

Nov. 13, 1951

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2,574,486

WEIGHING AND PACKAGING MACHINE

Filed Sept. 25, 1945

2 SHEETS—SHEET 1

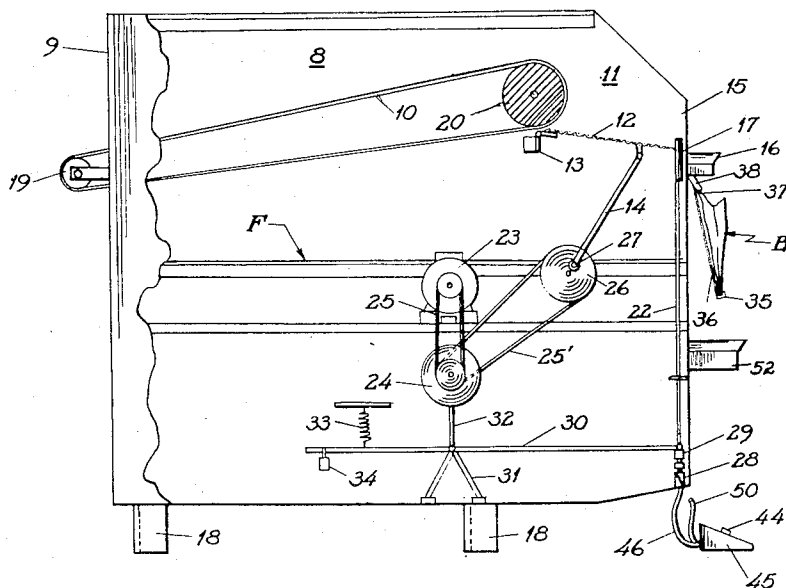


Fig. 1.

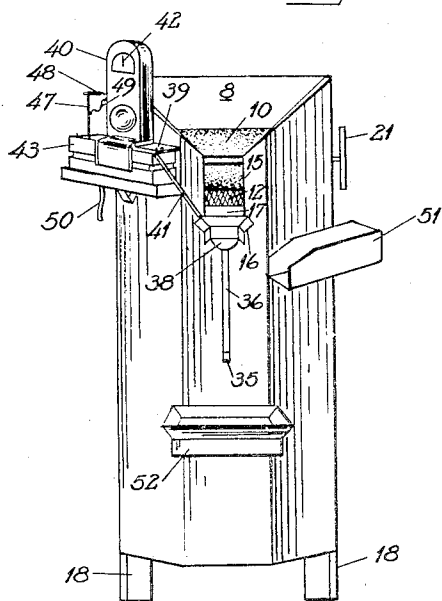


Fig. 2

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Filed Sept. 25, 1945

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2 SHEETS--SHEET 2



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2,574,486

WEIGHING AND PACKAGING MACHINE

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Application September 25, 1945, Serial No. 618,442

8 Claims. (Cl. 249—60)

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This invention relates to packaging machines, and more particularly to machines for packaging irregular articles, such as potato chips and the like.

Irregular articles such as potato chips are sometimes difficult to package, since such articles tend to jam or pack in a hopper or container. Normally, potato chips are packaged in transparent bags, each bag containing a predetermined amount of potato chips by weight, and potato chips also tend to be deposited irregularly when fed into such a bag or similar container. Also, it is sometimes difficult to handle the chips during packaging without crushing or otherwise damaging the same to an undesirable extent, and the bulk of the chips renders handling during packaging sometimes quite difficult.

Among the objects of this invention are to provide an improved machine for packaging potato chips and the like; to provide such a machine which is adapted to handle effectively relatively large amounts of such articles; to provide such a machine which delivers the irregular articles, without undue breakage and in a suitable condition to fill readily a package, such as a bag or the like; to provide such a machine in which the tendency for the articles to jam or unduly pack in the compartment or the like from which the articles are fed into the package is overcome; to provide such a machine in which the flow of articles to the bag may be started by manual control but is terminated automatically as soon as a predetermined weight is in the bag; to provide such a machine in which the bag for receiving the articles is mounted in association with a scale or the like, so that the exact weight of the articles in the bag can be observed by an operator; to provide such a machine in which suitable means is associated with a scale so that the feed of irregular articles will be terminated when the desired weight is reached; to provide such a machine which will accommodate a relatively large amount of potato chips or the like, yet only a portion of the chips are acted upon for direct feeding into the bag; and to provide such a machine which is relatively simple in construction and can be operated effectively by a relatively unskilled operator.

