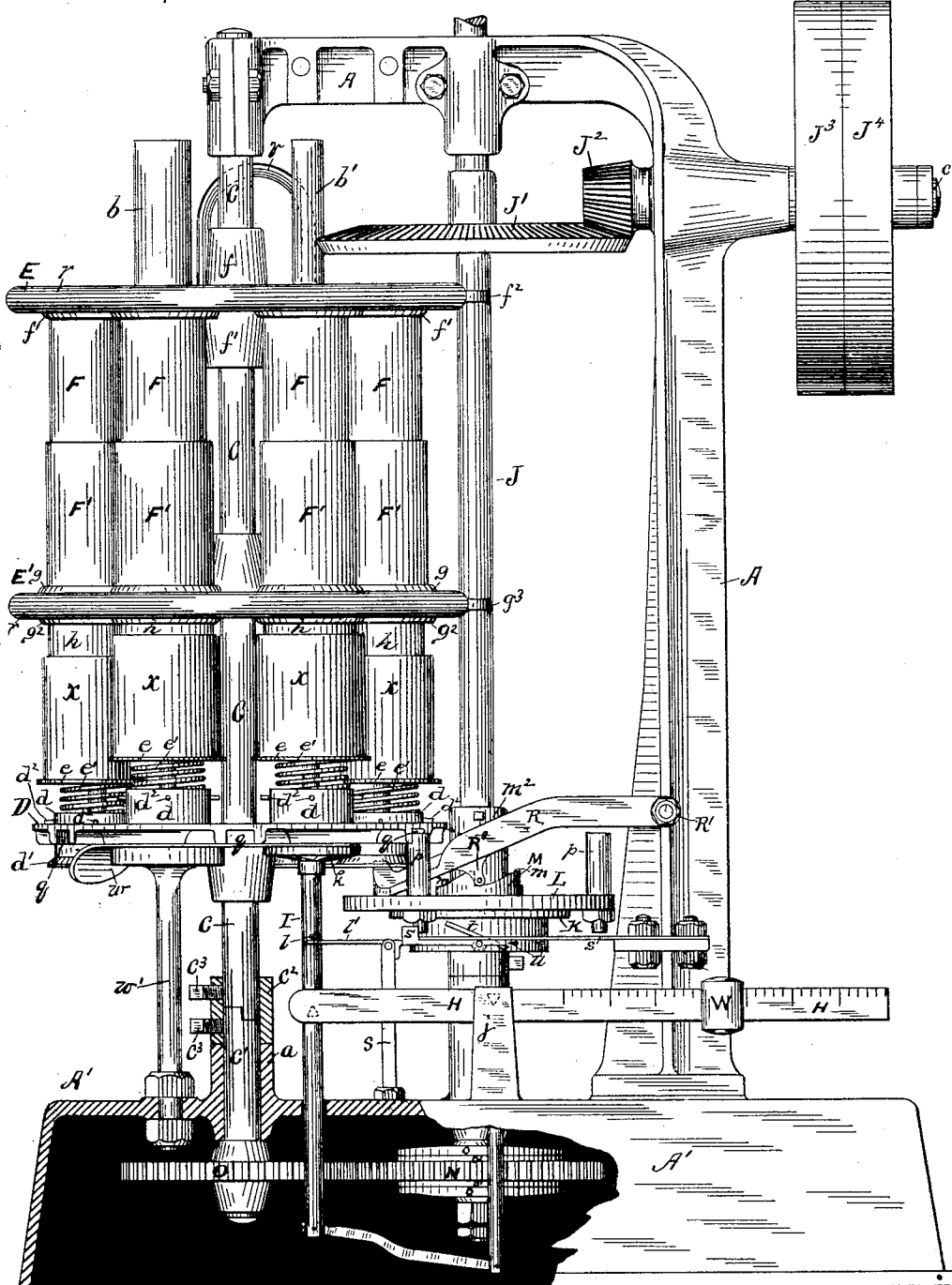


(No Model.)

