June 26, 1962 R. K. GALLOWAY 3,040,634

CARTON SET-UP MECHANISM

Filed April 27, 1960

4 Sheets-Sheet 1

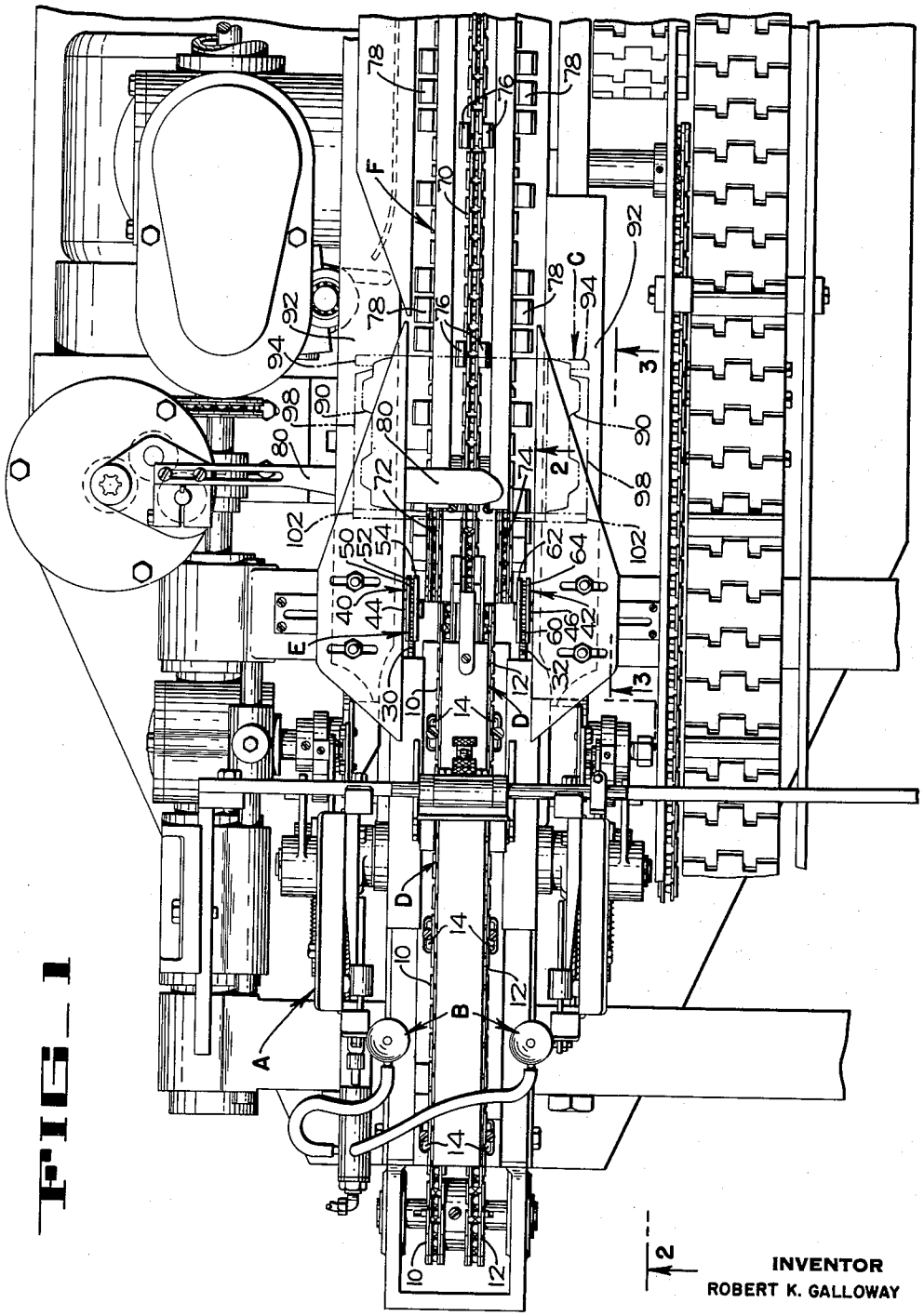


