2 Sheets—Sheet 1.

J. R. WILLIAMS.

Automatic Weighing-Machine.

No. 214,014. Patented April 8, 1879.

Fig. 1.

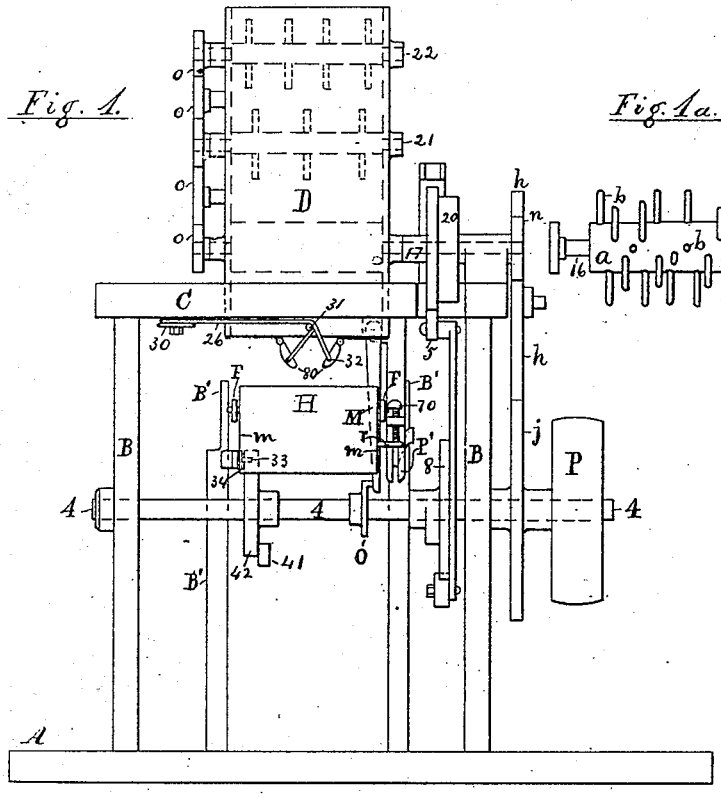
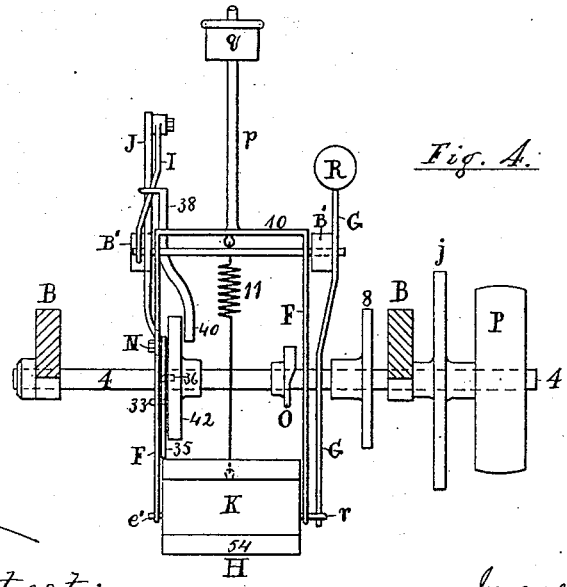


Fig. 1a.

Fig. A.



Attest:

Chas. C. Howell

Geo. H. Bodenschatz.

Inventor.

J. R. Williams, per

Thos. S. Crane, Atty.

