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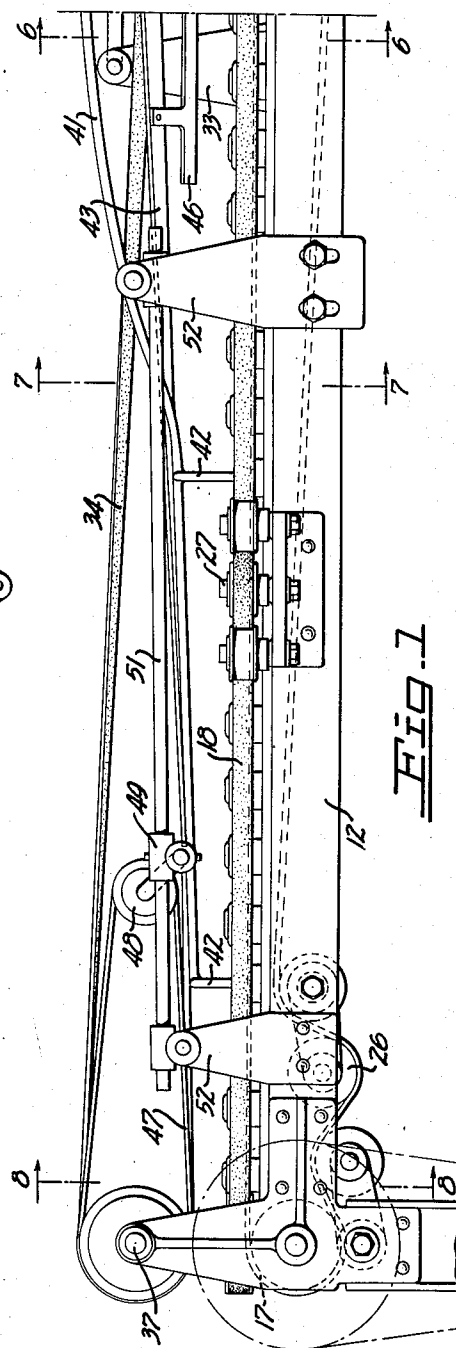
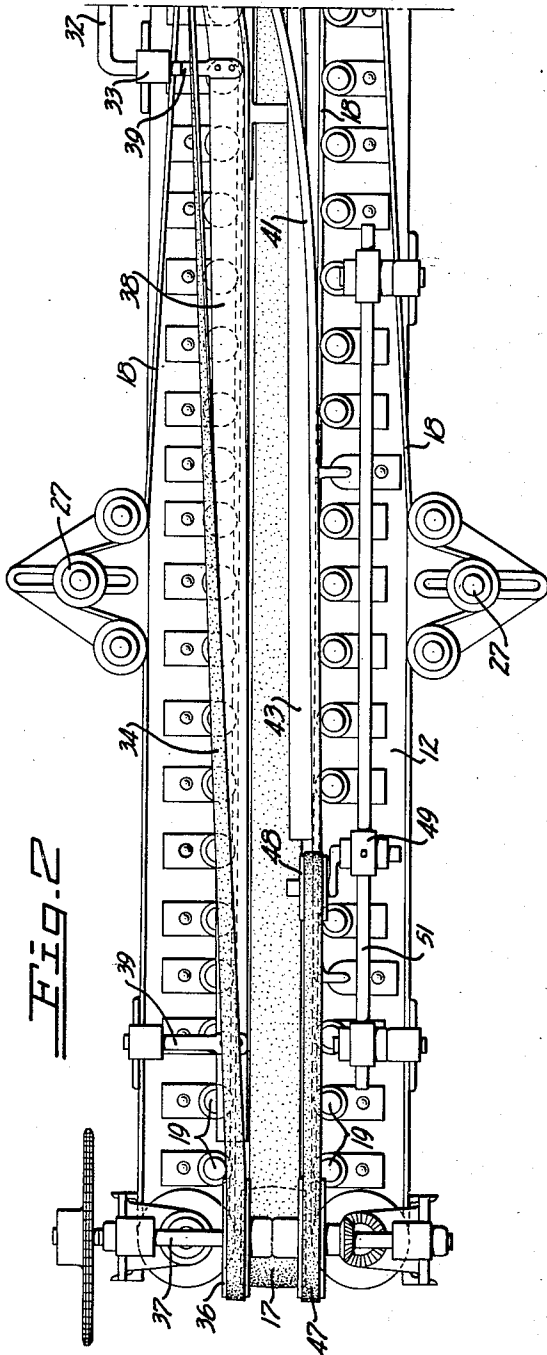
G. F. FORD ET AL

