E. B. ELDER.

AUTOMATIC PACKAGING EQUIPMENT.

APPLICATION FILED AUG. 15, 1919.

1,421,925. **Patented July 4, 1922.**

6 SHEETS—SHEET 1.

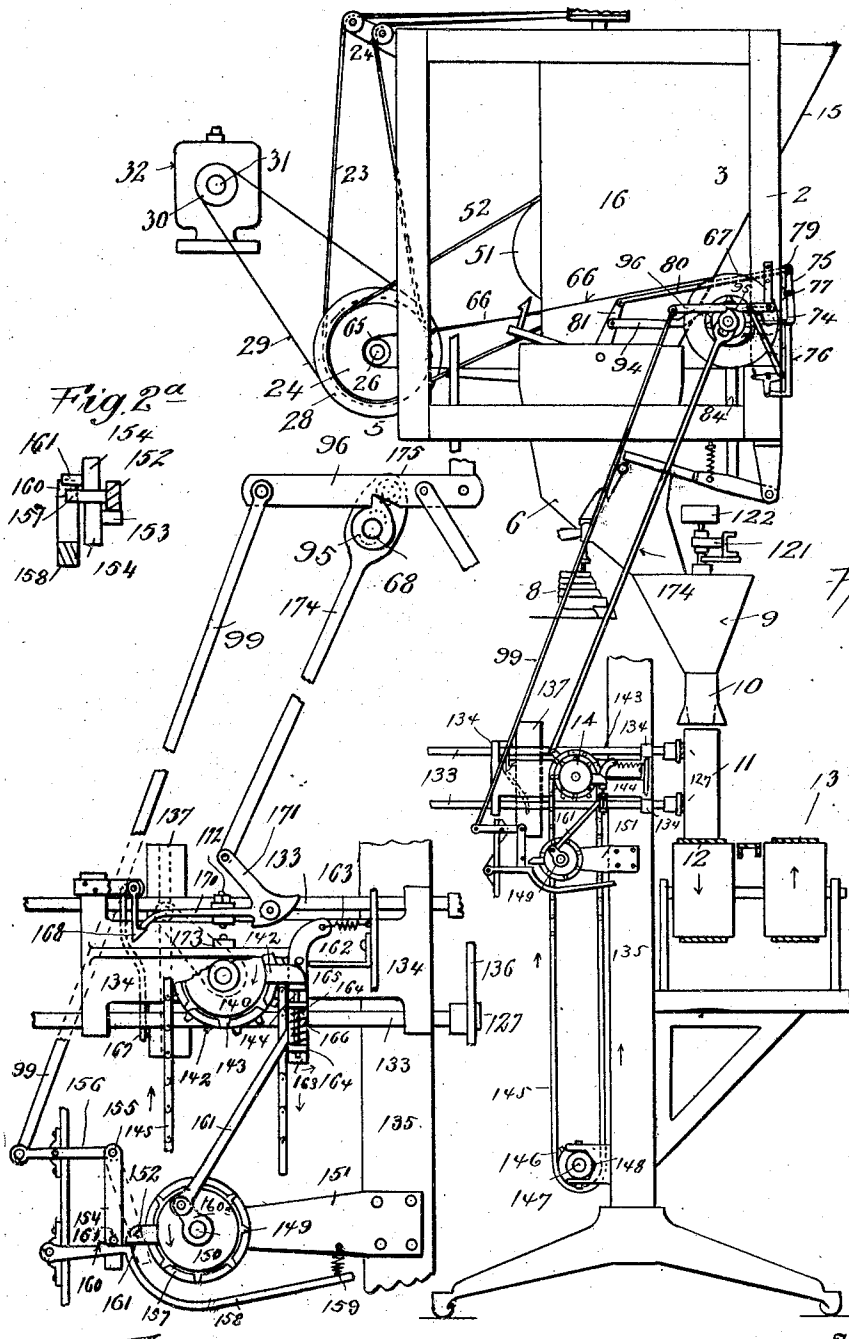

Fig. 1.

Fig. 2a.

Fig. 2.

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6 SHEETS—SHEET 2.

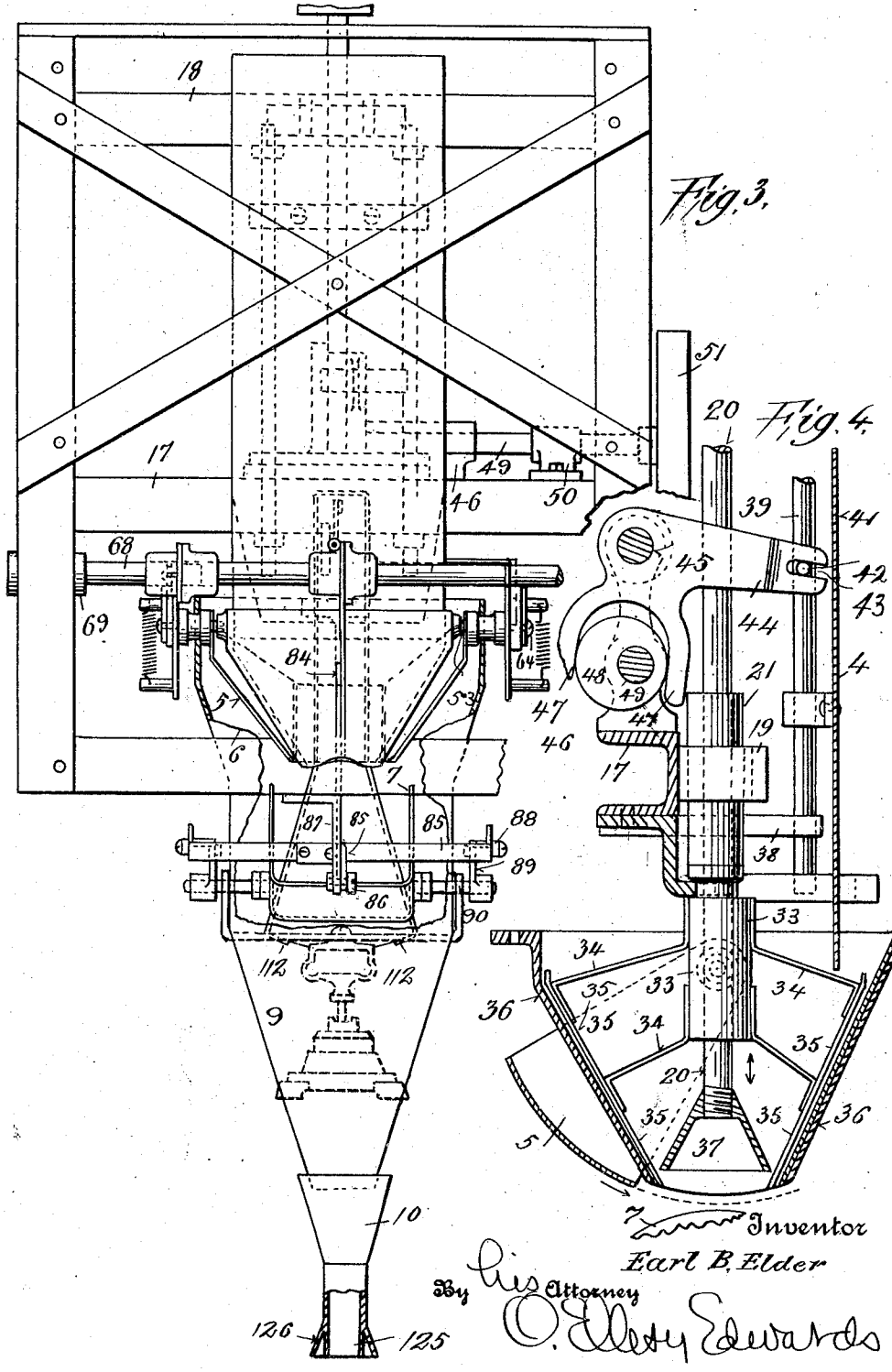

Fig. 3.

