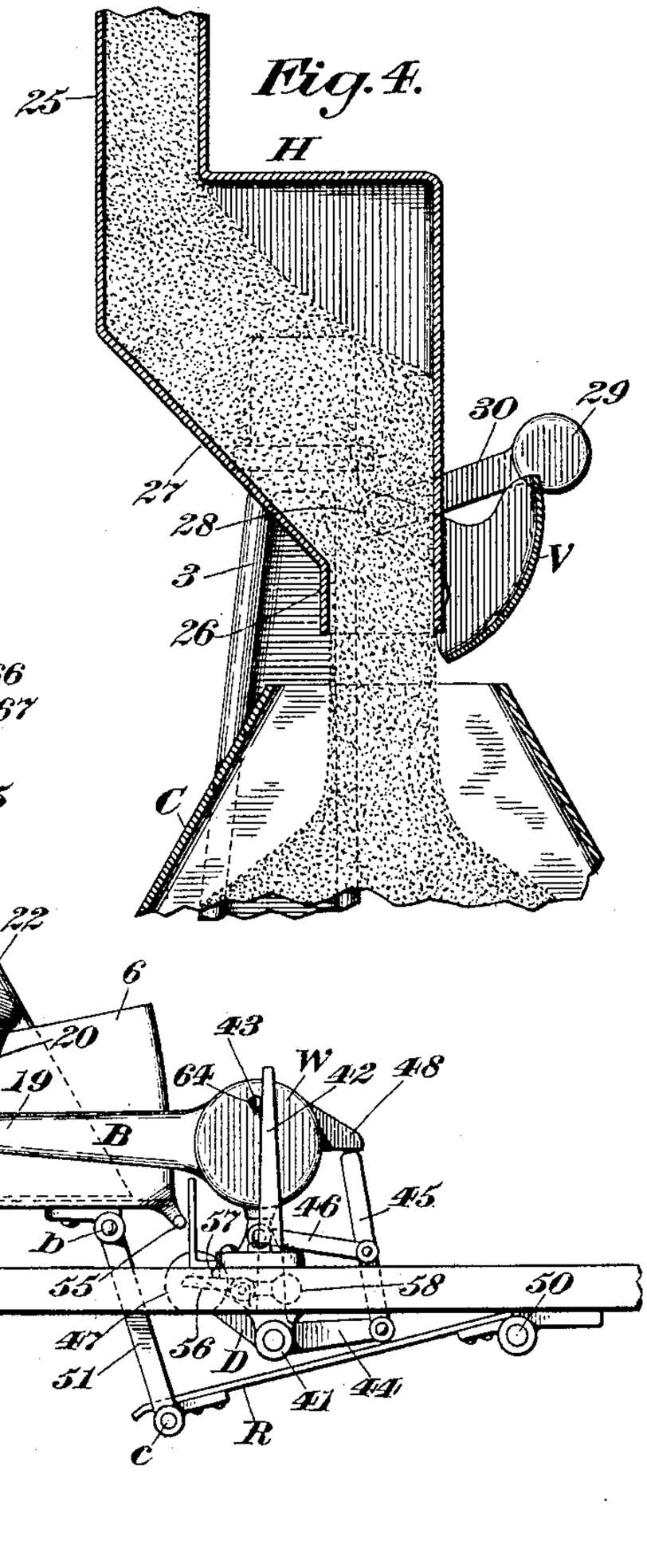


Fig. 4.



