

June 18, 1963

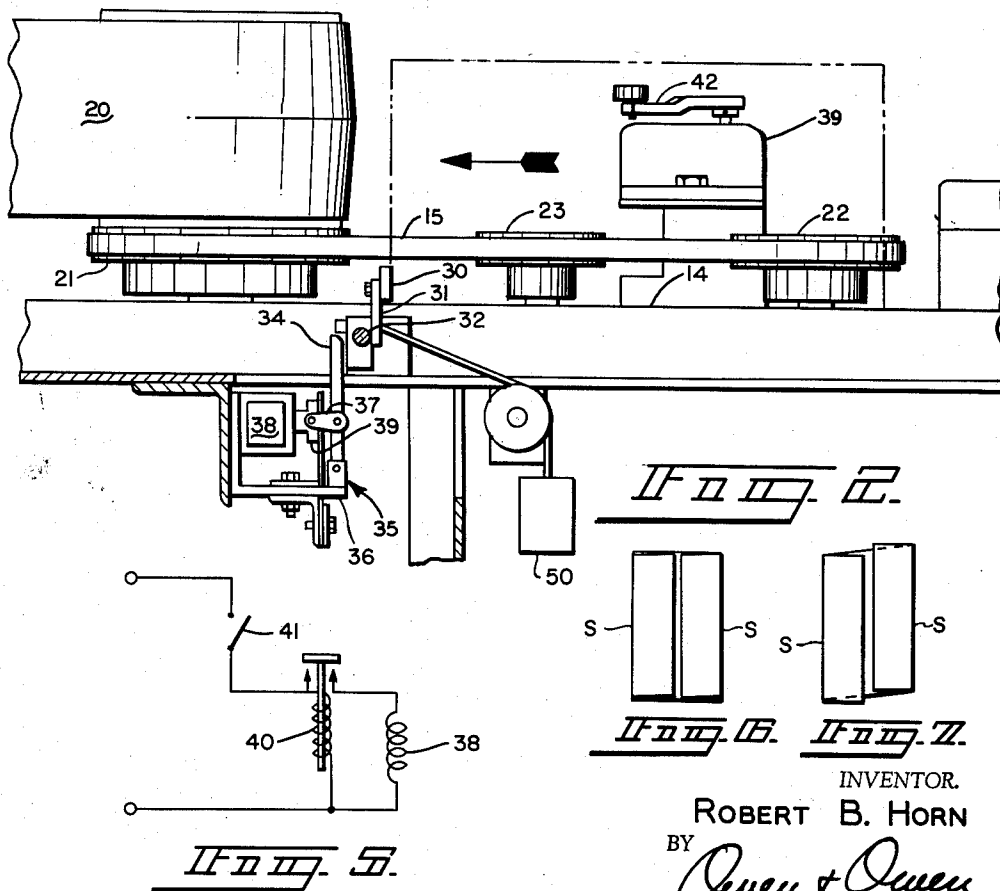
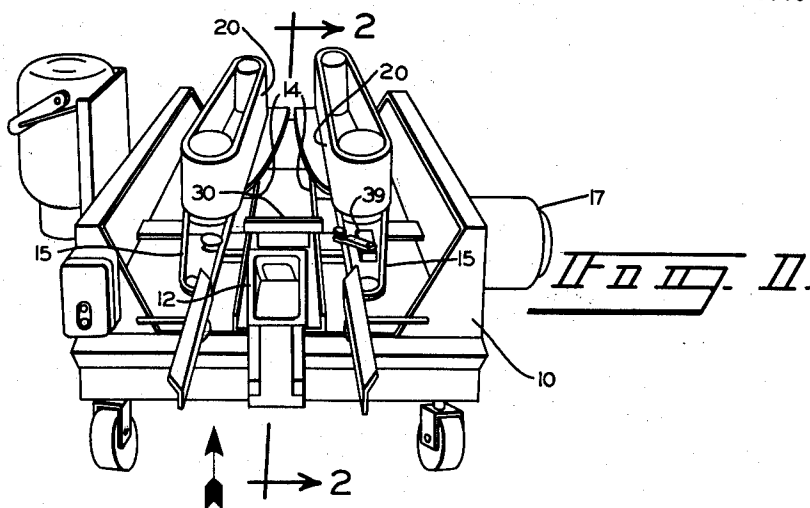
R. B. HORN

