No. 657,178. Patented Sept. 4, 1900.

W. E. NICKERSON.

APPARATUS FOR AUTOMATIC WEIGHING.

(Application filed Jan. 27, 1896.)

(No Model.) 2 Sheets—Sheet 1.

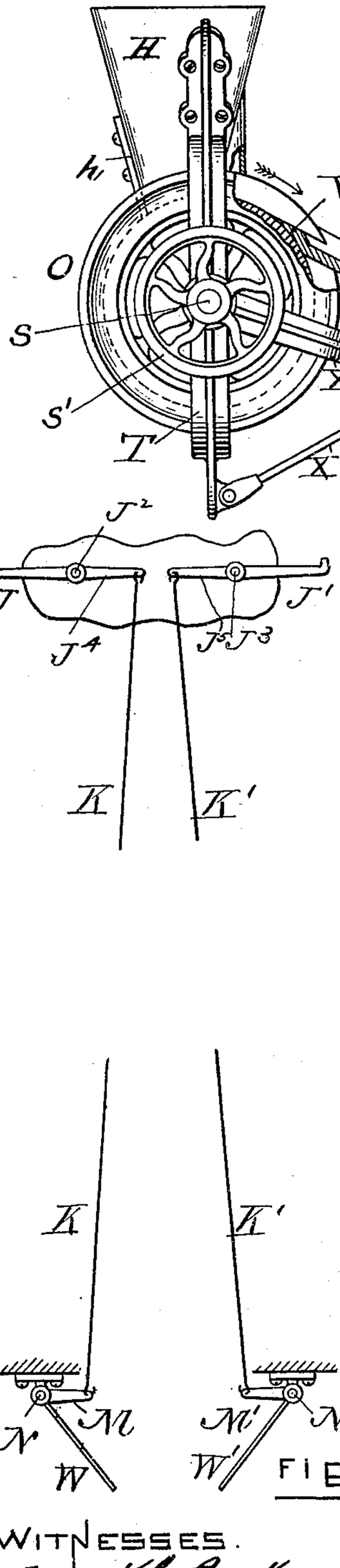

Fig. 6.

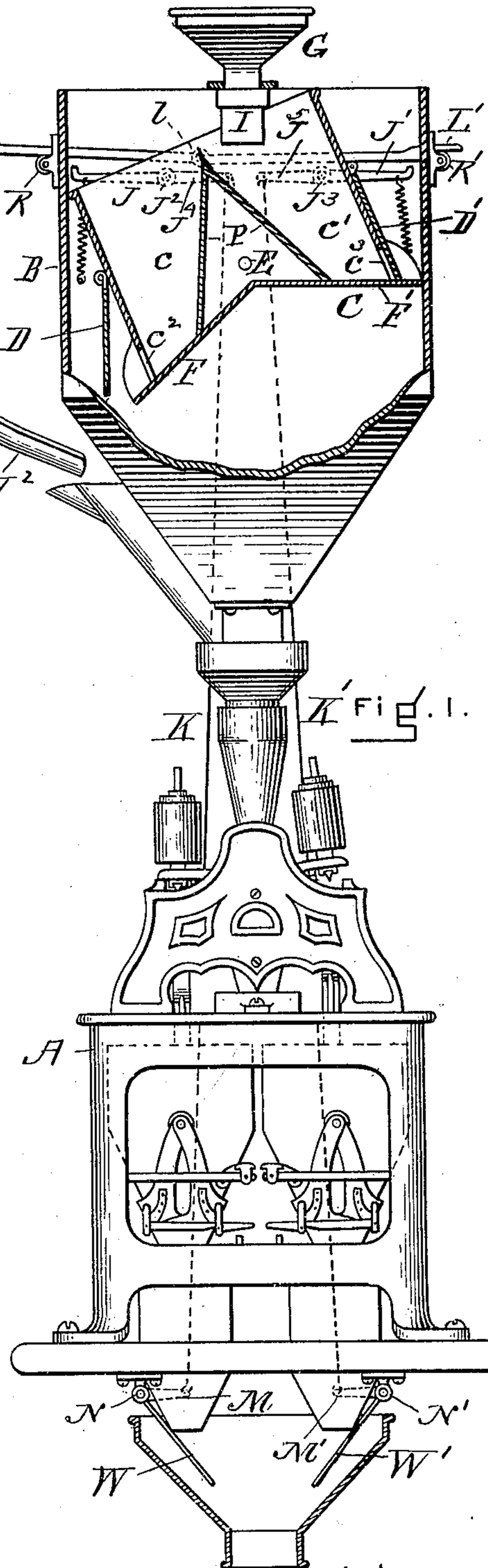

Fig. 1.