FIG. 1

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FIG_2

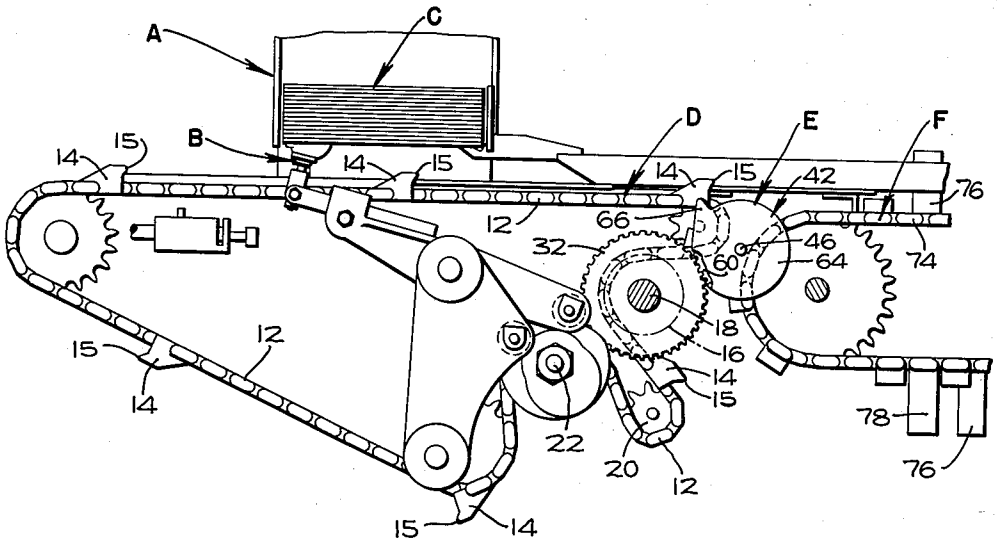
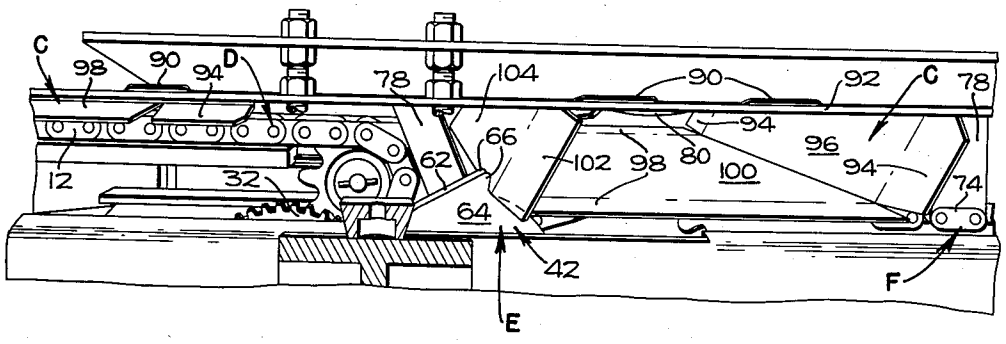


