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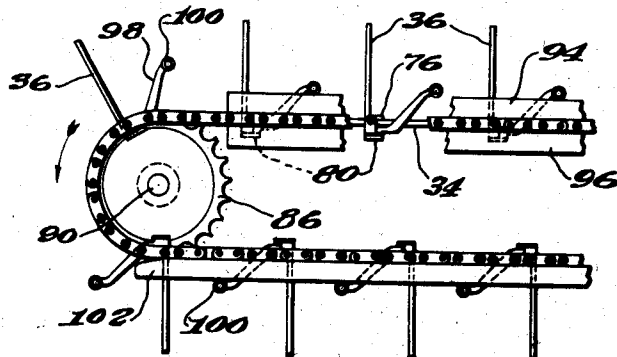
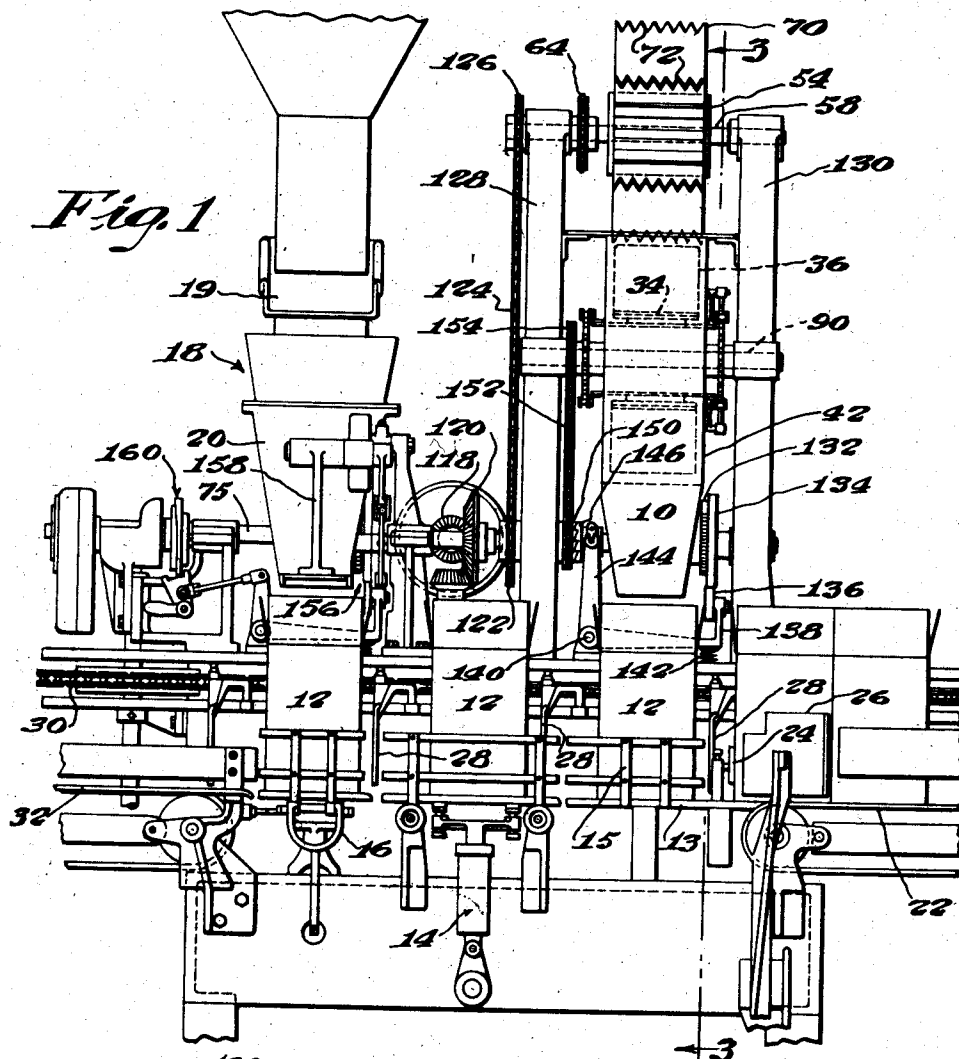
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2,385,233