Fig. 5.

WITNESSES.
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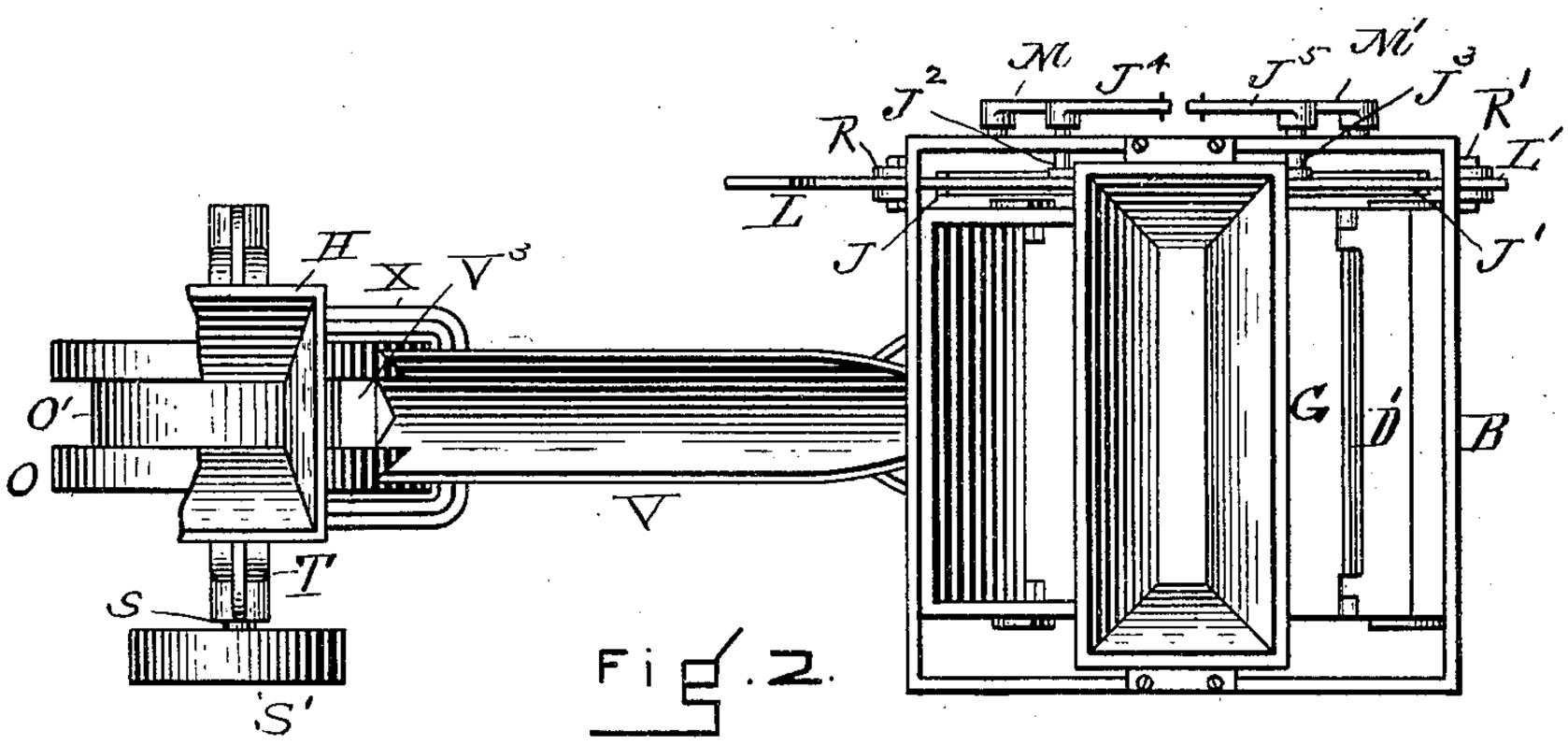

Fig. 2.

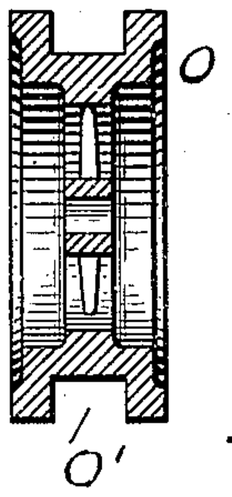

Fig. 4.