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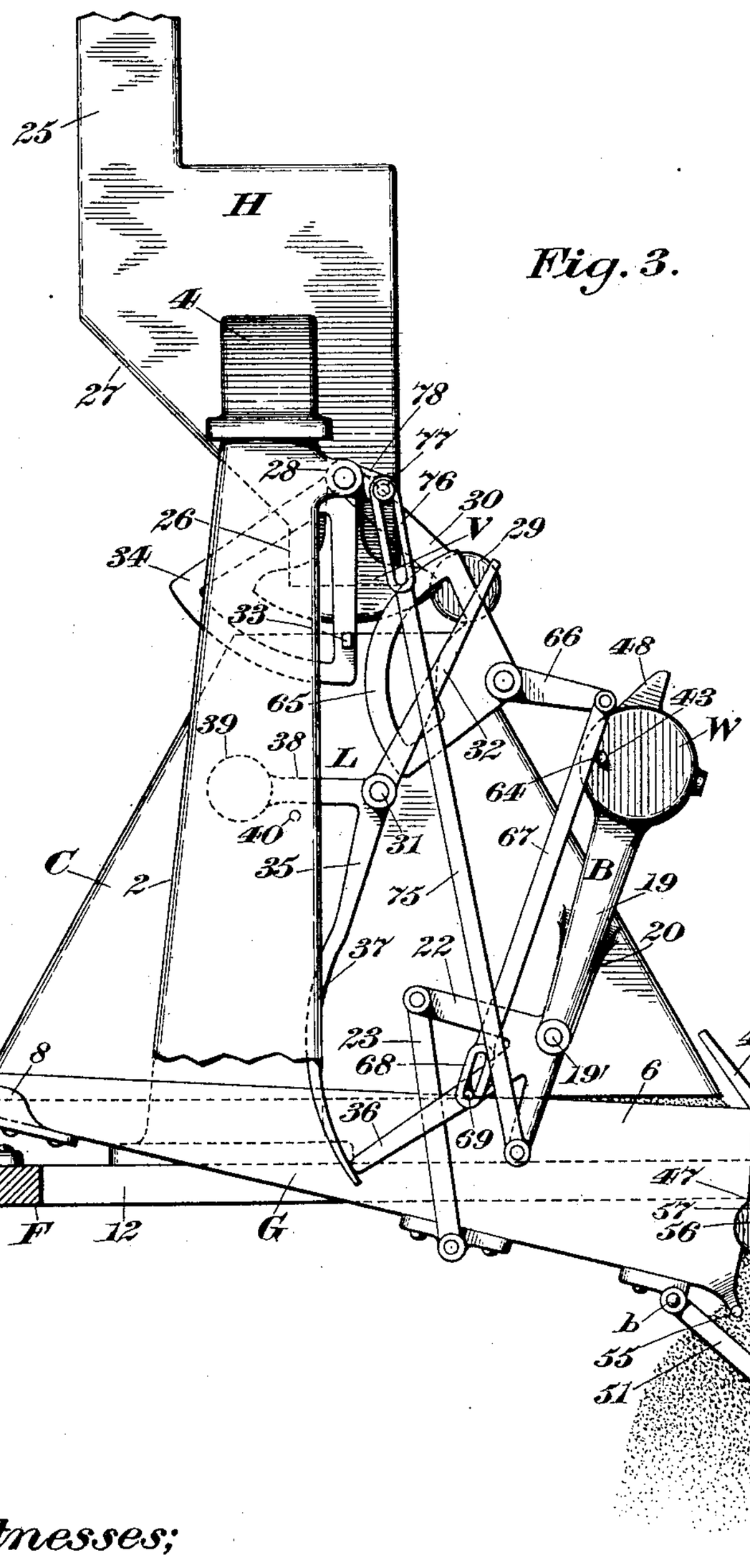

Fig. 3.

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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 600,023, dated March 1, 1898.

Application filed March 17, 1897. Serial No. 628,036. (No model.)

To all whom it may concern:

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

This invention relates to weighing-machines, the object being to provide an improved apparatus of this character in which the load-receiver is preferably sustained in part by a scale-beam and also by a stationary support, the machine being particularly adapted for use in connection with threshing-machines, as the ordinary weighing-machines are impracticable for this purpose on account of the delicate poising of their scale-beams.

In the drawings accompanying and forming part of this specification, Figure 1 is a rear elevation of my improved weighing-machine. Figs. 2 and 3 are end elevations of the machine, as seen from the left in Fig. 1, and illustrate the positions occupied by the various parts at the commencement and close, respectively, of a weighing operation; and Fig. 4 is a transverse central section of the supply mechanism and adjacent parts.

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

The framework may be of any suitable construction, it being herein represented consisting of the end frames or columns 2 and 3, mounted upon the floor F and secured thereto in some suitable manner, and the brackets 4 and 5, extended oppositely from the supply-hopper H, said brackets being attached to the end frames 2 and 3 by suitable fastening means.

The weighing mechanism, as usual, consists of a load-receiver and a supporting scale-beam therefor, said load-receiver being designated by G and the scale-beam therefor by B, the load-receiver being also sustained by a fixed support or supports.