5 Sheets—Sheet 1.

N. L. TUCK & J. S. MERRITT.
MACHINE FOR AUTOMATICALLY FILLING AND WEIGHING PACKAGES.
No. 461,651. Patented Oct. 20, 1891.



WITNESSES:

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FIG. I.

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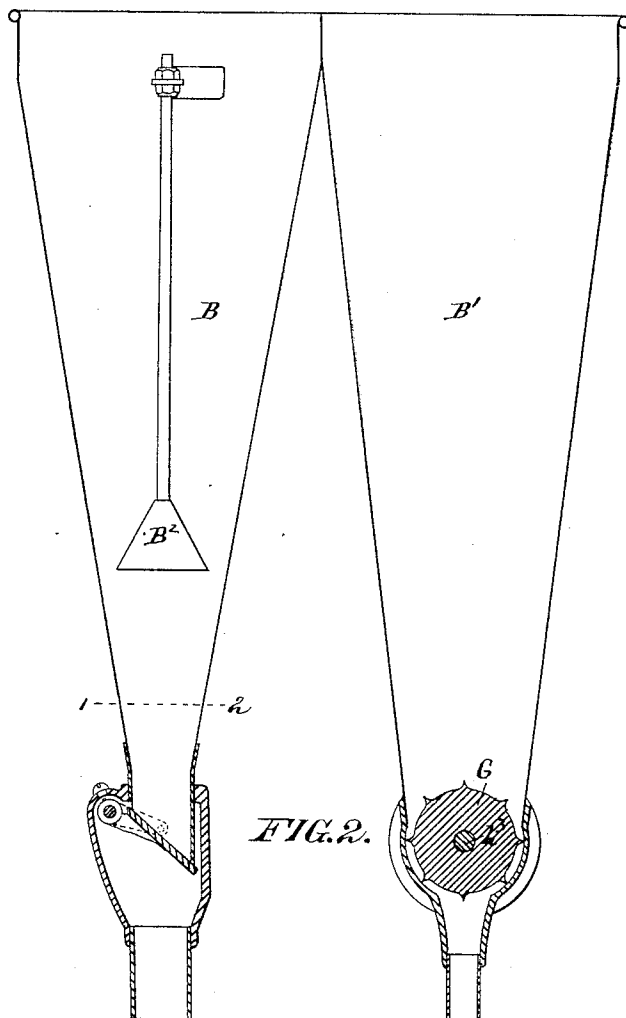


FIG. 2.

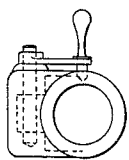


FIG. 3.

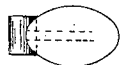


FIG. 4.

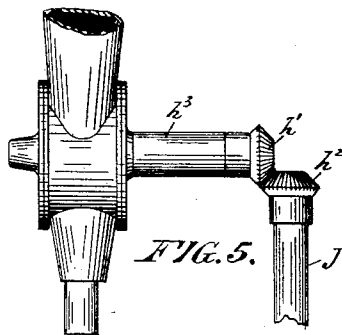


FIG. 5.