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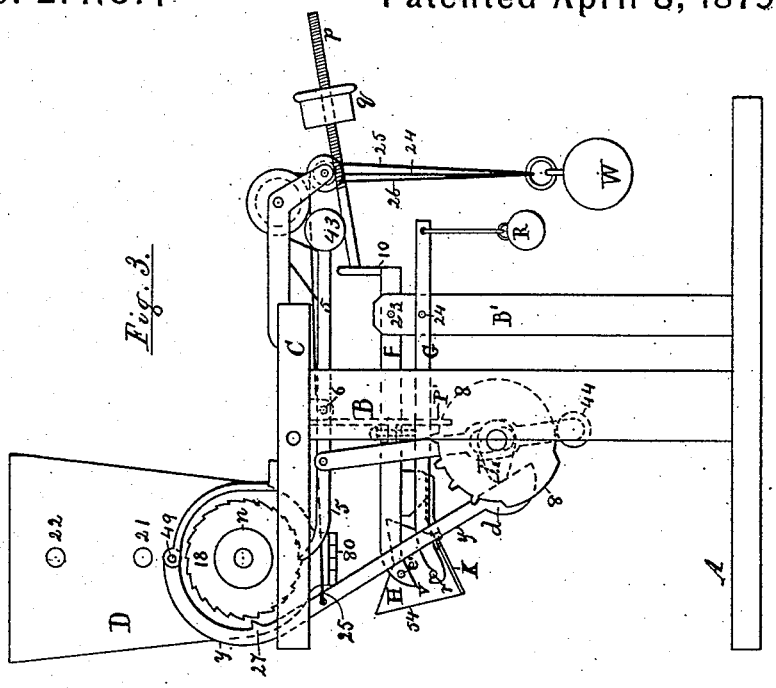
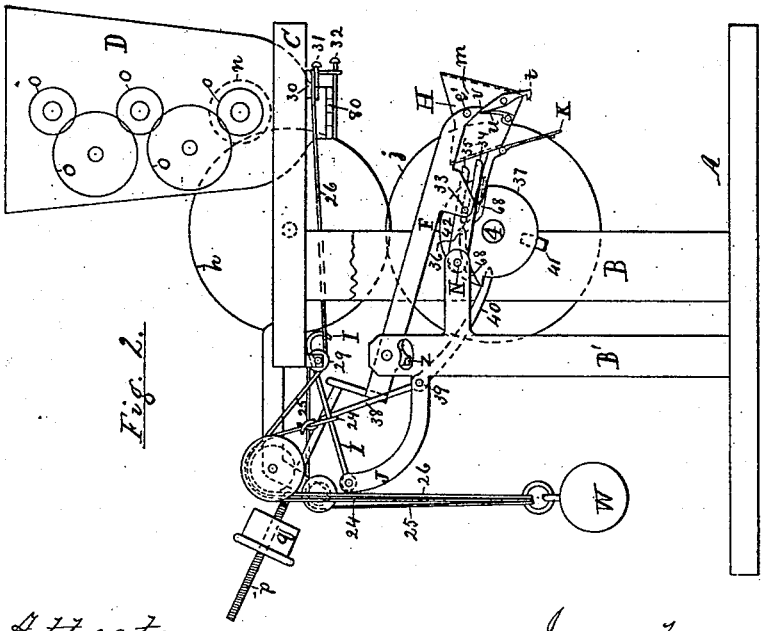


Fig. 2.



Attest:

Chas. C. Kovick

Geo. H. Bodenschatz.

Inventor.

J. R. Williams, per

Thos. S. Crane, Atty.

UNITED STATES PATENT OFFICE.

JOHN R. WILLIAMS, OF NEWARK, NEW JERSEY.

IMPROVEMENT IN AUTOMATIC WEIGHING-MACHINES.

Specification forming part of Letters Patent No. **214,014**, dated April 8, 1879; application filed November 22, 1878.

To all whom it may concern:

Be it known that I, JOHN R. WILLIAMS, of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Automatic Weighing-Machines, which improvement is fully described in the following specification.

My invention relates to the class of automatic weighing-machines; and consists in certain novel modes of operating the doors to the hopper, and effecting the movements of the scale at regular intervals of time independent of the influence of gravity, and especially in actuating the feeding mechanism, so that the bulk of each charge shall be first discharged into the scale, and the remainder then supplied in minute quantities until the exact weight is secured.

Figure 1 is a front elevation of the machine complete. Fig. 1ª shows the feeder detached from the machine; Fig. 2, a side elevation of the machine with one of the posts B broken away; Fig. 3, a view of the opposite side of the machine; Fig. 4, a plan of the weighing mechanism below plate C.

A is the platform of the machine, on which two posts, B, support a plate, C, to which is secured the hopper D. This hopper may be provided with any suitable devices for expelling the contained material, and is shown in the drawings provided with a feed-shaft passing across its interior, near the bottom, and with stirring-shafts similarly arranged higher up. The posts B are placed far enough apart to admit the scale-pan H and its supporting-beams F, and the plate C has an aperture near its front edge, over which the hopper D is secured, and through which it discharges its contents into the pan H, which rises to the base of the hopper to receive its charge, and deposits it when filled in any receptacle provided for the purpose.