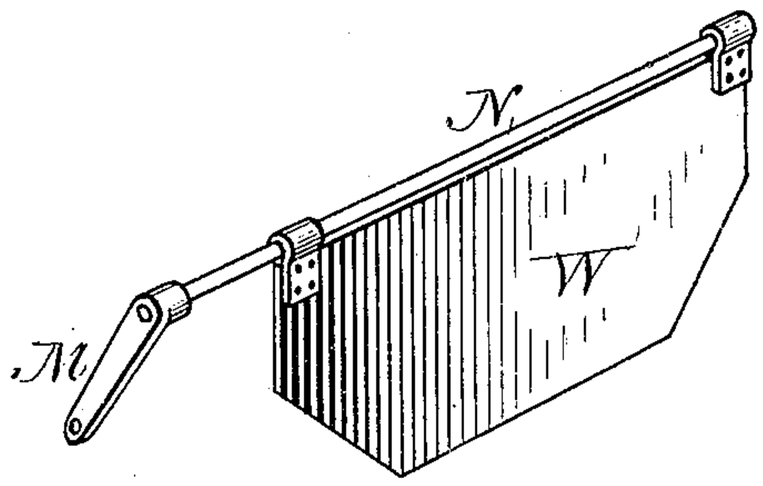

Fig. 5

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UNITED STATES PATENT OFFICE.

WILLIAM EMERY NICKERSON, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NEW ENGLAND AUTOMATIC WEIGHING MACHINE COMPANY, OF PORTLAND, MAINE.

APPARATUS FOR AUTOMATIC WEIGHING.

SPECIFICATION forming part of Letters Patent No. 657,178, dated September 4, 1900.

Application filed January 27, 1896. Serial No. 577,083. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM EMERY NICKERSON, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Apparatus for Automatic Weighing, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to apparatus for automatic weighing, and more particularly to that class of automatic weighing-machines wherein the material to be weighed is first measured approximately and then dumped into the scale-pan, the exact weight being made up by a small independent stream of the material.

A preferred form of my invention is illustrated in the accompanying drawings, in which—

Figure 1 shows the complete apparatus in front elevation with the upper portion of one part thereof partly broken away to show a vertical section of the interior mechanism. Fig. 2 is a plan view of the apparatus. Fig. 3 shows in detail parts of a tripping device, hereinafter described. Fig. 4 shows in vertical cross-section a feed-wheel which may be used for delivering to the weighing-machine proper the small stream of material which acts to complete the correct weight. Fig. 5 is a detail showing a latch-tripping wing-piece, hereinafter described. Fig. 6 is a cross-section of the feed-trough used in connection with the feed-wheel shown in Fig. 4.

In my apparatus I employ a weighing-machine proper, which I prefer to be of the twin-bucket variety, and in connection therewith I have two independent feeding devices. The first acts quickly and comprises an approximately-measuring supply-bucket adapted to receive a quantity of material of somewhat less than the required weight and to discharge the same at the proper time into the weighing-machine proper. The second feeding device is arranged to deliver a small continuous stream of material directly into the weighing-machine proper, adding gradually and regularly to the mass already delivered to it by the first feeding device until the proper amount has been received, whereupon the mechanism for discharging the weighing-machine acts, and at the same time the supply mechanism is actuated in such manner as to cause the process to be repeated. Corresponding to the twin buckets of the weighing-machine proper I prefer to provide my preliminary measuring device with two compartments, one for each bucket of the weighing-machine, these parts being so arranged and connected that the compartments of the preliminary measuring devices are discharged alternately each into its appropriate bucket of the weighing-machine, one of said compartments being filled while the other is being emptied, so that the operation of weighing is made practically continuous.

That part of the present apparatus which relates wholly to the accurate weighing of the material after it has been delivered by the feeding devices, and which may be called the "weighing-machine" proper, is not new in itself in this application. It may be found fully illustrated and described in my Patents Nos. 555,393 and 555,179, both issued February 25, 1896, and its specific construction is not involved in this specification or in the following claims, except in a limited manner. It is shown here, being designated as a whole by the letter A, for the purpose of making my invention appear in an operative combination, and is to be regarded as an elementary unit in the combinations expressed in the claims. It need not therefore be particularly described further than to state that it is adapted to weigh material which is supplied to it in the manner of a delivery nearly in mass of the greater part of the weight required, the balance being made up by a small and continuous stream. Twin-bucket machines having oscillating chutes adapted to swing from one bucket to the other are particularly adapted to be fed in this way, and single-bucket machines may be so adapted by suitable modifications providing for the uninterrupted flow of the small continuous stream.