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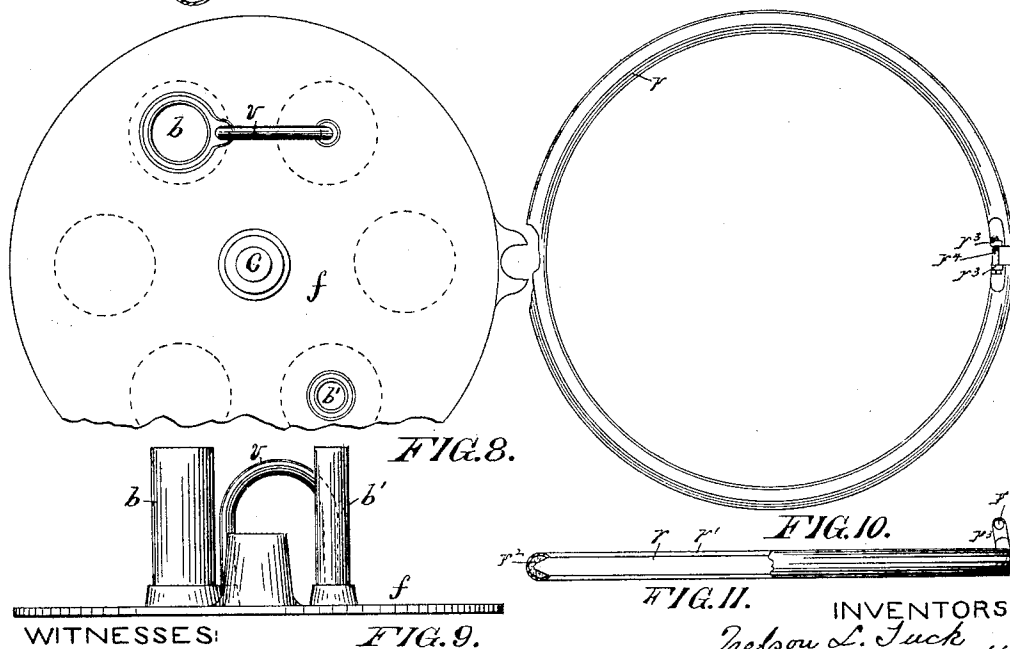
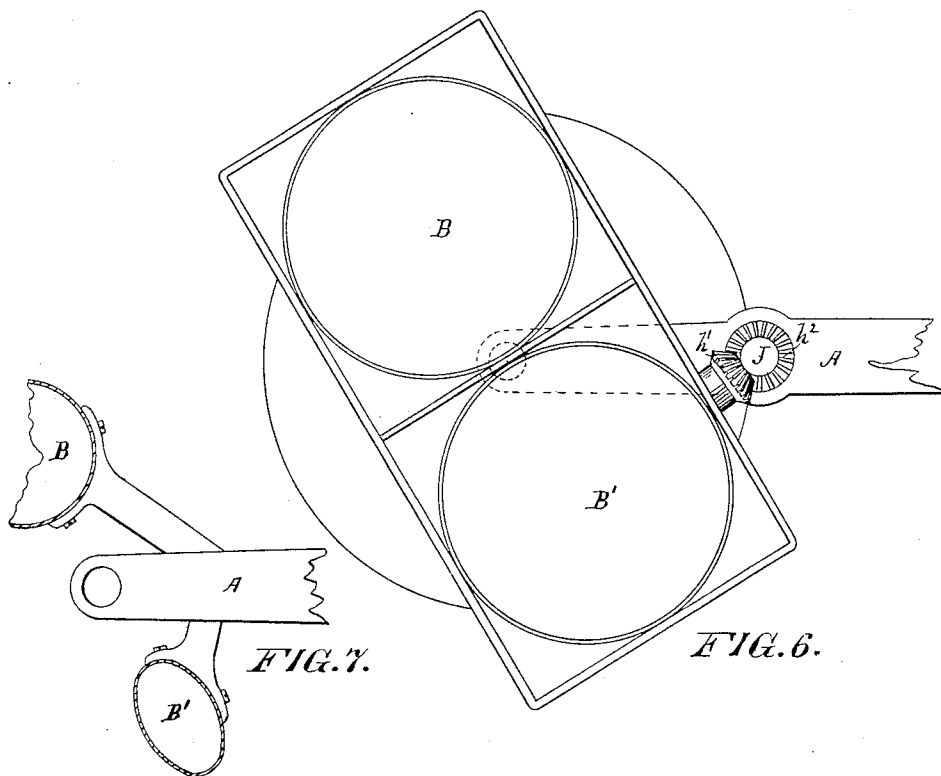
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