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CARTON EAR FOLDER

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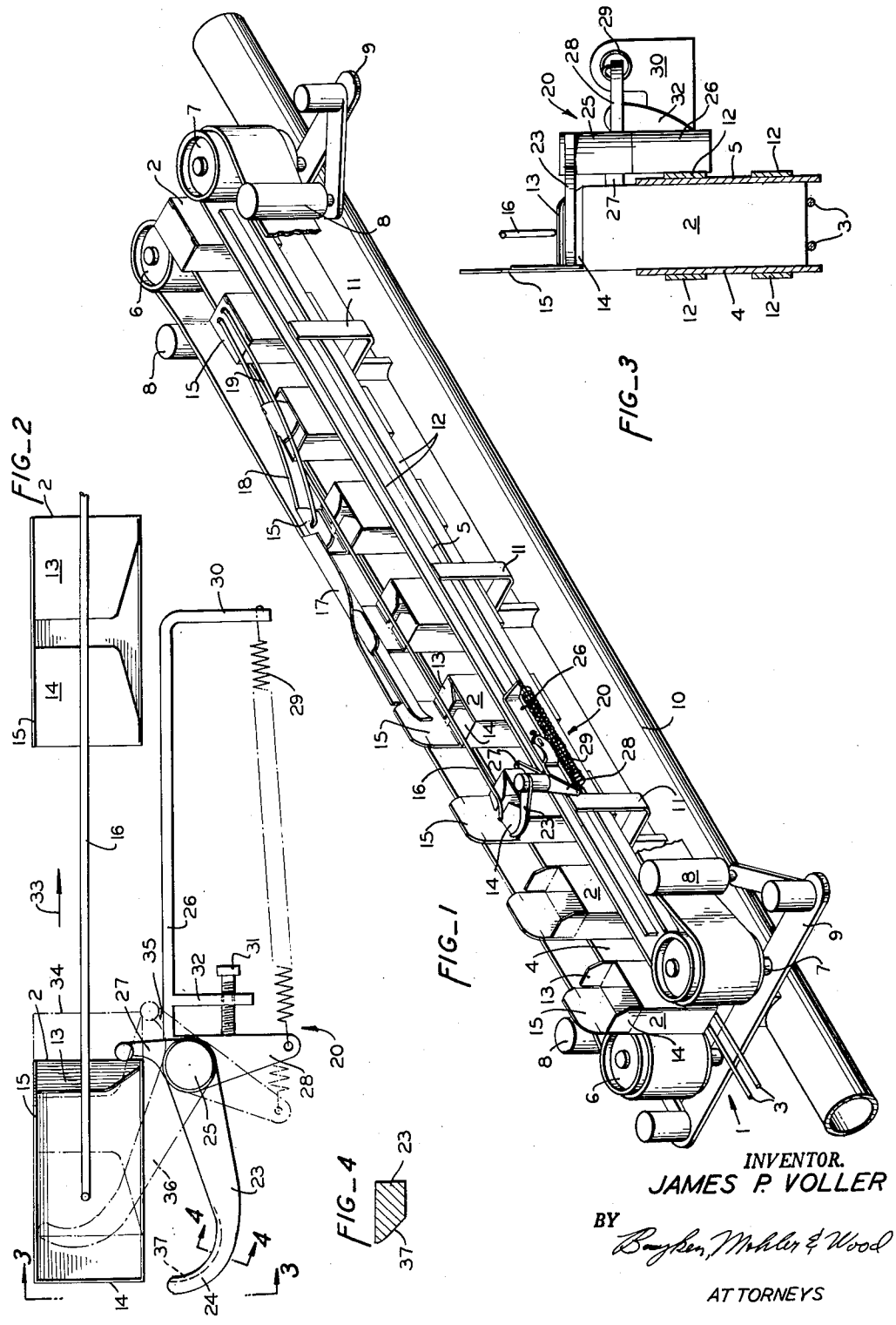


FIG_1

FIG_3

FIG_2

FIG_4

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CARTON EAR FOLDER

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This invention relates to packaging apparatus and more particularly to a mechanism for folding the trailing ear or flap to a closed position on a carton that is moving along a conveyor system.

In the packaging art it is customary practice to form a carton with one end remaining open, to insert the contents into the carton, and then to close the open end. Various methods and devices have been proposed for performing these functions and there are several different types of cartons which lend themselves to these practices.