The scale-pan H is made, for convenience, with inclined sides and vertical ends, Figs. 1 and 2. Near the top of each of these ends is inserted a supporting-pin, e', and about an inch below one of these pins is secured another pin, r.

The two scale-beams F are pivoted upon two standards, B′, behind posts B, and extending forward between the posts beneath the hopper support the pan H by the pins e'. These beams are united by a tie-bar, 10, beyond the rear fulcrum, 23, on standard B′, from which extends, still farther to the rear, a balance-rod, p, carrying a weight, q, by the position of which the weights of the charges are graduated.

The beams F extend forward somewhat beyond the pins e', and are formed with downwardly-projecting points v.

A lever, G, Fig. 3, is secured to the standard B′ by a pin, 24, below the fulcrum 23, and extends parallel with the beam along the side of the scale-pan below the pin r. It also projects behind the standard, and carries a weight, R, which keeps its front end pressed upward against pin r.

A notch is provided on the upper side of this lever to fit the pin r, so that when the pin is in the notch the scale-pan is prevented from swinging or tipping, as it could readily do while suspended freely on pins e'.

Any such movement would prevent the operation of the catches t, Fig. 2, which are provided one on each side of the ends $m\,m$, for holding the door K closed while the pan is carrying its charge.

Springs u keep the catches fast during the descent of the scale-pan H with its charge; but in its lowest position the points v of beam F press on the catches t and release the door to discharge its load. In the upward movement of the scale-pan the door is closed by an incline attached to beam F, and pressing on a bar secured to the rear of the door K, a spring, 11, being attached to the bottom of the pan and to the tie-bar 10 to produce the necessary pressure.

When the scale, in its rise, reaches the position shown in Fig. 3, the lever G is stopped by a set-screw, 70, Fig. 1, and the scale-pan is carried to its highest position by the weight q, being then free from all restraint and ready to receive the charge graduated by the position of weight q on the rod p.

A detent, z, is formed on one of the beams F, near its fulcrum, and a hooked lever, I, Fig. 2, is arranged to catch on this detent during the filling of the scale and sustain a weight, W, which is designed to fall upon the descent of the pan and arrest the feed for that charge.

Were the charge thrown into the scale-pan

by a continuous feed, it would be impossible to secure exact weights, as in weighing or filling a scale by hand it is found necessary to stop the filling operation frequently to determine when the right amount has been supplied. The feed is therefore operated intermittently, as by hand, and is placed under the control of driving mechanism, which acts quite independently of the scale, its construction being such that the feed automatically supplies the scale with its charge at definite intervals of time, regulated by the motive power and gearing applied to the machine while it is subjected to the control or influence of the scale upon the descent of pan H with a charge, whereby the feed is stopped for that particular charge to be renewed again after the proper interval by the motive force supplied for that purpose.

I have used various devices for thus regulating and operating the feed, and have shown the intermittent movements of the feed-shafts 21 and 22, Fig. 3, governed by a cam, 8, secured to a cam-shaft, 4, which is supported in bearings upon posts B, a little below the scale-beams F. This shaft is shown in Fig. 1 provided with a driving-pulley, P, and it also carries a cam, 41, to lift a weight, W, for stopping the intermittent feed finally on the descent of pan H, the cam 42, for moving beams F downward to open the door of the pan H and discharge it contents, and cam L, as shown in dotted lines, Fig. 3, to remove pawl *y* from wheel 18.

The co-operation of these three cams produces a perfect succession of the several movements of the scale and its feed, and their connection with shaft 4 renders the speed and continuance of these movements dependent upon its revolutions.

To explain the operation of cam 8, I have, in Fig. 1ª, shown the arrangement of two clutch-wheels, 18 and 20, upon the lower stirring or feeding shaft, 16, of the hopper D, which carries a roll, *a*, with stirring-pins *b* projecting from its surface irregularly.

A shaft, 19, is supported on plate C, in line with shaft 16, and receives continuous motion from shaft 4 through gears *j*, *h*, and *n*, and terminates at the face of wheel 18 on dotted line 15, entering a short distance into a hub, 17, secured to shaft 16, and projecting over the end of the latter. The ratchet-wheel 18 rides loosely upon the hub 17, secured to shaft 16.