3,094,045

CARTON ERECTING MACHINE

Filed Dec. 26, 1961

2 Sheets-Sheet 1



INVENTOR.
ROBERT B. HORN
BY *Quen + Quen*
ATTORNEYS

June 18, 1963

R. B. HORN

3,094,045

CARTON ERECTING MACHINE

Filed Dec. 26, 1961

2 Sheets-Sheet 2

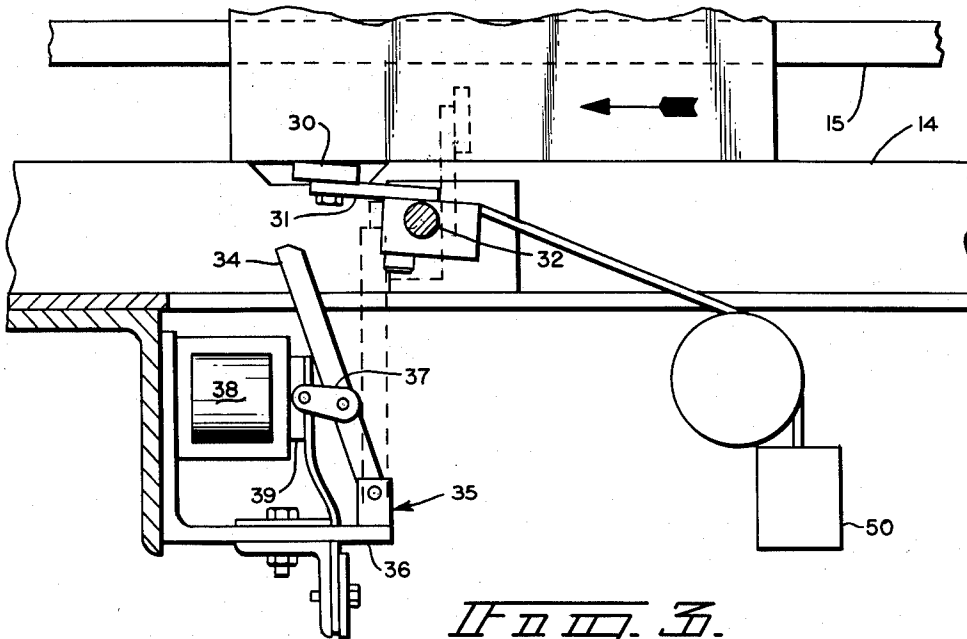


Fig. 3.