Fig. 4.

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6 SHEETS—SHEET 3.

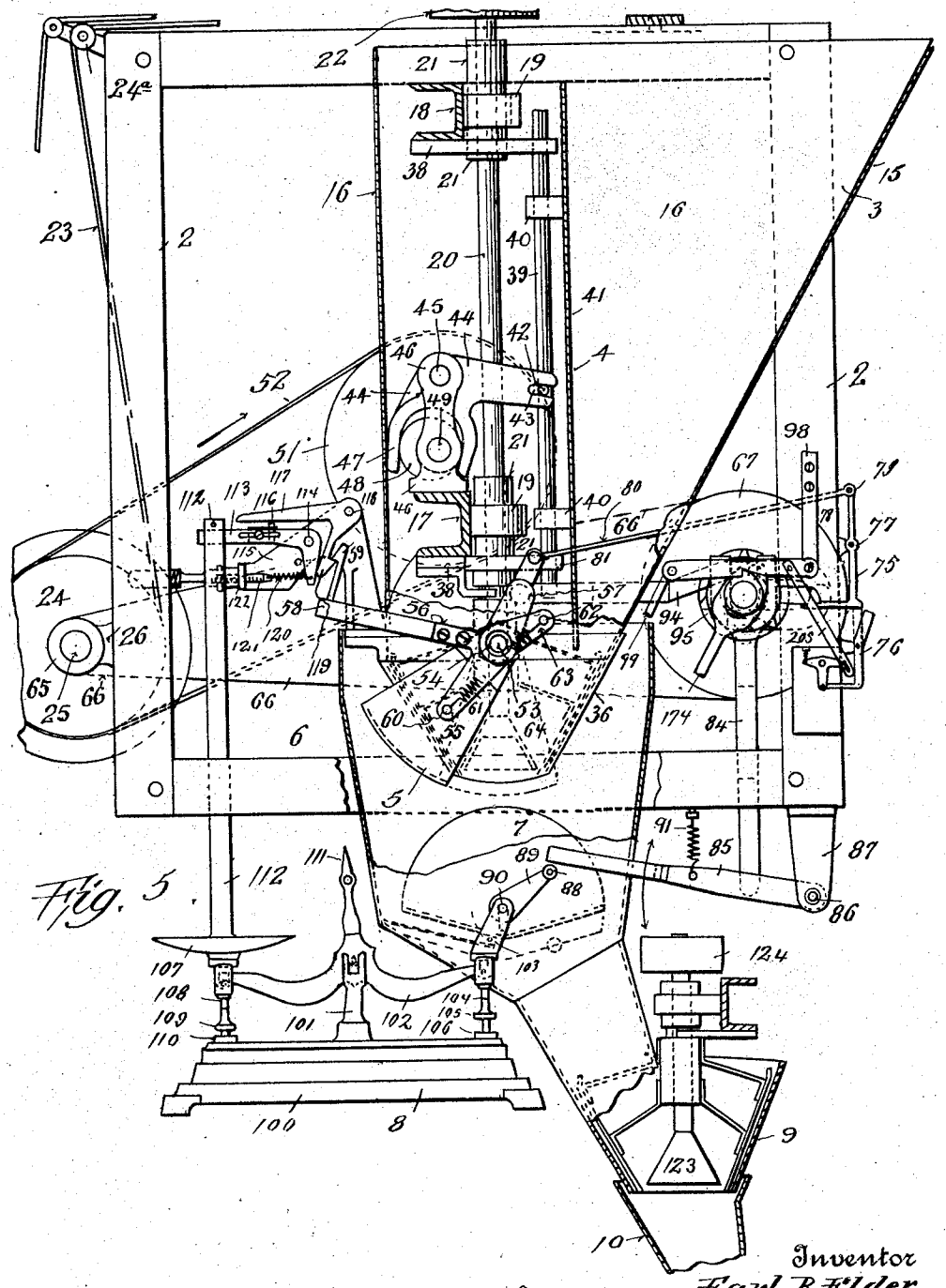

Fig. 5.

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6 SHEETS—SHEET 4.

Fig. 6.

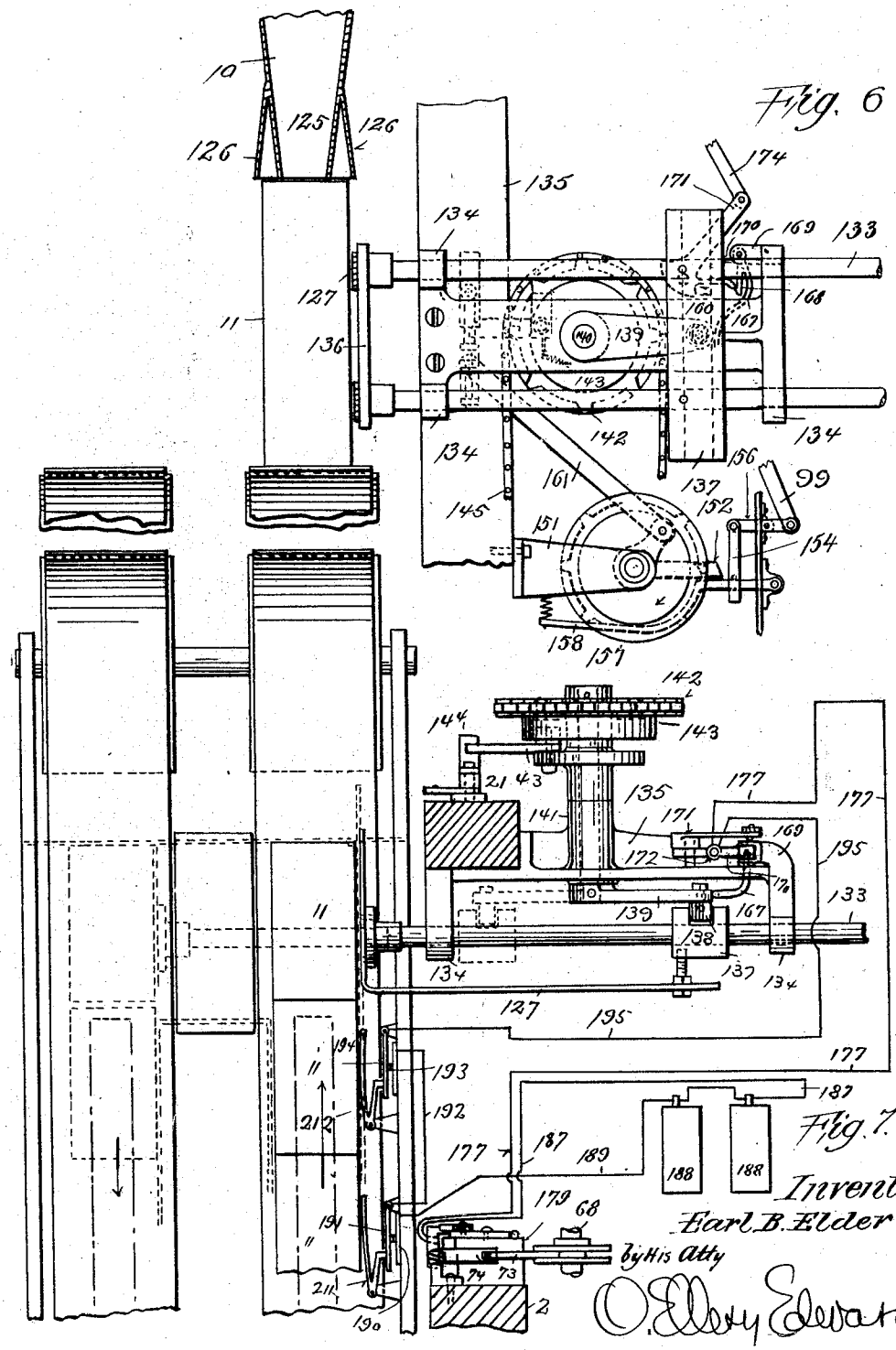

Fig. 7.