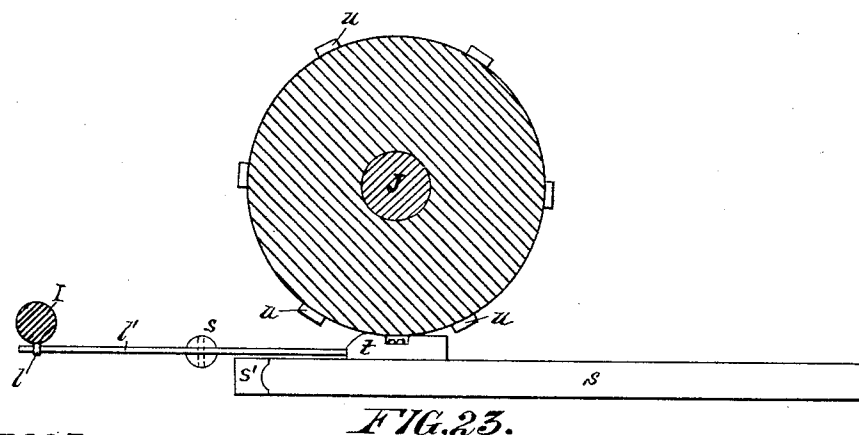
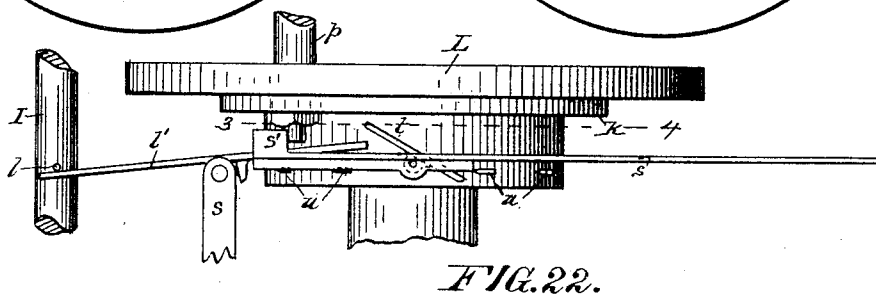
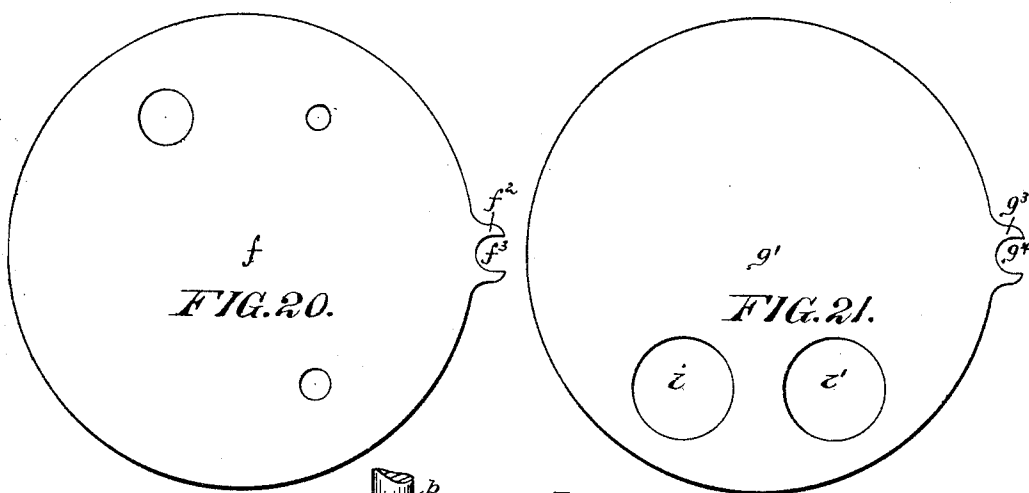
(No Model.)