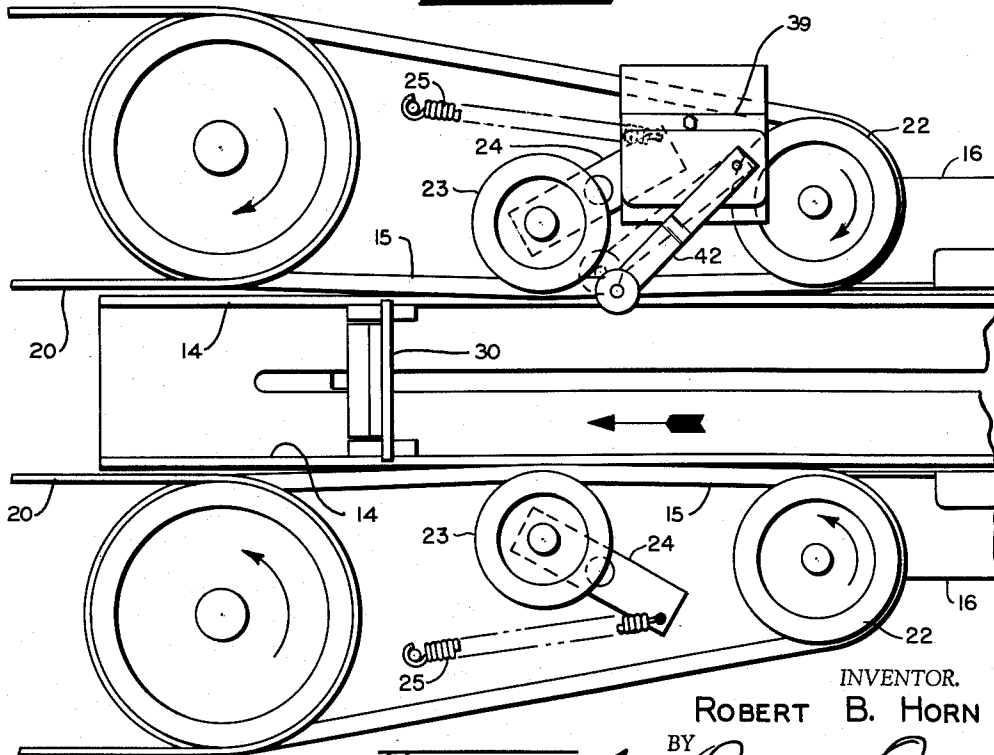


Fig. 4.

INVENTOR.
ROBERT B. HORN

BY *Owen & Owen*

ATTORNEYS

1

3,094,045

CARTON ERECTING MACHINE

Robert B. Horn, Winchester, Ind., assignor to Ball Brothers Company, Inc., Muncie, Ind., a corporation of Indiana

Filed Dec. 26, 1961, Ser. No. 162,030

2 Claims. (Cl. 93—36)

This invention relates to carton erecting machines and is particularly directed to means which will assure that the side walls of the erected carton are so positioned that subsequent folding of the top and bottom flaps will dispose these elements in properly squared relationship to the end walls of the carton.

At the present time carton erecting machines operate in such a manner that the operator picks up a folded carton and forces it over a horn of the machine which spreads the side walls and folds the bottom inner flaps toward each other. The bottom outer flaps at this stage project downwardly from the bottom. The partially erected carton is pushed manually into a sealing machine and the sides engage continuously running belts which carry the carton through and into gluing stations where glue is applied to the bottom inner flaps. The carton is held between two guides while the top and bottom outer flaps are folded in toward the center. The boxes then go into a compression unit and are held between two belts for a time interval sufficient to allow the glue to dry.

Cartons erected by machines of this character are sometimes completed with the side and end walls disposed as sides of a rhomboid rather than sides of a rectangular parallelogram. The present invention assures that the cartons will be square so that the respective pairs of folded-in top and bottom outer flaps will be directly opposite each other, and will not project beyond the ends of the box. Projection of the top and/or bottom outer flaps beyond the end walls results in a carton which is commercially unacceptable and if such a carton is loaded with glassware, for example, it must be unloaded and the glassware repacked in another carton for shipment.

The primary object of the present invention, therefore, is to provide means to so guide and support the sides and ends of a carton as to assure that these walls are substantially at right angles to each other, within commercial limitations.

Another object of the invention is to provide a mechanism which operates on successive cartons automatically and which subjects each successive carton to a squaring operation, preferably for a predetermined time period.

Other objects and advantages of the invention will become apparent from the following detailed description of a preferred embodiment thereof, reference being had to the accompanying drawings, in which:

FIGURE 1 is a perspective view of a folding section of a carton erecting machine embodying the present invention;

FIG. 2 is a fragmentary section on line 2—2 of FIG. 1 showing stop and squaring members in operative position;

FIG. 3 is a fragmentary view similar to FIG. 2, but on an enlarged scale and showing a carton in full rather than dotted lines, showing the stop and squaring members in released position;

FIG. 4 is a fragmentary plan view of the apparatus shown in FIG. 2;

FIG. 5 is a circuit diagram; and

FIGS. 6 and 7 are diagrammatic plan views of properly and improperly folded cartons.