FIG_3



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FIG_4

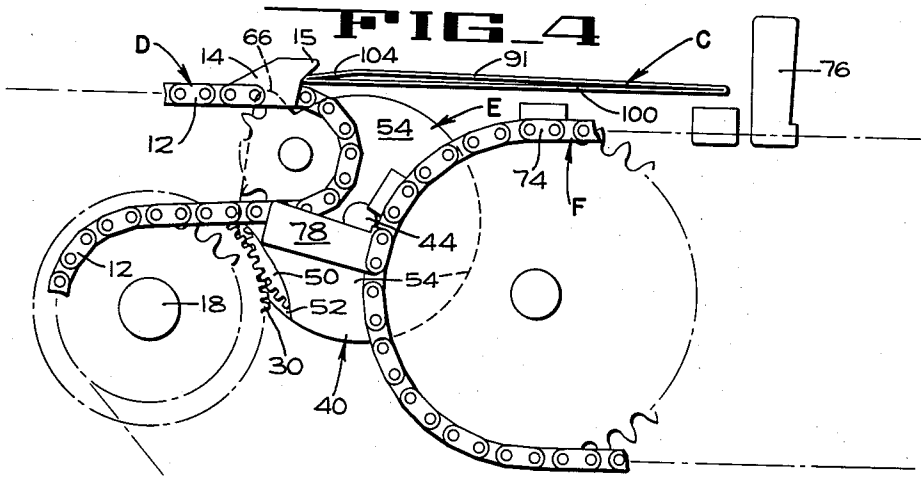


FIG_5

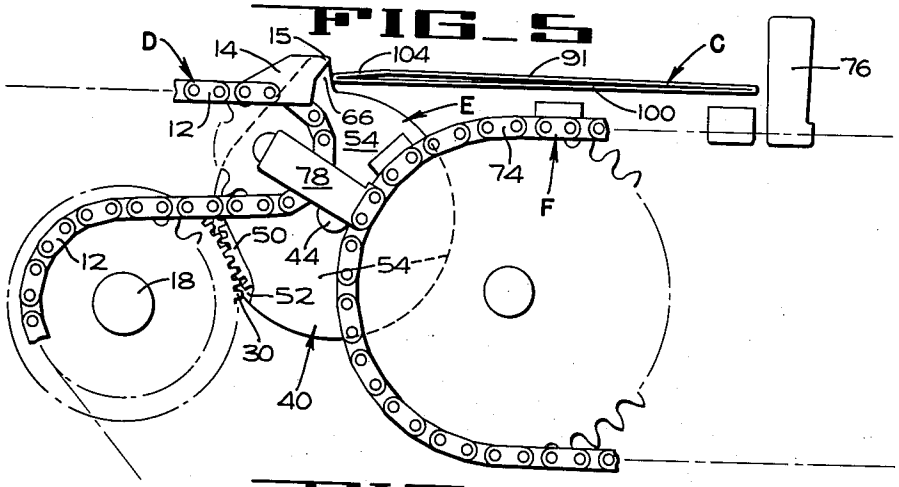
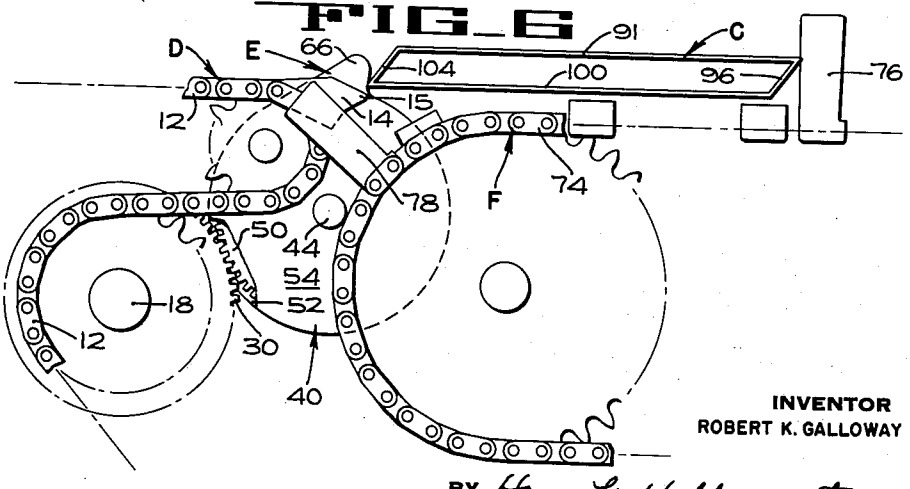