Shaft 19 has a hollow shell, 20, keyed to it, and friction-dogs are fitted between the hub 17, attached to shaft 16, and the shell 20 in such manner that the shaft 19 drives the shaft 16 until the ratchet-wheel is checked by a pawl, when the dogs loose their gripe on the shell, and all the parts attached to shaft 16 come to rest—viz., the shaft, hub 17, dogs attached to the hub, and wheel 18.

The pawl being removed, springs on hub 17 bring the dogs again into action, and the motion is instantly renewed.

From the above description it will be seen that the action of the clutch is very easily controlled by any obstacle opposed to the wheel 18, and I therefore provide for that purpose a pawl, 5, controlled by cam 8. Cam 8 is of circular form, having a certain portion of its periphery concentric, and the remainder provided with short sections or teeth, so that a roller pressed against the lower side of its rim would be depressed a long time by the concentric portion, and again at brief intervals by the passage of the smaller teeth over the roller. The pawl 5 is pivoted below plate C by a pin, 6, and has a weight, 43, to keep it pressed into the teeth on wheel 18.

A long link is secured by pin to pawl 5, and reaches down to shaft 4, which it embraces by a slot formed in the link, and at its lower end is provided with a roller, 44, which presses against the lower side of the circular toothed cam 8. The weight 43 keeps the pawl 5 against wheel 18, and stops the feed, except when the projections on cam 8 depress the link by their contact with the roller 44, and set the feed in motion. The periphery of the cam is constructed to do this several times, first causing the greater part of the desired charge to be fed into the scale-pan, and then adding a little at a time until the exact weight is secured, the intermittent motion being conveyed from shaft 16 to shafts 21 and 22 by gears O O O O O.

The hooked lever I, Fig. 2, is hinged on an arm, J, behind standard B′, and raised when free by the cord and link 24, attached to the weight W, but serving, when hooked on the detent *z*, to support the weight and slack the other cords, 25 and 26, attached to W.

Cord 25 is seen in Fig. 2 carried to a weighted pawl, *y*, hinged at a point, 49, over the ratchet-wheel 18, and furnished with a tooth, 27, that engages the teeth of wheel 18 when the cord 25 is tight; but when the cord is slack the pawl is kept clear of wheel 18 by the action of the weight *d*, secured on pawl *y*.

The descent of the scale a short distance moves detent *z*, releases hook I, and allows weight W to fall. The cord 25 then checking the motion of wheel 18 stops the feed, the cord 26, Fig. 2, at the same time closing the doors 80 of the hopper by passing over pulleys 29 and 30 to the guide-pin 31, where it divides into two cords, which are attached to the doors 80 by pins 32.

To effect the opening of the door K upon the descent of the scale-pan, a forked arm is provided, into the end of which a pin, 33, Fig. 2, attached to one of the beams F, enters when the scale-pan first drops. This arm is hinged upon B′ by pin N, and has its lower prong, 34, longer than the upper one, 35, the pin 33 penetrating the slot between the two prongs, and being carried downward when the arm is depressed by a cam, 42, having a groove, 68, traversing its face, and embracing a guide-pin, 36, projecting sidewise from the arm.

This groove is so proportioned that the arm and scale pan are carried downward and upward in about one-half a revolution of the cam-

shaft 4, the pin 36 resting during the remaining ' ne on the concentric surface 37 of the

igs. 2 and 3 are shown the arrangements opted to secure the lifting of the weight W automatically when the pan H has reached its highest position, and it is desired to have the hook I engaged in the detent *z* before the scale-pan H receives its charge.

A lever is hinged just below pin 23 upon the side of post B′ at 39, and one arm, 38, is extended above the middle of hook I, and bent so as to reach over the same. The other arm, 40, rests near cam 42 on shaft 4, which carries a toe, 41, Fig. 1, so adjusted that it lifts the arm resting near it, and depresses the other arm, 38, carrying hook I, downward over detent *z*.

The rising of scale-pan H causes the detent o engage the hook while thus held by toe 41, the further motion of which, by releasing the arm 40, leaves the hook I at liberty to act as described, when the pan again drops.

The depression of hook I by the arm 38 acts upon the link 24, (embracing the link and cord attached,) and raises weight W, to fall again at the proper time, for the purpose specified above.

