No. 618,384. Patented Jan. 24, 1899.

F. H. RICHARDS.

AUTOMATIC WEIGHING MACHINE.

(Application filed Dec. 11, 1897.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

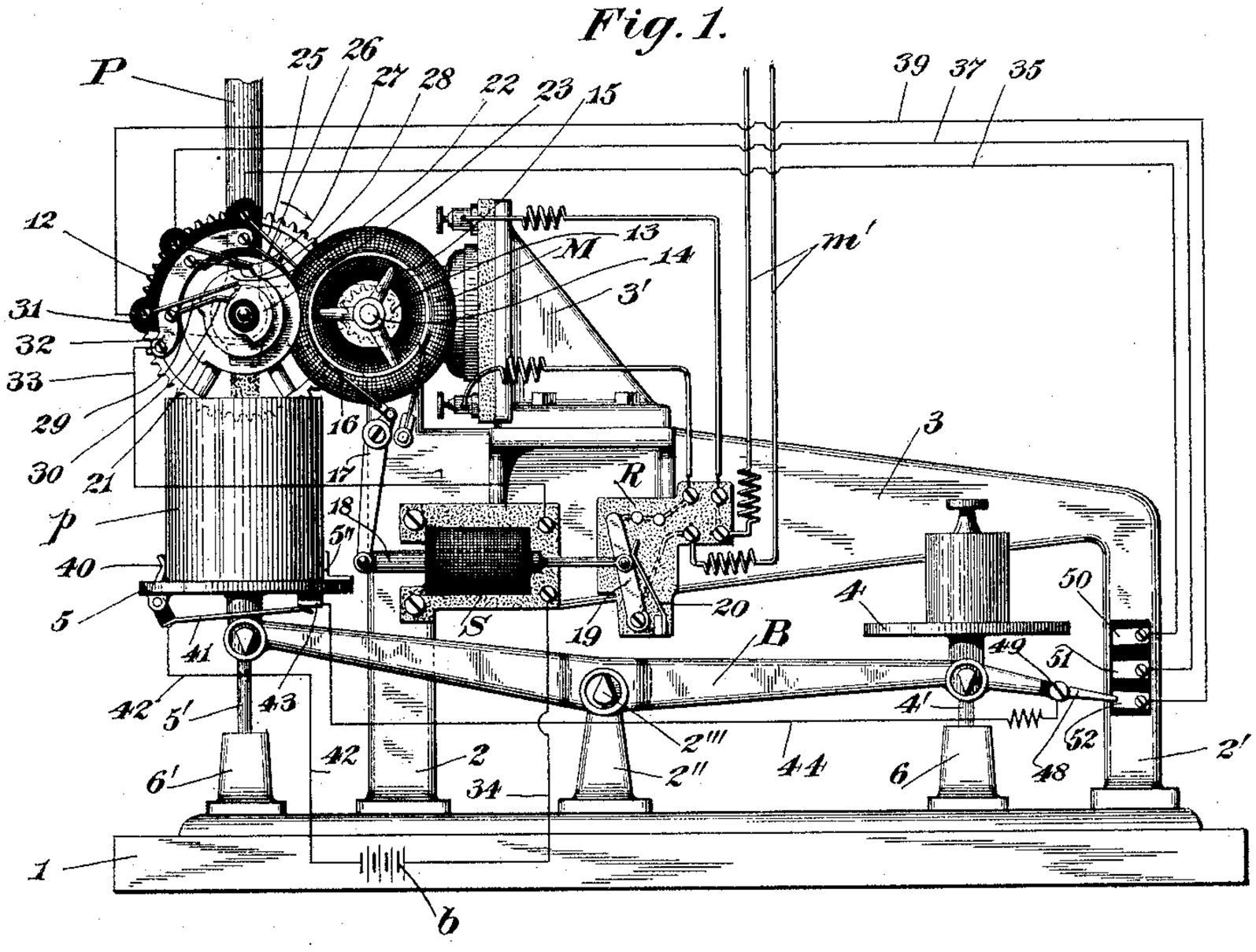

Fig. 2.