The box or carton squaring device of the present invention comprises, in general, a squaring member placed across the path of progress of the box through the erecting and gluing machine. The squaring member is at 90

2

degrees to the direction of flow of the carton and thus tends to form 90 degree corners on the cartons, and the side walls of the carton are continuously urged against the squaring member by driving belts which operate continuously against the sides of the carton. The squaring member is placed in the path of each successive carton and is released and moved out of the way after being engaged by a carton at the end of a predetermined time for example. When the squaring member is moved out of the way, the carton passes thereover and proceeds to the gluing station for the application of glue to the squared carton flaps. After the carton has passed over the squaring member, the squaring member is returned to the upright position ready for engagement by another carton, and in the preferred embodiment, the time cycle of its operation begins again at the moment of engagement with the next incoming carton.

The preferred embodiment of the invention is shown in the drawings in conjunction with a substantially conventional carton erecting machine having a frame 10 on which various flap guiding and bending members are provided. A horn 12 is disposed at the entrance end of the machine and in use the operator takes a flattened carton and forces it over the horn to commence the erecting operation and the sealing of the bottom inner and outer flaps. Cartons therefore move through the machine and in the direction of the arrows in FIGS. 1, 2, 3 and 4.

During their movement through the machine the partially erected cartons are supported by longitudinal rails 14.

A pair of oppositely disposed, constantly operating drive belts 15 are provided which are carried by laterally adjustable side frames 16 and are driven from a motor 17 through an appropriate gearing (not shown). These drive belts are disposed to engage the lower portion of the side walls of a carton and move it forwardly, ultimately into engagement with a pair of wide drive belts 20 which are a part of a conventional machine and which move the carton through a folding station and into a gluing station at which glue is applied to the lower inner flaps, the lower outer flaps being bent upwardly and held in position as the cartons progress for a sufficient length of time to set the glue. Machines of this general character are, of course, well known in the art.

As shown in FIGS. 2 and 4 the constantly driven belts 15 are trained over drive pulleys 21 on the live pulley shafts for the wide drive belts 20. The drive belts 15 can, of course, be driven independently from the main wide drive belts 20. At their remote bights the driven belts 15 are trained over pulleys 22 and on their live sides the belts are engaged by idlers 23 carried at the ends of pivoted arms 24 and urged outwardly by springs 25 to assure that the belts will be forced firmly against the sides of the cartons to exert a substantial and constant driving force forwardly on the carton sides.

The present invention is particularly directed to a means which will assure that the cartons are square within commercial limitations at the time the lower outer flaps are bent up to engage the glued lower surface of the inner flaps. If the carton side walls are not square with the ends at the time this operation is performed, the carton takes on a rhomboidal configuration and a part of the lower outer flap extends beyond the end wall of the carton rendering it commercially unacceptable.

To assure a square configuration of the carton the present invention includes a squaring member comprising a plate 30 which is disposed in the path of the cartons as they move through the machine along the rails 14 under the influence of the driving belts 15. The squaring member is carried on the end of a vertically extending arm 31 which is pivotally connected on an axis 32 between the longitudinal rails 14. The squaring member is disposed

to be moved out of the path of the carton after the carton has been forced against it long enough for the sides to be forced into a rectangular position with respect to the end. In the preferred form of the invention shown in the drawing, a time delay device is used to assure that the squaring contact persists for a predetermined time interval.