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6 SHEETS—SHEET 5.

Fig. 8

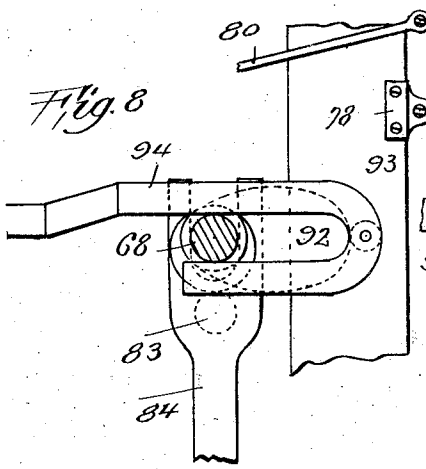


Fig. 9

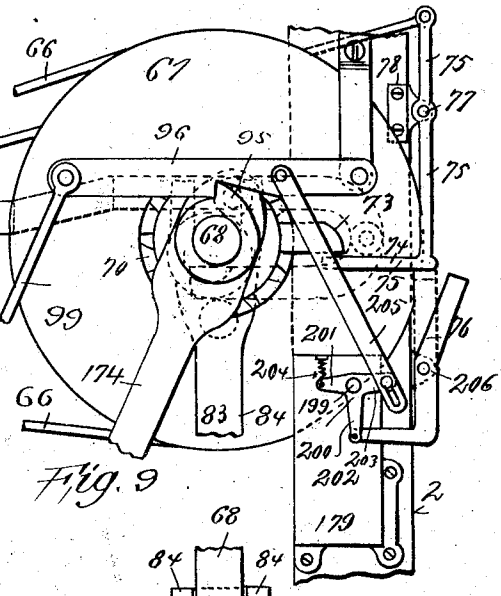


Fig. 11

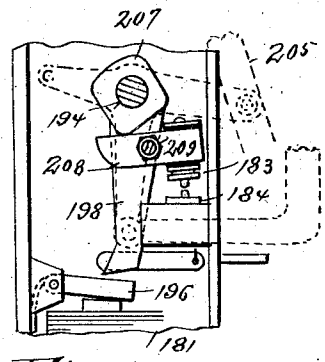


Fig. 10

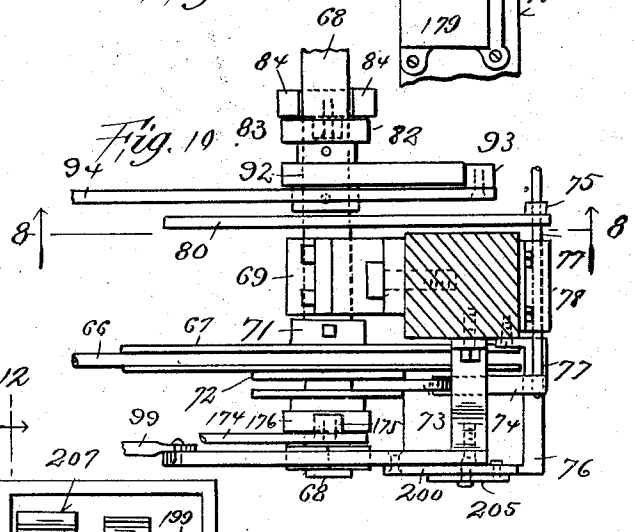
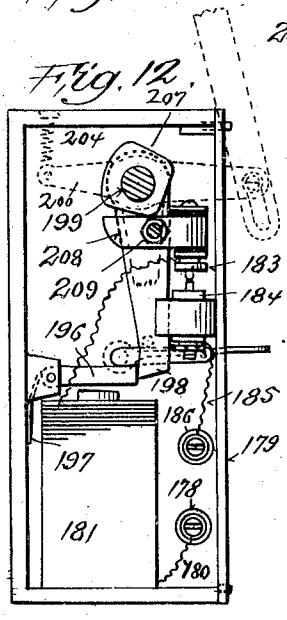


Fig. 12



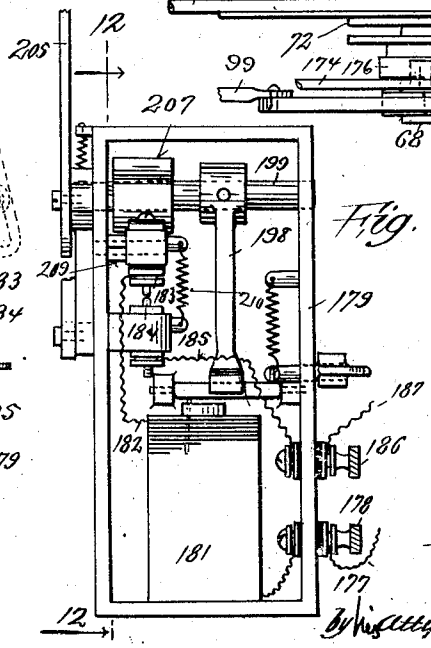


Fig. 13

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6 SHEETS—SHEET 6.

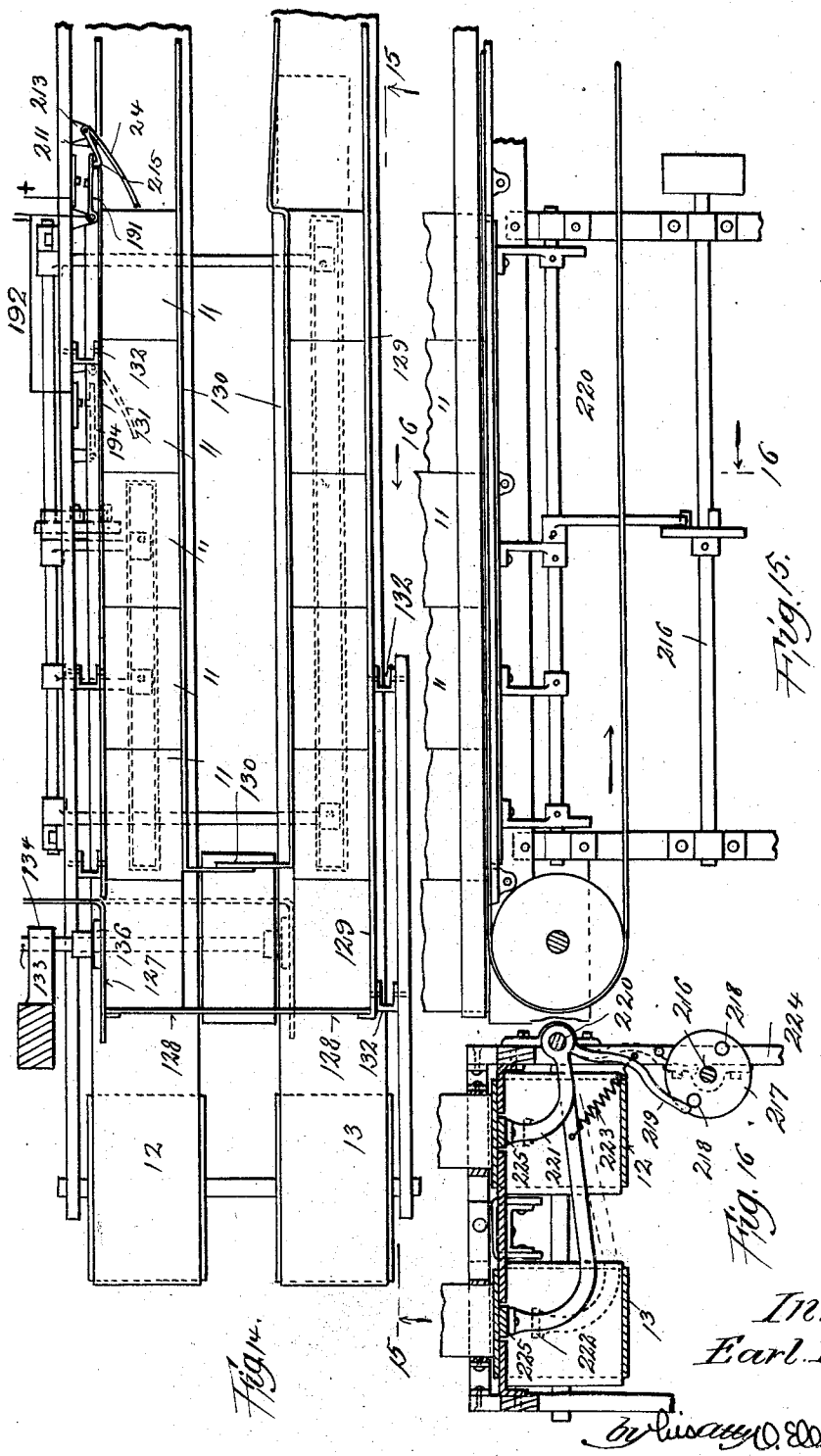

Fig. 14.