2,064,200

MACHINE FOR CLOSING CARTONS

Filed Nov. 30, 1935

3 Sheets-Sheet 1



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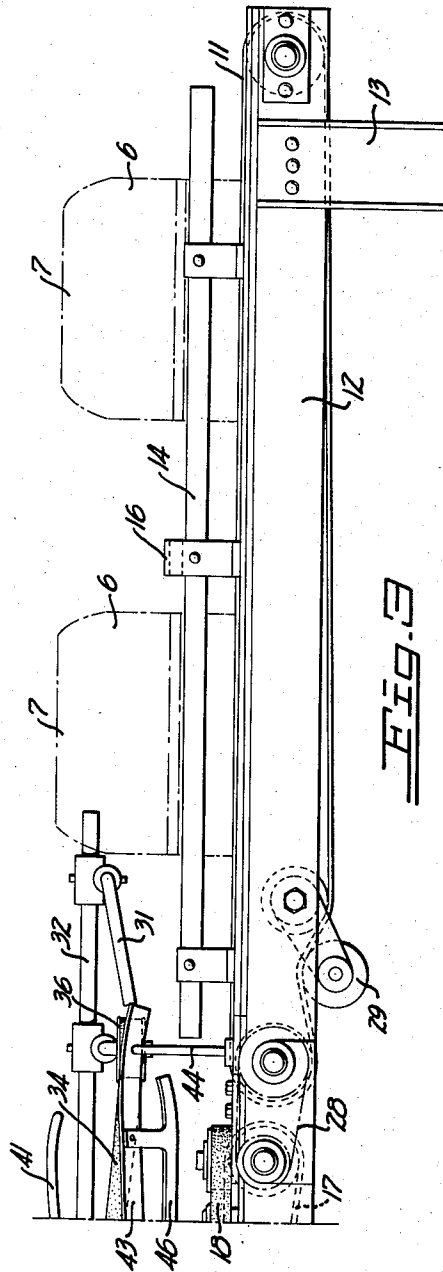
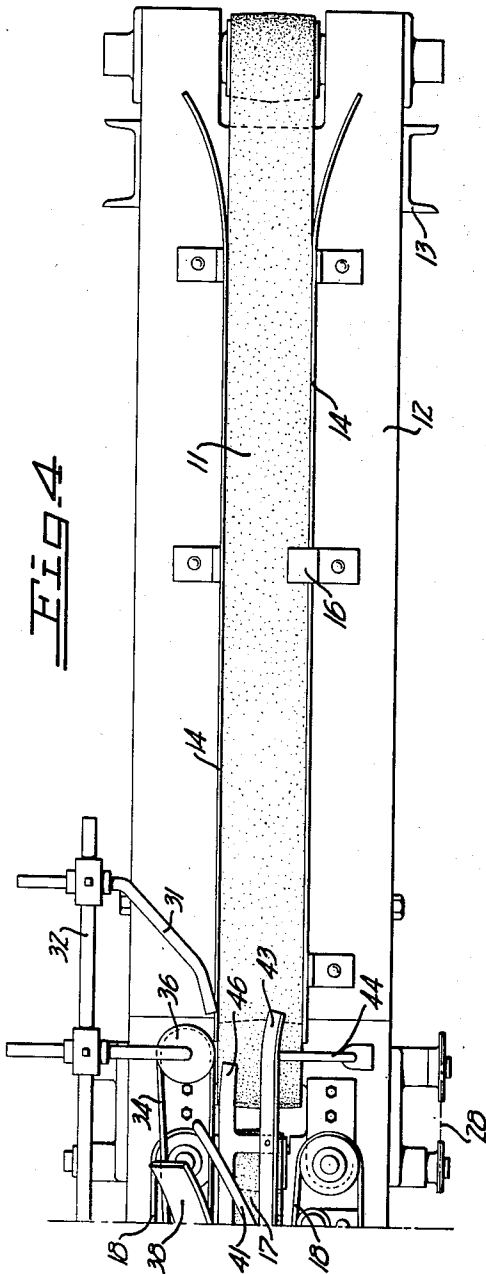
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3 Sheets-Sheet 2