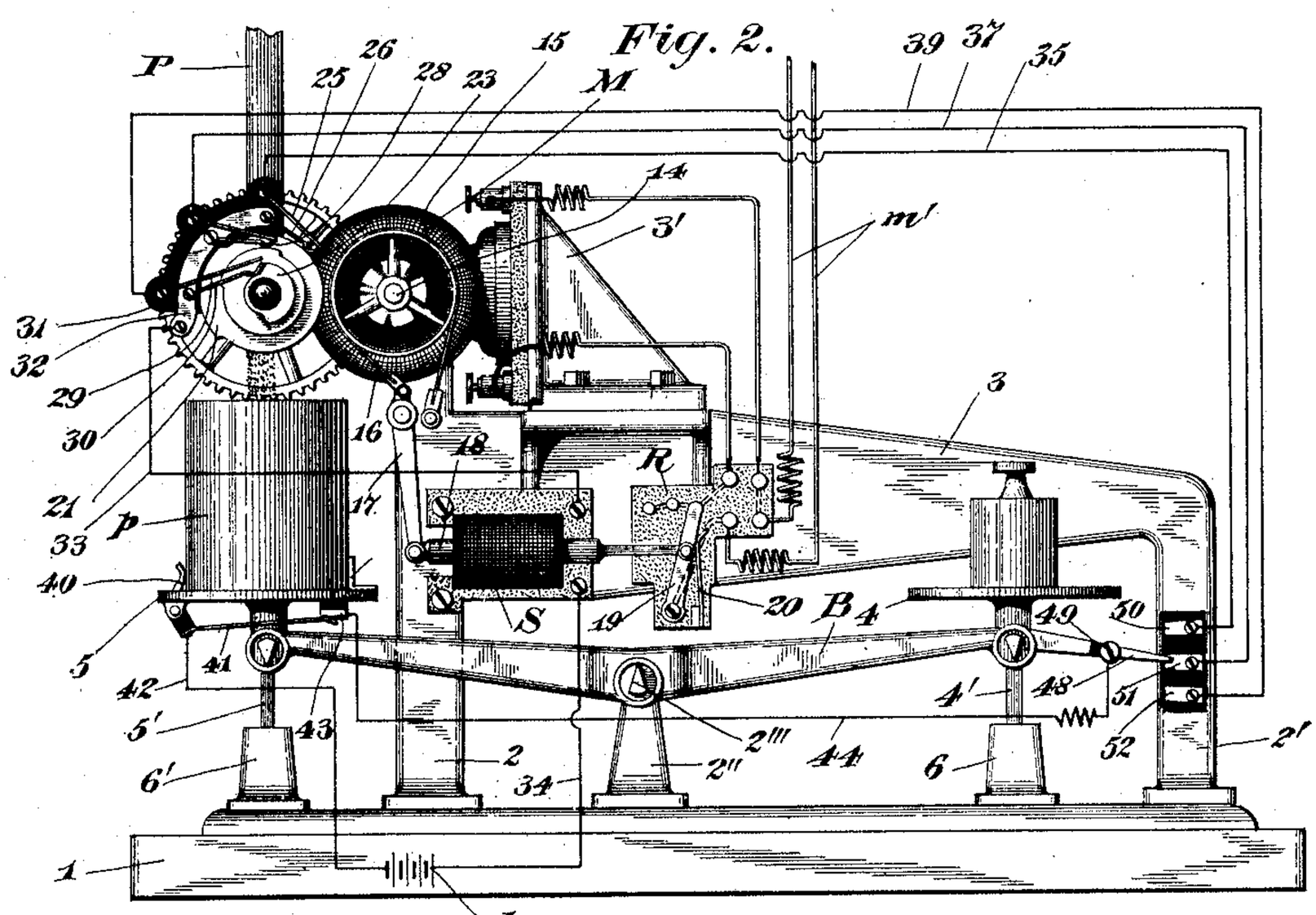

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Fig. 3.

