No. 616,855. Patented Dec. 27, 1898.

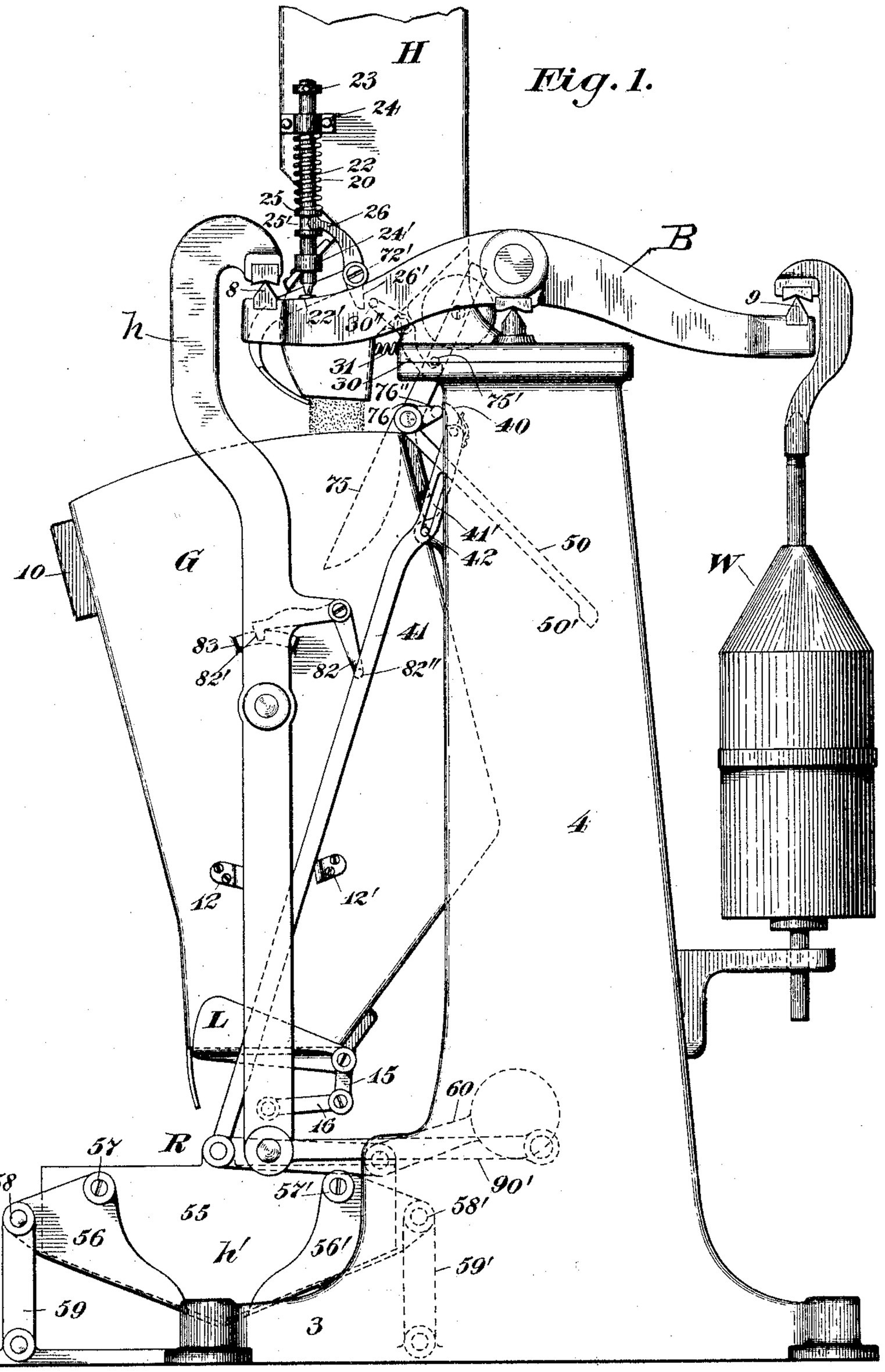
F. H. RICHARDS.

WEIGHING MACHINE.

(Application filed Nov. 29, 1897.)

(No Model.) 4 Sheets—Sheet 1.

Fig. 1.