The load-receiver G is represented herein consisting of an elongated flat plate supported for oscillatory movement and having guard walls or flanges 6 and 7 along its opposite ends to prevent the lateral flow of material therefrom. The load-receiver G at its forward side has suitable brackets, as 8, to which are connected V-shaped or notched bearings, as 9, which rest on suitable stationary supports, as the pivots or knife-edges 10, which are preferably mounted on the floor F, which constitutes a convenient base for the machine. The floor F has the longitudinal opening 12 to admit the load-receiver G and permit the same to reciprocate therein.

In connection with the load-receiver G, I preferably employ a casing, such as C, the inlet-opening of which is situated below the mouth of the supply-hopper H, the wide or flared discharge end of said casing being located over the load-receiver G, said casing being stationary and being adapted to prevent scattering of the material as it drops from the hopper H to the load-receiver G and also serving as a means for insuring an even loading or building up of the mass. The casing C in the form illustrated is stationary or fixed, it having the projecting brackets 15 and 16 on its opposite ends, which may be bolted or otherwise secured to corresponding brackets 17 and 18 on the inside faces of the two frames 2 and 3, respectively.

The scale-beam B is preferably pivotally connected with the casing C, and it consists of a pair of longitudinal members, as 19, joined at the rear by the cylindrical counterweight W, said arms being pivoted at suitable points, as at 19′, to the depending brackets 20 and 21 on the opposite ends of the casing C. The longitudinal members 19 of the beam B are furnished with crank-arms, as 22, to the upper ends of which are pivoted the suspension-links 23, said links being likewise attached to the load-receiver G.

The hopper H constitutes a convenient means for supplying a stream of material to the load-receiver to form the load, and it has connected therewith the inlet and outlet pipes 25 and 26, situated at the front and rear, respectively, thereof, the chamber of the hopper also having an inclined bottom wall 27, against which the supply received from the inlet-pipe 25 is adapted to flow, whereby the force of impact of the stream is materially modified before it reaches the load-receiver. The stream to the load-receiver G will pass through the pipe or spout 26 and will enter the casing C and then drop to the load-receiver G to form the load thereon.

For the purpose of controlling the supply

to the load-receiver I prefer to employ the valve V, which is of the "oscillatory-pan" type, having a reciprocatory movement across the outlet of the pipe 26 to either stop or permit the flow of the supply-stream to the load-receiver, said valve being connected with the two-part supporting-shaft 28, having suitable bearings in its opposite ends for receiving pivot-screws on the frames 2 and 3, respectively. Any suitable means may be employed for closing the valve; but for this purpose the weight 29 is illustrated, said weight being formed at the rear end of the arm 30, extending from the rock-shaft 28 and exerting a constant valve-closing action.

The valve V will preferably be maintained in its wide-open position until the load is completed, at which time it will be released and will be immediately shut by the dropping of the weight 29. The means for maintaining the valve in its wide-open position consists of a latch, as L, said latch being in the form of a three-armed lever pivoted at 31 to the stationary casing C, and the arm 32 of said latch being adapted to engage the lug or projection 33 on the segment 34, the latter being connected with the valve V for operation. The segment 34 is fixed to the two-part shaft 28, and hence it will be evident that when the lug or projection 33 of said segment is engaged by the latch-arm 32 the valve V will be held against closure, as indicated in Fig. 2. The arm 35 of the latch L is disposed in the path of movement of a suitable tripper, which is preferably connected with the beam B, the arm 36 of said beam serving this purpose.

When a certain amount of material has been received by the load-receiver G, it, with the poising side of the beam B, or that part to the left of the fulcrum of said beam, will descend, the arm 36 moving in a corresponding direction, whereby at about the time the load is completed the free end of the arm will engage the curved portion 37 of the latch-arm 35 and will swing said last-mentioned arm to the left, thereby oppositely rocking the upper arm 32 of the latch and disengaging it from the lug 33, whereby the valve V is released and can be shut. As the arm 36 rides along the curved portion 37 it will prevent retraction of the latch L. For returning said latch to its normal position its arm 38 is furnished with a counterweight 39, said arm being adapted to rest on the stop-pin 40, extending from the inside face of the frame 2.