5 Sheets—Sheet 5.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR AUTOMATICALLY FILLING AND WEIGHING PACKAGES.

SPECIFICATION forming part of Letters Patent No. 461,651, dated October 20, 1891.

Application filed April 1, 1890. Serial No. 346,248. (No model.)

To all whom it may concern:

Be it known that we, NELSON L. TUCK and JAMES S. MERRITT, citizens of the United States, the former a resident of the city and county of Camden, and State of New Jersey, and the latter a resident of the city and county of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Automatically Filling and Weighing Packages, of which the following is a specification.

Our invention relates, in general, to improvements in machines for automatically filling and weighing cans, boxes, or other receptacles; and the object of our invention is, first, to furnish an improvement in the method of feeding the material to the boxes to be filled and weighed on an automatic weighing-machine; second, to furnish improvements in the weighing and filling mechanism, as fully described hereinafter. It has heretofore been the practice on so-called "weighing-machines" to fill the boxes either by a measure, which by experiment was graduated to contain approximately the desired weight, or to place the box to be filled directly upon the scales and to pour the material to be weighed into it from a hopper, a cut-off operated by the scales shutting off the flow of material when the scale-beam drops. Both of these methods of filling the box fail to assure that accuracy which is desirable in machines of this class. In order to obtain perfect accuracy in the weighing and filling, and at the same time to obtain speed, we make use of a combination of these two methods. In the first place we pour into the box to be filled and weighed a quantity of the material by measure, care being taken that the weight of the measured material shall be less than the weight that the package is finally to have. We then automatically move the package to the scales, where the final filling is accomplished by means of a very small stream of the material, which is poured from a hopper, an automatic cut-off actuated by the scales shutting off the flow of material when the desired weight is reached. By the combination of the methods of measuring and weighing we are enabled to obtain great speed in

filling the packages and at the same time great accuracy. It will be seen that the margin for error in weighing is much less with a small stream than it is with a large one.

In the accompanying drawings, forming part of this specification, and in which similar letters of reference indicate similar parts throughout the several views, Figure 1 is a side elevation, partly in section, of our improved automatic filling and weighing machine; Fig. 2, a central sectional elevation through the hoppers of the machine; Fig. 3, a section through the main hopper, taken on the line 1 2, Fig. 2; Fig. 4, a plan of the valve or gate for shutting off the flow of material through the main hopper; Fig. 5, a side elevation of the lower part of the auxiliary hopper; Fig. 6, a plan of the hoppers; Fig. 7, a plan of part of upper part of frame of machine and bracket for supporting hoppers; Fig. 8, a plan of the upper stationary disk, through which the material is fed from the hoppers to the telescopic receiving-chambers; Fig. 9, a side elevation of the same; Fig. 10, a plan of a dust-proof ring; Fig. 11, a side elevation, partly in section, of the same; Fig. 12, a central sectional elevation through the stationary and moving disks and telescopic receiving-chambers; Fig. 13, a bottom view of the star-wheel disk; Fig. 14, a central sectional elevation of the star-wheel disk, showing cups, springs, and platforms for carrying the package which is to be filled; Fig. 15, a central sectional elevation of gear-wheel and friction-disks on lower part of driving-shaft, Fig. 1; Fig. 16, a side elevation of upper friction-disks and packing device for settling the material in the packages after it has been weighed; Fig. 17, a central sectional elevation of the friction-disks, Fig. 16; Fig. 18 a plan, and Fig. 19 a side elevation, of device for raising and supporting the cups and packages after they have been partly filled in order to place them upon the scales; Fig. 20, a plan of the upper central and stationary disk, Fig. 1; Fig. 21, a plan of the lower central and stationary disk, Fig. 1; Fig. 22, an enlarged side elevation of the upper friction-disks on the driving-shaft and springs and tripping device for arresting and releasing the upper

friction-disk and restricting the movements of the star-wheel and its connected parts; and Fig. 23 is a section of Fig. 22 on line 3 4.

A, Fig. 1, is the frame of the machine, 5 mounted on a suitable base A'.

B B', Figs. 2 and 6, are the hoppers, in which the material to be packed and weighed is placed preparatory to being fed to the machine. There may be two hoppers, as shown 10 in the drawings, or one hopper with two spouts. Projecting from the base A' is a boss *a*, Fig. 1, through which a vertical shaft C passes. On this vertical shaft C is a disk D, (shown more clearly in Figs. 13 and 14,) said 15 disk carrying a series of cups *d*, having flaring bottoms *d'*. These cups are suspended by pins *d²* in orifices D' in the disk D. In each cup *d* is a spring *e'*, carrying a platform *e*, although in some cases the springs may be 20 dispensed with and the platform carried directly by or form part of the cup *d*.