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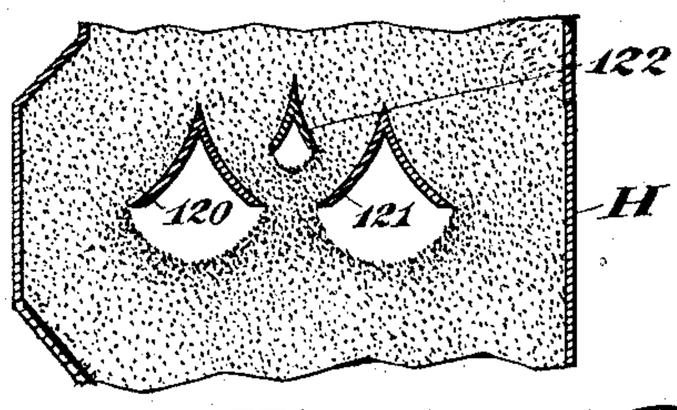

Fig. 5.

Fig. 2.

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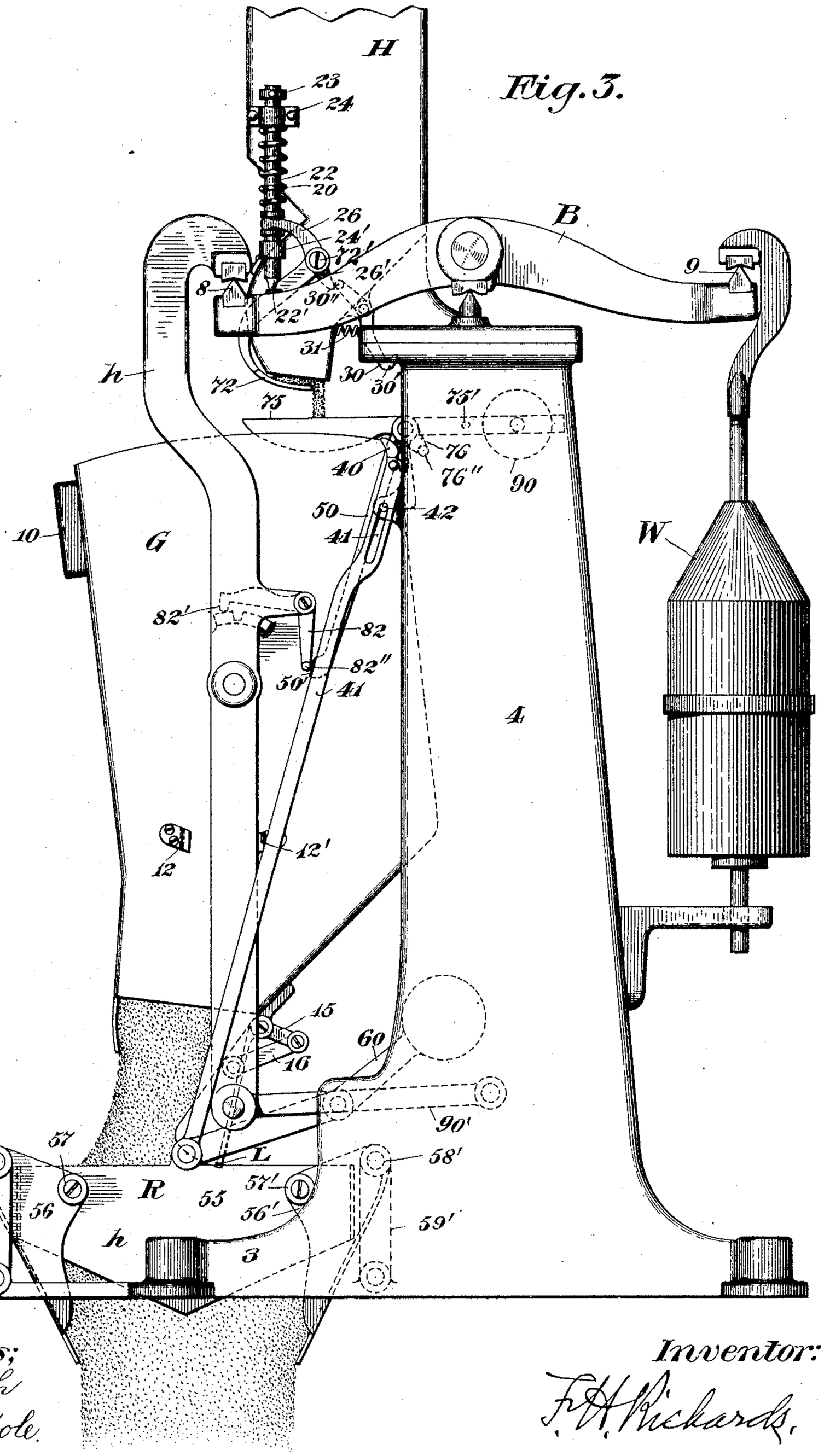
(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