Fig. 15.

Fig. 16.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC PACKAGING EQUIPMENT.

1,421,925. Specification of Letters Patent. **Patented July 4, 1922.**

Application filed August 15, 1919. Serial No. 317,698.

To all whom it may concern:

Be it known that I, EARL B. ELDER, a citizen of the United States, and a resident of the city, county, and State of New York (whose post-office address is 52 Broadway, New York city), have invented a new and useful Improvement in Automatic Packaging Equipments, of which the following is a specification.

The object of my invention is to provide a device which will accurately and automatically weigh, deliver and pack pulverulent material, such as tea, coffee, cocoa, spice, salts, chemicals or similar materials. This object is accomplished by my invention, wherein are provided one or more of the following instrumentalities, namely: the agitating mechanism, a gate mechanism, a weighing mechanism, a delivery mechanism, a carton or package container mechanism, automatic means for preventing any undesirable action of any of the mechanisms, package agitating mechanisms and package delivery mechanism.

For a more particular description of my invention, reference is to be had to the accompanying drawings, forming a part thereof in which:

Figure 1 is a side elevation of my apparatus with parts in section.

Figure 2 shows a portion of the package shifting mechanism and safety devices, and Figure 2^a is a section of a detailed construction.

Figure 3 is an enlarged elevation of the upper portion of the apparatus, the view being taken at right angles to the view shown in Figure 1, and at the right side thereof.

Figure 4 is a sectional view showing the gate and agitating mechanism connected therewith.

Figure 5 is a side elevation, somewhat enlarged and partially in section, of the structure shown in the upper part of Figure 1 with certain parts omitted.

Figure 6 is a side elevation somewhat enlarged of the package transferring mechanism shown in Figure 2, the view being taken on the opposite side from that in which Figure 2 was taken.

Figure 7 is a plan view of the structure shown in Figure 6.

Figure 8 is a detailed view showing a cam and connected mechanism for opening the gate and tilting the weigh pan, the section being taken on the line 8—8 of Figure 10, looking in the direction of the arrows.

Figure 9 is a side elevation of a portion of the mechanism for shifting the gate, scale, pan and other parts.

Figure 10 is a plan view of the structure shown in Figure 9.

Figures 11, 12 and 13 show an electric safety mechanism, which prevents the weigh pan from discharging out of time, Figure 12 being a sectional view taken on the line 12—12 of Figure 13, looking in the direction of the arrows, and Figure 11 shows a portion of the mechanism in a different position from that indicated in Figure 12.

Figure 14 is a plan view of the belt conveyor mechanism for moving cartons towards and away from the loading chute.

Figure 15 is a sectional side elevation of the structure shown in Figure 14, the section being taken on the line 15—15 and looking in the direction of the arrows.

Figure 16 is a sectional view taken on the line 16—16 of Figure 15, looking in the direction of the arrows.

Throughout the various views of the drawings, similar reference characters designate similar parts.

My improved machine 1 is provided at its upper portion, with a suitable frame 2, which carries a hopper 3 in which is placed an agitator 4, and at the bottom of this hopper is a gate 5 which extends into a chute 6 which has a scale pan 7 of a scale 8 mounted therein, and this scale pan 7 dumps into the chute 6 which delivers into a hopper 9 which is connected to a delivery tube 10, beneath which may be placed a carton or other receptacle 11 which rests on a belt 12 which is provided with a suitable agitator, for condensing the material placed in the carton or box and expelling air. After said carton is filled, it is shifted to a belt 13 by a shifting mechanism 14, and further vibrated and these various mechanisms are so timed and arranged that they will cooperate together and produce accurate automatic weighing, delivering, filling and compacting in a manner which will be more particularly pointed out in the detailed description which will now be given. After

the final compacting the packages are delivered by a peculiar delivery apparatus.

The upper hopper with its agitating and gate mechanisms.

In order that the mechanism may function properly it is essential that the upper hopper, which receives all pulverized material from any suitable source, should deliver the same in a constant stream which is properly shut off when the desired amount of material has been delivered to the weighing mechanism. To perform these functions and to secure the desired results, in the preferred embodiment of my invention, I provide the hopper 3 with one sloping wall 15 and with vertical walls 16 on the other sides. The hopper is supported from the frame 2 by two horizontally disposed crossings 17 and 18 which are provided with bearings 19 in which is mounted the rotary shaft 20, which is kept in place by means of suitable collars 21 which are fixed on the shaft. The upper end of the shaft 20 is provided with a suitable pulley 22 which is run by a belt 23 that runs over idle pulleys 24ª supported from the frame 2 or in any suitable manner, and this belt runs to a pulley 24 mounted on the main shaft 25 of the machine, which is mounted in suitable bearings 26 that run from the frame 2. The shaft 25 is driven in any suitable manner, as by a pulley 28, which carries a belt 29 which runs on a pulley 30 on the armature shaft 31 of a motor 32 which is supported in any desired way and runs from any source of power that may be convenient. The lower end of the shaft 20 is provided with a collar 33 which has radiating arms 34 fixed thereon and preferably extending radially and adjacent arms are connected by blades 35, as shown in Figure 4. These blades rotate near the bottom or bowl of the hopper 3 and prevent any undue accumulation of material in the hopper. The bottom 36 is circular in cross section. The extent of the opening in the bottom of this part 36 will vary according to the nature of the material, which is being weighed. To permit adjustment for this purpose, I provide the extreme lower end of the shaft 20 with a truncated cone 37, which is connected to this shaft by screw threads or in any other suitable manner and may be raised or lowered on this shaft by turning. When lowered it is brought close to the blades 35 and thereby reduces the size of the opening, and when raised it is taken away from these blades and enlarges this opening. From the foregoing it is apparent that when the shaft 20 is rotated, all material in the bottom 36 is stirred by the blades 35 and arms 34, and can, at a suitable time, pass between these blades and the cone 37 and through the opening below this cone. It is not necessary to operate this shaft continuously, although this may be done if desired. It is sufficient to operate intermittently and while material is flowing through the opening.

Mechanism for permitting the free and even flow of material into the bowl 36 and maintaining a substantially even control over the feed parts, will now be described. The crossings 17 and 18 have guides 38 fixed to their lower surfaces, and these guides carry at their free ends, near the inclined wall 15, suitable parallel spindles 39 which may rise and fall in them, but have no other movement. The spindles 39 have brackets 40 fixed thereon, which carry a vertically disposed partition plate 41 which reaches from one wall 16 across to the other, and has its upper end near the top of the hopper 3 and its lower end near the bottom of the inclined wall 15. This partition 41 moves in a vertical direction only and is driven by a pin 42 which is fixed in a spindle 39 and rides in a recess 43 in a bell crank lever 44, which is fulcrumed at 45 in a bearing 46, which is mounted on the crossing 17. The bell crank lever 44 has a recessed lower arm 47 which engages an eccentric 48 mounted on a shaft 49 which is supported by the bearing 46 and also by a bearing 50, both of which rest on the crossing 17 and is driven by a pulley 51 which is fixed to the shaft 49. This pulley is driven by a belt 52 which runs to the pulley 24 on the shaft 25.