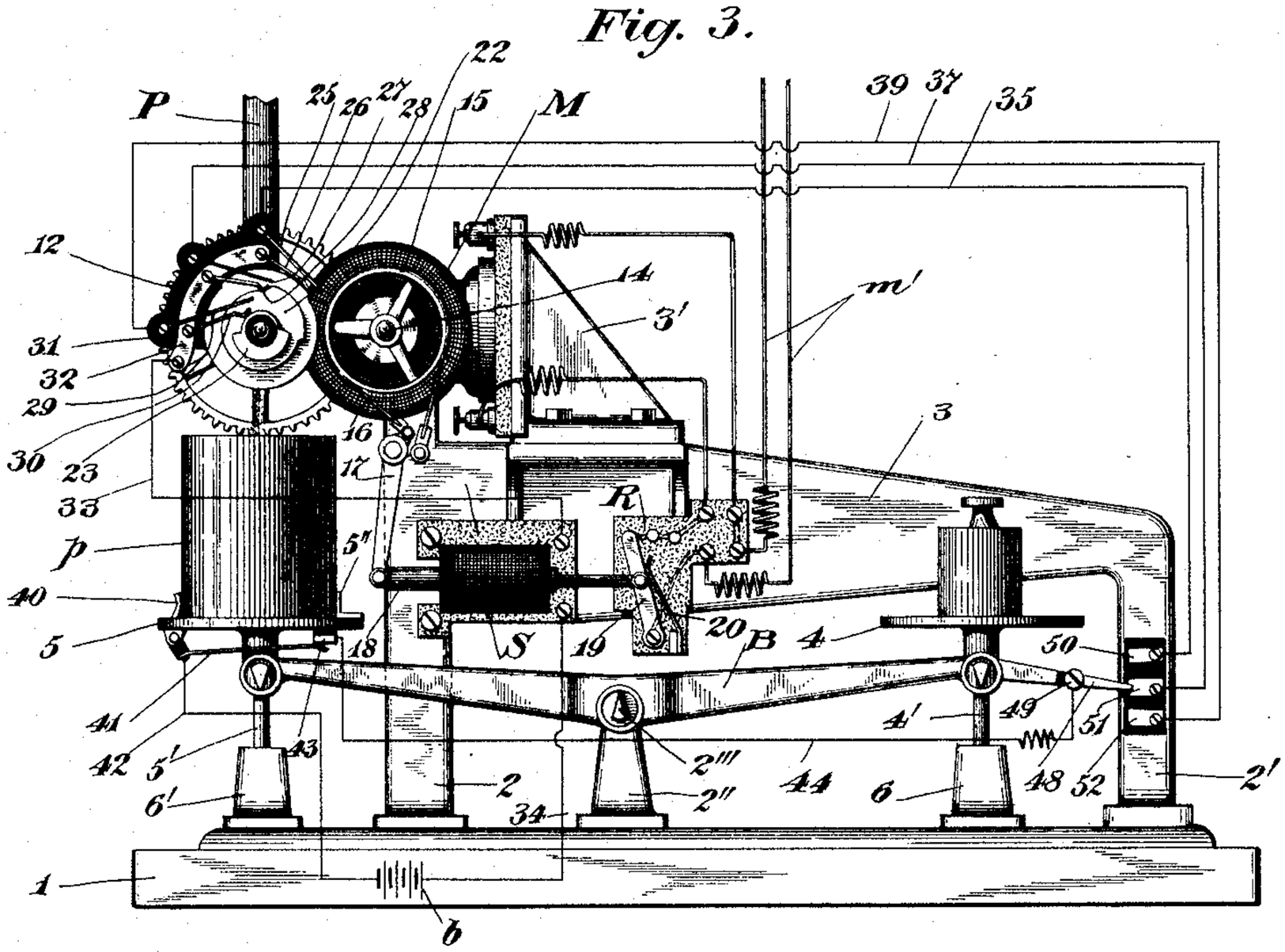
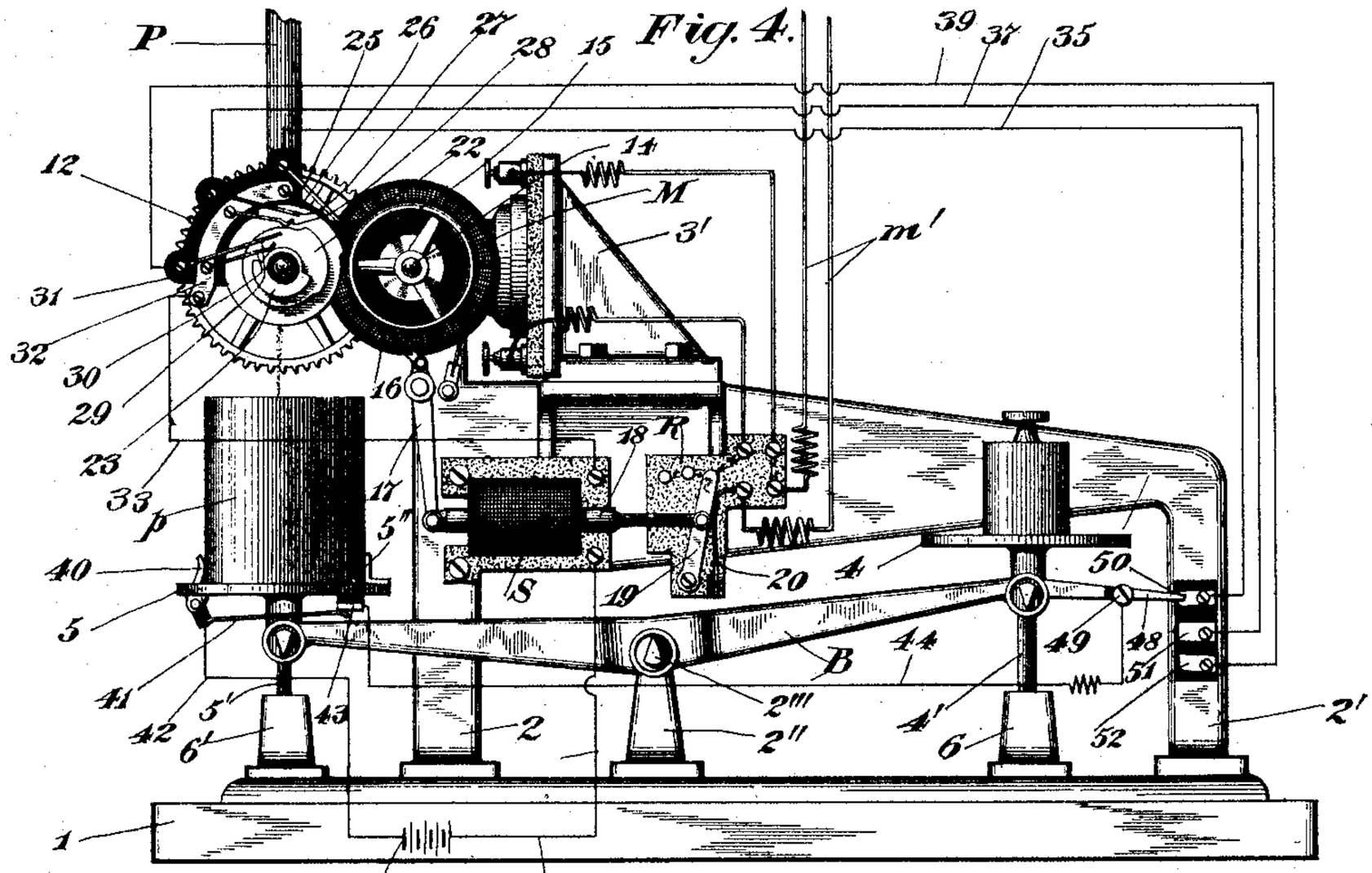