Means are provided for shifting the scale-beam B at a predetermined point, so that the effect of its weight will be added to the load-receiver G, whereby the latter can be held in a position to insure the complete passage of all material therefrom. The beam-shifting means will be held normally ineffective or out of action until the center of gravity of the weight is on the poising-line, the weighing mechanism being then poised, at which time a comparatively slight pressure applied to the weight W will shift the same on account of its decrease in efficiency and the equipoising of the weighing mechanism.

The beam-shifting device is designated by D, and it consists of a counterweighted lever pivoted to a depending lug 41 on the floor F, said lever having the upright arm or member 42, which is engaged normally by the stop 43 on the weight W, whereby the lever or shifting device D is held ineffective. The arm 44 of the lever D has pivoted thereto the link 45, connected by the guide-link 46 to a suitable device on the floor F, the weight of said lever being designated by 47. The end of link 45 at the commencement of operation, as indicated in Fig. 2, will bear against the lug 48 on the weight W; but as said weight rises during the making of a load the lug will rise to a point considerably above the free end of said link, it being understood that the shifting device or lever is held against action by the stop 43, which engages the arm 42 of said lever. When the load is almost completed, the stop 43 will nearly have passed out of contact with the arm 42, so that on the further slight ascent of the weight W, and when the load is completed, the stop 43 will reach a point above the free end of the arm 42, thereby releasing the lever D, so that the weight 47 will drop, thereby thrusting the link 45 upward, so that it will impart a sudden blow to the weight W and will elevate the same. As the beam is thus forcibly shifted by the shifting device D, acting through the intermediate link 45, the weight thereof of course will decrease in efficiency as it approaches a vertical line passing through the center of oscillation of the beam, whereby the load-receiver can be quickly lowered by the load to further shift the beam to carry the weight thereof very near the said vertical line, whereby the power of the weight is exerted directly against the load-receiver in a substantially perpendicular line. As the beam B thus operates the arms 22 will be swung to the left as the forward end of the load-receiver G is lowered. When the beam is shifted, the action is a very rapid one and occurs, as will be understood, when the load is fully completed, so that the material can quickly pass from the inclined load-receiver, as indicated in Fig. 3, said load-receiver being held in its load-discharging position by the weight W, which is nearly at its minimum efficiency.

For the purpose of assisting the beam B in maintaining the load-receiver in its load-discharging position, as indicated in Fig. 3, I employ suitable mechanism including a regulator, such as R, the latter consisting of a plate pivoted at 50 to the under side of the floor F and also connected with the load-receiver G, the links 51 being preferably employed to connect the load-receiver and regulator, respectively, and being pivoted to such parts. When the load-receiver G is forced downward by the beam as the latter is shifted, it will throw the pivots *a b c* toward a common line, said piv-

ots being brought substantially into aline-ment as the load-receiver is further lowered, the material from the load-receiver being discharged against the regulator R, whereby the weight and pressure of the mass are sufficient to maintain the regulator in its lowermost position and until all particles of the load have left the load-receiver, it being understood that the two links 51 and the pivotally-supported load-receiver act in the nature of a toggle. When the material has all passed from the regulator R, the load-receiver G, and consequently the beam B, can again return to the normal position thereof, as illustrated in Fig. 2, wherein the load-receiver G is shown horizontally disposed.

For the purpose of resetting or returning the lever D to its normal position means operative with the load-receiver will be preferably employed, an actuator, such as 55, near the discharge end of the load-receiver being illustrated for this purpose, said actuator being in the form of a projection or pin extending laterally from the load-receiver and being adapted to coöperate with a suitable device, as the switch or by-pass 56, which is carried by the weighted arm of the lever D. The by-pass or switch 56 consists of a short lever pivoted to the weighted arm of the shifting device or lever D, and the free arm thereof is maintained in engagement with the stop or pin 57 by the action of the counterweight 58. As the load-receiver G is lowered the actuator or pin 55 thereof will engage the free arm of the by-pass 56 and swing the latter ineffectively about its center, as will be obvious, and on the return stroke of the load-receiver the actuator 55 will engage the free arm of the by-pass 56, which is held against movement by the stop 57 and constitutes practically a fixed device on the lever D, whereby the weighted arm of said lever will be elevated and the opposite arm 44 thereof, and consequently the link 45, will be lowered, as will be understood.