PACKAGING MACHINE

Filed July 14, 1939

2 Sheets-Sheet 1



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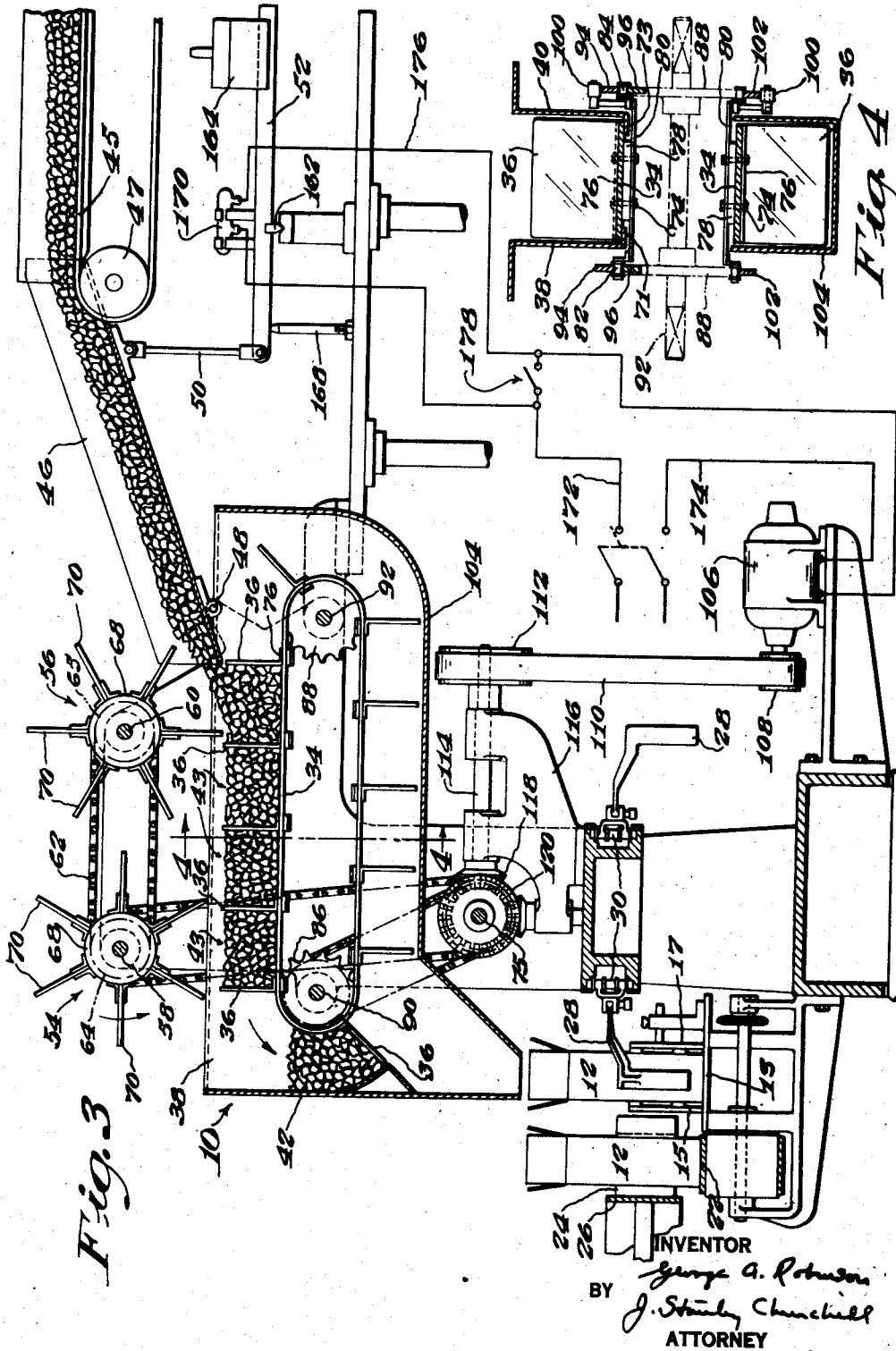
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UNITED STATES PATENT OFFICE

2,385,233

PACKAGING MACHINE

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Application July 14, 1939, Serial No. 284,414

3 Claims. (Cl. 249—59)

This invention relates to a packaging machine and more particularly to a container filling machine.