I will now describe in detail that form of my invention which is shown in the accompanying drawings.

Mounted above the weighing-machine

proper, Fig. 1, and connected with it by a suitable connecting-pipe is a case B, the front side of which is partially broken away in order to show the supplementary-supply bucket C, here shown in vertical section and having the compartments *c* and *c'*, which are separated from each other by the partition P. The bucket oscillates upon pins projecting inwardly from the wall of the case B, one of which is shown at E. The compartments of the bucket C are each provided with outlet-apertures c^2 and c^3, respectively, and preferably, but not necessarily, with the doors D and D'. These doors naturally swing away from the apertures c^2 and c^3 when these apertures are in their lower or discharging position and against them when in their upper or loading position. The doors D and D' may be dispensed with by making the floors of the bucket C to project farther beyond its side walls than is represented in the drawings or by causing the bucket to oscillate farther or by both these means. The floors F and F' of the compartments of the bucket are made upon such a slant, preferably, that when a compartment is in its upper or loading position its floor is approximately horizontal, and when said compartment is in its lower or discharging position its floor is at such an angle of inclination as to permit material to freely slide out and fall into the weighing-machine proper.

Centrally above the supply-bucket C is mounted the hopper G, having the supply-pipe I, said pipe being preferably adjustable in a vertical line and serving to deliver material into the bucket C. The lower end of the pipe I is but a little above the top of the partition P, so that when the compartment of the bucket which is uppermost has become filled the flow of material is stopped by its accumulation in the said compartment up to the discharge end of the pipe, so that no further flow can occur until a movement of the bucket lowers the filled compartment and brings the other and empty compartment beneath the pipe. The amount of material which the supply-bucket C will deliver can be regulated by raising or lowering the end of the pipe I or by increasing or diminishing the height of the partition P or by both these means.

The bucket C is so balanced upon its axis of oscillation that (the uppermost compartment being filled and the other empty) it tends to oscillate, but is maintained with the filled compartment uppermost until a discharge is required by the latches L and L', which are pivoted to the side of the bucket at *l* and have shoulders, one of which is shown at *l'*, adapted to engage with the holding or latch rollers R and R'. The latches L and L' are tripped or loosened—*i. e.*, lifted off their their rollers—when required by the arms J and J', respectively, located underneath them and pivoted upon the shafts J^2 and J^3, which extend through the side of the case B and bear on their outer ends the arms J^4 and J^5. The arms J^4 and J^5 are connected by the pull-wires K and K' to the arms M and M', Figs. 1 and 5, which are fixed upon the shafts N and N', said shafts carrying the wing-pieces W and W', located beneath the discharge-apertures of the weighing-machine proper. Upon the discharge of a load from the weighing-machine the impact of the falling material against the wing-pieces W and W' throws them alternately downward, and acting thereby through the arms M or M', wires K or K', arms J^4 or J^5, and arms J or J' causes the respective latch L or L' to trip or be loosened, whereby a fresh quantity of material having a weight somewhat less than that of a full load for the weighing-machine proper is caused to fall from a compartment of the bucket C into the weighing-machine.

I will now explain the particular method by which I prefer to feed the slow continuous stream of material, which after the weighing-machine proper has received a charge from the supply-bucket above described adds by small and regular increment to such charge already delivered to the weighing-machine sufficient material to make up the weight required.

H is a hopper shown in full in Fig. 1 and in part in plan in Fig. 2 and which is suitably supplied with the material to be weighed. The bottom of this hopper is provided with a discharge-outlet and is fitted to the feed-wheel O, located immediately underneath it. The feed-wheel O is shown in vertical section in Fig. 4 and is provided with a groove O'. A check-piece *h*, Fig. 1, extends from the rear side of the hopper H into the groove O' and prevents the escape of material in that direction. The feed-wheel O is mounted on the shaft S, which is housed in the frame T. The wheel O is made to rotate in the direction of the arrow, Fig. 1, by means of the pulley S'. The upper end of a conveying spout or trough V, preferably having a V-shaped cross-section, Fig. 6, is fitted, by means of a tongue-piece V^3, to the groove O' of the feed-wheel O in such a manner that the material received by the groove through the discharge-aperture in the bottom of the hopper H will regularly and evenly flow over it and along the spout. I have found by experiment that an inclined trough or spout of V-shaped cross-section has the greatest capacity for equalizing and maintaining equal a stream of granular material. The incline of said trough should be such that the material delivered to it will pass evenly downward and, actuated partly by gravity and partly by the impelling action of the feed-wheel O, flow slowly and regularly into the weighing-machine.