The stop 43, to which I have hereinbefore referred, consists of a spring-actuated pin (see Fig. 1) which is seated in a socket 60 on the end of the beam-weight W, said pin having a projection 61, which is passed through a longitudinal slot or opening 62 in the weight, whereby the length of stroke of the stop-pin 43 is limited. The actuating-spring for the stop is a coiled one and is designated by 63 and is seated within the recess 60 and bears against the inner end of the pin to force the same outward. The outer end of the pin 43 is beveled at 64. When the weight W drops, the load-receiver G will simultaneously be elevated, during which action the lever D is shifted, and when the respective parts have nearly reached their initial places the upright arm 42 of the shifting device D will come in contact with the beveled face or end 64 of the stop 43 and will force the latter into its seat, so that the shifting device D can return freely to its primary position. (Shown in Fig. 2.) When the arm 42 passes out of contact with the beveled face 64 of the pin, the latter will be thrust outward by the coiled spring 63 to prevent the action of the lever D.

The segment 34, to which I have hereinbefore referred, constitutes a stop, the effective action thereof reciprocating or alternating with a similar stop, as 65, which is preferably connected with the scale-beam B, said stop 65 being pivotally mounted on the stationary casing C and having a crank-arm 66, to which is pivoted the rod 67, the latter being connected with the scale-beam, preferably by a slide-joint. The rod 67 has at its lower end the loop 68, which embraces the pin 69 on the beam-arm 36.

In Fig. 2 the valve V is represented open, while the load-receiver G is in its horizontal position, and the full volume of the supply-stream is also shown entering the casing C, from whence it passes to the load-receiver G. In this figure the stop 65 is shown in contact with the curved face of the stop 34, whereby the oscillation of the stop 65 will be prevented by the other stop. By reason of the sliding connection between the rod 67 and the beam B the load-receiver and beam can descend freely to the poising-line, or until the pin 69 reaches the lower end of the loop 68, at which time the load is completed. Should outside pressure from any source be applied to the load-receiver at this time, the valve being open, the downward action thereof will be prevented by reason of the connection between the beam and the stop 65, the stop 34 positively preventing the action of the stop 65 so long as the valve V is open. When the latch L is tripped by the beam B, the valve V will be released and can be shut by the dropping of the weight 29, as shown in Fig. 3. As the valve V shuts the stop 34 will be swung therewith and will be caused to cross the plane of the curved face of the coacting stop, when the supply is cut off, and at this time the shifting device or counterweighted lever D will be released, so that the link 45 can act against the lug 48 for shifting the beam, as shown in Fig. 3. As the beam thus shifts the rod 67 and the crank-arm 66 will be drawn downward thereby, so that the interlocking stop 65 will be rocked about its center substantially in contact with the stop 34, whereby retraction of the latter, and consequently of the valve V, is prevented.

The beam B constitutes a convenient means for transmitting the necessary thrust to the valve V for forcing the same open, it having pivoted to its outer end the rod 75, the upper end of said rod having a loop 76, which embraces the pin 77 on the crank-arm 78 of the valve-supporting rock-shaft 28. As the poising side of the beam B and the load-receiver descend during the weighing-operation the rod 75 will be drawn downward for a short distance, whereby at a subsequent point the valve V can freely close. When the valve is closed, the beam B will be given a consider-

able movement, which will further draw the rod 75 downward until the upper end of the loop 76 reaches the pin 77, as shown in Fig. 3. When the material passes from the load-receiver G, the weight W will overbalance the same and will drop, thereby thrusting the rod 75 upward until the lower end of the loop 76 reaches the pin 77, this action taking place when the poising-line has been reached by the load-receiver. On the continued return movement of the beam B and rod 75 the crank-arm 78 will be turned so that the valve V will be swung open. As the valve opens the stop 34 will move simultaneously therewith and the lug 33 on said stop will ride along the upper arm of the latch L until it has reached a point above the same, when said latch-arm will be thrown under the lug by the weight 39.