FIG_6



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CARTON SET-UP MECHANISM

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FIG_7

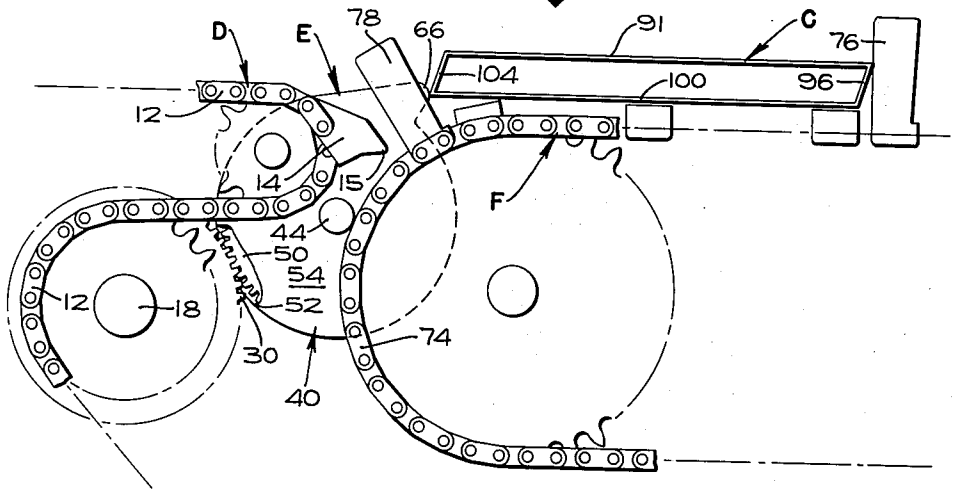
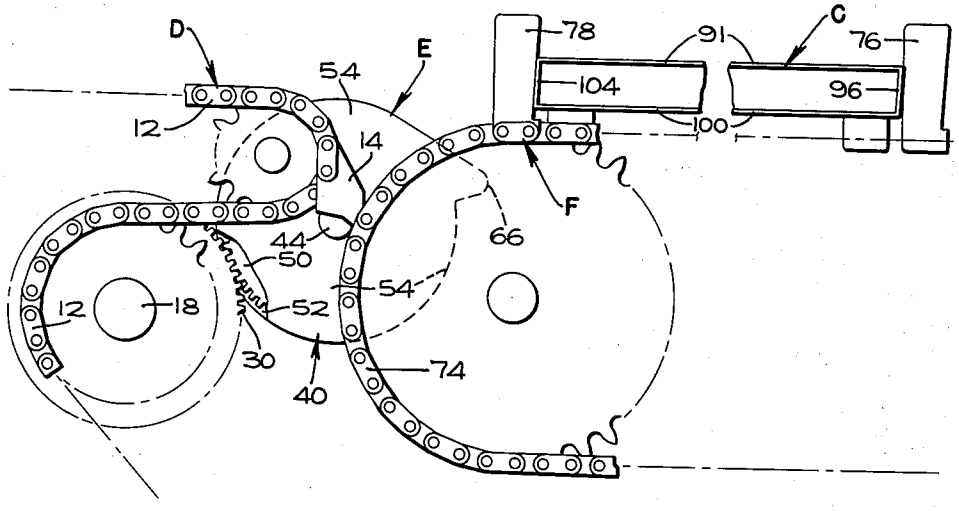


FIG_8



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United States Patent Office 3,040,634 Patented June 26, 1962

3,040,634

CARTON SET-UP MECHANISM

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Filed Apr. 27, 1960, Ser. No. 25,106
6 Claims. (Cl. 93—53)

This invention pertains to the art of packaging articles, and more particularly relates to a carton set-up mechanism for use with a machine for inserting articles into cartons.

This application is a continuation-in-part of my co-pending application Serial No. 693,077, filed October 29, 1957, and entitled "Carton Feeding and Erecting Mechanism."

An object of the present invention is to provide an improved high-speed carton erecting mechanism adapted for, but not necessarily limited to, use in conjunction with a high-speed packaging machine.

Another object of the invention is to provide a high-speed mechanism adapted to receive cartons in flat folded relation and to deposit them in erected condition on a discharge conveyor, which advantageously can be the carton conveyor of a packaging machine.

Another object of the present invention is to provide a carton erecting mechanism having improved qualities of positiveness, dependability, and rapidity in its operation.

Various other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings, in which:

FIG. 1 is a fragmentary plan of a packaging machine incorporating the carton erecting mechanism of the present invention.

FIG. 2 is a partially diagrammatic section along line 2—2 of FIG. 1.