The trough V is adjustably connected to the frame T by means of a link V' and a swinging yoke X, said yoke extending on each side of the wheel O and being pivoted on the shaft S. The yoke X is adjustably held in position by a sliding clamp X' and a

rod X^2, attached to the lower part of the frame T. By the above-described method of connecting the trough V to the framework T, I am enabled to adjust the said trough to any desired position or angle.

The material flowing in the trough V is in some cases liable to become more or less irregular—that is, sometimes it will tend to break by sliding faster in one portion of the spout than in another, and thereby introduce a more or less uneven discharge into the weighing-machine. I have found that this tendency to break or become uneven is much reduced by giving the lower portion of the trough a slightly-less angle of inclination to the horizontal than the remainder has. When this arrangement is used, the slightly-increased resistance to the flow at the lower and less inclined part prevents separation in the stream of material by preventing the portions in the lower part of the trough from running away from those portions which are following. This difference of angle of inclination in the trough V is shown extending from V^2 to the lower end, Fig. 1.

The mode of operation of my apparatus may be briefly described as follows: It will be supposed that one of the buckets of the weighing-machine proper contains a quantity of material somewhat less than the full weight required, which has just been delivered to it by the supplementary-supply bucket C, and that the auxiliary or slow-feeding device, consisting of the feed-wheel O, trough V, and connected parts, is delivering into the said bucket of the weighing-machine a small and even stream of material. When the required amount has collected in the aforesaid bucket of the weighing-machine, the weighing mechanism proper acts and the said fully-charged bucket descends, the small stream of material being simultaneously shifted over into the empty bucket of said weighing-machine by means of a swinging chute, which forms a part of the weighing-machine proper and not here described, as it is common in twin-bucket weighing-machines. It is to be understood that while the weighing-machine proper is in the act of discharging a loaded bucket the small continuous stream is flowing into the alternate and empty bucket, the material which it is delivering going to make a part of the load for that bucket, the quantity discharged from the supplementary-supply bucket into the weighing-machine proper being so adjusted as to allow for the amount delivered by the small stream from the instant of the shifting of the chute to the alternate bucket until the discharge from the supplementary bucket is completed, further allowance being made for a small quantity to be made up by the small stream after the supplementary bucket has discharged into the weighing-machine. The descent of the loaded bucket causes it to discharge by means of appropriate mechanisms also forming a part of the weighing-machine proper and which it is not necessary here to describe, and the impact of the falling charge as it leaves the weighing-machine operating upon one of the wing pieces W or W′ causes, through one of the pull-wires K or K′ and the respective arms and latches, the loosening or tripping of the supply-bucket C, which is being held by one of the said latches with its filled compartment uppermost, the flow of material through the pipe I being stopped by the accumulation of material in the filled compartment, as hereinbefore described. Upon the loosening of the supply-bucket C the weight of the material in the upper and filled compartment causes it to oscillate, bringing the empty compartment underneath the supply-pipe and allowing the filled one to discharge its load into the alternate bucket of the weighing-machine proper. The auxiliary stream now makes up the full load in the said alternate bucket, as before described. The alternate compartment of the supply-bucket C, which has just been presented to the supply-pipe I, becomes full, stopping the flow through the said pipe by accumulating about the end of it, as before described, and the whole apparatus is ready to repeat the operation, but on the alternate sides of the supply-bucket and weighing-machine proper.

It is evident that in my apparatus as above set forth the weighing-machine proper is fed by two devices, one of which delivers the greater part of the load and then remains inactive while the other makes up by gradual increment the exact weight required, but that neither of the devices imposes any hampering mechanical work upon the weighing-machine itself and does not require any outside power, as a magnet, to cause the actuation of the supply-bucket. This method allows the weighing-machine proper to operate with perfect freedom and conduces largely to accurate results. It will also be seen that in the duplicate or twin bucket form of my invention, which I have shown and described herein, the operation is automatic and practically continuous, one half of the apparatus being filled while the other half is discharging, and vice versa.