The invention has for one of its objects to provide a novel and improved packaging machine embodying load forming mechanism in which provision is made for controlling the machine in a novel and practical manner to prevent an insufficient supply of material to the load forming mechanism.

A further object of the invention is to provide a novel and improved container filling machine in which predetermined volumes of material are deposited into successive containers and in which provision is made by novel mechanism for assuring a sufficient supply of material to the load forming mechanism to provide such predetermined volumes at all times during the operation of the machine.

A still further object of the invention is to provide a novel and improved multiple station container filling machine having provision for delivering a predetermined bulk or primary load into a container at one station of operation and for delivering additional material to the container at a final station of operation and in which provision is made by novel mechanism for assuring a sufficient supply of material to assure the introduction of predetermined bulk loads into the containers at all times during the operation of the machine.

With these general objects in view and such others as may hereinafter appear, the invention consists in the packaging machine and in the various structures, arrangements and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a front elevation of a packaging machine embodying the present invention; Fig. 2 is a detail view of a portion of the measuring conveyor to be referred to; Fig. 3 is a view in cross-section taken on the line 3—3 of Fig. 1; and Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 3.

In accordance with the present invention provision is made for controlling the operation of the machine when the supply of material to the primary loading station falls below a predetermined rate to prevent the delivery of insufficient amounts or loads of material into the containers during the operation of the machine. The invention may also be embodied in a two station package filling machine wherein a bulk load is intro-

duced at the primary station and a drip load is added at the final station provided with a weighing scale and in which the drip stream continues to flow until the package has reached the required weight. In such a machine, if the primary load falls below a predetermined minimum the drip stream will be required to flow for an unreasonably long period of time to bring the package up to the required weight, thereby increasing the filling time. In accordance with the present invention, such delay is eliminated by assuring the delivery of the proper quantity of material at the primary or bulk loading station.

Referring now to the drawings, for the purpose of illustration, the invention is illustrated as embodied in a multiple station package filling machine which, except as hereinafter pointed out, may comprise the two station package machines of the type illustrated and described in the United States patent to Cleaves, No. 1,739,061, December 10, 1929. Only sufficient portions of the complete packaging machine have been herein illustrated and will be described as appear to be necessary for a complete understanding of the present invention.

In general, the machine illustrated in the drawings comprises a bulk loading station 10 adapted to deliver a measured primary load into a container 12 supported beneath it upon a transfer plate 13 and between guide rails 15, 17. Provision is made for moving the container after it has received its bulk load onto an intermediate platform which may be referred to as a tapping mechanism 14 which operates to shake down the bulk load to settle it in the container, after which the container is advanced to a weighing scale 16 of the final loading station 18. The final loading station comprises in part a vibratory feeder 19 and a hopper 20 adapted to deliver a stream of the material being weighed into the container which has previously been supplied with the bulk load.

The empty containers are fed into the machine by a constantly driven inlet conveyor 22 until the foremost container thereon engages a fixed stop 24 and a transfer plate 26 is arranged to thereafter engage the foremost container on the inlet conveyor and push it into a position where it may be engaged by one of a plurality of spaced pusher arms 28 on an endless intermittently driven chain 30 by which the container is moved beneath the bulk loading station 10. The transfer plate 26 is arranged to operate in timed relation to the series of pusher arms 28 on the conveyor chain 30 to intermittently feed the containers in suc-

cession first to the bulk loading station 10, then to the tapping mechanism 14, and then onto the weighing scale 16 of the final loading station. Finally, after the container has received its final load, it is discharged from the machine upon a discharge conveyor 32.