From this it is apparent that as the shaft 49 rotates, the bell crank lever 44 is oscillated and the spindles 39 are reciprocated, whereby the partition 41 is raised and lowered, and this raising and lowering of the partition prevents any arching or accumulating of the material in the hopper 3 and causes this material to flow with an even flow into the bowl 36 regardless of the amount of material in the hopper, so as to maintain practically a constant level of material in the bowl 36.

The bowl 36 is closed at its lower end by the gate 5 which is pivotally mounted on lugs 53 which extend laterally therefrom and near the top thereof. The gate 5 has fixedly connected therewith, suitable bosses 54, one about each pivot 53, and fixed to each boss is a plate with integral projecting arms 55, 56 and 57. The arms 56 are connected by a suitable bail 58 from which rises a catch 59 which is connected to releasing mechanism, which in turn is connected to the weighing mechanism 7 as will appear below. The arm 57 is connected to timing mechanism so that the gate can operate only under certain conditions and not discharge the material out of season. The arm 55 is provided with a post 60 which is connected to a tension spring 61 that runs to another post 62 on an arm 63 which is fixed to the pivot 53 by means of a suitable screw 64 or in any other desired manner. The spring 61 has

the function of swinging the gate so as to close the opening under the bowl 36, when the catch 59 is released and the timing mechanism permits. This timing mechanism will now be described. As it starts the gate when near a dead centre, the movement at first is slow but rapidly accelerates as the spring becomes more positive in its action with the result that the gate is closed promptly.

The shaft 25 has a small pulley 65 on which is mounted a suitable belt 66 that runs to a pulley 67 which is loosely mounted on a shaft 68 and this shaft is supported by suitable bearings 69 which are carried by the frame 2 at any convenient locations and preferably on the side opposite that which carries the shaft 26. This pulley 67 is fixed to an annular collar 70 with teeth projecting therein and means are provided for preventing the pulley 67 and collar 70 from moving in the direction of the axis of the shaft 68 such as a collar 71 on one side which is fixed to the shaft in any suitable manner, and a larger collar 72 on the other, which has a spring pressed dog 73 pivotally mounted therein. The dog 73 and connected parts on the shaft 68 constitute a "dog clutch" of the conventional kind where the clutch releases the pulley 67 from the shaft 68 while engaged at its free end and not otherwise. This dog 73 engages the lower and inwardly extended end 74 of the lever 75 and which is provided with a part which engages a lever 76 which will be described below. The lever 75 is fulcrumed at 77 on a bracket 78 which extends from the main frame 2, and the upper end of this lever is pivotally connected at 79 to a link 80 that runs to an arm 81 and is pivotally connected therewith. This arm 81 is fixed to the arm 57 and moves with the same.

To make clear the action of the link 80 and its connected parts, it is necessary to describe the cams on the shaft 68 and their connections.

The shaft 68 has fixed thereon, a cam 82 which engages a roller 83 near the end of a slotted link 84 and this link is mounted to slide in suitable guides secured to the frame 2, and at its lower end it is pivotally connected to a lever 85 which is bifurcated at the free end so as to engage two pintles 88 mounted at the ends of crank arms 89 which are fixed on the pivot 90 of the scale pan 7 so that when the cam 82 is turned the proper amount, the scale pan 7 is dumped. A coil spring 91 which is secured to the frame 2 and lever 85 causes the roller 83 to closely follow the cam 82 and raises the lever 85 and permits the scale pan to resume its normal position. Another coil spring about the shaft 90 (not shown) causes the scale pan 7 to return to its normal position.

The shaft 68 has also fixed thereon, another cam 92, which is adapted to engage a pintle 93 on the end of a bent link 94. It is bent so as to surround the shaft 68 with an elongated slot and the other end of this link 94 is pivotally connected to the arm 57 so that the gate 5 may be swung into its open position under the influence of the cam 92 and when in this position, the catch 59 may engage the tripping mechanism, which will be described below, and the gate will be held open until the tripping mechanism operates, and it is closed by the tension of the spring 61.

Another cam 95 is fixed to the shaft 68 at its extreme end, and this case is an ordinary snail shaped cam, adapted to engage with a lever 96 pivoted at 97 at a bracket 98 which is fixed to the frame 2, and this lever 96 is pivotally connected to a link 99 that runs to the shifting mechanism 14 so that the shifting mechanism will be properly timed with regard to the other mechanism of this device. The details will be set forth below.

The weighing mechanism.

The scale 8 may be any suitable kind of a scale but is preferably a weight scale rather than a spring scale, and is provided with a base 100 with a center pedestal 101 on which is placed a beam 102 in the conventional manner. The pan 7 is supported from this beam 102 at one end and is pivotally mounted, as above described, on a rod 90 which is journalled in a suitable bracket 103 which is suitably connected to said beam through a pivotal connection and below this bracket extends a rod 104 with a stop 105 which is adapted to connect a corresponding check block 106 on the pedestal 100. The other end of the beam 102 is provided with a weight pan 107 which is mounted in the conventional manner and guided by a rod 108, which also has a stop collar 109 adapted to engage a check block 110 on the pedestal 100. Any desired weight may be placed in the pan 100 according to what weight of material is to be weighed and delivered by the machine. For the purpose of illustration it will be assumed that the weight is one pound, although it is obvious that any other weight may be employed. The weight beam 102 is also provided with a pointer 111 of the usual kind and for the usual purpose which indicates when the beam is balanced.

Extending upwardly from the pan 107 is a strap 112 which is fixed thereto and adapted to ride over and normally rest upon the free end of a lever 113, which is fulcrumed at 114 on a bracket 115 which is fixed to a projection which extends from the bowl 36 or is mounted in any other convenient way. The lever 113 is preferably a bell crank lever which has its larger and

horizontally disposed arm at the top and this arm is preferably made in two parts so that it may be adjusted. This upper arm is also provided with a projection 116 which is adapted to engage the under surface of a lever 117 fulcrumed at 118 on the bracket 115 and provided at its lower end with a diagonally disposed and downwardly extending catch 119, which is adapted to engage the catch 59 to hold open the gate 5. Enough has been said to show that by adjusting the horizontal arm of the lever 113, the projection 116 may be moved one way or the other for a limited distance so as to modify the action of the lever 117 to produce a quick release which may be regulated. The downwardly extending arm of the lever 113 is provided with a spring 120 which runs to an adjusting screw 121 so that it may be given any desired tension, and this screw is mounted in an ear 122 which extends from the bracket 115.

From the foregoing, it is apparent that normally when there is very little or no material in the scale pan 7, the weight on the pan 107 will force the collar 109 against the check block 110, and then the strap 112 will rest on the lever 113, and this will cause the lower arm of this lever to press the catch 119 against the catch 59 or in the direction of this catch. When the material on the scale pan 7 approaches the predetermined weight, the pan overbalances the weight and thereafter the pan 107 rises and so does the strap 112, whereby the lever 113 is free from all restraint which normally prevents it from moving upwardly in its horizontal extension. The spring 120 then becomes active and draws the vertically disposed and lower end of the lever 113 towards the ear 122, and this causes a slight disengagement from the catch 119 and a slight elevation of the projection 116, which in turn elevates the lever 117 and causes the catch 59 to disengage. The exact time that it takes these catches to disengage depends upon how much overlap there is and how far the projection 116 is from the fulcrum 114, and the tension of the spring 120. By adjusting the tension of this spring and the location of this projection, it is possible to regulate the time of disengagement of the parts 59 and 119 when the material is being weighed. No two materials have exactly the same weight and exactly the same specific gravity with the result that some materials fall through air more readily than others and while falling absorb more or less air. By trial the correct positions of the parts 59 and 119 are determined so that the strap 112 will rise when the pan 7 has received almost the complete load and enough material remains in the air to complete the load. Then by timing, as above described, it is possible to release the catch 59 so that the spring 61 will close the gate 5 and shut off the material with great accuracy so that in weighing out say one hundred pounds of a commodity, such as cocoa, each package will contain a pound of cocoa with so slight an error in each package as to constitute perfect weights in the ordinary commercial meaning of that term. When once the material is weighed, it is passed to the delivery mechanism which will now be described.