The operation of the hereinbefore-described machine, briefly stated, is as follows: Fig. 2 represents the positions occupied by the various parts at the commencement of operation, the load-receiver G and the beam B being in their normal positions, while the valve V is wide open and is held in such position by the arm 32 of the latch L, which engages the projecting lug 33 on the stop 34, the beam-shifting device D being held in its ineffective position by the stop 43. The valve V being wide open a stream of large volume will pass from the hopper H to the casing C and to the load-receiver G. When a certain proportion of the load has been received by the load-receiver, it, with the poising side of the beam B, will descend, such action continuing until the load is completed, at which time the tripping device or arm 36 on the beam will run against the curved face 37 of the latch L and will throw the upper arm 32 of said latch to the right and disengage it from the lug 33, whereby the valve V will be released and can be promptly shut by the weight 29, as shown in Fig. 3. When the load is completed, the stop-pin 43 will reach a point above the free end of the lever-arm 42, whereby the lever D will be released, so that the weight 47 can fall, and when it does so the link 45 will be thrust upward rapidly against the projecting lug 48 on the weight W, thereby imparting a sudden blow to said weight to elevate the same so that the load-receiver can drop sufficiently far to permit the material to pass therefrom and to the regulator R, it being understood that the weight will be further shifted as the load-receiver G is lowered to discharge its load. As the parts thus operate the several centers *a b c* will be thrown substantially into line, as seen in Fig. 3, whereby the mass on the regulator R will act to keep the parts in this relation for a comparatively long period of time and sufficient to permit all the material to pass from the load-receiver. When the load-receiver is completely emptied, the weight W can return to its normal position, and when it has nearly reached such position the remaining members of the machine will be also returned to their primary places for a succeeding operation.

Having described my invention, I claim—

1. The combination, with a load-receiver; of a support on the framework, for directly sustaining the same at one end thereof; a scale-beam connected with the load-receiver adjacent to the other end; a device for shifting the scale-beam to cause the same to give an additional impetus to the load-receiver; and means normally adapted to hold the shifting device ineffective.

2. The combination, with a load-receiver sustained in part by a stationary support, of a scale-beam connected with the load-receiver; a shifting device for said scale-beam; and means on the said scale-beam, normally adapted to hold said shifting device ineffective.

3. The combination, with a load-receiver, of a scale-beam therefor; a shifting device for the scale-beam; and a spring-actuated stop on said scale-beam, adapted normally to hold the shifting device ineffective.

4. The combination, with a load-receiver, of a scale-beam therefor the weight of which is provided with a socket; a spring-actuated pin seated in said socket and having a projection passing through an opening in the weight; and a shifting device for the scale-beam, having an arm which is normally engaged by said spring-actuated pin.

5. The combination, with a load-receiver sustained in part by a stationary support, of a scale-beam for also supporting said load-receiver; a counterweighted lever constituting a shifting device for the scale-beam; and means for normally holding said counterweighted lever against action.

6. The combination, with a load-receiver; of a scale-beam therefor, said scale-beam having a stop; a counterweighted beam-shifting lever having an arm normally engaged by said stop; and a connection between one arm of said counterweighted lever and the scale-beam.

7. The combination, with a load-receiver, of a scale-beam therefor having a stop; a counterweighted beam-shifting lever provided with an arm normally engaged by said stop to hold the lever against action; and a link pivoted to said lever and adapted to act against the beam when the lever is released.

8. The combination, with a load-receiver, of a scale-beam therefor the weight of which is provided with a lug and also with a stop; a counterweighted lever constituting a shifting device for the scale-beam, said lever having an arm which is engaged normally by said stop; and a link pivoted to said lever, the free end of said link being adapted to act against said lug when the lever is released.

9. The combination, with a load-receiver, of a scale-beam therefor consisting of two arms joined by a counterweight; said arms being connected with the load-receiver; shifting means for said beam; and a stop nor-

mally adapted to hold said shifting means ineffective.

10. The combination, with a load-receiver; of a support on the framework, for partially sustaining the same; a scale-beam; and a link connected, respectively, with the scale-beam and the load-receiver.

11. The combination, with a load-receiver; of a support on the framework, adapted to sustain one end of the load-receiver; a scale-beam connected to the load-receiver between its ends; a shifting device for the scale-beam; and means normally adapted to hold the shifting device ineffective.

12. The combination, with a load-receiver sustained in part by a stationary support on the framework; of a fixed casing over the load-receiver, adapted to confine the mass of material thereon; and a scale-beam mounted on the casing and connected with the load-receiver.

13. The combination, with a load-receiver, of a scale-beam therefor having a crank-arm; a link connected, respectively, with the crank-arm and the load-receiver; and a fixed support on the framework, for partially sustaining the load-receiver.