The present filling machine is particularly adapted for packaging relatively coarse or bulky materials such as, for example, thin wafers, crackers, lump starch, elbow macaroni, etc., and is designed to handle such materials in a smooth and gentle manner, with a minimum breakage of the goods.

Referring now particularly to Fig. 3, the present bulk loading mechanism 10 may and preferably will comprise a measuring device including an endless driven belt conveyor 34 provided with a plurality of spaced pusher plates 36 traversable through a conduit formed by the side walls 38, 40 of a hopper 42, thus forming a series of compartments or pockets 43 of equal capacity. Material is supplied to the conveyor 34 in a continuous stream from any source of supply by a belt conveyor 45 running over a pulley 47 at one end and the material is arranged to flow from the belt 45 by gravity down an inclined chute 46 directly into the compartments 43 on the conveyor 34. As herein shown, the inclined chute 46 is pivotally mounted at its lower end upon a pin 48 supported in the machine frame and the upper end is supported through a connecting link 50 by one end of a counterweighted balance beam 52 for a purpose to be hereinafter disclosed.

The belt conveyor 34 is arranged to be driven intermittently in timed relation to the movement of the containers 12, and in the operation of the machine, the contents of an individual compartment are delivered through the hopper 42 into a container positioned beneath it during each cycle of operation of the machine. Provision is also made in the preferred embodiment of the invention for levelling off the material in the top of the compartments during the operation of the machine and, as herein shown, a pair of continuously rotated brushes 54, 56 disposed above the conveyor 34 are arranged to sweep any surplus material off the top and in a backward direction toward the inclined chute. As herein shown, the rotary brushes 54, 56 mounted upon shafts 58, 60 respectively, are spaced apart and are arranged to be rotated together by a chain 62 running over sprockets 64, 65. Each brush may comprise a drum 68 having secured thereto a plurality of radially arranged blades 70 provided with serrated edges 72 and the blades may preferably be made of a flexible material such as leather so as to effect a gentle combing action upon the goods and to prevent breakage thereof, particularly when fragile goods such as thin wafers or crackers are being run. The brushes are arranged to be driven continuously through connections from the main driving shaft 75 of the machine, as will be described.

As illustrated in detail in Figs. 2 and 4, the conveyor belt 34, which may comprise any suitable flexible belting material, forms the bottom of the measuring compartments. The belt is supported along its longitudinal edges by the turned in lower edges 71, 73 of the side walls 38, 40. Each pusher plate 36, which may be made of metal, is attached to the flexible belt by bolts 74 extending through a base 76 and an elongated cross bar 80 disposed below the belt, the latter forming part of the driving connections to the belt. As herein shown, each cross bar 80 is con-

nected at either end to driving chains 82, 84 which are arranged to run over similar sprockets 86, 88 mounted upon cross shafts 90, 92 respectively.

Provision is made for guiding the chains 82, 84 along the upper run in order to support the pusher plates 36 during their travel through the upper or measuring run of the conveyor and as herein shown, the upper run of each chain is guided between spaced upper rails 94, 96. Provision is also made for retaining the pusher plates 36 in a vertical position with respect to the flexible belt during their travel through the conduit, and to this end, each cross bar 80 is provided with an angularly extended arm 98 carrying a roller 100 at its outer end, which is arranged to engage the top of a rail 94 whereby to prevent the plates 36 from tipping backward when they engage the material being delivered to the belt as clearly illustrated in Fig. 2. Provision is also made for intermittently moving the belt 34 through connections from the main driving shaft 75 as will be described, and as illustrated in Fig. 3, each intermittent movement of the belt will advance a pusher plate 36 a sufficient distance to permit the contents of a compartment to be discharged into a container. During its travel through the lower or return run, the chains 82, 84 are supported upon guide rails 102 to guide the pusher plates and the belt through the casing 104 enclosing the lower run, the latter forming a part of the hopper 42.