E E' are disks carried by shaft C and between which are placed telescopic tubes F F', into which the material is fed from the hop- 25 pers before passing into the boxes, where it is weighed and packed. The arrangement and construction of these disks are shown more clearly in Figs. 8, 9, 10, 11, 12, 20, and 21. The upper disk is constructed of two pieces 30 of metal, the upper one *f* being furnished with tubes *b b'*, through which the material from the hoppers can pass to the telescopic tubes F F', and the lower one *f'* with orifices, as indicated by dotted circles in Fig. 8. The upper 35 disk *f* does not turn with shaft C; but the lower one *f'* does. The lower disk E' is constructed of three plates of metal, the upper and lower plates *g g²* being secured to shaft C and turning with this shaft, and the middle plate *g'* being stationary at all times. 40 The upper plate *g* is furnished with orifices, into which the telescopic tubes F' are screwed or otherwise secured, and the lower plate with orifices, into which the tubular projections *h*, 45 which enter the boxes to be filled, are secured. The middle plate is furnished with holes *i i'*, Fig. 21, through which the material may pass from the telescopic tubes F F' to the boxes to be filled.

J is a vertical shaft, near the upper end of which is placed a bevel-gear J', into which meshes a bevel-gear J², which is carried upon a shaft *c*, which turns in suitable bearings in the frame A. 50

J³ J⁴ are fast and loose pulleys on shaft *c*, by means of which this shaft, the bevel-gears J² J', and the shaft J may be driven. 55

Secured to or forming part of the shaft J is a friction-disk K, Figs. 1, 16, and 17, and 60 above this friction-disk and adapted to slide upon the shaft J is a friction-disk L.

L' is a sleeve on disk L, which surrounds shaft J.

m² is a collar secured to shaft J and which 65 surrounds sleeve L'.

n is a spring surrounding shaft J, one end of which bears against collar *m²* and the other

against sleeve L' and which tends to force the friction-disk L against the friction-disk K.

M is a collar on the lower part of collar *m²*, 70 which is furnished with a number of teeth or cams *m*, the purpose of which will be described hereinafter.

Near the lower end of shaft J is placed a gear-wheel N, which is loose on this shaft, 75 and above and below this wheel are friction-disks, by means of which this wheel is driven. These friction-disks are constructed as follows: *o o*, Figs. 1 and 15, are metal washers, which are secured to and turn with shaft J, 80 and *o' o'* are washers, of leather or other suitable material, placed between washers *o* and the wheel N. The washers *o* force the washers *o'* against the wheel N, and by friction cause this wheel to revolve until it is locked, 85 as hereinafter described.

O is a gear-wheel on the lower end of shaft C, which gears into and is driven by gear-wheel N.

The material to be weighed and packed is 90 placed in the hoppers B B', Figs. 2 and 6. These hoppers are connected with the main part of the machine (shown in Fig. 1) by the tubes *b b'*. The material falls freely through hopper B, being prevented from choking in 95 this hopper by the cone B², through the tube *b*, and into the telescopic tubes F F', and rests upon the middle plate *g'* of the lower disk E'. The tubes F F' are arranged so as to hold a quantity of material, which will be slightly 100 less by weight than the weight of the packages which are to be filled by the machine. The tubes F F' being filled, the shaft *c* is rotated, as hereinafter described, and the tube which has been filled with material from the 105 hopper B is brought over the hole *i* in the lower stationary plate *g'*, when the material falls through this hole into one of the boxes X which are to be filled. A further turn of the shaft C brings this box X upon the scales, 110 when the filling of the box to the exact weight, determined by the scales, is accomplished. The plates *f* and *g'* are furnished with projections *f² g³* at one side, Figs. 20 and 21, which are furnished with slots *f³ g⁴*. The 115 shaft J passes through these slots and forms a stop, which prevents these plates from turning. The final filling is from the hopper B', which pours a very fine stream of the material into the box while it is on the scales, and 120 in order that this stream may be a constant one we use the device shown in Figs. 2 and 5. Near the bottom of the hopper B' we place a toothed wheel G, the teeth of which at the bottom touch or nearly touch the sides of the 125 hopper or a chamber in which this wheel works. In feeding material which is in a finely-divided state—such as baking-powder, for example—it is essential that the mouth of this hopper B' be completely closed by wheel 130 G, for if any space be left between the sides of the hopper and the teeth of this wheel the material would be apt at any time to pour down through this opening and the feed would