Other objects and the novel features of this invention will become apparent from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of a packaging machine constructed in accordance with this invention, and

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exterior housing being extensively broken away to show the interior construction;

Fig. 2 is a front elevation of the machine of Fig. 1;

Fig. 3 is a wiring diagram illustrating a control circuit and related parts similar to that of the machine of Fig. 1 and exemplifying its operation; and

Fig. 4 is a wiring diagram illustrating an alternative control circuit.

In a packaging machine constructed in accordance with this invention, as in Figs. 1 and 2, a relatively large quantity of potato chips may be placed, or received from a suitable conveyor leading from an oven or the like, in a receiving compartment 8 formed within a housing 9 above a belt 10. From the receiving compartment, the chips pass into a feeding compartment 11, formed within housing 9 above a sloping web or screen 12, which is hinged at its upper end upon a transverse beam 13 and vibrated or reciprocated upwardly and downwardly by a crank 14, the upper end of which is pivotally attached to the underside of the screen. From feeding compartment 11, the chips flow through an outlet 15 and a hopper 16 into a bag B, the flow of chips through the outlet 15 being controlled by a vertically movable gate 17.

Housing 9 is attached to a framework F, supported by legs 18, while belt 10 at the rear end passes around an adjustable roller 19 and at the front end around a larger roller 20. Roller 20 is turned manually by a hand wheel 21, situated exteriorly of the housing and in a convenient position for the operator, as in Fig. 2. The capacity of receiving compartment 8 is considerably in excess of the capacity of feeding compartment 11, so that a relatively large quantity of chips can be accommodated, the operator maintaining the feeding compartment sufficiently full by periodically turning hand wheel 21. Hopper 16 is three-sided and open at the top and bottom, to facilitate vision of the filling operation and removal of excess chips from the bag or placement of chips to make up a deficiency, as explained subsequently.

Gate 17 is mounted on the upper end of a vertical rod 22, suitable guides preferably being provided for the gate. Screen 12 is vibrated only during feeding of chips to a bag, from a continuously running motor 23 which drives a clutch 24 through a belt 25. When clutch 24 is engaged, a belt 25' (which passes around a pulley behind clutch 24 and is driven thereby) in turn drives a pulley 26 provided with an eccentrically mounted

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crank pin 27, on which the lower end of crank 14 is rotatively mounted by a suitable bearing. It will be understood, of course, that clutch 24 may be a disk or cone clutch, as in Fig. 1, or may be a jaw clutch, as in Fig. 3, or any other conventional type of clutch or equivalent thereof.

A solenoid 28 is mounted adjacent the lower front end of the machine, plunger 29 of the solenoid being attached to rod 22, while one arm of a lever 30 is pivotally attached to the plunger, as by a pin and slot connection, if necessary to accommodate relative radial movement. The lever 30 is pivoted on a support 31, and is also rigidly attached to an operating lever 32 for engaging and disengaging clutch 24. A tension spring 33 is attached to the opposite arm of lever 30 to assist solenoid 28 in pulling the gate open when the solenoid is energized, while a weight 34 is mounted on the opposite arm of lever 30, to counterbalance the weight of gate 17 and rod 22, and insure upward movement thereof when the solenoid is de-energized.

As will be evident, when solenoid 28 is energized, gate 17 is moved downwardly to permit the flow of chips through outlet 15 into bag B, while the clutch operating lever 32 is moved to engage the clutch 24, thereby causing screen 12 to vibrate. Such vibration of screen 12 assists materially in feeding the chips into bag B, since the vibration will cause the chips to flow downwardly over the screen relatively evenly and also feeds the chips evenly into the bag. Similarly, when solenoid 28 is de-energized, weight 34 causes gate 17 to close to stop the flow of chips, and clutch 24 is simultaneously disengaged to terminate vibration of screen 12. Energization of solenoid 28 may be accomplished manually, while de-energization is automatic as soon as a predetermined weight of chips is in the bag, as explained hereafter.