Fig. 4.



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(No Model.) 3 Sheets—Sheet 3.

Fig. 5.

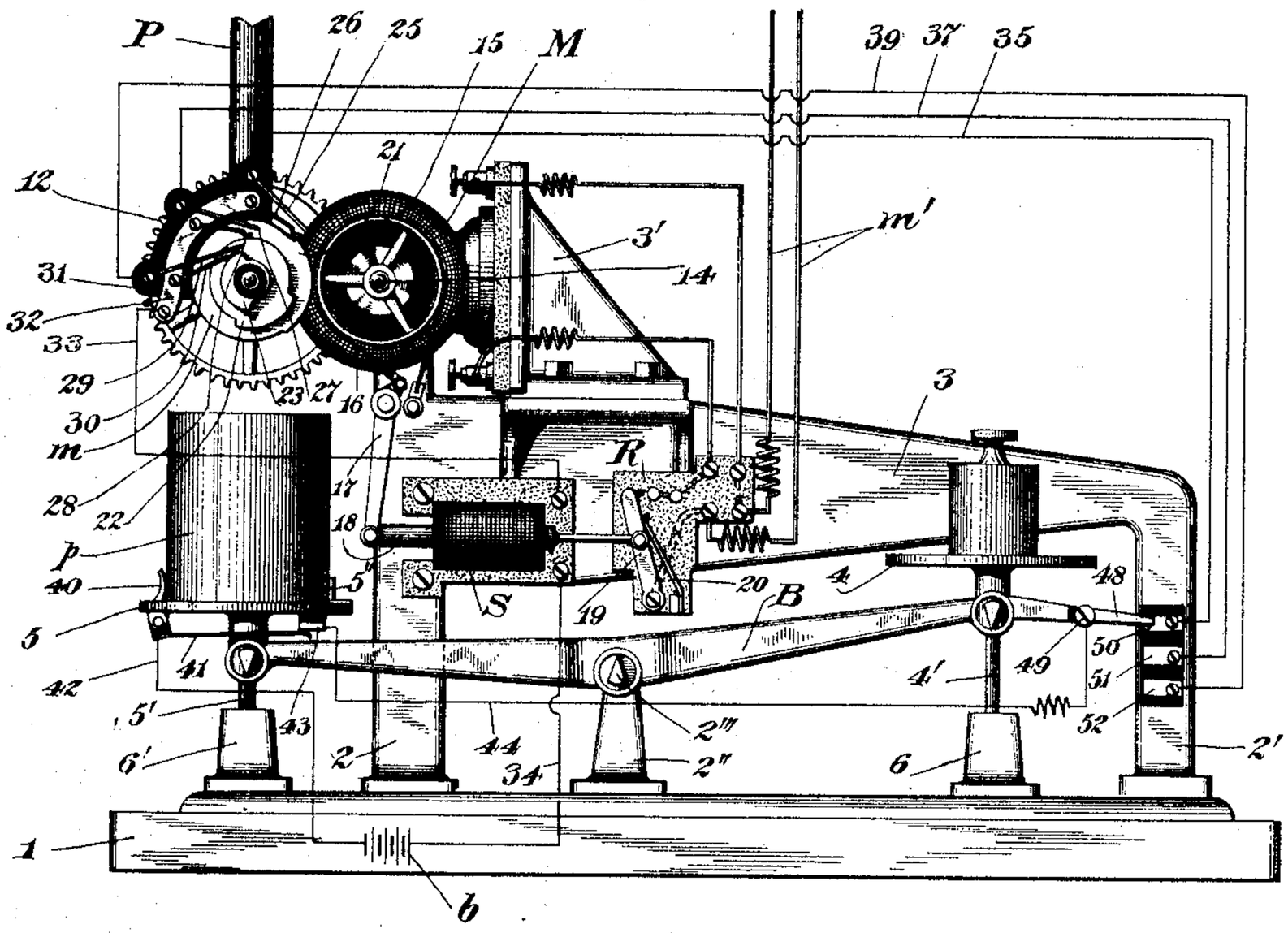


Fig. 6.

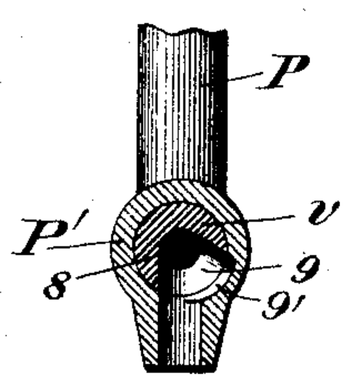


Fig. 7.

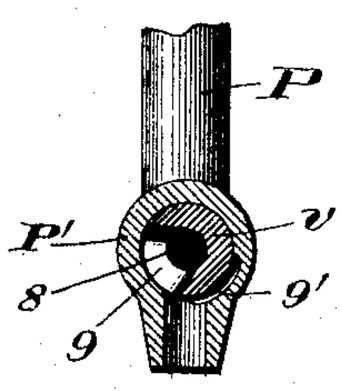


Fig. 8.

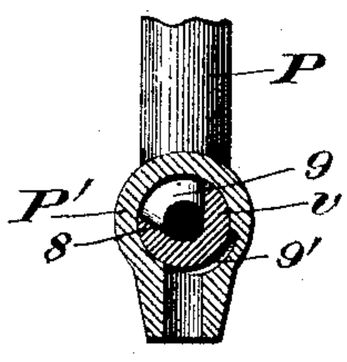


Fig. 9.

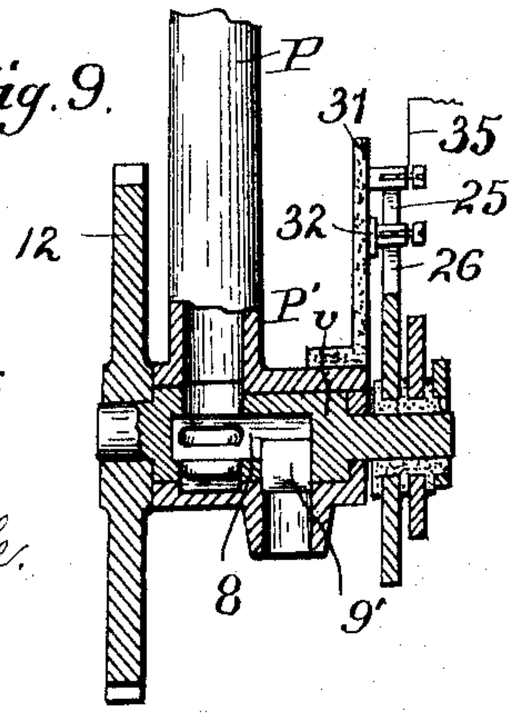
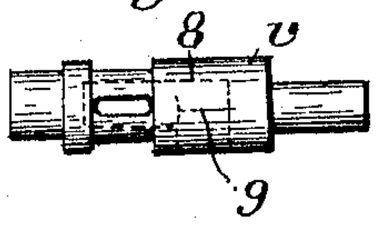


Fig. 10.



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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

AUTOMATIC WEIGHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 618,384, dated January 24, 1899.

Application filed December 11, 1897. Serial No. 661,528. (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, and especially to automatic electrical weighing-scales in which the operation of the valve mechanism is controlled by electrically-operated devices; and it has for its main object the provision of an improved weighing-machine of this type in which there will be no valve-opening force applied to the stream-controlling means, while a valve-closing force is exerted thereon, and vice versa.

This invention is in the nature of an improvement upon that shown and described in my Patent No. 616,861, dated December 27, 1898, in which I have illustrated one form of mechanism operative in accordance with this principle. The principal feature of that portion of this invention which relates to the operation of the valve mechanism as distinguished from the corresponding feature of said other invention is the employment of a rotary valve which will move intermittently in successive arcs for the purpose of shutting off and turning on a supply of material to the receiver supported on the weighing mechanism.