It has been found that the most economical and efficient means for closing cartons in this manner incorporates a continuous conveyor system along which the cartons travel during the various closing stages. A number of such cartons are provided with a pair of opposed under flaps or ears which are to be folded toward each other, and a top or cover flap, which is to be folded over the ears and glued or tucked into the carton for closing the same.

In most cases where a conveyor system is employed, the carton is moved along a path of travel with one of the ears leading and one trailing with respect to direction of movement of the conveyor. Folding the leading flap opposite to the direction of movement presents no particular problem and may be accomplished by a "plow" or bent rod member under which the carton passes. The trailing flap, however, must be folded in the direction of movement of the carton, which operation is therefore more difficult.

Prior art mechanism for folding the trailing flaps in such instances have been restricted to movable devices which were required to be timed or synchronized with the carton conveyor or other mechanisms in the system. There have been many inherent problems in so timing these folding devices since any mechanical or electrical scheme for accomplishing this purpose is liable to become misadjusted and therefore fail to perform its function adequately. Likewise, the timing of these prior devices has depended upon the speed and spacing of the cartons and therefore the associated conveying means have had to be accurate in operation.

It is therefore an object of this invention to provide carton ear folding means which overcome the objections of prior art devices.

Another object of this invention is the provision of a carton ear folding mechanism for use with a conveyor system, which mechanism is self synchronizing.

Still another object of this invention is a carton ear folder which is satisfactorily operable without regard to the speed or spacing of cartons on a conveyor.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a portion of a packaging apparatus showing the carton ear folder of this invention mounted thereon;

FIG. 2 is an enlarged top plan view of the carton ear folder of FIG. 1 shown in operation with a carton;

FIG. 3 is a rear end elevational view as seen generally from line 3—3 of FIG. 2 showing the carton ear folding arm at the end of its inner ear folding stroke; and,

FIG. 4 is an enlarged cross sectional view taken along line 4—4 of FIG. 2.

In detail, the portion of the packaging apparatus shown

in FIG. 1 comprises a conveyor, generally designated 1, for moving the open ended cartons 2 along a generally horizontal path of travel. Conveyor 1 may be of the type providing a pair of elongated, parallel rods 3 upon which cartons 2 are adapted to be supported while being moved therealong by a pair of parallel, opposed side belts 4, 5. The inner runs of said belts are adapted to engage the opposed sides of cartons 2 and to travel in the same direction at the same speed. For this purpose said belts may be mounted on their respective end pulleys 6, 7, provided with suitable take-up rollers 8, and driven by conventional motor means (not shown). Pulleys 6, 7 and take-up rollers 8 may be mounted on cross members 9 of a suitable frame 10.

Frame 10 may also carry a plurality of U-shaped brackets 11 on which are supported not only rods 3 but also belt guides 12. Guides 12 are for the purpose of assuring that belts 4, 5 remain in contact with the sides of cartons 2 for moving said cartons along the conveyor.

The cartons 2 are moved along the conveyor in an upright position with their upper ends open and having upwardly extending therefrom opposed leading and trailing ears 13, 14 and an adjacent top flap 15. Ears 13, 14 are adapted to be folded inwardly toward each other and flap 15 is adapted to be folded over the same to close the end of the carton 2. In the drawings the carton is illustrated with a tuck flap at 15 but it is obvious that various other types of cartons having similar types of flaps and ears may be closed with the apparatus of this invention.

As shown in FIG. 1, leading ear 13 will be folded to the closed position by traveling under the conventional plow or bent rod 16 which is supported over the path of travel of the cartons between belts 4, 5. Likewise plows 17, 18, 19 may be provided as is customary for folding top flap 15 into closing relation with the upper end of the carton.

The folding of trailing ear 14 inwardly of carton 2 cannot be accomplished in a similar manner since ear 14 must be folded in the direction of movement of the cartons along conveyor 1. Hence, in order to accomplish this purpose the ear folding device, generally designated 20, of this invention is provided for folding ear 14 inwardly and forwardly relative to the direction of travel from its upright position to a position generally coplanar with the open end of carton 2. As seen in FIG. 1, when ear 14 is in this latter folded position, the same will pass under and be held down by plow 16 during the remainder of the carton closing process.