FIG. 3 is a fragmentary perspective of the packing machine of FIG. 1, showing the carton erecting mechanism of the present invention drawn to an enlarged scale and viewed as indicated by the line 3—3 of FIG. 1.

FIGS. 4, 5, 6, 7 and 8 are a series of schematic views illustrating the action of the mechanism of the present invention in erecting a carton from flat folded relation to its fully erect condition.

The drawings illustrate the carton erecting mechanism of the present invention incorporated within a packaging machine which comprises a magazine A (FIGS. 1 and 2) adapted to receive a stack of cartons C (FIG. 2) in superposed relation therein. A suction cup mechanism B is adapted to withdraw the cartons singly from the carton magazine A and deposit them on a first carton conveyor D in flat folded relation. The carton conveyor D advances the cartons C from beneath the magazine A and delivers them in rapid succession to the carton set-up mechanism E of the present invention. The carton magazine A, the suction cup feed mechanism B and the carton delivery conveyor D are fully described in the above-mentioned co-pending application, and the specific details thereof are not described herein. As the cartons C are erected by the carton set-up mechanism E described hereinbelow, they are deposited in their fully erect condition on a carton conveyor F which corresponds to the carton discharge conveyor disclosed in the above-mentioned co-pending application.

The delivery conveyor D comprises two parallel chains 10 (FIG. 1) and 12 (FIGS. 1–3) each having a series of equally spaced lugs 14 mounted thereon in the same manner as described in said above-mentioned application. It should be noted, however, that in this instance the lugs 14 are provided with nose portions 15 which are much shorter than the elongate forwardly projecting nose portion that characterize the corresponding lugs in said prior application. The lower reaches of the chains 10 and 12 are trained around two sprockets which are not shown but which are indicated by the pitch line 16 (FIG. 2). These

sprockets are fixed to a shaft 18 rotatably mounted between the side plates (not shown) of the machine frame. Two idler sprockets, one of which is shown at 20 in FIG. 2, may be provided for the chains 10 and 12, respectively, between the shaft 18 and the main drive shaft 22 to provide sufficient wrap of the chains 10 and 12 about the sprockets on the shafts 18 and 22.

The carton set-up mechanism E of the present invention comprises two spur gears 30 (FIG. 1) and 32 (FIGS. 1 and 2) which are fixed to the shaft 18 outwardly of the chains 10 and 12. Two carton set-up cam assemblies 40 (FIG. 1) and 42 (FIGS. 1–3) are rotatably mounted on two stub shafts 44 and 46, respectively, fixed to the side frames of the machine adjacent the forward ends of the horizontal reaches of the chains 10 and 12. The assembly 40 comprises a spur gear 50 (FIG. 1) meshing with the spur gear 30 on the shaft 18, and two cam plates 52 and 54 one fixed to each side of the spur gear 50. Similarly, the assembly 42 comprises a spur gear 60 (FIG. 1) meshing with the spur gear 32 on the shaft 18, and two cam plates 62 and 64 (FIGS. 1–3) fixed to the opposite sides of the gear 60. All of the cam plates 52, 54, 62 and 64 are alike and each is provided with a cam finger or lug 66 projecting radially outward therefrom.

The carton discharge conveyor F is the same as that disclosed in the above-mentioned copending application and comprises three parallel chains 70, 72 (FIG. 1) and 74 (FIGS. 1–3), respectively. A plurality of forward pocket defining blocks 76 (FIGS. 1–3) are fixed at equally spaced points to the central chain 70, and pairs of rear pocket defining blocks 78 are fixed at equally spaced points to the two outer chains 72 and 74, respectively, in opposition to each other.

A splitting blade 80, similar to the carton erecting blade of the above-mentioned application, is mounted and driven for orbital movement in the same manner as described in detail in said application. However, in this instance the blade 80 is a relatively thin blade and is not provided with the depending vertical flange as is the blade of said application. In this instance the blade does not perform any erecting function, but instead merely acts to break any adhesion between the upper and lower carton panels.