In the preferred construction I make use of a single intermittently-rotative valve which will have at least three successive stages of movement in different arcs of the same circle, one movement being for reducing the full stream to a drip, another for cutting off the flow entirely by stopping the flow of the drip-stream, and a third for opening the valve again to a full-stream position. I deem it advantageous to use for this purpose a plug-valve supported in the usual manner to regulate the flow of a stream through a suitable supply pipe or conduit, and this valve may have an opening in one end thereof, through which material will have access to the inside of the plug and from which it may be discharged in a manner regulated by the position of the valve through the discharge-outlet of the pipe. The opening in the valve through the end thereof of course communicates with the receiving side of the supply-pipe and is of substantially the same diameter as the bore of the pipe.

The material-discharging opening in the valve should be of considerably greater length in the direction in which the valve rotates than the corresponding opening in the pipe, and in this case will be about twice as long as the diameter of the pipe-opening. When this material-discharging opening is formed in this way in the side of the plug-valve and communicates with the central material-receiving opening in its end, the valve may turn through a suitable arc from its wide-open to its drip position without varying the volume of the flow during the first part of such movement. It will be seen, therefore, that in a valve constructed in this manner the arc through which the valve is oscillated during each of its closing movements is dependent upon the length of the material-discharging opening in its side, and these movements may be properly proportioned, so that both of the closing movements will be through substantially equal arcs, each preferably a quadrant, and the opening movement through substantially a half-rotation.

For the purpose of imparting to the valve its intermittent rotary movements just described I prefer to make use of a rotary valve-actuator which will also rotate intermittently and will be stopped at the proper point in its movement by a suitable brake, which in this case will be controlled electrically and will be applied and taken off at successive points in the movements of the weighing mechanism. I prefer to gear this actuating device directly to the rotary valve and to rotate the actuator by means of an electromotor the armature of which may be secured to and therefore rotate in unison with the actuator. I deem this the most suitable type of mechanism for this purpose, as the rotary actuator always turns in one direction and so does the valve. This being the case, it will be seen that in order to rotate the valve a proper distance at each operation it is only necessary to start and stop the actuator at the proper points. The starting of the actuator will of course be accomplished by the closing of a suitable power-circuit to the motor, the stop-

ping of such rotary actuator being effected by the brake. The brake that I prefer to make use of is a band-brake, which will pass around a rather large band wheel or pulley, also movable in unison with the rotary actuator, this band-brake being operated by electrical brake-controlling means, such as a solenoid, governed, as before stated, by the weighing mechanism of the machine. In connection with this solenoid and with the motor I may employ a rheostat the switch-arm of which may be connected with the core of the solenoid and operate with the brake, so that when the brake is put on the resistance of the rheostat will be switched into the circuit and when the brake is taken off the coils of the rheostat will be correspondingly switched out of such circuit.

In my patent hereinbefore referred to I have shown and described a make-and-brake wheel controlling several circuits governing the operation of valve mechanism conjointly with the weighing mechanism of that machine, and in the present case I have retained this feature, although in a different form. In this instance the make-and-brake wheel has a plurality of cams preferably secured to and rotatable in unison with the valve, the cam-faces being disposed in different circumferential positions and advantageously side by side at different distances from the common axis of rotation thereof. With these cams coöperate circuit-controllers governing, respectively, the circuits which control the two closing movements and the opening movement of the valve. Each of these circuit-controllers coöperates with the proper one of a series of three contact-terminals, over which may pass a circuit-controlling arm carried by the beam mechanism, thus making two breaks in each circuit, both of which breaks must be closed before the solenoid or other electrically-operated member can be energized.

The machine shown in the drawings of this specification is especially designed and intended as a scale for weighing predetermined quantities of material in small lots into cans or packages removable from the machine. These cans or packages will when properly positioned constitute the load-receivers and will be supported on a suitable scale-pan or package-carrier.

As it will frequently happen that there will be no can in position under the supply-spout for receiving material therefrom, some means should be employed for preventing the closing of any circuit unless there is a package properly positioned on the weighing mechanism. This feature is also present in my other application hereinbefore referred to and is retained herein as a safety device which will prevent the improper operation of the machine unless the latter is tampered with intentionally.

In the drawings accompanying and forming part of this specification, Figure 1 is a side elevation of an automatic electrically-controlled weighing-machine constructed in accordance with my present improvements, illustrating the parts in the positions which they assume to make up a new load in a package properly supported on the weighing mechanism beneath the supply-pipe. Fig. 2 is a similar view showing the positions of the parts on the descent of the beam mechanism almost to the poising position and illustrates the manner in which the brake is taken off and the coils of the rheostat switched out to permit the motor to operate and turn the valve to the drip position. (Shown in Fig. 7.) Fig. 3 is a similar view illustrating the positions of the parts at the moment that the circuit is broken by the completion of the first closing movement of the valve. Fig. 4 is a similar view showing the positions of the parts when the beam mechanism descends to the cut-off position and closes the circuit for reënergizing the solenoid, switching out the resistance-coils, and taking off the brake to permit the valve to turn again to completely shut off the stream. Fig. 5 is a similar view illustrating the positions of the parts when the valve reaches the end of its final closing movement (shown in Fig. 8) and the circuit to the solenoid is broken, the rheostat switched in again, and the brake reapplied. Figs. 6, 7, and 8 are enlarged sectional details of the valve mechanism, illustrating, respectively, the wide-open, drip, and cut-off positions of the intermittently-rotative valve. Fig. 9 is a longitudinal section of the valve mechanism and adjacent parts, a portion of the supply-pipe being shown in side elevation; and Fig. 10 is a detail in elevation of the supply-valve.

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 my improved weighing-machine. That illustrated herein embodies as its essential features a main base or bed plate 1, from which rise two uprights 2 and 2′, connected at their upper ends and preferably forming with said connecting member 3 a single or unitary casting, on which most of the controlling and valve-actuating devices are mounted.