be irregular, while with the arrangement which we have shown the feed is always uniform and regular. A shaft h^3 , upon which wheel G is carried, extends from the hopper and carries upon its end a bevel-gear h' , which gears into and is driven by a bevel-wheel h^2 upon the top of shaft J. The teeth upon wheel G run the whole length of the face of this wheel and collect and carry the material from the hopper B' and drop it down in small quantities through tube b' and tubes F F' to the box X. While the box X is being filled the machine is stationary, or at least that part of it operated by shaft C is stationary. The box X being filled from hopper B' rests upon the head k of a rod I, to which rod is attached by suitable means one end of the scale-beam H. This scale-beam is pivoted in standards j , carried by the base A' of the machine.

Upon the scale-beam H, which is graduated in the usual manner, is a sliding weight W, by means of which the quantity of material to be placed in the boxes is determined. The scales may be constructed in any of the well-known ways. Upon the rod I, which carries the box X being finally filled and weighed, is a pin l , (see Figs. 1, 22, and 23,) which, when the weight of the box X overbalances the weight W on the scale-beam, is lowered with the rod I and engages one end of a lever l' , which is carried by and pivoted on a standard S, carried by the frame A'. When the pin l throws down one end of lever l' , it raises the other end of this lever, which then throws up one end of a trigger t , which is pivoted to and carried by a spring s , which is carried by the frame A, Fig. 1. The outer end of spring s carries a stop s' , which until now has engaged the lower end of a pin p , carried by the upper friction-plate L on shaft J, causing this friction-plate to stand still. When the trigger t is thrown up, as shown, however, one of the lugs u , carried on the hub of the lower friction-plate K, engages this trigger and, running along its top, depresses said trigger and the spring s and releases the pin p from the stop s' . The friction between plates K and L now causes plate L to turn, and one of the pins p enters one of the slots q in the bottom of disk D and moves this disk around one space, bringing a new box upon the scales and removing the old one. This is the well-known star-wheel movement and is used in the present instance to limit the rotation of the disk D. The shaft C, disk D, the boxes to be filled, and the telescopic tubes F F' are driven by the gear-wheel N on shaft J, which drives gear-wheel O, which is fast on shaft C.

The plates forming the disks E E' are surrounded by a dust-proof band r , Figs. 1, 10, and 11. This band consists of an outer ring of metal r' and an inner ring r^2 , of felt or some other suitable material. The felt ring covers the joints between the plates and prevents all dust from escaping between them, and the metal ring r' holds the felt ring in place. The metal ring may be furnished with ears r^3 ,

through which a bolt r^4 may pass in order to hold this ring in place.

In order to allow the escape of air from the telescopic tubes F F' while being filled with the material from the hopper B and to prevent the escape of dust from the machine, we use a small pipe v , Figs. 1, 8, 9, and 12, one end of which communicates with the interior of the tubes F F' which are being filled by passing through the plate f , as clearly shown in Fig. 8, and the other end of which communicates with another set of the telescopic tubes by passing through the plate f . The air and dust escape through the tube v from the tubes which are being filled to an empty set of tubes. It is very important in weighing and filling cans with poisonous substances—such as paris-green, for instance—that no dust escape; but in weighing and filling non-poisonous substances it is not necessary to exercise such great care to prevent escape of dust.