As the machine operates, the carton feed mechanism B withdraws the flat, folded cartons C successively from the magazine A and places each on the conveyor D with its rearmost edge in contact with the forward faces of an aligned pair of the lugs 14. Each carton is advanced from beneath the magazine A by its associated pair of lugs 14 on the carton conveyor D. As the carton moves from beneath the magazine A the end flap 90 connected to each end of the upper panel 91 (FIG. 6) of the carton is separated from the other end flaps connected to the same end of the carton so that the end flap at each end of the upper panel of the carton passes above and rests on a plate 92, while the corresponding end flap 94 associated with the front wall 96 of the carton, the corresponding end flap 98 associated with the bottom wall 100 of the carton, and corresponding end flap 102 associated with the rear panel 104 of the carton all pass beneath the same plate 92. This is accomplished by structure fully described in the above-mentioned co-pending application.

During operation of the apparatus, and as the rear edge of a folded carton approaches the forward end of the carton delivery conveyor D, the lugs 66 of the carton set-up cam assemblies 40 and 42 are approaching the rear edge of the carton C as illustrated in FIG. 4. It is to be noted that the peripheral velocity of the carton set-up assemblies 40 and 42 is greater than the linear velocity of the carton delivery conveyor D. The lugs 66 of the cam assemblies advance past the lugs 14 on the supply conveyor D and engage the rearmost edge of the

folded carton blank C and advance the same away from the lugs **14** as shown in FIG. 5, until the forwardmost edge of the carton blank C contacts the forward pocket defining lug **76** on the discharge conveyor F. At about this time, the blade **80** is inserted between the upper and lower panels of the carton blank C to break any adhesion therebetween. Continued advance of the lugs **66** as illustrated in FIG. 6 wipes the lugs **66** downward across the rear panel **104** of the carton bending the same downward and forward relatively to the upper panel **91**. The forward movement of the lower panel **100** of the carton resulting from the downward and forward bending of the rear panel **104** causes the front panel **96** of the carton C to move downward away from the upper panel **91** so that the carton C assumes a parallelogram configuration as illustrated in FIG. 6.

The continued rotational movement of the lugs **66** causes the parallelogram illustrated in FIG. 6 to approach more closely to a rectangular configuration as illustrated in FIG. 7. It will be noted that at this point the rear pocket defining lugs **78** of the conveyor F are sweeping upward around the rearmost sprocket of said conveyor and are approaching a vertical position. The lugs **78** strike the lower rearmost corner of the carton C and as the lugs **78** assume their vertical positions illustrated in FIG. 8 they move closer to the forward pocket defining lugs **76** until the space between the lugs **76** and **78** is just sufficient to accommodate the carton in its fully erect, rectangular configuration illustrated in FIG. 8, thus completing the total erection of the carton.

While a preferred embodiment of the invention has been disclosed herein, it should be understood that various changes may be made therein without departing from the spirit of the invention as defined in the appended claims.

The invention having thus been described what is claimed and desired to be protected by Letters Patent is:

1. Mechanism for setting-up a carton including top, bottom, front, and rear panels and end flaps attached to the laternal edges of the top and bottom panels, comprising a conveyor for advancing the carton in flat folded condition, means for driving the conveyor, lugs on said conveyor for engaging the rear edge of the carton, a plate adjacent each side of said conveyor for slidably supporting the flaps connected to the top panel while the other parts of the carton are suspended from the top panel flaps, a plurality of carton unfolding cams mounted for rotation about a transverse axis adjacent the forward end of said conveyor, a lug on each of said cams adapted to engage and wipe downward across the rear carton panel and turn it downward toward a position perpendicular to said top panel, and means for driving said cam in timed relation to the speed of said conveyor.

2. Mechanism for setting up a carton having top, bottom, front, and rear panels and end flaps connected to the top panel, comprising a conveyor for advancing the carton in flat folded condition, means for driving the conveyor, lugs on said conveyor for engaging the rear edge of said carton to propel the carton as the conveyor advances, a plate adjacent each side of said conveyor in positions to support the carton by slidably engaging the flaps connected to the carton's top panel, means mounted adjacent the conveyor for breaking adhesion between the top and bottom panels of said carton, a carton unfolding cam rotatably mounted adjacent the forward end of said conveyor, a lug on said cam adapted to engage and wipe downward across the rear carton panel to turn it downward toward a position perpendicular to said top panel, and means for driving said cam in timed relation to the speed of said conveyor.

