May 22, 1956 H. E. ENGLESON ET AL 2,746,222

DETECTOR MECHANSIM FOR A PACKAGING MACHINE

Filed April 21, 1955

FIG. 5

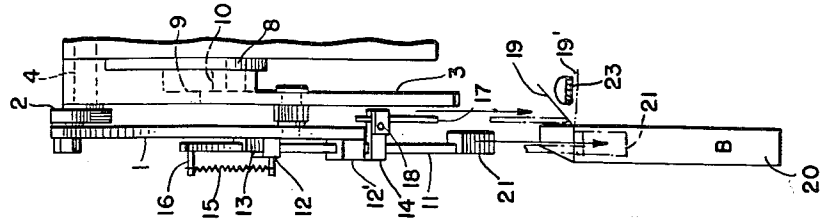


FIG. 4

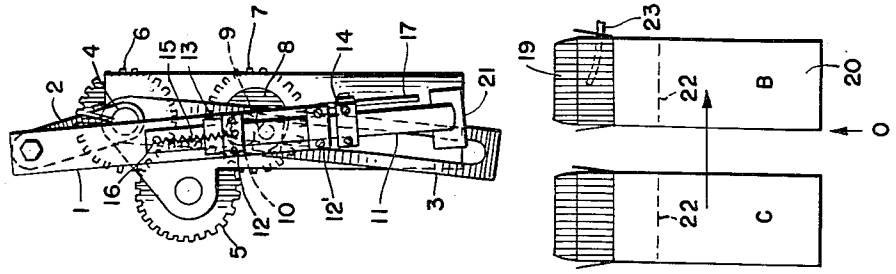


FIG. 3

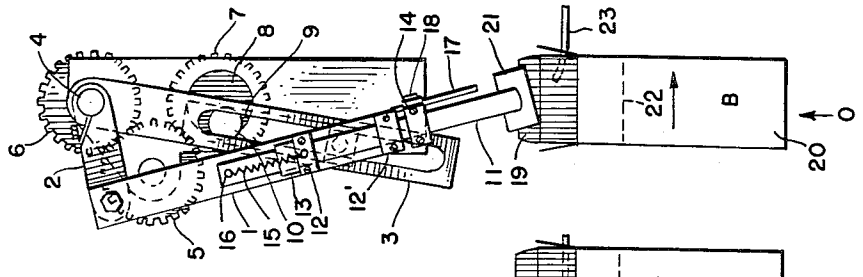


FIG. 2

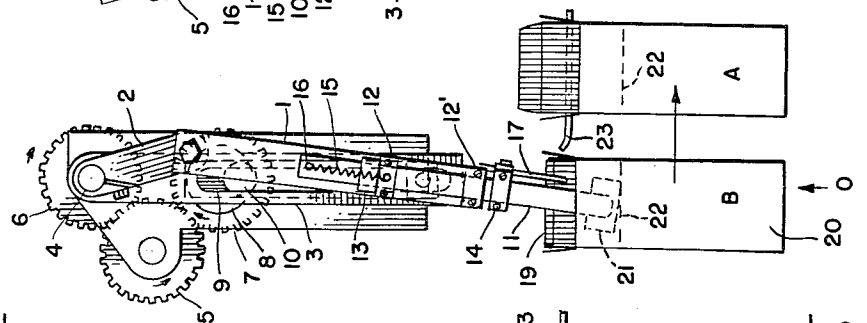
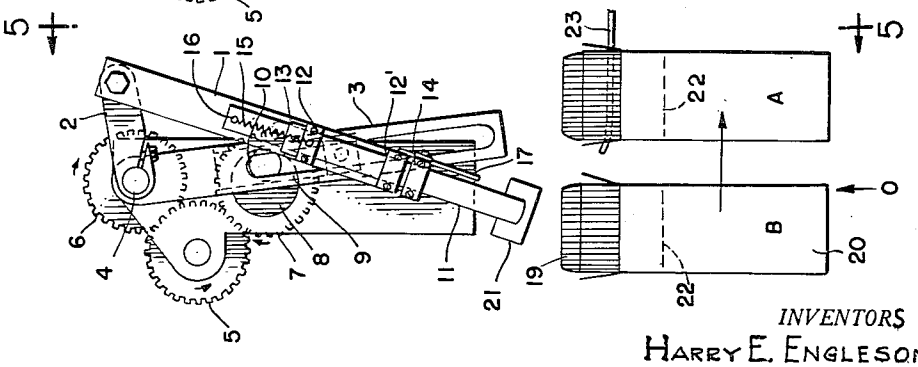


FIG. 1



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DETECTOR MECHANISM FOR A PACKAGING MACHINE

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8 Claims. (Cl. 53—75)

This invention relates to packaging machines, and more particularly to mechanical means for detecting packages which may be incompletely filled.