The lower end of bag B rests in a hook 35, attached to the lower end of a bar 36, which in turn is attached to hopper 16. The upper edge of one side 37 of the bag is held beneath a lip 38 extending downwardly at an angle to hopper 16 and outwardly from the upper end of bar 36, as in Fig. 1. Side 37 of bag B is preferably longer than the opposite side of the bag, to facilitate placement of the upper edge of side 37 beneath lip 38, and to permit the longer side to be folded over the shorter side preparatory to sealing the bag. The hopper and bag support are suspended from one pan 39 of a balance scale 40 by an arm 41, which is attached to pan 39 in any suitable manner, as by bolting. The scale 40 is provided with a pointer 42, so calibrated that it reads in ounces or any other suitable weight unit, excess weight being indicated on one side and deficiency weight being indicated on the opposite side of a zero position. If necessary, suitable weights may be added to the opposite pan 43 of the scale, to balance the weight of the bag support, the bag, the hopper, and the weight of chips to be contained in the bag.

As soon as one bag is filled with the desired weight of chips, it is removed from the bag support, and an empty bag is placed in position. The operator then pushes a plunger 44 of a push button switch mounted in a housing 45 and connected by a cable 46 with solenoid 28. This energizes the solenoid, thus pulling down the solenoid plunger 29 and thereby opening gate 17 and simultaneously engaging clutch 24. As indicated in Fig. 1, the switch plunger 44 is adapted to be operated by the foot of an operator, but if de-

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sired the switch plunger can be mounted in a suitable position for manual operation. Also, cable 46 is preferably sufficiently long so that the switch housing 45 may be placed in any suitable position.

As the bag becomes full, pan 43 will start to rise and then reach a position to cause a vertical pin 47, which is mounted on pan 43, to engage a contact 48. Wires 49, passing through a cable 50, connect pin 47 and contact 48 in series with a relay, mounted in housing 45 or in any other suitable position, for shutting off the current to the solenoid. Thus, as soon as a predetermined weight of chips has been received in the bag B, pin 47 will engage contact 48 to open the solenoid circuit and thereby de-energize the solenoid, so that the gate 17 will move upwardly to shut off the flow of chips to the bag, and vibration of screen 12 will also be stopped. In case a small amount of chips in excess of the desired weight is in the bag such excess in weight is indicated by pointer 42, and the operator thereupon removes the excess chips and places them in a pan 51, mounted on housing 9 in a convenient position. A lower pan 52 catches any chips which may accidentally fall over the bag, or move past the gate when there is no bag in position to receive the same. When a deficiency in weight is indicated by pointer 42, the operator places a sufficient number of chips to bring the weight up to the desired value, removing the same from pan 51 or lower pan 52.

A slightly different circuit, which operates in substantially the same manner, but instead includes a Micro Switch 54, is illustrated in Fig. 3. Micro Switch 54 is mounted above a pin 47', and is adapted to be opened when engaged by the pin, as when the desired weight of chips is in the bag, and to be closed as soon as the pin moves downwardly due to removal of a full bag from the bag support. Current for operation of the machine is supplied by power leads 55, a disconnecting switch 56 being closed to start motor 23 by current supplied through motor leads 57. Power leads 55 are connected by a wire 58 with Micro Switch 54, and by a wire 59 with a manually or pedally operated switch 60. When a bag B is in position to be filled, the bag of course is empty, and Micro Switch 54 will be closed. When switch 60 is closed by the operator, current will flow through solenoid 28, the circuit including a wire 61 leading from Micro Switch 54 to the solenoid, and a wire 62 leading from switch 60 to the solenoid. This will cause clutch 24 to engage and gate 17 to open, as described previously. As soon as the bag has received the desired weight of chips, pin 47' will rise to open Micro Switch 54, thereby terminating the flow of current through solenoid 28, to disengage clutch 24 and cause gate 17 to close. If desired, a holding relay may be placed in circuit with switch 60, so that the switch will remain closed until Micro Switch 54 opens, otherwise switch 60 will need to be held closed by the hand or foot of the operator, until the bag is filled.