The delivery mechanism.

The delivery mechanism is embraced in the hopper 9 and receives material from the chute 6. It may be of any desired form, but, in the preferred embodiment of my invention, it is provided with a stirring mechanism 123 which is in substance the same as the stirring mechanism above described which is carried by the vertical shaft 20 and includes the inverted cone 37 and the blades 35 and their connected parts. These are shown in the lower part of Figure 5. This mechanism is driven by a suitable pulley 124, which derives power from any suitable source, not shown. At the lower end of the hopper 9, is a delivery tube 10 which may be made integral with the hopper, as shown in Figure 1, or as a separate instrument as shown in Figure 5. In either case the lower end of this tube 10 is provided with a contracted inner nozzle 125 which is surrounded by an outer petticoat flange 126, which is preferably made integral therewith and is no larger than the carton to be filled and is preferably the shape of the upper end of the carton. The reasons for this is that when the granular or pulverulent material falls into the carton, or container, it carries air, also displaces air already in the container and this escaping air carries with it the fine particles of product forming a cloud of dust. As soon as the dust strikes the inner surface of the petticoat 126, it loses its velocity and falls back quietly and without spreading into the space about the carton. This is true, although there is a slight gap between the upper edge of the carton and the lower edge of the tube 10. This is the only device that I know of which avoids physical contact with the carton while the same is being filled with cocoa or similar powder and yet prevents any material amount of dust from escaping. So far as I know, this feature is absolutely new both in form and function, and forms a very valuable feature of my invention. The tube 10 and its connected parts may be run continuously, if so desired, although in the embodiment of my invention herein shown, this tube operates only intermittently, although the stirring apparatus 123 may run continuously.

From the chute 10, the material runs to a carton 11 which rests on the delivery belt 12

and remains there until the shifting mechanism 14 operates to shift the carton after it is loaded. This shifting mechanism will now be described.

Shifting mechanism.

The shifting mechanism is provided with upper and lower angle bars 127 each of which has two parts, one adapted to bear against the carton 11 while being filled and shifted, and the other, running at right angles thereto, and adapted to prevent any other carton from getting under the chute 10, until after the removal of the first carton and the complete return of these bars to their original position. It will be understood that the belt 12 keeps pressing one carton against another while one is held by a stopping device, one of which will be described below. At this time it is sufficient to state that over the belts 12 and 13 is placed a horizontally disposed stop bar 128 against which a carton 11 rests while being filled. When this carton is moved laterally of the belts 12 and 13 under the influence of the angle bars 127, as indicated in dotted lines in Figure 15, it rubs against this bar 128 and has its movement finally limited by a guiding bar 129 which is set longitudinally over the belt 13. A corresponding inner guiding bar 130 is set over the belts 12 and 13 and has overlapping and laterally extending ends which run parallel to the bar 128. There is an additional guiding bar 131 on the outer edge of the belt 12, and all these guiding bars are located at the bottom of the cartons and close to the belts so that the movement of the cartons on the belts and under the influence of the belts is always accurately determined. These guiding bars are supported by suitable brackets 132 which are separated from the table of the machine in any suitable way.

The angle bars 127 are mounted on the laterally disposed shafts 133 which reciprocate in suitable guides 134 which are carried in any suitable way from the frame 135 of the machine. At the angle bars 127 these bars 133 are connected to a crossing 136 and between the bearings 134 they are connected by a slotted bar 137 which is fixed to them. This slotted bar has a gideway for a pintle 138 mounted on a crank arm 139, which is fixed on a shaft 140 which is journalled in a suitable bearing 141 in the frame 135. This shaft 140 carries an idle sprocket 142 which is fixed to a part of a dog clutch 143 and has a connection with a spring pressed bar or dog of the conventional kind, which is carried by this clutch so that when this dog is released, the sprocket wheel 142 becomes rigidly connected to this shaft 140 and will rotate the same. The sprocket wheel 142 is continuously driven by means of a suitable sprocket chain 145 which is driven from any suitable source of power, such as a sprocket wheel 146 on a shaft 147 mounted in suitable bearings 148. The source from which the power is derived to run the shaft 147 is not shown, but it may be any suitable source, such as an electric motor. From any other suitable source of power a chain, not shown, drives a sprocket wheel 149 which is mounted on a shaft 150 so as to normally run idle and this shaft is journaled in a suitable bearing 151 which is mounted from the frame of the machine. The sprocket wheel 149 may be fixed to the shaft 150 whenever the dog clutch 152 is released from the pin 153 where it is normally held. The pin 153 is mounted on a bell crank lever 154, (see Figure 2[a]) which is fulcrumed at 155, (see Figure 2) in a bracket 156 fixed to the frame of the machine or any other suitable support. This bell crank lever 154 is pivotally connected to the link 99 and shifts when the lever 96 is raised by the cam 95, as above described. When it is so shifted, the dog member 152 is separated from the pin 153 and free from the same and starts moving in an anti-clockwise direction when viewed as shown in Figure 2, and as it moves the pin 157, which is fixed therein, engages the pivot catch 158 and knocks the same down. This catch 158 is pivoted at one end to any suitable support and at the other end is held up by a spring 159 or any other suitable means. The pivoted catch 158 has an upwardly projecting lug 160 adapted to engage a pin 161 on the bell crank lever 154 so that when the bell crank lever makes its movement, it rides up the inclined side of the lug 161, and then falls abruptly and rests against the steep side so that the tension of the spring 159 holds the bell crank lever 154 away from the dog clutch 152 until the dog clutch is free from the pin 153, and then the pin 157 on the dog clutch 152 lowers the catch 158 and thereby releases the pin 161 from the projection 160 so that when the dog clutch 152 turns through 360 degrees it will come to rest on the pin 153, and this cycle of operations is repeated indefinitely.

When the dog clutch 152 is free, it locks the sprocket 149 and the shaft 150 together, and then the sprocket 149 slowly drives the shaft 150 and also the crank 160[a] which is fixed thereto and pivotally connected to a link 161 which runs diagonally and upwardly to a suitable pin on the pivoted bar 162 and this bar is connected with a coil spring 163 at its top so that it may rapidly restore this bar after displacement by the link 161. This bar 162 has two laterally extending ears 164 which serve as guides through which the shaft 163 of the stop 144 is passed. This stop 144 is normally kept away from the nearest ear 164 by a coil spring 166 so that the dog 143 will be brought to rest on a cushion and not too abruptly.

This spring 166 also permits a limited swing of the bar 162 towards the shaft 140 without disturbing the dog 143. When the stop 144 is swung free of the dog 143, the clutch operates to fix the sprocket 142 on the shaft 140 and then the shaft is driven from the chain 145 in the manner described above, and when so driven, the crank 139 acts to shift the slide 137 and connected parts in the manner above described, and shift a carton 11. This shifting can only occur when the link 161 is passing through a limited portion of its movement, say twenty or thirty degrees of the movement of the crank 160^a and as this sprocket wheel 149 is timed to have a slow movement as compared with the sprocket wheel 142, it is obvious that the dog 143 is released sometime after the link 99 is shifted say five seconds thereafter or whatever time is required to allow the granular or pulverulent material to be measured, dumped and received in the carton 11. The link 160^a and its connected parts might be called a relay mechanism because it acts so as to delay the shifting of the carton, as above described. This delay in shifting prevents any carton from being moved before the discharge from the chute 9 is complete. However, this is not sufficient. Additional mechanism must also be provided to prevent any discharge from the chute 10 when a carton is not thereunder, and also until after the filled carton has been shifted and an empty one has taken its place. Such a mechanism will now be set forth.