Machines used for packaging granular substances, such as popcorn, peanuts, and the like, may carry packages or cardboard cartons to be filled along a mechanical conveyer. After the cartons are filled, but before flaps on one end of the carton are tucked and closed, it is desirable to employ means for checking the contents of the carton and for providing a visual indication on any packages wherein the contents are less than a predetermined desired amount. Cartons, thus bearing a visual indication of their incomplete filling, may be rejected in a subsequent operation, thereby allowing the conveying system to continue without interruption, filling other packages.

It is an object of this invention to provide improved mechanical means for detecting packages, on a moving conveyer, which may be incompletely filled.

A further object of this invention is to provide an improved mechanical device adapted to probe into a package or carton as it is carried on a moving conveyer, and to detect any such packages which are not filled to a predetermined level.

Another object is to provide an improved device for checking cartons with means for visually indicating those cartons that are not filled to the desired level.

According to this invention, packages or cardboard cartons which are filled but which have one open end are passed along a conveyer, and a probing arm is inserted into the open ends of the cartons to determine the level of filling. As the probing arm enters the package, an associated member engages a flap on the carton and depresses it outwardly and downwardly from the carton. If the carton is filled to an amount less than a predetermined level, the flap engaging member bends the flap to such an extent that it is tucked beneath a fixed guide which retains it and prevents the package from being properly closed in subsequent machine operations, thereby providing a visual indication of the incomplete filling.

A more complete understanding of the present invention, its mode of operation and its advantages may be gathered from further reading of this specification together with an inspection of the accompanying drawings, in which:

Figs. 1, 2, 3, and 4 are all front elevational views of the detector mechanism of this invention showing the various positions of operation wherein the probing arm is inserted into a moving carton to contact the contents thereof; and

Fig. 5 is a side elevational view of the detector mechanism looking along the plane 5—5 of Fig. 1.

The detector mechanism of this invention comprises a probing arm 1 which is pivotally attached at one end to a crank 2 and slidably coupled to a mechanically oscillating guide member 3. The guide member 3 and the crank 2 move in synchronism such that the guide member 3 completes one complete oscillation with each

revolution of the crank 2. The guide member 3 is mounted to pivot about a fixed axis 4 about which the crank 2 rotates. The oscillation of the guide member 3 is a pendulum-like motion wherein the lower extremity of the guide member swings in an arc to either side of a vertical line—Fig. 1 depicts the guide member 3 in a position approaching one extreme of its oscillatory motion, and Fig. 3 shows the guide member 3 in its opposite extreme.

To accomplish the synchronous motion between the crank and the guide member, a gear 5 drives a gear 6 for turning the crank 2, and a gear 7 which turns an eccentric 8. The guide member 3 mounted to pivot about the axis 4 contains a formed slotted guideway 9 engaging eccentric roller 10. The gears 6 and 7 have a 1:1 ratio and, therefore, they will turn at the same rotational speed and in synchronism. Since the crank 2 is driven from the gear 6 and the oscillating guide member 3 is driven from the eccentric 8 and the gear 7, the crank and the guide member will likewise move in synchronism.

A probe arm extension 11 is mounted to slide within limits along the probe arm 1. The probe arm 1 has fixed thereto a pair of slide brackets 12 and 12' through which the probe arm extension 11 is inserted. An upper stop 13 and a lower stop 14 are fixed to the probe arm extension 11 to limit the upward and downward motion of the probe arm extension 11 relative to the probe arm 1. A spring 15 is attached between a stud 16 on the probe arm extension 11 and the slide bracket 12 on the probe arm 1, and the probe arm extension is thereby urged into an extreme downward position of its slidable mounting, whereupon the stop 13 engages the slide bracket 12. The urging of the spring 15 supplements the action of gravity and the probe arm extension 11 is urged downward, partly by the influence of the spring 15 and partly by its own weight.

An elongated member 17 is attached to the probe arm extension 11 by an adjustable clamp 18 associated with the lower stop 14. The member 17 performs the function of engaging and depressing a flap 19 of the cardboard carton 20. As the probe arm 1 is lowered toward the moving carton 20, the probe arm extension 11 is inserted into the open end of the carton 20 and a foot member 21 will lower to the point of contact with the normal level of filling 22. Simultaneously the flap depressor 17 engages rearward flap 19 of the carton and bends it outwardly and downwardly from the carton 20 as shown in Figs. 2 and 5.