As solenoid 28 is in series with Micro Switch 54, as in Fig. 3, and in series with pin 47 and contact 48, as in Figs. 1 and 2, it is necessarily a relatively low amperage solenoid, since Micro Switch 54 will handle only a small current and undue arcing would be caused if a large current were to be passed through pin 47 and contact 48. Thus, the pull of solenoid 28 is limited, and such limited pull may slow the opening and closing movements of gate 17, or cause difficulty in en-

gagement or disengagement of clutch 24. To overcome such weakness of pull, it may prove desirable to utilize a high amperage and thereby stronger solenoid, as in the circuit illustrated in Fig. 4.

The circuit of Fig. 4 includes a high amperage solenoid 28', the gate and clutch being operated in the same manner as before. Full line current passes through solenoid 28', but pin 47 and contact 48 handle only a low amperage current, by means of a transformer 65. The primary of transformer 65 is connected at one side to one power lead 66 and at the other side by a wire 67 with a normally closed, relay operated switch 68, in turn connected to solenoid 28' by a wire 69. The circuit through the solenoid to the other power lead 70 is completed through a wire 71 leading to a holding coil 72, in series with a pedally or manually operated switch 73. The secondary of transformer 65 is connected in series with relay coil 74 of switch 68 by a wire 75 connecting one side of the transformer secondary with pin 47, a wire 76 connecting contact 48 with relay coil 74, and a wire 77 connecting coil 74 with the opposite side of the transformer secondary.

As before, switch 73 is closed, to initiate the bag filling operation by energizing solenoid 28' to open gate 17 and engage clutch 24 to start vibration of screen 12. Plunger 29' of solenoid 28' may be somewhat heavier, and the stronger solenoid will insure quick movement of gate 17 and clutch lever 32. Holding coil 72 maintains switch 73 closed until the bag has received the desired weight of chips. Thereupon, pin 47 will engage contact 48 to close the circuit through coil 74, thereby opening switch 68 and opening the circuit through solenoid 28'. This causes the gate 17 to close and clutch 24 to disengage in the same manner as before. Also, as soon as the circuit through solenoid 28' is open, current no longer passes through switch holding coil 72, whereupon switch 73 will open and will be ready for the next filling operation. Thus, it is necessary only for the operator to close switch 73 momentarily to start the bag filling operation, the remainder of the operation following automatically. It will be understood, of course, that a Micro Switch may be substituted for contact 48, and that a holding coil similar to coil 72 of Fig. 4 may be added to switch 60 of Fig. 3.

From the foregoing, it will be apparent that the machine of this invention fulfills to a marked degree the objects and requirements hereinbefore set forth. The vibrating screen 12 is an important feature of this invention, since it insures that the chips will be fed evenly through the outlet and also that the chips will be sufficiently packed to fill the bag in a short space of time, while at the same time preventing packing or bunching of chips at the outlet which would interfere with the desired flow therethrough. Other important aspects of this invention include the simultaneous opening of the gate and vibration of the screen; the simultaneous closing of the gate and termination of screen vibration; the automatic closing of the gate and termination of the screen vibration when the bag has received the desired weight of chips; the simple and effective manner in which a pan scale may be utilized, not only in regulating the feed of the chips to the bag, but also in enabling the operator to ascertain definitely the weight of chips in the bag; the simplified bag support, whereby the bag can be expeditiously placed in position to receive

the chips; the variations in the electrical circuit which may be employed, in order to utilize different equipment; the placement of only a small portion of the chips over the vibrating screen, under complete control of the operator; and the large amount of chips which may be fed to the machine, due to the relatively large capacity of belt 10. In addition, the machine may be operated by a relatively unskilled operator, since the operator need only press a single switch, either by hand or by foot, once an empty bag is in position, as the filling operation thereafter proceeds automatically.

It will be understood that other and different circuits may be utilized, and that other and similar equipment operating in substantially the same manner to produce the desired results, may be utilized. It will further be understood that other changes may be made, all without departing from the spirit and scope of this invention.

What is claimed is:

1. A machine for packaging irregular articles comprising a feed device including an inclined screen pivoted at its upper end; a movable gate at the lower end of said screen; drive means including a disconnecting device; means for reciprocating said screen about its pivoted upper end and driven from said drive means through said disconnecting device; and means for moving said gate downwardly and substantially simultaneously engaging said disconnecting device.

2. A machine for packaging irregular articles as defined in claim 1, wherein said gate moving means includes a solenoid and a manually operated switch for causing current to pass to said solenoid and energize the same.