As above stated, in general, the construction and mode of operation of the illustrated two station filling machine, except as herein pointed out, may comprise that of the known automatic filling machine as fully illustrated and described in the patent to Cleaves, to which reference is made. For an understanding of the operation of such machine, it may be stated that the machine is operated in successive cycles. During the first part of each cycle in the operation of the machine, the bulk loading, tapping and final weighing operations described take place. After the container 12 on the weighing scale 16 has reached its full weight, the second part of the cycle is permitted to begin and the container moving mechanism is actuated to advance a container to the position previously occupied by the preceding one. In other words, an unfilled container is fed into position under the bulk loading mechanism and the container with its bulk load is fed onto the weighing scale 16 and the completely weighed container is fed onto the discharge conveyor 32 to be discharged from the machine.

Referring now to Figs. 1 and 3, the main driving shaft 75 of the machine is rotated continuously through any usual or preferred source of power, herein shown as an electric motor 106 whose pulley 108 is connected by a belt 110 to a pulley 112. The pulley 112 is secured to one end of an intermediate shaft 114 journaled in the bearings of a bracket 116 mounted on the machine frame. The other end of the intermediate shaft 114 is provided with a bevel pinion 118 which meshes with a bevel gear 120 mounted upon the main shaft 75. As illustrated in Fig. 1, the rotary brushes 54, 56 are driven continuously through a sprocket 122 fast on the main shaft 75 and which is connected by a chain 124 to a sprocket 126 fast on the shaft 58, the latter being supported in the side frames 128, 130 mounted upon the machine frame.

In order to intermittently drive the conveyor belt 34 provision is made for controlling the driv-

ing connections through the usual pawl and ratchet control mechanism, indicated generally at 132 which is adapted to be engaged to rotate one half revolution with the main shaft 75 at the end of the package moving period of operation. As herein illustrated, a cam 134 rotatable with the ratchet mechanism 132 is arranged to cooperate with a roller 136 carried by one arm 138 of a bell-crank pivoted at 140 on the machine frame. The roller is urged into engagement with its cam by a spring 142, and as shown in Fig. 1, the second arm 144 of the bell-crank is operatively connected to a clutch member 146 slidably mounted on and arranged to rotate with the main shaft 75. During the container filling cycle of operation, the clutch member 146 is moved into cooperative engagement with a sprocket 150 loosely mounted upon the shaft 75, and as herein shown, the sprocket 150 is connected by a chain 152 to a sprocket 154 fast upon the conveyor shaft 90. The cam 134 is designed to hold the clutch member 146 and sprocket 150 in engagement for a sufficient period of time to advance the belt 34 to deliver a measured load into a container positioned upon the platform 13 whereupon the clutch is disengaged.

During the bulk loading operation, as above described, a previously loaded container positioned upon the weighing scale 16 is receiving its drip or final load from the hopper 20. When the container has received its full weight, the control mechanism, indicated generally at 156 is actuated to close a shutter 158 cutting off the drip stream and to start the package moving cycle of operation through connections indicated generally at 160 and as fully illustrated and described in the patent to Cleaves above referred to.

Referring now to Fig. 3, the goods being introduced into the measuring compartments 43 are normally delivered thereto in a continuous and substantially uniform stream from the point of supply by the belt 45 and through the inclined chute 46. As herein shown, the balance beam 52 supporting one end of the chute 46 is mounted upon knife edges 162 in a standard supported upon the machine frame and is provided with a counterweight 164 at its other end. When the material flowing through the chute 46 passes at a normal rate of flow and in an amount sufficient to fill the compartments 43, the weight of the material will counterbalance the beam 52 and hold the beam in a horizontal position against a stop member 168, as shown in Fig. 3. When, however, the rate at which the material passes through the chute falls below the desired predetermined minimum, then the counterweight 164 will overbalance the beam causing the latter to be rocked to an angular position.