When the foot member 21 contacts the filling level 22 the probe arm extension 11 is moved upward relative to the probe arm 1 against the urging of the spring 15 and the weight of the probe arm extension 11. Under such a condition as will be encountered with a normally filled carton 20, the flap depressor 17 will bend the rear flap 19 of the carton 20 to a particular angular extreme as indicated in Fig. 5. A fixed guide member 23 positioned along the conveyer line will fail to receive the flaps of normally filled cartons, and as the probe arm 1 and the probe arm extension 11 are raised from the carton 20, the flap 19 will then spring back to its normal upright position.

However, if a carton 20 is incompletely filled and the level 22 is below that of the desired level, the probe arm extension 11 will descend further into the carton 20 and the flap depressor 17 will bend the flap 19 a greater amount as illustrated by 19' in Fig. 5. The fixed guide member 23 will then receive and retain the flap 19' in its depressed position indicative of the fact that the carton 20 was incompletely filled. In subsequent operations of the packaging machine, the flaps of the carton 20 will normally be folded together and the carton will be closed,

but should a flap 19' be held in a depressed position below the fixed guide 23, the machine will fail to fold the flap and close the carton. The fact that a carton has failed to close properly will give visual indication to an attendant who packs the cartons for handling and shipping. Thus, the attendant may easily identify and reject any carton which fails to fill properly.

As heretofore described, no mention has been made of the possibility of inserting an inner liner or bag within the cardboard carton 20. The use of such a bag will not interfere with the operation of this invention since the probe arm and probe arm extension 11 may be inserted into the open end of the bag which, in turn, is inside of the carton 20 having open flaps. The probing operation of the extension arm 11 and the flap depressing function of the member 17 will not be impaired by such an inner liner, and although further sealing and closing operations may be required, the guide member 23 may hold the flap 19' in a depressed position throughout these further operations with the end result that any cartons or packages which may be incompletely filled will likewise remain open as a visual indication for an attendant.

Changes may be made in the form, construction, and arrangement of the parts without departing from the spirit of the invention or sacrificing any of its advantages, and the right is hereby reserved to make all such changes as fall fairly within the scope of the following claims.

The invention is hereby claimed as follows:

1. In a packaging machine adapted to carry packages filled to a predetermined level, apparatus for detecting a deficiency in the level of filling of the packages, said apparatus comprising a crank, and oscillating guide member, means operatively associated with the crank, and the guide member to drive said crank and said guide member in synchronism whereby the guide member completes one oscillation with each revolution of the crank, a probe arm having one end rotatably attached to the crank, said probe arm being slidably coupled to said oscillating guide member whereby the motion of the probe arm is determined by the relative motions of the crank and oscillating guide member, a probe arm extension mounted to slide axially along the probe arm for probing the level of filling of the packages, and means for establishing a visual indication on any packages wherein the probed level is below the predetermined level of filling.

2. In a packaging machine adapted to carry packages filled to a predetermined level, apparatus for detecting a deficiency in the level of filling of the packages, said apparatus comprising a crank, an oscillating guide member, means operatively associated with the crank and the guide member to drive said crank and said guide member in synchronism whereby the guide member completes one oscillation with each revolution of the crank, a probe arm having one end rotatably attached to the crank, said probe arm being slidably coupled to said oscillating guide member whereby the motion of the probe arm is determined by the relative motions of the crank and oscillating guide member, a probe arm extension mounted to slide axially along the probe arm for probing the level of filling of the packages, cooperating means associated on said probe arm and said probe arm extension for limiting the slidable movement of the probe arm extension relative to the probe arm, and spring means for urging the probe arm extension into an extreme downward position against said limiting means.

3. In a packaging machine adapted to carry packages filled to a predetermined level, apparatus for detecting a deficiency in the level of filling of the packages, said apparatus comprising a crank, an oscillating guide member, means operatively associated with the crank and the guide member to drive said crank and said guide member in synchronism whereby the guide member completes one oscillation with each revolution of the crank, a probe arm having one end rotatably attached to the crank, said probe arm being slidably coupled to said oscillating guide member whereby the motion of the probe arm is determined by the relative motions of the crank and oscillating guide member, a probe arm extension mounted to slide axially along the probe arm for probing the level of filling of the packages, means associated with said probe arm extension for depressing flaps of the packages in accordance with the probed level, and means positioned adjacent to the extreme position of the flap depressing means for receiving and retaining in a depressed position the flaps of any packages wherein the probed level is below the predetermined level of filling.