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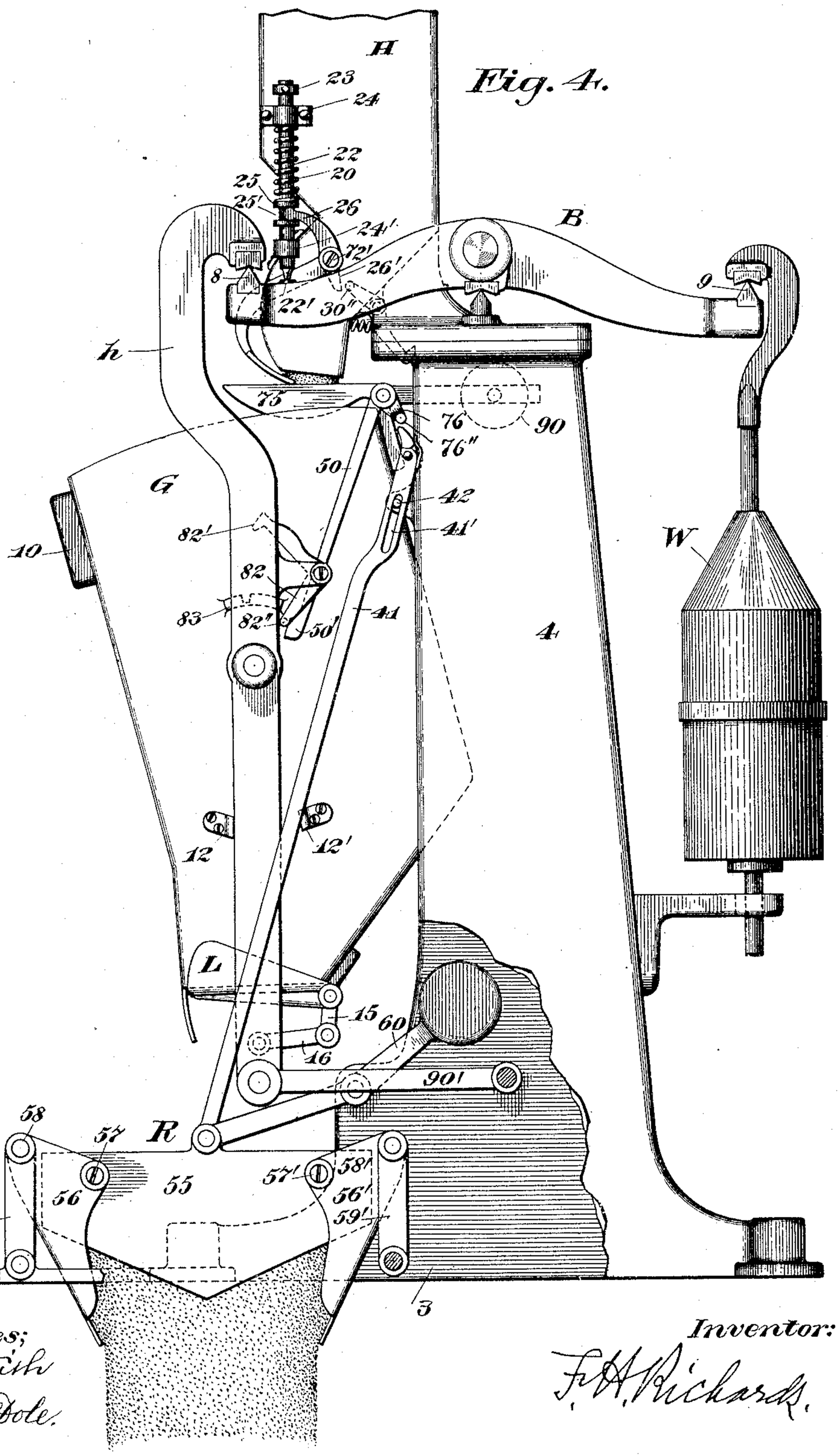
(No Model.) 4 Sheets—Sheet 4.

Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 616,855, dated December 27, 1898.

Application filed November 29, 1897. Serial No. 660,120. (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; and it has for its main object the provision of an improved automatic weighing-machine adapted for weighing predetermined quantities of granular or other material.