3. A machine for packaging irregular articles comprising a feed device including an inclined bottom element pivoted at its upper end; a movable gate at the lower end of said bottom element; drive means including a disconnecting device; means for reciprocating said bottom element and said drive means through said disconnecting device; means including a solenoid for moving said gate to an open position and simultaneously engaging said disconnecting device; a weighing device; a bag support suspended therefrom; a switch operable in accordance with movement of said weighing device and thereby in accordance with the weight of articles in said bag; and a circuit including said solenoid and said switch, said circuit being constructed and arranged so that said gate will close and said disconnecting means will disengage upon such operation of said switch.

4. A machine for packaging irregular articles comprising a housing; a movable belt forming with a portion of said housing a receiving compartment; an inclined screen pivoted at its upper end adjacent said belt and forming with a second portion of said housing a feeding compartment; a vertically movable gate at the lower end of said screen; a vertical support for said gate; a motor; a clutch driven by said motor and having an operating lever; a pulley driven from said clutch; a crank having its lower end rotatively attached eccentrically to said pulley and its upper end pivotally attached to the underside of said screen, for reciprocating said screen; a solenoid having a plunger attached to said gate support for moving said gate; a lever pivotally attached at one end to said solenoid plunger and also attached to said clutch operating lever, for disengaging said clutch; a weighing device having balancing arms; a bag support suspended from one arm of said

weighing device; a switch operable in accordance with the position of said opposite arm; and a circuit including said solenoid and said switch, and so constructed and arranged that said gate will close and said clutch will disengage upon operation of said switch when a predetermined weight of articles is in said bag.

5. A machine for packaging irregular articles comprising a feed device having an inclined bottom; means for reciprocating said inclined bottom; a movable gate for controlling the flow of articles from said feed device; means including a solenoid for moving said gate and also starting and stopping reciprocation of said bottom; a manually or pedally operable switch in series with said solenoid for effecting energization of said solenoid to cause said gate to open and said bottom to be reciprocated; a scale, a bag support on the scale and movable therewith to a predetermined position when a predetermined weight of articles is in said bag; and a second switch in series with said solenoid and operatively associated with said bag support so as to be opened upon movement of said support to said predetermined position, and thereby de-energize said solenoid to cause said gate to close and said reciprocation to be stopped when a predetermined weight of articles is in said bag.

6. A machine for packaging irregular articles comprising a feed device having an inclined bottom; means for reciprocating said inclined bottom; a movable gate for controlling the flow of articles from said feed device; means including a relatively high amperage solenoid for moving said gate and also starting and stopping reciprocation of said bottom; a manually or pedally operable switch in series with said solenoid for effecting energization of said solenoid to cause said gate to open and said bottom to be reciprocated; a scale, a bag support on the scale and movable therewith to a predetermined position; a relay switch in series with said solenoid; a transformer having a primary in series with said solenoid; and a switch, adapted to handle only relatively low amperages, in series with the secondary of said transformer and the coil of said relay switch, and also operatively associated with said bag support so as to be opened upon movement of said support to said predetermined position, said relatively low amperage switch being adapted to be opened so as to open the circuit through said relay switch coil to open said relay switch and open the circuit through said

solenoid, so as to thereby de-energize said solenoid to cause said gate to close and said reciprocation to be stopped, when a predetermined weight of articles is in said bag.

7. In a machine for packaging irregular articles, walls and an inclined bottom element forming a feed compartment and defining an outlet, a support pivotally connected to the end of the bottom element remote from the outlet, a gate for opening and closing the outlet, power means for moving the end of the bottom element nearest the outlet upwardly and downwardly in an arcuate path below the level of the opposite end of said element, a control member for governing operation of the power means, and means interconnecting the control member and the gate for opening the gate when the power means is actuated.

8. In a machine for packaging irregular articles, a scale, a bag support on the scale, a feed hopper having upwardly extending walls and a screen bottom, one of said walls having a discharge opening for discharge into a bag on the scale and near an end of the screen bottom, means for moving only the end of the screen bottom nearest the discharge opening upwardly and downwardly for feeding articles into the discharge opening, a support pivotally connected to the other end of the screen at a level above the first mentioned end, a gate for closing the discharge opening and means controlled by the scale for closing the gate when a predetermined weight has been attained.

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