4. In a packaging machine having a conveyer for carrying packages filled to a predetermined level with granulated substance, apparatus to detect a deficiency in the level of filling of said packages, said apparatus comprising a crank mounted to rotate about a fixed horizontal axis, an eccentric mounted to rotate about another fixed horizontal axis spaced below the rotational axis of the crank, means for driving said crank and said eccentric at the same rotational speed, an oscillating guide member having one end mounted to pivot about the rotational axis of the crank, said oscillating guide member engaging said eccentric and being mechanically oscillated thereby, a probe arm having one end pivotally attached to said crank, a slide block mounted to slide along the oscillating guide, said slide block being pivotally attached to said probe arm at a point intermediate to the ends, a probe arm extension slidably attached to said probe arm for probing the level of the granulated substance in said packages, and a flap depressor attached to said probe arm extension for bending package flaps outwardly and downwardly by amounts corresponding to the probed levels of the granulated substance in the packages.

5. In a packaging machine having a conveyer for carrying packages filled to a predetermined level with granulated substance, apparatus to detect a deficiency in the level of filling of said packages, said apparatus comprising a crank mounted to rotate about a fixed horizontal axis, an eccentric mounted to rotate about another fixed horizontal axis spaced below the rotational axis of the crank, means for driving said crank and said eccentric at the same rotational speed, an oscillating guide member having one end mounted to pivot about the rotational axis of the crank, said oscillating guide member engaging said eccentric and being mechanically oscillated thereby, a probe arm having one end pivotally attached to said crank, a slide block mounted to slide along the oscillating guide, said slide block being pivotally attached to said probe arm at a point intermediate to the ends, a probe arm extension slidably attached to said probe arm for probing the level of the granulated substance in said packages, cooperating means on said probe arm and said probe arm extension to limit the sliding movement of said probe arm extension on said probe arm, spring means for urging the probe arm extension downward against the limiting means, and a flap depressor attached to the probe arm extension for bending package flaps outwardly and downwardly according to the probed levels of the granulated substance.

6. In a packaging machine having a conveyer for carrying packages filled to a predetermined level with granulated substance, apparatus to detect a deficiency in the level of filling of said packages, said apparatus comprising a crank mounted to rotate about a fixed horizontal axis, an eccentric mounted to rotate about another fixed horizontal axis spaced below the rotational axis of the crank, means for driving said crank and said eccentric at the same rotational speed, an oscillating guide member having one end mounted to pivot about the rotational axis of the crank, said oscillating guide member engaging said eccentric and being mechanically oscillated thereby, a probe arm having one end pivotally attached to said crank, a slide block mounted to slide along the oscillating guide, said slide block being pivotally attached to said probe arm at a point intermediate to the ends,

a probe arm extension slidably attached to said probe arm for probing the level of the granulated substance in said packages, a flap depressor attached to said probe arm extension for bending package flaps outwardly and downwardly according to the probed levels of the granulated substance in the packages, and a fixed flap guide positioned at a level to receive and retain any package flaps which are bent downwardly to a degree indicating a deficiency of granulated substance in the corresponding packages.

7. In a packaging machine, apparatus for detecting a deficiency in the level of filling of a cardboard carton having flaps open at one end, said apparatus comprising a movable guide member, a crank, means coupled to said guide member and said crank to cause said guide member to mechanically oscillate and said crank to rotate in synchronism with the oscillating guide member, a probe arm having one end pivotally attached to the crank and having a point slidably coupled to the guide member, and a probe arm extension mounted to slide along the

probe arm for probing into the carton through the open flaps.

8. In a packaging machine, apparatus for detecting a deficiency in the level of filling of a cardboard carton having flaps open at one end, said apparatus comprising a movable guide member, a crank, means coupled to said guide member and said crank to cause said guide member to mechanically oscillate and said crank to rotate in synchronism with the oscillating guide member, a probe arm having one end pivotally attached to the crank and having a point slidably coupled to the guide member, a probe arm extension mounted to slide along the probe arm for probing into the carton through the open flaps, a flap engaging member attached to the probe arm extension for depressing one of the open flaps in accordance with probed level of filling, and a fixed flap guide to receive and retain the depressed flap of any cartons having deficiencies in the level of filling.

No references cited.