The weighing mechanism of the machine may be of any suitable style; but I prefer to make use of beam mechanism of the "single-beam" type, such as indicated at B, supported in the usual manner by knife-edge pivots, such as 2‴, on a standard 2″, rising from the base 1. At the opposite ends thereof this scale-beam may have pivotally supported thereon by knife-edge pivots substantially similar in construction to that just described a pair of substantially flat pans, one of which is the weight-pan and is indicated by 4 and the other of which is the scale-pan and is designated by 5. These two pans may be guided in their movements in any suitable manner—as, for example, by means of rods or hangers

4′ and 5′, depending from said pans and working in suitable openings in bosses 6 and 6′, rising from the base 1.

The stream-controlling means or valve mechanism may be of any suitable type so long as the essential feature of an intermittently-rotative valve is retained; but in the construction illustrated herein I prefer to employ a supply-pipe, such as P, the flow of material from which will be regulated by a stream-controlling plug-valve such as that shown at *v*. This valve is supported in the usual manner in an enlargement or valve-body P′ at the lower end of the pipe P and will have in one end thereof a central opening or passage 8, constituting a material-receiving opening communicating with the corresponding bore in the supply-pipe. This axial opening in the valve may be intersected by a transverse opening cutting the periphery of said valve, and such transverse opening may have flaring sides in order to form an outlet or discharge opening in the valve of greater length than the diameter of the bore in the discharge-pipe. This discharge-outlet in the valve is indicated by 9 and is substantially twice as long as the diameter of the pipe-bore. Hence it will be clear that when the valve has turned, for example, from the position shown in Fig. 6 to that illustrated in Fig. 7, which is a quarter-turn of the plug, the flow-stream will continue to flow through the valve and out from the discharge-outlet in the valve-body until the last half of this movement begins, and there will be no reducing action except during the last half of such closing movement. For the purpose of providing clearance for the material discharged from the valve I have illustrated at 9′ in the valve-body a cut-away portion or space which will prevent clogging of the action of this part. The second closing movement of the valve from the position shown in Fig. 7 to that illustrated in Fig. 8 is also through substantially a quarter-turn of a circle, while the opening movement of the valve to the position indicated in Fig. 6 is through an arc of about one hundred and eighty degrees.

For the purpose of transmitting to the valve an intermittent rotary movement I prefer to secure to the valve-stem a gear-wheel, such as 12, of large diameter, the teeth of which will mesh with those of a small pinion, which may be secured to a rotary driver, which constitutes the valve-actuator proper. This pinion is shown at 13 and the actuator is indicated by 14. In the construction illustrated said intermittently-rotative actuator constitutes the armature-shaft of an electromotor the field-magnets of which are carried by a suitable bed insulated from and fixed on a bracket 3′, secured to the member 3 of the framework. The motor, which may be of any usual type, is indicated by M, and on the armature-shaft thereof may be mounted a band-wheel, such as 15, of large diameter, with which will coact a suitable brake, to be applied at the proper point in the rotation of the actuator or driver 14. This brake will preferably be of the "band" type, and the band thereof is indicated by 16. One end of the band may be fixed to the framework and the other may be carried by the short arm of a lever 17, pivoted on the framework, the long arm being operated by suitable electrical brake-controlling means, preferably in the form of a solenoid, having a core which when the coils of the solenoid are not energized will be pushed out by a strong spring. The lever 17 is connected directly to the core 18 in this case, and the core is similarly connected to another operating member, which may be in the form of a lever, such as 19, forming the switch-arm or circuit-controller of a rheostat of ordinary construction, (indicated in a general way by R.)

When the coils of the solenoid S are not energized, a strong spring, such as 20, will hold the switch-arm 19 to the left, as seen in the drawings, and will cause the brake to be applied to stop the rotation of the rotary valve-actuator.

It will be noticed that the controlling action of the solenoid is twofold, as it not only applies the brake 15 in the manner just described, but also shifts the switch of the rheostat so as to cut into the power-circuit or cut out from such circuit the resistance of such rheostat. When the switch-arm 19 is thrown to the left by the spring 20, all of the resistance of this rheostat will be in the circuit and the motor will not be energized, and when the switch-arm is carried to the right when the solenoid is energized the resistance will be switched out and the motor will receive the full strength of the current.

The power-circuit is designated in a general way by *m*′, and as it is connected with the rheostat and the motor in the usual manner (clearly shown in the drawings) a detailed description thereof is believed to be unnecessary.

The make-and-break wheel, by means of which one break in each of the controlling-circuits will be governed, will preferably be substantially of the type hereinbefore described, and is indicated in a general way by *m*. This make-and-break wheel will be supported ordinarily on the valve-stem for rotation in unison with the valve, and embodies as its essential features a plurality of cams in fixed relation with one another and having their cam-faces in different circumferential positions. These cams are designated, respectively, by 21, 22, and 23, and it will be noticed that while the ends of adjacent portions of these cam-faces overlap to some extent, yet the main portions of all these cam-faces are in different circumferential positions. Moreover, in the construction illustrated said cams are disposed side by side on the valve-stem and coöperate with contact-arms, the contact ends of which are in different positions axially of the valve-stem. In this

case each of the circuit-controllers comprises a pair of yielding members, one of which is intended to be engaged directly by the corresponding cam-face, while the other member will be engaged by the first at the proper time to close the circuit.

In the construction shown there are three pairs of resilient contact-arms, (designated by 25 26, 27 28, and 29 30.) The three arms 25, 27, and 29 are insulated from one another and may be supported on an insulating-block 31, while the arms 26, 28, and 30 may be connected to a common conducting plate or segment 32 and to a return-conductor 33, passing to a solenoid S, from which a return-conductor 34 connects with a source of energy or battery *b*.

The three contact-arms 25, 27, and 29 may be connected by means of conductors 35, 37, and 39 with corresponding contact-terminals—such as 50, 51, and 52 on the framework—these three contact members being controlled in turn by a circuit-controlling arm operative with the weighing mechanism and preferably adjustably supported on one end of the beam mechanism. This circuit-controlling arm is designated by 48, and a set-screw 49 may be employed for maintaining said contact-arm in any desired position on the beam.