A cam, L, as shown in dotted lines, Fig. 3, secured on shaft 4, near weight *d*, at the same time removes the tooth 27 on pawl *y* from wheel 18, leaving the latter at liberty to revolve at the first impulse from cam 8 to the pawl 5. This sets the entire weighing apparatus to receive a charge. If the scale-pan H should tremble or oscillate on completing its upward movement, the hook I might not catch upon detent *z*; and to secure a steady motion of the scale at that time I provide a friction-lever M, Fig. 1, hinged below plate C, and pressed at the proper time against one of the beams F by cam O on shaft 4. A guide, P′, is also provided to steady the lever G in its motion.

By the construction described above it will be seen that the regulation of the feed does not depend upon the movements of the scale-pan, as in other weighing-machines, but upon the operation of a force or motive power supplied to the machine for the threefold purpose of working the doors of the hopper and its stirring or feed shaft if any be employed, setting the hook I and weight W prior to each charge of the scale, and opening and closing the door of the scale-pan at the proper time.

In all these respects I consider that my apparatus radically differs from other automatic weighing-machines, in all of which the regulation of the feed, the movements of the scale, and its resetting for a subsequent charge are determined by the force of gravity.

My apparatus also differs from others in the delivery of the feed in the intermittent manner described for each charge, the scale-pan being supplied at first with nearly the whole of its charge, and subsequently with minute additions of material until the exact weight is secured.

It is obvious that the various weights described might be replaced by springs, and vice versa; and I do not, therefore, limit myself to the precise construction shown and described, but consider that the essential points of my invention are, first, operating the feed by a motor independent of the scale; and, secondly, operating the feed intermittently during each charge to secure exactness of weight.

These objects may be secured by levers or rock-shafts instead of cams secured to a revolving shaft, as described; and the intermittent feed has been operated by me without the use of a clutch on the feed-shaft 16 by employing therefor a ratchet-wheel, the pawl of which was intermittently operated to discharge the feed in the manner desired.

I do not therefore limit myself to the use of a clutch for effecting this object; neither do I propose to use feed-shafts for the discharge of granular or powdered material, which will flow from the hopper unassisted, as the intermittent feed would then need to be secured by causing cam 8 to open a sliding door in the hopper at such intervals as to secure the feed described herein.

The power supplied by shaft 4 furnishes ample force to effect such a movement of a sliding door, and the machine would then weigh with the same exactness as when fibrous or coarse materials are expelled by the stirring devices described herein.

The driving or cam shaft 4 may also be made to operate suitable packing mechanism, so that the material may be received from the scale-pan H, and made up at once into complete packages of perfectly uniform weight.

I therefore claim, broadly, as follows:

1. In an automatic scale, the combination of a scale-pan, its levers and counterpoise for determining the weight of the charge, a mechanism operated by a motor independent of the scale for first feeding the greater part of the charge into the scale, and then adding minute quantities of material until the exact weight is secured, and connections from the scale-pan to the feeding mechanism for stopping the feed when the exact weight is secured, substantially as herein set forth.

2. In an automatic weighing-machine, a scale-pan for receiving the material, beams for holding the scale-pan, and adjustable counterpoise on said beams, a weight to control the feeding shaft or shafts, a detent for controlling the weight, hopper-doors working automatically, and cords or belts connecting the weight with the other parts, as shown, all in combination with a hopper for holding the material, with its described feeding-shafts, operated by a motor independent of the scale, substantially as herein described, and for the purposes set forth.

3. In an automatic weighing-machine, the automatic intermittent feed, consisting of shafts

for moving or stirring the material in the hopper, and at the same time properly feeding it through the hopper, said shafts having an intermittent motion imparted to them by an independent motor, substantially in the manner described, and for the purpose set forth.

4. A hooked lever, I, connected by a cord or belt with a weight for controlling the feeding-shafts, in combination with a scale-pan, beams for holding the scale-pan, and a detent for controlling the weight and operating to regulate the feed and control the hopper-doors, substantially as shown and described.

5. The mechanism for closing the door of the scale-pan, consisting of a notched lever for holding the scale-pan in a parallel position, a pin on one end of the scale-pan, so arranged as to work in the notch of the lever, a strip attached to the scale-door, and a beveled incline on the scale-beam, and all managed and operating to close the door of the scale-pan as it rises to receive a charge, substantially as shown and described.

In testimony that I claim the foregoing as my own I hereto subscribe my name in presence of two witnesses.

JNO. R. WILLIAMS.

Witnesses:

E. B. BURDETT, Jr.,

THOS. S. CRANE.