A stop member 34 is normally disposed in the swinging path of the squaring member and prevents the squaring member from moving out of the path of the carton until the stop member is released. The stop member comprises a vertically disposed arm pivoted at 35 on a sub-frame 36 carried by the main machine frame 10. Intermediate its ends the stop member 34 is connected by a link 37 to the plunger of a solenoid 38 also carried by the sub-frame 36. When the solenoid is energized, its armature 39 is drawn inwardly and draws the stop member 34 to a position where it is swung out of the path of movement of the squaring member or plate 30 and the latter is then free to be pushed out of the way by the carton which has been pressed against it by the driving belts 15.

As indicated in FIG. 5 of the drawings the solenoid 38 is energized by a time delay relay 40, the circuit to the time delay relay being closed by a microswitch 41, the lever arm operator for which is designated 42 in FIGS. 2 and 4 and which is engaged by the carton as it enters between the constantly operated driving belts 15. Closure of the microswitch by engagement of a carton with the lever arm operator 42, therefore, starts a time interval after which the relay 40 closes the circuit to the solenoid 38 and pulls the stop member 34 out of the way of the squaring member plate 30.

When the squaring member 30 has been swung to its retracted position as shown in FIG. 3, the carton moves over it and as soon as the carton has passed the squaring member is restored by a counterweight 50 and the solenoid is released by opening of the microswitch 41. The squared carton passes then into engagement with the wide drive belts 20 and continues through the machine in a conventional manner.

The restored squaring member or plate 30 is in position to receive the next carton which is pushed into place between the first set of driving belts 15, the microswitch 41 being closed by the advancing carton which engages the squaring member 30 for a predetermined time interval sufficient to assure a substantially 90 degree angle between the side and end walls of the carton prior to its release for engagement with the wide driving belts 20 which will carry it through the remainder of the conventional box erecting operation.

FIG. 6 of the drawing is a bottom plan view of a carton having side flaps folded in a commercially acceptable manner. It will be noted that no part of either of the side flaps S extends beyond the end wall of the carton. While such a carton may not have a precise 90 degree angle be-

tween sides and ends the variation from the right angle is very small. If a significant variation occurs the side flaps will protrude beyond the end walls as shown in a somewhat exaggerated manner in FIG. 7. This rhomboidal configuration of the carton is not acceptable from a commercial standpoint and if filled, must be emptied and re-packed. The present invention has been found to completely obviate the possibility of misformation of the cartons.

What I claim is:

1. In a carton erecting machine, a pair of drive belts having spaced, parallel, live sides, with at least the surfaces of said live sides which are toward the opposite belt lying in parallel planes, means for driving said belts in a common direction, a pivotable squaring member having a carton-engaging surface lying in a plane perpendicular to the direction of movement of said belts and which is also perpendicular to the planes of said surfaces of said live sides, the length of said squaring member being substantially equal to the distance between the planes of said surfaces, the plane of said carton-engaging surface intersecting the live sides of said belts at intermediate portions thereof, said belts adapted to frictionally engage side walls of a carton to be erected and said squaring member being adapted to engage an end wall of the carton to restrict movement of the end wall of the carton while said belts urge said side walls toward said squaring member to position said end wall perpendicularly to both of said side walls, means supporting said squaring member for movement into and out of the path of a carton advanced by said belts, means for yieldingly holding said squaring member in the path of a carton, stop means normally preventing said squaring member from moving out of the path of a carton, switch means closed by engagement of an entering carton, delay means actuated by the closing of said switch means, and moving means actuated by said delay means to move said stop means away from said squaring member whereby an engaging carton moves said squaring member out of its path of advancement, and additional belt means beyond said engaging belts for engaging side walls of the carton and for moving it beyond said belts while holding the carton in the squared relationship.

2. The combination according to claim 1 wherein said switch means is spaced from said squaring member toward the entry end of said belts and capable of operating independently of engagement of a carton with said squaring member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,728,274	Nitchie et al. -----	Dec. 27, 1955
2,985,076	Toennies -----	May 23, 1961