14. The combination, with a load-receiver; of a fixed support on the framework, adapted partially to sustain the same; a fixed casing located over the load-receiver for confining a mass of material thereon; a scale-beam; brackets on the casing, for supporting the scale-beam; and a link connected, respectively, with the scale-beam and the load-receiver.

15. The combination, with a load-receiver; of a fixed support on the framework, for partially sustaining the same; a scale-beam connected with the load-receiver; and a regulator in position to be acted upon by the load discharged from and connected with the load-receiver.

16. The combination, with a load-receiver; of a support on the framework, adapted partially to sustain the same; a scale-beam connected with the load-receiver between its ends; and a regulator connected with the load-receiver and in position to be acted upon by the load discharged therefrom.

17. The combination, with a load-receiver, of a scale-beam therefor; a shifting device for said beam; a stop normally adapted to hold the shifting device ineffective and for also releasing the same; and means for resetting said shifting device.

18. The combination, with a load-receiver sustained in part by a stationary support, of a scale-beam; a shifting device for the scale-beam; a stop adapted normally to hold the shifting device ineffective and for also releasing the same; and means on the load-receiver for resetting said shifting device.

19. The combination, with a load-receiver, of a scale-beam therefor; a shifting device for the scale-beam; means for normally holding said shifting device ineffective and for also releasing the same at a predetermined point, said shifting device having a by-pass thereon; and an actuator on the load-receiver for engaging said by-pass device.

20. The combination, with a load-receiver sustained in part by a stationary support, of a scale-beam for said load-receiver; stream-supplying means; a valve; and means including a latch, for holding the valve open, said latch being tripped by the scale-beam.

21. The combination, with a load-receiver sustained in part by a stationary support, of a scale-beam for said load-receiver; stream-supplying means; a valve having a stop connected therewith; a latch adapted to engage a projection on said stop and to be tripped by the scale-beam; and a stop coöperating with said first-mentioned stop and connected with the scale-beam.

22. The combination, with a load-receiver, of a scale-beam therefor; stream-supplying means; a valve having a stop; a latch consisting of a counterweighted lever one arm of which is adapted to engage a projection on said stop and the other arm of which is disposed in the path of movement of the scale-beam; and a stop adapted to coöperate with the first-mentioned stop and having a rod pivoted thereto, said rod being connected to the scale-beam by a sliding joint.

23. The combination, with a load-receiver, of a scale-beam therefor connected to the load-receiver by a link; a casing adapted to confine the mass of material on the load-receiver; a hopper; a valve for said hopper, connected with the scale-beam and having a stop; a latch on said casing, adapted to engage a projection on said stop; and a coöperating stop connected with the scale-beam.

24. The combination, with a load-receiver sustained in part by a stationary support, of a scale-beam connected with the load-receiver; a device for shifting said scale-beam; means on the scale-beam normally adapted to hold said shifting device ineffective; a supply-valve; and reciprocally-effective stops connected, respectively, with the valve and the scale-beam.

25. The combination, with a load-receiver, of a fixed support adapted to directly sustain the load-receiver at one point; a scale-beam connected at another point with the load-receiver; a shifting device in position to act against one of said parts; and means in position normally to hold the shifting device ineffective.

26. The combination, with a load-receiver, of a scale-beam; a gravity-shifting device; a link disposed between the shifting device and the beam; and means in position normally to hold the shifting device ineffective.

27. The combination, with a load-receiver, of a scale-beam therefor; a shifting device for the scale-beam; an arm connected with the scale-beam; and a by-pass device on the latter normally adapted to engage said arm.

28. The combination, with a load-receiver,

of a scale-beam; a counterweighted lever supported independently of the scale-beam; a link connected with one end of the scale-beam and connected with a fixed part by a guide-link; an arm fixed to the counterweighted lever; and a by-pass stop on the scale-beam, adapted to engage said arm.

29. The combination of a load-receiver having a notched bearing secured thereto; a stationary knife-edge pivot on the framework, adapted to receive said bearing; a scale-beam for the load-receiver; beam-shifting means; a device normally effective to hold the beam-shifting means against action; an oscillatory regulator; and a connection between said regulator and the load-receiver.

30. The combination, with a load-receiver having a notched bearing; of a knife-edge pivot on the framework, adapted to receive said notched bearing; a scale-beam; a connection between the scale-beam and the load-receiver; a regulator pivoted beneath the load-receiver; and a link pivoted, respectively, to the load-receiver and the regulator.

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