In the drawings of this application my improvements are illustrated in connection with a weighing-machine having a load-receiver of the "single-bucket," "oscillatory," or "tilting" type; but of course such improvements might be embodied in a weighing-machine having a different style of receiver.

One of the main features of this invention is the employment, in connection with some suitable main valve, preferably one operative for reducing the full stream to a drip-stream, of a drip-catching valve or pan supported on the load-receiver and movable therewith both in vertical direction and sidewise. This drip-catching valve may be self-closing and will usually have a valve-closing counterweight, by means of which it will be closed, except when it is held open by a latch or some other means. In this case the drip-catching valve is normally held open by a latch, and this latch is released by the main or reducing valve at the proper point in the closing movement of the latter, and, moreover, said drip-catching valve controls the operation of a suitable latch-tripper governing the release of the usual holding device or latch for the shiftable member of the load-receiver, by means of which shiftable member the discharge of a completed load is controlled. Both of these valves will preferably have independently-operative valve-opening actuators and similarly-operative valve-closing devices, the drip-catching valve being opened in this case by means of a by-pass actuator connected with said regulator.

The valve-opening actuator for the main or reducing valve is in this instance an elastic device or member, preferably in the form of a spiral spring, which is tensioned by the movement of the weighing-machine in one direction and when released operates to impart a movement in the opposite direction to the valve, this spring being tensioned by the return of the beam mechanism to its normal counterpoised position and being effective to impart a closing movement to the main valve when the beam descends on the loading of the receiver. As this spring shifts the valve to close the same it will be apparent that the force stored up therein during the tensioning thereof by the beam mechanism is gradually expended. If the parts are properly organized, it will be seen that not only will the spring exert a gradually-decreasing force, but that this force may be entirely spent at the moment that the load-receiver reaches the poising position. Hence if this spring exerts its force against the beam mechanism to aid the descent of the latter not only will the main valve close properly, but the descent of the beam to the poising-line will be facilitated during the early stages of the loading of the receiver and this additional poising force removed entirely before the weighing mechanism reaches a point in its descent where the additional force so exerted would become a load-vitiating factor.

In connection with the device just described I employ an improved regulator-hopper by means of which the drip-catching valve may be opened. This hopper embodies as its essential features two pairs of oppositely-disposed sections, the sections of one of which pairs are mounted for oscillation on those of the other pair and constitute the bottom of the regulator-hopper, the hopper as a whole being counterpoised in some suitable manner. In the construction illustrated this hopper has two end sections, to which are pivoted between their side edges a pair of side or bottom sections, which in turn may be pivoted to the framework beyond the points at which they are pivoted to the end sections of the hopper.

Other features of this invention relate to improved means for breaking the force of the stream of material flowing through the main supply spout or hopper and to various details of construction, which will be described more fully in detail hereinafter.

In the drawings accompanying and forming part of this specification, Figure 1 is a

side elevation of a weighing-machine embodying my present improvements, the parts being in the positions which they assume at the beginning of the making up of a load. Fig. 2 is a similar view showing the position of the parts during the drip period. Fig. 3 is a similar view illustrating the positions of these parts when a completed load is discharged. Fig. 4 is a similar view illustrating the return of the bucket and the drip-catching valve to their normal positions for making up a new load; and Fig. 5 is a sectional detail of a portion of a supply-hopper, showing my improved stream-shedding device for breaking the force of material flowing through the spout.

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

Any suitable framework may be employed for supporting the several operative parts of this improved mechanism. That shown herein embodies as its essential features a suitable base 3, from which rise a pair of side frames, one of which is indicated at 4, the usual hopper or supply-spout H being mounted at the upper ends of these side frames.

The beam mechanism is indicated by B and may be of any suitable type, it being supported, preferably, by knife-edge pivots on the framework in the usual manner, the main beam having near opposite ends thereof corresponding knife-edges 8 and 9 of the usual type, the former for supporting the bucket and the latter for carrying a pendent counterweight, which may be of the type indicated by W. All of these parts are of well-known construction and need not be described in detail.

At the forward end thereof the beam mechanism supports a pair of knife-edge pivots, one of which is indicated by 8, as just stated, and a pair of hangers, such as *h*, between which may be pivoted a load-receiver or bucket, such as G, of the usual oscillating or tilting type. This bucket will be pivoted at one side of the central vertical plane thereof and may be counterweighted, as shown at 10, in order that it may assume normally the position shown in Fig. 1. When filled, it will of course tend to oscillate to the opposite position on the release of said latch. The extreme positions of the oscillating bucket are determined in this case by the usual stops 12 and 12′.