3. Mechanism for setting up a carton having top, bottom, front, and rear panels and end flaps connected to the top panel, comprising a first conveyor for advancing the carton in flat folded condition, lugs on said first conveyor for engaging the rear edge of said carton, a second conveyor mounted with its rear end adjacent the forward end of said first conveyor, front and rear pocket defining lugs on said second conveyor, carton supporting plates adjacent the sides of said conveyors in position to slidably receive the flaps connected to the top panel of the carton, a carton unfolding cam rotatably mounted adjacent the forward end of said first conveyor, drive means for synchronously operating said conveyors and said cam, and a lug on said cam adapted to engage the rear edge of said carton and move said carton forward into contact with a forward pocket defining lug on said second conveyor and to wipe downward across the rear carton panel to turn it downward to a position wherein said rear pocket defining lug can contact the same and square the set-up carton in the pocket defined by the lugs on said second conveyor.

4. Mechanism for setting up a carton having top, bottom, front, and rear panels and end flaps connected to the top panel, comprising a first conveyor for advancing the carton in flat folded condition, lugs on said first conveyor for engaging the rear edge of said carton, a second conveyor mounted with its rear end adjacent the forward end of said first conveyor, front and rear pocket defining lugs on said second conveyor, carton supporting plates adjacent the sides of said conveyors in positions to slidably support the flaps connected to the top panel of the carton, means mounted adjacent the conveyor in position to engage the carton while the carton is supported from said plates for breaking adhesion between the top and bottom panels of the carton, a carton unfolding cam rotatably mounted adjacent the forward end of said first conveyor, means for driving said conveyors and said cam in synchronism with each other, a lug on said cam adapted to engage the rear edge of the carton and move the carton forward into contact with a forward pocket defining lug on said second conveyor and to wipe downward across the rear carton panel to turn it downward to a position substantially perpendicular to said top panel at which position the rear pocket defining lug can contact the same and square the setup carton in the pocket defined by the lugs on said second conveyor.

5. Mechanism for setting up a carton having top, bottom, front, and rear panels and end flaps connected to the top panel, comprising a first conveyor for advancing the carton in flat folded condition, lugs on said first conveyor for engaging the rear edge of said carton, a second conveyor mounted with its rear end adjacent the forward end of said first conveyor, front and rear pocket defining lugs on said second conveyor, plates adjacent the sides of said conveyors, said plates being adapted to engage the underside of the flaps connected to the top panel only and thereby to slidably support the carton, means for breaking adhesion between the top and bottom panels of the carton, a plurality of carton unfolding cams rotatably mounted for rotation about a transverse axis adjacent the forward end of said first conveyor, a lug on each of said cams adapted to engage the rear edge of the carton and move the carton forward into contact with a forward pocket defining lug on said second conveyor and to wipe downward across the rear carton panel to bend it downward to a position substantially perpendicular to said top panel, said rear pocket defining lug being adapted to contact the rear panel and square the set-up carton in the pocket defined by the lugs on said second conveyor and means for driving said cam and said conveyors in timed relation to each other.

6. A set-up mechanism for unfolding a carton having top and rear panels lying substantially flat adjacent front and bottom panels comprising means for movably supporting the top panel of the carton, means for advancing the carton along a predetermined path with the front rear, and bottom panels of the carton suspended from the top panel, a carton opening cam rotatably mounted adjacent said path, means for rotating the cam at a higher peripheral speed than the linear speed of the carton ad

vancing means, a lug on said cam in position to overtake the rear panel of the advancing folded carton during rotation of the cam and to engage the rear panel to propel the carton away from said carton advancing means, and means restricting the linear speed of the top panel of the advancing carton while the lug on the carton unfolding cam wipes against said rear panel in an oblique direction sloping forward and downward to turn the rear panel downward toward a position perpendicular to the top panel.

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