The safety mechanism.

The crank arm 139 is adapted to wipe a cam 167 which is fixed to a catch 168 and both these are pivoted from a bracket 169 which is fastened to the fixed guide 134. The catch 168 is adapted to engage an arm 170 extending from a rocking lever 171 which is pivotally supported and provided with a contact 172 which is normally kept off another contact 173 by said catch 168, but is allowed to go in contact with the part 173 after the releasing of this catch and the catch releases when the cam 167 is struck by the crank 139. The rocker 171 is pivotally connected to the link 174 and this link runs up to the shaft 68 which it straddles and is provided at its upper extremity with a pintle 175 which engages a cam 176 fixed to the shaft 68. This cam is so timed that the rocker 171 is thrown down while the catch 168 is thrown back through the action of the crank 139 which has been described above, and then a circuit may be closed through the contacts 172 and 173.

This lever 171 and link 174 serve no purpose except to cause this timely opening of the circuit at these points 172 and 173 and so prevent the action of discharging the completed weight of material from the pan before the work of the delivering and carton transfer mechanisms has been completed as will appear as this description proceeds.

This circuit will now be described and will be understood by referring to Figure 7 and Figures 10 to 14 inclusive. Beginning with the contact 173, the circuit may be traced through a wire 177 which runs to a binding post 178 on a switch box 179, which is fixed to the frame 2 at any convenient location and adjacent to the lever 76. From the post 178 a wire 180 runs to a magnet 181 and from there a wire 182 runs to a movable contact 183 which may engage a second contact 184 which in turn is engaged by a wire 185 extending to a binding post 186 and from there a wire 187 runs to a battery 188 which is preferably formed by several dry cells connected together in any suitable way but may be made in any desired manner and from the battery 188 a wire 189 runs to a contact 190 at which the circuit may be opened or closed. It is opened when a second contact 191 is allowed to swing away and closed when the contacts 190 and 191 are together and from the contact 191 a wire 192 runs to a second fixed contact 193 which in turn is adapted to engage a movable contact 194 which corresponds with the movable contact 191 and from there a wire 195 runs back to the contact 172 which can engage the contact 173 and thereby close the circuit. When the circuit is closed the magnet 181 may be energized and then it will draw its armature 196 against the tension of a suitable spring 197 which normally keeps the armature away from the magnet 181.

When the armature is raised by the action of this spring a catch lever 198 which is fixed to a shaft 199 journalled at the top of the box 179 cannot swing. The shaft 199, on its exterior end, has fixed thereon a cross arm 200 which has three branches which are arbitrarily numbered 201, 202 and 203. The branch 201 has a coil spring 204 which is connected to the top of the box 179 or to any other suitable place so that normally the arm 198 is forced against the armature 196 and held there or is over this armature. The branch 203 has a slotted link 205 pivotally connected thereto and also pivotally connected to the lever 96 so that when this lever is raised, the link 205 will lock the arm 200 against the tension of the spring 204. The arm 202 is pivotally connected to the lever 76, which is fulcrumed at 206 on a suitable bracket extending from the frame 2 of the machine.

The shaft 199 carries a cam 207 which is fixed thereon and in the box 179, and this cam is preferably shaped as shown in Figures 12 and 13 and so arranged and disposed that it can rub against and rock a lever 208 that carries the contact 183. This lever 208 is fulcrumed at 209 on a pin which projects

from the interior of the box 197. Assuming, for the moment, that the contacts are closed at 190 and 193 and also at 173 and 184 and the scale pan 7 has been filled in the normal manner and the gate 5 closed as above described, the dog 73 of the dog clutch on the shaft 68 is released by the withdrawing of the end 74 of the lever 75 and the shaft 68 then becomes attached to the pulley 67 and is driven thereby and the various cams and their connections operate as above described, so that the scale pan is dumped through the agency of the rod 84 and its connected parts, and a short time thereafter through the rods 99 and 174, the carton 11 is shifted and the movement of the belt 12 will bring another carton into place.

The foregoing is true upon the assumption that the lever 76 is free of the lever 75 as it is under normal conditions because the spring 204 keeps it in this position. However, soon after the lever 96 begins to rise under the influence of the cam 95, the link 205 is elevated and this overcomes the tension of the spring 204, and then the shaft 199 is rocked and the projection 198 slides over the armature 196 and becomes held thereby, as shown in Figure 13. (Before this and immediately following the dumping of the scale pan 7, the lever 75 has been returned to normal with the end 74 ready to engage the dog 73.) The projection becomes released when the magnet 181 is energized, as above described, and at that time the lever 96 has been sufficiently lowered so as not to cause the link 205 to interfere with the arm 200, and then the spring 204 is strong enough to shift the arm 200 and the shaft 199 to which it is fixed and swing the catch 198 forward over the armature 196, as shown in Figure 12. At the same time the cam 207 passes on the lever 208, and thereby causes the contacts 183 and 184 to part and open the circuit, which opening deenergizes the magnet 181 and allows the armature 196 to rest against the catch 198 in a position where the same will be held as soon as the link 205 again operates, as above described.

From the foregoing it is obvious that the lever 76 acts as a safety device which prevents flooding or spilling of the granular material passing through the hopper 9 through the untimely shifting of a carton 11. It is equally important that when a carton 11 is under the chute 10, it should be right side up and ready to be filled. To insure that it shall be as described, feelers are provided which are connected to the contacts 191 and 194 in a manner which will now be described. There are two feelers at different levels one, 211, is the first one that the cartons engage and the other 212, is the second one to be engaged. The feeler at the lower level opens the circuit when there is no empty carton, and the feeler at the higher level opens the circuit when the carton has fallen over with the long side up. Each feeler is provided with a pedestal 213, on which it is pivotally mounted, and it is provided with two arms 214 and 215, both of which are spring arms made substantially as shown, and adapted to shift on the pivoted contacts 191 and 194. When there is no carton passing the feeler 211, its resiliency causes it to swing out at once, as shown in Figure 14, and a corresponding action occurs with the feeler 212 if a carton passes by on its side instead of its base. In the latter case the circuit is opened and through the dropping in of a catch, it remains open until the trouble is corrected and the latch raised up by the operator.

The agitating mechanism.

Pulverulent material entrains air when delivered through the chutes, as above described, and it is essential that this air be gotten rid of so that the mass may be compacted and to do this it is desirable that the carton, after being filled, should be well shaken down. This is accomplished by providing the table which carries the belts 12 and 13 with a rotating shaft 216 driven from any suitable source of power, not shown, and this shaft carries a disc 217 from which extend suitable pins 218 which engage an arm 219 which is fixed to a shaft 220 which runs parallel with the shaft 216 and is preferably mounted above the same. The shaft 220 is provided with a number of laterally extending arms 221 and 222, the former shaking under the belt 12 and the latter under the belt 13. It is desirable that one of the arms 222 should be provided with a spring 223 which runs to a table leg 224, where it is secured so that the projection 219 will normally be drawn down against the pins 218 and receive movement from the same so that the belts 12 and 13 will receive a number of knocks in rapid succession, none of which are very severe, although those on the belt 13 are more severe than those on the belt 12. This agitating mechanism is made sufficiently long and extensive to produce the desired results. In the preferred embodiment of my invention, the two arms 222 and the two arms 221, at their extreme ends are connected by slats 225, as indicated which rest against the belts and lie in corresponding slots in the table. These belts are mounted in the conventional way on pulleys which it is not necessary to describe.

Operation.