Any suitable holding device may be employed for maintaining the bucket in its receiving position, (shown in Fig. 1;) but I prefer to make use of a simple latch, such as 82, which is in the form of a weighted angle-lever having a detent or stop 82′, adapted to engage in a corresponding recess in a stop member 83 on the bucket. Of course the latch 82 is supported on one of the hangers, and it may have a releasing-pin, such as 82″, in position to be engaged by a suitable tripper supported on the drip-catching valve or any suitable part of the machine.

At the lower end thereof the bucket G will have a load-discharging opening, which may be controlled by a closer L of the usual type, this being connected, in the present case, with the hanger by means of a rock-arm and link, (indicated by 15 and 16, respectively.)

As to many features thereof the stream-supplying hopper H is of the usual type; but I prefer to employ in connection therewith improved means for breaking the force of the material descending therethrough before it reaches the valve mechanism controlling the volume of the flow-stream. In this case I employ a plurality of substantially V-shaped stream-shedding devices in fixed relation with the hopper, these stream-shedding members extending advantageously from side to side of the supply-chute and being so disposed as to check the movement of the material just before the stream reaches the valve. I have illustrated three of such stream-shedding devices at 120, 121, and 122, the former two being disposed substantially in the same horizontal plane, while the latter is located above and between the first two, in position to direct material thereonto, and thus set up in the supply-hopper a number of interfering currents, some of which will be directed against the walls of the supply-spout, while others will be directed toward the faces of the stream-shedding members. In order to render the operation of the devices most effective, they preferably have curved stream-shedding faces, which of course will tend to throw off the material in curved lines, and thus increase the resistance to a rapid descent of the material in the hopper.

In connection with the supply-hopper II, I employ stream-controlling or valve mechanism the main element of which may be a reducing-valve, substantially of the type shown in prior patents granted to me, this reducing-valve operating to cut off the first portion only of the stream and leave a relatively small drip-stream to be controlled by a suitable drip-valve. The main or reducing valve is indicated by 72 and is supported for oscillation about an axis 72′, passing through the flow-stream. This valve may be operated in any suitable manner; but I prefer to make use of an improved valve-closing actuator therefor substantially of the type herein indicated. This actuator may be supported advantageously on a fixed portion of the machine, preferably on the side of the hopper H, and will usually embody as its essential element a spring, such as 20, the force of which may be transmitted in some suitable manner to the valve 72 for operating the latter. In this instance the spring 20 is a helical one and is coiled around a pin 22, having at the upper end thereof a stop 23 and supported for vertical reciprocation in guides 24 and 24′ on the side of the hopper. Between these guides the pin may carry a peripherally-grooved member or enlargement 25 in a groove 25′, of which the free end of a forked shifting lever or arm, such as 26, may operate.

This shifting-lever is secured to the valve-shaft 72′, and at the opposite end thereof (indicated at 26′) it is intended to coöperate with a suitable holding device or latch, which latter will maintain the drip-catching valve in its open position normally. At the lower end of the pin 22 the latter is positioned to bear at 22′ against the poising side of the beam mechanism, and thus transmit thereto a gradually-decreasing force as the tension on the spring is relaxed by the expansion thereof. This tension will be so regulated that it will disappear entirely when the beam mechanism reaches the poising-line.

It will be obvious from the foregoing description of the operation of these parts that the spring 20 and its coöperating devices constitute not only a valve-closing actuator of gradually-increasing efficiency, but also a poising device coöperative with the weighing mechanism for transmitting to the latter a gradually-decreasing thrust during the descent of such mechanism to the poising position, the tension upon the spring being so regulated as to have a considerable effect during the early stages of the making up of a load and a gradually-decreasing effect during the latter portion of the loading operation and until the load is practically completed, when the force of the spring will be entirely removed. It will be noticed, of course, that the weighing mechanism on its return to a normal position constitutes the means for putting the spring under the proper tension.