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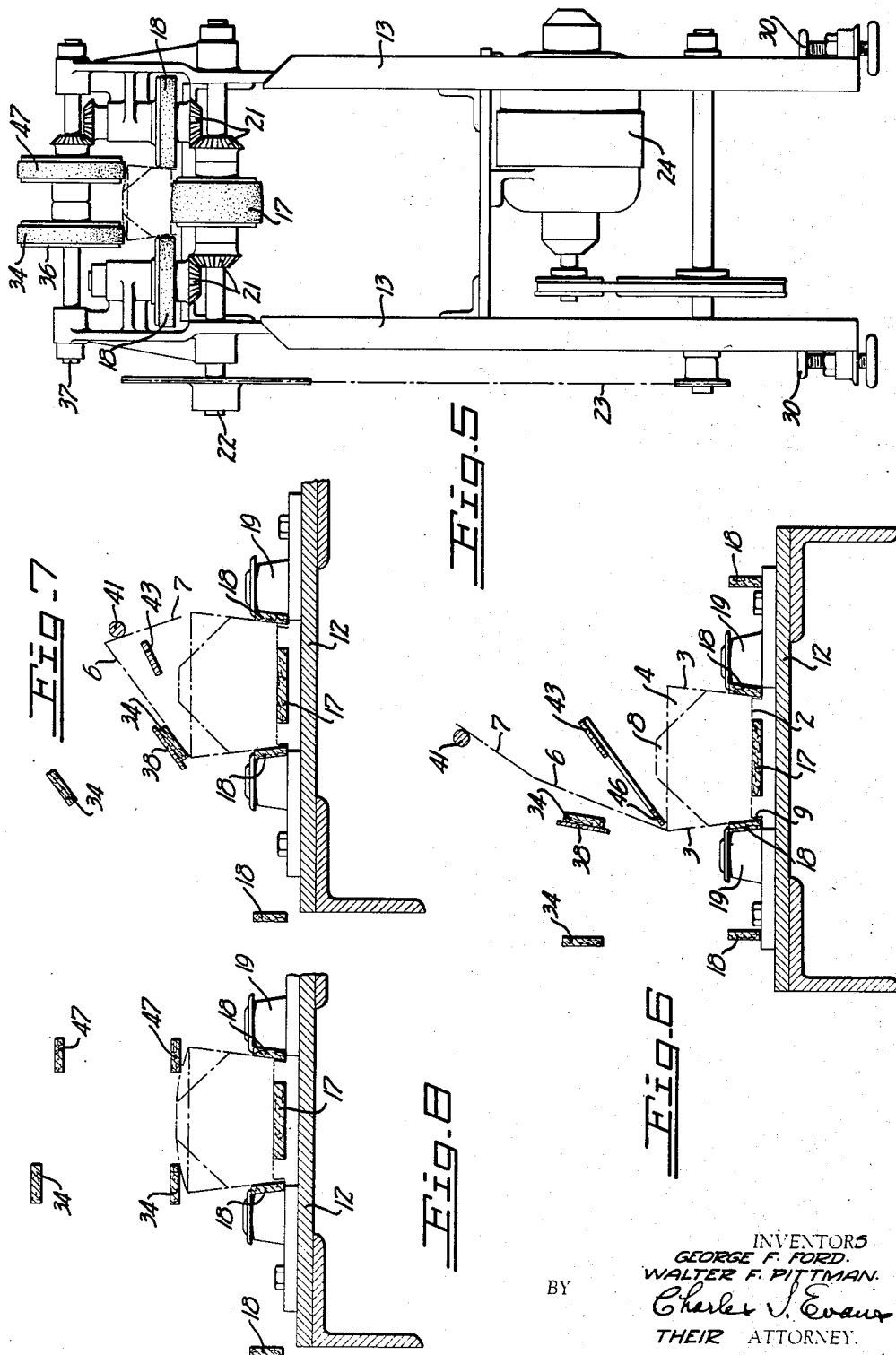
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MACHINE FOR CLOSING CARTONS

Filed Nov. 30, 1935

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,064,200

MACHINE FOR CLOSING CARTONS

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Application November 30, 1935, Serial No. 52,372

7 Claims. (Cl. 93—6)

Our invention relates to carton closing machines, and more particularly to a machine for closing egg cartons.