If no other means than the circuit-controlling arm 48 and the contact-points 50, 51, and 52 were employed for making and breaking the different circuits controlled by the make-and-break wheel *m*, the valve-actuating means would be operated to open the valve even if no can were in position under the supply-spout, and hence I prefer to employ in connection with the two sets of circuit-controlling devices just described a third controlling means governed directly by the package or can in the manner hereinbefore described.

In the construction illustrated herein the scale-pan or package-carrier 5 has a fixed guide 5″ at one side thereof, between which and a movable circuit-controlling member at the opposite side of said package-carrier the can may be placed when a load is to be made. This circuit-controller embodies in this instance two arms, one of which is designated by 40 and is pivotally supported between the walls of an opening in the scale-pan 5 and projects both above and below said scale-pan, the upper end being, as just stated, in the path of the can or package *p*, supported on the receiver, while the lower end is connected to the circuit-controlling arm proper, (indicated by 41.) This circuit-controlling arm is connected by means of a conductor 42 with the opposite side of the source of energy *b* from that with which the conductor 34 is connected, and the contact-arm 41 coacts with a contact-terminal 43, which in turn is connected by a conductor 44 with the beam-controlled contact-arm 48. Of course if there is no can in place the weight of the contact-arm 41 will be sufficient to break the circuit at 43 and prevent the operation of the valve.

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 position for making up a load, the full stream will be delivered into the can *p* until the charge therein is sufficient to cause the descent of the weighing mechanism, it being understood, of course, that during this time the brake will be applied to the band-wheel 15 to prevent the rotation of the valve-actuator, and hence maintain the valve in its wide-open position. At this time the motor will be deënergized, as the full resistance will be thrown into the power-circuit *m′*. On the descent of the weighing mechanism to the position shown in Fig. 2 the circuit-controller 48 will pass on to the contact-point 51, whereupon a circuit will be closed from the battery through conductor 42, contact-arm 41, terminal 43, conductor 44, contact-arm 48, terminal 51, conductor 37, contact-arms 27 and 28, contact-strip 32, conductor 33, solenoid S, and conductor 34, whereupon the solenoid being energized will release the brake and switch out the resistance of the rheostat. The motor being then energized will cause the rotation of the valve-actuating shaft 14, and hence of the valve itself, which will be turned from the position shown in Fig. 6 to that represented in Fig. 7 and stopped in the drip position by the deënergization of the solenoid due to the breaking of the circuit between the contact-arms 27 and 28, the spring 20 of course operating upon the deënergization of the solenoid to apply the brake and switch the resistance of the rheostat into the circuit again. When the brake is applied, the valve-actuator, and hence the valve and the make-and-break wheel, will be stopped in the position shown in Fig. 3, with the breaks 27 28 and 29 30 open and the break at 25 26 closed by the engagement of the cam 21 with the contact-arm 26. The drip-stream will be supplied to the package *p* until the beam mechanism in its descent carries the circuit-controlling arm 48 on to the contact-point 50, as shown in Fig. 4, whereupon a circuit will be closed from the battery through conductor 42, contact 41, terminal 43, conductor 44, contact-arm 48, terminal 50, conductor 35, contact-arms 25 and 26, contact-plate 32, conductor 33, solenoid S, and conductor 34. This circuit will of course cause the solenoid to be reënergized, the resistance of the rheostat switched out of the power-circuit, and the brake taken off to permit the valve to be turned from the position shown in Fig. 7 to that illustrated in Fig. 8, and the stream thereby cut off. When the valve reaches the limit of its closing movement, (shown in Fig. 5,) the contact between the arms 25 and 26 will be broken and the break at 29 30 will be closed by the engagement of

the cam 23 with the contact-arm 30. As soon as the circuit just described is broken the solenoid will be deënergized, the brake applied, and the resistance switched in again, as shown in said figure. The filled can will be removed now from the scale-pan, and when it is so removed all of the circuits will be open by the breaking of the contact at 41 43, and the machine will remain idle until an empty can is inserted between the fixed guide 5″ and the upwardly-extending arm 40 of the package-controlled contact-arm. When a new can is placed in position, a circuit will be closed from the battery through conductor 42, contact-arm 41, terminal 43, conductor 44, contact-arm 48, and contact 52, owing to the return of the weighing mechanism to its normal counterpoised position, and from this point the circuit will be by way of conductor 39, contact-arms 29 and 30, contact-strip 32, conductor 33, solenoid S, and conductor 34. On the making of this circuit the solenoid S will be reënergized, the brake taken off, the resistance switched out of circuit, and the valve turned through an arc of substantially one hundred and eighty degrees, or twice as long as for either of the closing movements of the valve, and the valve will be opened wide to turn on the full stream. When the valve is stopped in its wide-open position for making up a new load, as shown in Fig. 1, contact will be broken at 29 30 and reëstablished at 27 28, the brake will be reapplied, the rheostat switched into the circuit *m'* again, and all of the parts will be in position for a new cycle of operations.

Having described my invention, I claim—

1. In a weighing-machine, the combination, with stream-supplying means and with an intermittently-rotative stream-controlling valve, of valve-actuating means operative for applying to said valve a valve-opening force and for also applying thereto a plurality of successive valve-closing forces independent of each other and of the valve-opening force and of different durations; an electric circuit controlling the operation of said valve-actuating means; and electrical circuit-controlling means.

2. In a weighing-machine, the combination, with a stream-supplying pipe, of a rotary plug-valve having a material-receiving opening and also having a material-discharging opening of greater length in the direction of rotation of the valve than the width of the corresponding opening in the pipe; and valve-actuating means for imparting to said valve successive and differential strokes.

3. In a weighing-machine, the combination, with a stream-supplying pipe, of a rotary plug-valve having a material-receiving opening and also having a material-discharging opening of greater length in the direction of rotation of the valve than the width of the corresponding opening in the pipe; and valve-actuating means for imparting to said valve successive and differential strokes.