In connection with the main or reducing valve 72 for reducing the full flow-stream to a small drip-stream I prefer to make use of a drip-catching valve, which may be mounted on the weighing mechanism, preferably on the load-receiver, so as to move with the latter both vertically and horizontally. This drip-catching valve may be of the type indicated as 75, which shows a valve pan or basin supported for oscillation on the load-receiver and constructed so as to be self-closing, this valve being provided, in this instance, with a counterweight 90, which constitutes the valve-closing actuator thereof. Normally this drip-catching valve will be held wide open, in the position shown in Fig. 1, by some suitable holding means—such, for example, as the valve-latch 30. This valve-latch is preferably of the "by-pass" type and is mounted on a fixed portion of the machine, it having a spring 31 for returning it to its normal position. This valve-latch is in the form of a lever one end of which has a detent 30′ for engaging a corresponding stop or pin, such as 75′, on the drip-catching valve, and at the opposite end of this lever is a releasing-pin, such as 30″, in position to coact with the releasing device or valve-latch tripper 26′ of the valve 72. The valve-latch 30 will hold the drip-valve in its open position until the main valve 72 reaches the limit of its closing movement, at which point the valve-latch tripper 26′ will engage the stop 30″ and become effective to release the valve-latch, the latter of course closing as soon as the detent 30′ is disengaged from the stop-face 75′. The manner in which the valve-latch tripper operates will be obvious, as it will be seen that the spring 20, bearing against the pin 22, will cause the latter to push down on the free end of the fork 26, and thereby oscillate the latter and also the main valve, the return of the reducing-valve being of course effected by a corresponding pull on the free end of the fork 26 when the pin is forced upward by engagement of the beam mechanism with the point 22′ of said pin.

For the purpose of actuating the drip-catching valve 75 to open the latter I make use, in this case, of an actuator operated by a regulator, (indicated in a general way by R.) This actuator will be of the by-pass type, and in this case is in the form of a spring-pressed by-pass stop 40, carried at the upper end of a connecting-rod, such as 41, pivoted to the regulator and preferably guided in some suitable manner. In this case the rod is slotted at 41′, and into this slot a pin, such as 42, on the framework is intended to be inserted to guide the rod in its movements.

The by-pass stop 40 coöperates with a pin 76″, carried by a rock-arm 76, movable in unison with the valve 75, and a by-pass actuator 40 is intended to engage the stop on the upward movement of the rod 41 and throw the valve 75 to its open position, in which it will be held by the latch 30. The manner in which these parts coact for this purpose will be clear by referring to Fig. 4, and, moreover, it will be seen from another view that the actuator 40 will pass by the stop 76″ when the load is discharged and the regulator descends. (See Fig. 3.)

As the drip-catching valve 75 does not close under the valve 72 and under the mouth of the supply-hopper H until the load in the receiver G is completed, it will be obvious that the movement of the cut-off or drip valve may be employed as the means for releasing the bucket-latch 82 to permit the discharge of a load. Hence I have illustrated, in connection with the drip-catching valve 75, a bucket-latch tripper controlled by the latter and preferably carried thereon and movable in unison therewith, so as to release the latch 82 when said valve is closed. This bucket-latch tripper may be in the form of a fixed arm 50, secured to the valve 75 and of such length that the outer end 50′ thereof will swing in the path of the stop 82″ of the latch 82 and release said latch just as the drip-catching valve arrives at its closed position.

The regulator hereinbefore referred to is of a novel type and is preferably in the nature of a regulator-hopper having a two-part bottom the sections of which swing in opposite directions relatively to each other. In the construction illustrated this hopper embodies two pairs of oppositely-disposed sections—viz, two end sections, one of which is indicated by 55, and a pair of side sections—such,

for example, as those shown at 56 and 56′. In this case the side sections, which also constitute the bottom of the hopper, are supported for oscillation on the end sections and are constructed to close the hopper tightly when the regulator is in its uppermost position and to swing open relatively to the end sections when the regulator descends. In this case the end sections 55 are supported by a counterweighted lever, such as 60, carried on the framework and constituting the counterpoise for the hopper. The two sections 56 and 56′ are preferably pivoted between their side edges on the end sections beyond such pivotal points, as indicated at 57 and 57′. They may be pivoted also at 58 and 58′ to links 59 and 59′, connected to the base or bed 3. In such a construction as this the regulator will be positively guided in its ascending and descending movements and all of the parts will be actuated positively, owing to the fact that the links and the several members of the hopper constitute a link-and-lever train the opposite ends of which are fixed and the intermediate members of which are positively guided in their movements.

The hopper *h′* may be guided in its movement in some suitable manner—as, for instance, by means of the usual link 90′, pivoted to the lower end thereof and also connected to the framework.