The cups d , which carry the boxes to be filled and weighed, are suspended in the orifices D' in disk D by means of the pins d^2 , Fig. 14. These cups have flaring bottoms d' , and the bottoms of the orifices are correspondingly flared, as shown. Before the cups and boxes are placed upon the scales it is necessary to raise them up. This is accomplished by a platform w , Figs. 1, 18, and 19, the forward end of which is bent down, as clearly shown in Figs. 1 and 19, and against which the bottom of cup d strikes and rides up until the bottom of the cup is flush with the bottom of the disk D. The flaring bottom d' of the cup entering the corresponding flaring orifice in the disk D and being accurately centered thereby, the cup slides along the top of platform w until it reaches its end, when it slides onto the head k of the rod I, which is connected with the scale-beam, as already described. The platform w is carried by a standard w' , secured to the base A' of the machine. After the material has been weighed the disk D is revolved, as before described, and the cup d and the full box x are removed from the rod I, the cup d dropping down until caught by the pins d' . The material is now packed in the box by the following device: R, Figs. 1 and 16, is an arm, one end of which is pivoted to frame A at R', and the other end of which rests on the top of friction-plate L and touches at the same time the bottom of the cup d , which carries the box which has just been moved off the scales. Upon the bottom of sleeve m^2 is a collar M, which is furnished with a number of notches or cams m , upon which a projection R², which may carry an anti-friction roller, if desired, rests. As the sleeve m^2 is revolved with the shaft J, the notches or cams m on collar M raise the arm R, which raises the cup d and full box X, which, when the projection R² reaches the end of the incline on the cams, falls and jars the material in the box X and settles it. The rising and falling of the arm R is continuous

and rapid, and the jarring which it gives to the full box X perfectly packs the material in it.

The shaft C is made in two pieces, as shown in Fig. 1, the lower piece C' having an L-shaped piece cut out of its top and the upper piece C having a corresponding piece cut out of its bottom. These pieces are placed together, as shown, and are held in place by a collar C² and set-screws C³, making practically one shaft. If it is desired to move the upper part of the machine for any purpose, it can be done by simply loosening the screw or screws C³. The shaft J is constructed in a similar manner. After the boxes have been weighed and packed they are removed from the machine by the attendant and empty boxes are put in their places.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. The combination, in a weighing-machine, of devices adapted to charge a package with a certain quantity by measure of the material to be weighed, devices adapted to move said package when so charged onto a scale-beam, and devices adapted to put into said package a sufficient quantity of said material to make up the requisite weight and then cut off the supply by the action of the scale-beam.

2. The combination, in a machine for automatically filling, weighing, and packing boxes, of two hoppers, a series of telescopic measuring-tubes adapted to be filled from the first or larger spout, stationary and carrying disks for cutting off the flow of material to and for carrying said telescopic tubes, with weighing mechanism and a box-carrier and mechanism for moving the boxes and the telescopic measuring-tubes into and out of line with the spouts of the hopper as the weighing mechanism dictates, substantially as set forth.

3. The combination of the hoppers, the telescopic measuring-tubes and disks for carrying the same into and out of line with said hoppers, and the upper and lower stationary disks,

the former being furnished with orifices for allowing the material to pass from the spouts to the telescopic tubes, and the latter being furnished with orifices through which the material may pass to the boxes to be filled, said stationary and moving disks and orifices being adapted to cut off the flow of material to and from said telescopic measuring-tubes, substantially as described.

4. The combination of the intermittently-moved box carrying disk D, having orifices D', with flaring bottoms, as shown, the platform w, and the cups d, with flaring bottoms d', all substantially as and for the purpose set forth.

5. The herein-described device for packing the material in the boxes after they have been filled and weighed, consisting of an arm pivoted to the frame of the machine or to some other suitable support, and which touches the bottom of the cup carrying the filled box, and a collar furnished with notches and carried by the main shaft of the machine and adapted to give a reciprocating jarring motion to said arm.

6. The combination of arm R, pivoted at one end to the frame of the machine and furnished with a projection R², collar M, furnished with notches or cams m, and shaft J, said cams upon said collar being adapted to raise and drop said arm, which in turn is adapted to jar the filled box in order to settle and pack the material in it.

7. The combination, with shaft J and suitable means for driving the same, as shown, of friction-disk L, carrying pins p, and friction-plate K, friction-disks o', and gear-wheel N, gear-wheel O, shaft C, and disk D, with slots q, all substantially as and for the purposes set forth.

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