4. In a weighing-machine, the combination, with a stream-supplying pipe, of a rotary plug-valve having a material-receiving opening and also having a material-discharging opening in the side thereof of greater width than the corresponding opening in the pipe; and valve-actuating means for rotating said valve first to a drip position and then to a cut-off position.

5. In a weighing-machine, the combination, with a stream-supplying pipe, of a rotary plug-valve having a material-receiving opening of substantially the same diameter as the opening in the pipe and also having a material-discharging opening in the side thereof, the walls of which diverge from those of the other opening to form a discharge-outlet of relatively great length in a direction of rotation of the valve; and valve-actuating means for rotating said valve first to a drip position and then to a cut-off position.

6. In a weighing-machine, the combination, with weighing mechanism, of stream-supplying means, a rotary stream-controlling valve, actuating means for said stream-controlling valve for imparting to the same successive and differential strokes of different durations, electrical means for governing the said actuating means, and automatic electrical circuit-controlling means governed by the weighing mechanism.

7. In a weighing-machine, the combination, with stream-supplying means and with a rotary stream-controlling valve, of a rotary valve-actuator; a brake for said actuator; and brake-controlling means.

8. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; a brake for said actuator; an electric circuit; brake-controlling means in said circuit; and electrical circuit-controlling means.

9. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; a band-brake for said rotary actuator; an electric circuit; brake-controlling means connected with said band and controlled by said circuit; and electrical circuit-controlling means.

10. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; a brake for said actuator; an electric circuit; a solenoid in said circuit and connected with said brake; and electrical circuit-controlling means.

11. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; an electric circuit; brake-controlling means in said circuit; and circuit-controlling means governed by the weighing mechanism.

12. In a weighing-machine, the combination,

with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; intermittently-operative electrical brake-controlling means; and circuit-controlling means governed by the weighing mechanism and operative for making and breaking the circuit to the brake-controlling means a plurality of times during each operation of the weighing-machine.

13. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; an electric circuit; brake-controlling means in said circuit; and a pair of circuit-controllers governed, respectively, by the valve and the weighing mechanism.

14. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; a plurality of electric circuits; a rotary make-and-break wheel; electrical brake-controlling means governed by said circuits; and circuit-controlling means governed by the weighing mechanism and controlling said circuits conjointly with the make-and-break wheel.

15. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; a plurality of electric circuits; a make-and-break wheel rotatable in unison with said valve; electrical brake-controlling means governed by said circuits; and circuit-controlling means governed by the weighing mechanism and controlling said circuits conjointly with the make-and-break wheel.

16. In a weighing-machine, the combination, with stream-suppplying means and with a stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; a plurality of electric circuits; a make-and-break wheel carried by, and rotatable in unison with, said valve; electrical brake-controlling means governed by said circuits; and circuit-controlling means governed by the weighing mechanism and controlling said circuits conjointly with the make-and-break wheel.

17. In a weighing-machine, the combination, with stream-supplying means and with a rotary stream-controlling valve, of a valve-actuator geared directly to said valve; a brake for said rotary actuator; an electric circuit; brake-controlling means governed by said circuit; and automatic electrical circuit-controlling means.

18. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; a brake for said actuator; an electric controlling-circuit; an electric power-circuit; an electromotor for rotating the valve-actuator; brake-controlling means governed by the controlling-circuit; an automatic circuit-controller operative simultaneously with the brake and governing the power-circuit; and automatic circuit-controlling means for the controlling-circuit.

19. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; a brake for said actuator; an electric controlling-circuit; an electric power-circuit; an electromotor for rotating the valve-actuator; a brake-operating solenoid in the controlling-circuit; an automatic circuit-controller operated by said solenoid and governing the power-circuit; and automatic circuit-controlling means for the controlling-circuit.

20. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary valve-actuator; a brake for said actuator; weighing mechanism embodying a package-carrier; an electric circuit; brake-controlling means in said circuit; and circuit-controlling means governed by the valve, the weighing mechanism proper, and the package-carrier conjointly.

21. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a plurality of electric controlling-circuits; a rotary make-and-break wheel having a plurality of peripheral cam-faces disposed in circumferential positions; and circuit-controllers in said circuits and controlled by said cam-faces.

22. In a weighing-machine, the combination, with stream-supplying means and with a rotary stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; a plurality of electric circuits; electrical brake-controlling means governed by said circuits; a rotary make-and-break wheel movable in unison with one of said rotary members and having a plurality of peripheral cam-faces disposed in different circumferential positions; and circuit-controllers in said circuits and governed by said cam-faces.

23. In a weighing-machine, the combination, with stream-supplying means and with a rotary stream-controlling valve, of a rotary valve-actuator; weighing mechanism; a brake for said actuator; a plurality of electric circuits; electrical brake-controlling means governed by said circuits; a rotary make-and-break wheel movable in unison with one of said rotary members and having a plurality of peripheral cam-faces disposed in different circumferential positions; circuit-controllers in said circuits and governed by said cam-faces; and independent circuit-controlling means governed by the weighing mechanism and operative for making and breaking said circuits successively.

24. In a weighing-machine, the combination, with stream-supplying means and with a stream-controlling valve, of a rotary actuator;

an electromotor for rotating said actuator; a brake for the actuator; a controlling-circuit; brake-controlling means governed by said controlling-circuit; a power-circuit for said electromotor; a rheostat for the power-circuit; and a switch for the rheostat and operative with the brake.

25. In a weighing-machine, the combination, with stream-supplying means and with a rotary stream-controlling valve, of a rotary valve-actuator; an electromotor for rotating said actuator; a brake for the actuator; a controlling-circuit; a make-and-break wheel carried by, and rotatable in unison with, the valve; brake-controlling means governed by said circuit; a power-circuit for said electromotor; a rheostat for the power-circuit; a switch for the rheostat and operative with the brake; weighing mechanism; and circuit-controlling means governing said controlling-circuit conjointly with the make-and-break wheel.

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Witnesses:
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