The operation of a machine constructed in accordance with my present improvements, as illustrated in the drawings of this application, is as follows: It being understood that the parts are in their normal positions (shown in Fig. 1) for making up a load, it will be seen that the valve 72 is wide open and the drip-catching valve 75 down. As the material flows through the hopper H its momentum will be decreased, owing to the action of the stream-shedding devices 120, 121, and 122, and the main valve will operate freely when it begins to close. This closing of the valve will not take place until the major portion of the load is made up in the receiver and the bucket descends, when the beam will be withdrawn from under the pin 22 and the spring 20 will become effective to shift the main valve 72 to reduce the flow-stream. (See Fig. 2.) When the bucket reaches the poising position, the tripping-arm 26′ will release the valve-latch 30, whereupon the valve 75 will swing to the position shown in Fig. 3 to catch the drip material still flowing from the supply-spout H. By this time the force of the spring 20 will have been spent, and it will exert, through the pin 22, no pressure upon the beam mechanism. As the drip-valve 75 swings to its closed position the bucket-latch tripper 50′ will swing with it and the latch 82 will be released, whereupon the weight of the completed load will oscillate the bucket to the position shown in Fig. 3 and at the same time the closer L will open to discharge the material from the bucket. As the material flows into the regulator the latter will be carried down and the side or bottom walls 56 and 56′ thereof will swing and spread out, as shown in this view, thereby causing the connecting-rod 41 to be pulled down and the actuator 40 to pass by the stop 76′ on the rock-arm 76 of the drip-catching valve. The bucket will of course return immediately to its uppermost position, and as it rises it will swing back to the position shown in Fig. 1 and the closer will shut, as indicated in Fig. 4, but the drip-catching valve will not be operated until all of the material shall have passed by the regulator, when the sides of the latter will close and the regulator as a whole will rise and carry the drip-valve actuator 40 against the stop 76′ to swing the valve open. As soon as this valve is returned to its normal position (shown in Fig. 1) it will be latched open by the valve-latch 30. It will be seen, of course, that on the return of the beam mechanism to the normal position the main valve 72 will be opened and the spring 20 put under tension again, (see Fig. 4,) but the material will not flow into the load-receiver until the regulator rises and opens the drip-actuating valve.

Having described my invention, I claim—

1. In a weighing-machine, the combination, with stream-supplying means, of a main valve; weighing mechanism including a load-receiver; load-discharging means; a drip-catching valve supported on the weighing mechanism; and means, independent of the load-receiver and of the load-discharging means, for operating said drip-catching valve before the discharge of the load.

2. In a weighing-machine, the combination, with stream-supplying means, of a main valve; weighing mechanism including a load-receiver provided with a closer; a drip-catching valve supported on the load-receiver; and means, independent of the load-receiver and of the closer, for swinging said drip-catching valve under the discharge edge of the main valve before the discharge of the load.

3. In a weighing-machine, the combination, with stream-supplying means, of a main valve; weighing mechanism including a load-receiver provided with a closer; a drip-catching valve supported on the load-receiver; a weight serving to swing the drip-catching valve under the discharge edge of the main valve before the discharge of a load; and means, operative independently of the load-receiver and its closer, for controlling the operation of said drip-catching valve.

4. In a weighing-machine, the combination, with stream-supplying means, of a main valve; weighing mechanism including a load-receiver provided with a closer; a drip-catching valve supported on the weighing mechanism; means, independent of the load-receiver and of the load-discharging valve, for swinging the drip-catching valve under the discharge edge of the main valve; a regulator shiftable by the load; and means, operative with the regulator, for controlling the action of the drip-catching valve.

5. In a weighing-machine, the combination, with stream-supplying means, of a main valve; weighing mechanism embodying a load-receiver; a drip-catching valve adapted to close under the main valve; a latch for holding said drip-catching valve open; and a valve-latch tripper operative by the main valve at a determined point in the closing movement of the latter.

6. In a weighing-machine, the combination, with stream-supplying means, of an oscillatory main valve; weighing mechanism embodying a load-receiver; an oscillatory drip-catching valve adapted to close under the main valve; a latch for holding said drip-catching valve open; and a valve-latch tripper movable in unison with the main valve and operative at a determined point in the closing movement of the latter.

7. In a weighing-machine, the combination, with stream-supplying means, of a main valve, weighing mechanism embodying beam mechanism and a load-receiver; a self-closing drip-catching valve supported on the load-receiver; a latch for holding said drip-catching valve open; and a valve-latch tripper operative at a determined point in the descent of the weighing mechanism.