In view of the foregoing, the operation of my improved apparatus will be readily understood. Assuming that the apparatus has been properly set and suitable cartons have been provided and material of the correct kind has been placed in the hopper 3,

this material is passed through the bowl 36 until stopped by the gate 5 in the manner above set forth. Immediately thereafter, the pan 7 is dumped and the pulverulent material passes through the hopper 9 and chute 10 to the carton 11. The relay mechanism and safety devices prevent any dumping of the scale pan 7 when there is no carton to receive the pulverulent material and also any premature dumping of this pan 7 so that the carton 11 is always ready to receive the material when it comes. In due season the carton is filled and any material which tends to rise into the lower recess of the chute 10 falls back of its own weight as above described. After the carton is filled and somewhat shaken down, it is passed from the belt 12 to the belt 13 where a further consolidation occurs and thereafter is delivered as above set forth.

While I have shown and described one embodiment of my invention, it is obvious that it is not restricted thereto, but is broad enough to cover all structures that come within the scope of the annexed claims.

What I claim is:

1. In an apparatus of the class described, a hopper with a bowl at its lower extremity, a vertically moving partition in said hopper and means for moving the same, a rotary agitating mechanism in said bowl and means for closing the lower end of the bowl when a predetermined amount of material has passed through the same.

2. In an apparatus of the class described, a hopper with a vertically disposed shaft and means for mounting the same, means for driving the same, an adjustably mounted cone on the bottom of said shaft and adjacent to the hopper walls, whereby the space between the cone and the hopper may be regulated by raising or lowering the cone.

3. In an apparatus of the class described, a hopper with a vertically mounted spindle therein, means for mounting the spindle, means for driving the spindle and blades fixed to the spindle and adapted to move adjacent to the walls of the hopper, whereby the accumulation of material near the walls of the hopper is prevented, and a vertical partition extending across between spaced walls of the hopper, said partition being movable in the hopper.

4. In an apparatus of the class described, a hopper with a vertically disposed spindle mounted therein, means for mounting said spindle, means for driving said spindle, a cone at the bottom of said spindle adapted to nearly close the lower end of said hopper and blades fixed to said spindle and adjacent to said cone and hopper for preventing the accumulation of material in the lower end of the same, and means adjustably supporting the cone on said spindle.

5. In an apparatus of the class described, a hopper with a vertically disposed spindle therein, means for mounting said spindle, means for driving said spindle, a vertically disposed partition plate adjacent to said spindle, means for moving said partition plate in the direction of its length and a cone at the lower end of said spindle adapted to nearly close the lower opening of the hopper.

6. In an apparatus of the class described, a hopper, a vertically disposed spindle mounted therein and means for driving the same, means for mounting the same, a vertically disposed partition plate adjacent to said spindle and means for mounting the same, means for driving the same in the direction of its length with a reciprocating motion, a cone at the lower end of said spindle adapted to nearly close the lower end of said hopper and blades mounted on said spindle above the cone and adjacent to the hopper which are adapted to scrape any excess material lodging near the lower end of the hopper.

7. In an apparatus of the class described, a hopper, a gate to control its outlet, a weighing scale having a dumping pan to receive material from the hopper, devices to retain the gate open, means for controlling said devices from the scale, means to actuate the dumping pan, and means controlled by the gate to cause operation of the last named means after the gate has closed the hopper outlet.

8. In an apparatus of the class described, a hopper with a swinging gate at its lower end, springs for causing said gate to close, mechanism for opening said gate in opposition to said springs, a catch mechanism for holding the gate open when the opening mechanism is inoperative, a weighing mechanism having means resting on said catch mechanism and rising free of the same when a predetermined amount of material has been placed in the weighing mechanism and means for causing the catch mechanism to release promptly thereafter so that the springs may close the gate and prevent further delivery of material to the weighing mechanism until after the gate opening mechanism has operated.

9. In an apparatus of the class described, a hopper with a gate mechanism for opening and closing the lower end of the same and a release for said gate mechanism which permits the closing of the same, said release mechanism consisting of two catches adapted to interengage, one of which is rigidly connected to the gate mechanism and the other to a lever, a second lever adapted to engage the first, a spring for shifting the second lever and causing the first lever to release the catches when not held down by the weighing mechanism, means for regulating the time of operation of said levers

and a weighing mechanism with means attached thereto for preventing any operation of the levers until a predetermined amount of material has been delivered to the weighing mechanism.

10. In an apparatus of the class described, a hopper with a rotary spindle mounted therein, means for mounting said spindle, a cone at the lower end of said spindle, means for driving said spindle and blades fixed to said spindle and adapted to rotate with it and near the flaring walls of the hopper and adjacent to the cone, and means adjustably supporting the cone relatively to the hopper and blades, whereby material is prevented from accumulating in the hopper and all material is passed through the hopper with an even and controlled flow.

11. In an apparatus of the class described, a cam shaft with a series of cams thereon and a loose pulley with a dog clutch through which it may be held to said shaft and made to drive the same, a hopper adapted to receive pulverulent material and a gate for closing the lower end of said hopper, a spring mechanism for causing said gate to close when the gate opening mechanism is inoperative; a cam on said shaft and connections for opening said gate at a predetermined time and in opposition to said spring mechanism, a weighing mechanism, means connected to said weighing mechanism for releasing said gate when a predetermined amount of material has been delivered from the hopper to the weighing mechanism, means connected to said gate and said dog clutch for causing the clutch to make the pulley drive the cam shaft when the gate closes, a second cam on said shaft and means connected therewith for dumping the scale pan of the weighing mechanism after the closing of the gate, the cam being so timed that all material in the air between the hopper and the scale pan is allowed to accumulate in the pan before such dumping, a chute below said scale pan adapted to receive the pulverulent material therefrom, belts for shifting cartons towards and away from said chute and mechanism for registering each carton in its true position under the chute and means connected with said cam shaft for preventing the carton shifting mechanism from operating until sufficient time has elapsed for the material to all get into the carton and also for preventing the pan discharging mechanism from operating so as to cause material to be deposited when no carton is ready to receive it.

12. In an apparatus of the class described, a hopper adapted to hold pulverulent material and a gate for closing the lower end of the same, a weighing mechanism under said hopper which is adapted to receive material from the same until the flow of material is stopped by the gate, a chute for receiving material from the weighing machine, means for placing a carton under said chute to receive material and means for preventing the gate from opening when a carton is not in proper position to receive material after weighing.

13. In an apparatus of the class described, means for weighing and delivering pulverulent material, means for placing a carton under said delivering means, means for shifting said carton after it is filled, removing means for said carton, means for holding said carton after removal, means for agitating said carton while being filled and means for agitating the carton on said holding means after removal from the filling means.

14. In an apparatus of the class described, a bowl with a vertical shaft mounted in the center thereof and adapted to be rotated, means for supporting said shaft, an adjustable cone mounted at the lower end of said shaft and adjacent to the opening at the lower end of the bowl and blades mounted on said shaft independently of said cone and adjacent to said bowl so that the cone may be adjusted without disturbing the relation between the blades and bowl.

15. In an apparatus of the class described, a weighing mechanism, a chute adapted to deliver pulverulent material to the weighing mechanism, a gate adapted to close the lower end of said chute, a spring adapted to close said gate and a tripping mechanism for releasing said gate so that said spring may act, said tripping mechanism involving a bell crank lever with a catch, a catch attached to the gate which engages the corresponding catch on the bell crank lever, a second bell crank lever adapted to actuate the first mentioned bell crank lever and cause the catches to release, a spring mechanism for shifting the second bell crank lever, and a device connecting the weighing mechanism with the second bell crank lever so that when the device rests on the second bell crank lever, the spring cannot actuate the same and as soon as the device is raised by the weighing mechanism off the second bell crank lever, the spring can and will actuate and shift the first bell crank lever and release the catch.

16. A weighing machine comprising balancing mechanism, a supply receptacle for material, a gate to control said supply, an arm connected with the gate, means to close the gate, a lever, latch means between the lever and arm to control the latter, and power means connected with the lever to cause the latter to urge the balancing mechanism to overbalance and permit release of the gate when a definite quantity of material has been weighed.

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