I claim—

1. In an automatic weighing-machine, the combination with a movable meter having a plurality of separately-dischargeable chambers, of automatic weighing mechanism having a plurality of buckets loadable respectively by the respective chambers of said meter, and means operative in conjunction with the weighing mechanism for controlling the action of said meter.

2. In an automatic weighing-machine, the combination with a movable meter having a plurality of separately-dischargeable chambers, of automatic weighing mechanism having a plurality of buckets loadable respectively by the respective chambers of said meter, means for supplying a supplemental quantity of material to the weighing mech-

anism, and means operative in conjunction with the weighing mechanism for controlling the action of said meter.

3. In an automatic weighing-machine, a twin-bucket weighing-machine proper, a meter provided with two chambers arranged to discharge respectively into the respective buckets of the weighing-machine proper, and means operative in conjunction with the weighing mechanism for controlling the action of said meter.

4. In an automatic weighing-machine, a twin-bucket weighing-machine proper, a meter provided with two chambers arranged to discharge respectively into the respective buckets of the weighing-machine proper, means for supplying a supplemental quantity of material to the weighing mechanism, and means operative in conjunction with the weighing mechanism for controlling the action of said meter.

5. In an automatic weighing-machine, in combination, a twin-bucket weighing-machine proper, an oscillating meter having two chambers adapted to discharge respectively into the respective buckets of said weighing-machine proper, means for locking said meter in its extreme positions, means for supplying a supplemental quantity of material to the weighing mechanism, and means operative in conjunction with the weighing mechanism for releasing said meter.

6. In an automatic weighing-machine, in combination, an automatic weighing-machine proper having a plurality of buckets, a meter adapted to load said buckets successively, means for supplying a continuous supplemental stream of material, and means for shifting said stream successively into the respective buckets of the weighing-machine proper.

7. In an automatic weighing-machine, a twin-bucket weighing-machine proper, an oscillating meter having two compartments adapted to discharge respectively into the respective buckets of said weighing-machine proper, means for adding to the weighing apparatus a continuous supplemental supply of material, and means for shifting said supplemental supply from one bucket to the other of the weighing-machine proper.

8. In an apparatus for the automatic weighing of material, a weighing-machine, and a mechanism adapted to feed to said machine a small continuous stream of material; in combination with a supplementary-supply bucket having two compartments, each compartment having a discharge-aperture, and said bucket being adapted to oscillate under the end of a supply-pipe, in such a manner that the flow through the said supply-pipe is stopped by the filling up of the material against the end of the pipe when the compartment presented is full, substantially as described, and remains stopped until an oscillation of the bucket presents the other compartment to the pipe, and said bucket having latches adapted to hold it with the full compartment uppermost until released, and mechanism connecting the latches with said weighing-machine and adapted to release said latches at each discharge of the weighing-machine substantially as and for the purpose set forth.

9. In an apparatus for the automatic weighing of material, the combination of the weighing-machine A, having the wing-pieces W W′, said wing-pieces being adapted to receive the impact of the material discharged from said weighing-machine, the supplementary-supply bucket C having the latches L L′, mechanism for connecting said wing-pieces with said latches, and means for delivering to said weighing-machine a small continuous stream of material, substantially as and for the purpose set forth.

10. In an apparatus for the automatic weighing of material, the grooved wheel O and the hopper H; in combination with the trough V having the tongue V^3 all operating as described, to feed a regular stream of material, substantially as and for the purpose set forth.

11. In an apparatus for feeding granular material to a weighing-machine, the grooved wheel O and the hopper H; in combination with the inclined trough V of V-shaped cross-section, said trough having a less angle of inclination at its lower part, whereby unevenness of the stream of material is prevented, substantially as and for the purpose set forth.

12. In an apparatus for the automatic weighing of material, the grooved wheel O, the hopper H and the trough V; in combination with the yoke X pivoted upon the same axis as the said wheel O, and adapted to support the said trough in an adjustable manner, and mechanism for connecting said trough with said yoke, and for fixing said yoke in any desired position, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 17th day of January, A. D. 1896.

WILLIAM EMERY NICKERSON.

Witnesses:

FRANK G. PARKER,

WILLIAM H. PARRY.