Ear folding device 20 comprises an elongated ear folding arm 23 (FIG. 2) which has one curved end 24 and has its other end secured to a boss 25 (FIG. 3) which is rotatably mounted on a bracket 26. Said bracket is adapted to be mounted adjacent the path of travel of cartons 2 and for this purpose may be secured to belt guides 12 in order to position arm 23 for swinging into and out of said path of travel. Bracket 26 is also positioned vertically so that arm 23 swings in a horizontal plane above the open end of carton 2 and into engagement with trailing ear 14.

Also secured to sleeve 25 for swinging therewith is a lever arm 27 (FIG. 2) which projects generally at right angles to arm 23 across the inner run of belt 5 and at a level to be engaged by carton 2 moving along its path of travel.

Projecting outwardly from sleeve 25 in a direction opposite from lever arm 27 is an extension 28 (FIGS. 2, 3) which is connected by a helical coil tension spring 29 to a projection 30 on bracket 26. Spring 29 serves to yieldably urge extension 28, lever arm 27, and ear folding arm 23 to their initial or inactive position shown in solid lines in FIG. 2 in which arm 28 is held against adjustment screw 31 which is threadedly received through

projection 32 of bracket 26. Thus, the initial position of arm 23 may be set as desired by adjusting screw 31.

In operation, a row of cartons 2 are picked up and moved along a generally horizontal path of travel by belts 4, 5. For the operation of this invention it is necessary that the cartons be spaced from one another, but as will later appear, this spacing need not be consistent. In practice belts 4, 5 may receive cartons 2 from a previous, slower moving belt which will result in the cartons being spaced automatically by the faster moving belts 4, 5.

Spring 29 of folding device 20 yieldably retains ear folding arm 23 out of the path of travel of the cartons and holds lever arm 27 projecting thereinto as shown in solid lines in FIG. 2. As the leading side of a carton 2 engages lever arm 27 the latter is caused to swing about the axis of sleeve 25 thereby swinging arm 23 toward the path of travel of the cartons noted by arrow 33 (FIG. 2). As carton 2 progresses from the solid line position of FIG. 2 to the dot-dash line position 34, arms 27, 23 are swung to the dot-dash position 35, 36, respectively.

In moving to this latter position it is noted that the curved end 24 of arm 23 swings around trailing ear 14, engages the rear side of the same, and then moves to the position 36 in which arm 23 has folded trailing ear 14 into closing relation with the open end of the carton. It will also be noted that at this inner end of its swing denoted by the position 36, the curved end 24 of arm 23 is in engagement with the inner side of top flap 15. Therefore, arm 23 acts not only to fold trailing ear 14 to the closed position, but also acts to support top flap 15 upright to prevent accidental folding thereof or interference with other parts of the apparatus.

It will be noted that ear folding device 20 need not be timed or synchronized with any other portion of the packaging apparatus since said device is operated only upon engagement by a carton 2. It is therefore necessary only to place and adjust device 20 with respect to a sample carton and the device will then operate in a similar manner on each successive carton no matter what the speed of the conveyor system or the spacing between successive cartons.

It should be noted that the device 20 is so placed with respect to plow 16 that arm 23 folds trailing ear 14 inwardly just prior to its passage under said plow. The plow 16 thereby retains ear 14 in the closed position during the remaining steps of the operation. In order that the operation of arm 23 be relatively smooth in folding trailing ear 14, the leading edge of portion 24 of said arm may be chamfered or beveled on the underside as indicated at 37 in FIG. 4.

Although the invention has been described and illustrated in detail, it is obvious that modifications could occur to those skilled in the art which nevertheless should be understood to fall within the scope of the appended claim.

I claim:

In combination with carton closing apparatus in which an upright, rectangular, open ended carton, having opposed leading and trailing ears extending upwardly from opposed sides of said carton and a tuck flap extending upwardly from a side adjacent said opposed sides, is moved along a generally horizontal path of travel in one direction by a continuously moving conveyor and in which said ears and flap are adapted to be folded into closing relation with said open end, comprising: an ear folding arm, means mounting said arm adjacent said conveyor for swinging in a generally horizontal plane at a level above the open end of a carton in said path, means projecting into said path movable in response to engagement by such carton and connected to said arm for swinging said arm in an arc into said path in said one direction into engagement with the trailing side of said trailing ear for folding said trailing ear in said direction, at the inner end of its swing said arm being adjacent said tuck flap for supporting the same upright.

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