8. In a weighing-machine, the combination, with stream-supplying means, of a main valve, weighing mechanism embodying beam mechanism and a load-receiver; a drip-catching valve supported on the load-receiver; independently-operative valve-closing actuators for the main and drip-catching valves; holding means for engaging the drip-catching valve and preventing the closing movement thereof; and releasing means operative by the main valve-closing actuator at a determined point in the descent of the weighing mechanism for releasing said drip-catching valve.

9. In a weighing-machine, the combination, with a valve, of weighing mechanism, and a spring-pressed valve-closing actuator-rod mounted in guides on the framework and tensioned by the movement of the weighing mechanism in one direction and in position to bear against the weighing mechanism and exert its force thereon during the closing movement of the valve.

10. In a weighing-machine, the combination, with framework, of a valve; weighing mechanism; and a spring-pressed valve-closing actuator-rod having a stop at one end supported on the framework and tensioned by the movement of the weighing mechanism in one direction and in position to bear against the weighing mechanism and exert its force thereon during the closing movement of the valve.

11. In a weighing-machine, the combination, with weighing mechanism embodying a load-receiver having a member shiftable for discharging a load, of stream-supplying means; a main valve; a drip-catching valve; holding means for the shiftable member of the load-receiver; and releasing means operative by the drip-catching valve.

12. In a weighing-machine, the combination, with weighing mechanism embodying a load-receiver having a member shiftable for discharging a load, of stream-supplying means; a main valve; a drip-catching valve; a latch for the shiftable member of the load-receiver; and a latch-tripper carried by the drip-catching valve.

13. In a weighing-machine, the combination, with weighing mechanism embodying a load-receiver having a member shiftable for discharging a load, of stream-supplying means; a main valve; a drip-catching valve supported on the load-receiver; a latch for the shiftable member of the load-receiver; and a latch-tripper carried by the drip-catching valve.

14. In a weighing-machine, the combination, with weighing mechanism embodying a load-receiver having a member shiftable for discharging a load, of stream-supplying means; a main valve; a counterpoised oscillatory drip-catching valve supported on the load-receiver; a latch for the shiftable member of the load-receiver; and a latch-tripping arm carried by, and oscillatory in unison with, the drip-catching valve.

15. In a weighing-machine, the combination, with stream-supplying means, of a main valve; a load-receiver; a self-closing drip-catching valve adapted to close under the main valve; a regulator; and a regulator-operated valve-opening actuator for the drip-catching valve.

16. In a weighing-machine, the combination, with stream-supplying means, of a main valve; a load-receiver; a self-closing drip-catching valve adapted to close under the main valve; a regulator; and a regulator-operated, by-pass, valve-opening actuator for the drip-catching valve.

17. In a weighing-machine, the combination, with framework, of stream-supplying means; a main valve; a load-receiver; a self-closing drip-catching valve adapted to close under the main valve; a regulator; a guide on the framework; a regulator-operated, by-pass, valve-opening actuator guided by said guide and operative for opening the drip-catching valve.

18. In a weighing-machine, the combination, with a support, of a counterpoised regulator-hopper embodying a pair of oppositely-disposed sections and a second pair of oppositely-disposed sections mounted for oscillation on the sections of the first-mentioned pair and constituting the bottom of the hopper.

19. In a weighing-machine, the combination, with a support, of a counterpoised regulator-hopper embodying a pair of oppositely-disposed sections, a second pair of oppositely-disposed sections mounted for oscillation on the sections of the first-mentioned

pair and constituting the bottom of the hopper, and a link connecting one of the bottom-sections and the support.

20. In a weighing-machine, the combination, with a support, of a counterpoised regulator-hopper embodying a pair of oppositely-disposed sections, and a second pair of oppositely-disposed sections pivoted between their sides for oscillation on the sections of the first-mentioned pair and constituting the bottom of the hopper and pivotally connected beyond such pivotal points with said support.

21. In a weighing-machine, the combination, with a support, of a regulator-hopper embodying a pair of counterpoised end sections; a pair of counterpoised side sections mounted for oscillation on the end sections and constituting the bottom of the hopper; and links connecting said side sections with the support.

22. In a weighing-machine, the combination, with stream-supplying means, of a main valve; weighing mechanism embodying beam mechanism and a load-receiver; a self-closing drip-catching valve supported on the load-receiver; holding means for engaging the drip-catching valve and preventing the closing movement thereof; and releasing means operative at a determined point in the descent of the weighing mechanism for releasing said drip-catching valve.

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