Provision is made for interrupting the circuit to the motor 106 when the balance beam 52 is thus rocked, in order to stop the machine and as herein shown, a mercury switch 170 forming part of the circuit is attached to the balance beam 52. The switch 170 is arranged to be closed to permit the machine to run when the balance beam is disposed in a horizontal position as shown and to be opened when the balance beam is rocked, whereby the power supply to the motor is cut off. As illustrated in Fig. 3, the circuit to the motor 106 includes the leads 172, 174 the latter being connected directly to the motor and the lead 172 being connected to the mercury switch, the circuit being completed by the lead 176 running from the mercury switch to the motor. An auxiliary switch 178 may be pro-

vided to cut out the mercury switch when required, as when it is desired to run the remaining material out of the machine at the end of the day's run.

From the above description, it will be observed that in operation, if the weight of the material passing through the chute at any time falls below a predetermined amount corresponding to the counterweight upon the beam 52, the power supply will be cut off and conversely, when the weight of the material in the chute again reaches the predetermined amount, the power will again be reestablished to start the machine. In this manner, it is possible to prevent an insufficient supply of material to the measuring device to thereby assure formation of a uniform bulk load of material in each compartment to be delivered to the individual containers.

While the preferred embodiment of the invention has been herein illustrated and described it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:

1. In an automatic weighing machine of the type operating in cycles, in combination, a bulk loading device having compartments of a given volumetric capacity, a final loading device including a scale, conveying means for presenting successive containers to said loading devices to receive the bulk load from one of said compartments, then the final load of additional material from said final loading device to bring the contents of the container up to a predetermined weight, means for supplying a stream of material to the bulk loading device at a rate sufficient to fill said bulk load compartments with the desired volume of material, and automatic means actuable to effect stopping of said machine upon a given variation in the weight of a definite length of said stream of material from a predetermined value so that when said stream is of insufficient magnitude to supply the requisite volume of material to the compartments of said bulk loading device the machine is stopped, whereby said containers are filled with a predetermined weight of material in a minimum of time and the operation of the machine is not delayed by a prolonged filling period at said final loading device because of insufficient loading of the container by said bulk loading device.

2. In an automatic weighing machine of the type operating in cycles, in combination, a bulk loading device having compartments of a given volumetric capacity, a final loading device including a scale, conveying means for presenting successive containers to said loading devices to receive the bulk load from one of said compartments, then the final load of additional material from said final loading device to bring the contents of the container up to a predetermined weight, means for supplying a stream of material to the bulk loading device at a rate sufficient to fill said bulk load compartments with the desired volume of material, and automatic means actuable to effect stopping of said machine upon a given variation in the weight of a definite length of said stream of material from a predetermined value and to effect starting of said machine when the weight of said stream is restored so that when said stream is of insufficient magnitude to supply the requisite volume of material to the compartments of said bulk loading device the machine is stopped and is automatically re-

started when the weight of said stream is restored, whereby said containers are filled with a predetermined weight of material in a minimum of time and the operation of the machine is not delayed by a prolonged filling period at said final loading device because of insufficient loading of the container by said bulk loading device.

3. In an automatic weighing machine of the type operating in cycles such that the machine does not start upon a new cycle until the final loading of the preceding cycle has been completed, in combination, volumetric bulk load forming means arranged to operate to form successive bulk loads at predetermined time intervals, a final loading device including a scale, conveying means for presenting successive containers to the bulk load forming means, and then to the final loading device, material feeding means

for feeding a uniform stream of material to the bulk load forming means, said material feeding means comprising an inclined, movable conduit, counterbalancing means for supporting the conduit and the stream of material moving therethrough, said counterbalancing means being arranged to cause movement of the conduit when the weight of the material flowing therethrough falls slightly below a predetermined amount, and means actuated by movement of said conduit to stop the machine immediately upon and at the start of such movement of the conduit and while a substantial volume of material is still flowing through said conduit, whereby containers may be filled with material of a predetermined weight in a minimum of time and whereby the operation of the machine is not delayed by a prolonged filling period at the final loading device.

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