It is among the objects of our invention to provide a machine which closes the lid of an egg carton while the latter is continuously advancing through the machine, whereby breakage of eggs due to starting and stopping the carton is avoided.

Another object of our invention is to provide a machine of the character described having belts for conveying the cartons and for assisting in closing the carton lids; which belts are so positioned that pressure is applied only to the corners or reinforced portions of the carton, at which points stresses are absorbed fully by the carton and not transmitted to the enclosed eggs.

A further object of our invention is to provide improved means for closing the cartons while the latter are advancing through the machine.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of our invention. It is to be understood that we do not limit ourselves to this disclosure of species of our invention, as we may adopt variant embodiments thereof within the scope of the claims.

Referring to the drawings:

Figure 1 is a side elevational view of the left end portion of our machine; and

Figure 2 is the corresponding plan view.

Figure 3 is a side elevational view of the right hand portion of the machine; and

Figure 4 is the corresponding plan view.

Figure 5 is an end view showing the drive mechanism.

Figure 6 is a transverse vertical sectional view, taken in a plane indicated by the line 6—6 of Figure 1, showing the closing elements at the beginning of the lid closing operation.

Figure 7 is a similar view taken in a plane indicated by the line 7—7 of Figure 1, showing the position of the closing elements just before the tuck engages the carton; and

Figure 8 is another similar view, taken in a plane indicated by the line 8—8 of Figure 1 showing the position of the closing elements after the lid is tucked into place.

In terms of broad inclusion, the carton closing machine embodying our invention comprises means for advancing a carton, and means for pressing the carton lid into closed position while the carton is advancing with a continuous smooth motion through the machine. The car-

ton moving means and the lid closing means preferably comprise a plurality of belts, and these belts are so arranged that the pressure is applied only to the corners or reinforced portions of the carton.

In greater detail, and referring to the drawings, the machine for closing cartons embodying our invention is designed particularly for closing a carton having bottom, side and end walls 2, 3, and 4, respectively, and a lid 6 hingeably connected to one of the side walls 3. See Figure 6. A tuck 7 is also provided, hingeably connected to lid 6, and is adapted to engage inside the carton between the side wall 3 and the filler 8. The sides of the carton slope inwardly toward the bottom and a pair of flanges 9 are formed along the bottom edges of the side walls to provide supporting legs. Such a carton is described in detail in the patent to Bruce F. Brown and George F. Ford, No. 1,876,200, issued September 6, 1932. The filler preferably used in our co-pending application, Serial No. 6,946, filed January 25, 1935.

After the cartons have been filled with eggs they are placed on a conveyor belt 11 mounted on a table 12 having legs 13. As shown in Figures 3 and 4, the delivery belt 11 advances the carton into the machine, and suitable rails 14 are provided along the sides of the belt to hold the carton evenly in place. One of the rail supports 16 preferably overhangs the belt to prevent any deranged cartons from passing on into the machine. If the carton is resting properly on the belt, with the lid 6 on the rear side, the carton will pass freely under the overhanging support.

From the delivery belt 11 the cartons are deposited on a carrier belt 17 elevated slightly above the belt 11, so that the carrier belt 17 comes directly under the elevated bottom wall 2 of the carton. This belt is also narrower than the delivery belt, so as to lie between the legs 9 and engage with the bottom wall of the carton. Another pair of carrier belts 18 are also preferably provided, engaging the side walls 3 along the junction between the side and bottom walls. These belts are also mounted on the table 12, and suitable bevelled rollers 19 are arranged along the table for holding the inner reaches of the belt 18 at the proper angle for engaging the sloping side walls of the carton.

As best shown in Figure 5, the carrier belts 17 and 18 are driven at the same speed by connecting gears 21, the pulley shaft 22 being rotated

continuously by a suitable drive 23 from a motor 24. The continuous movement of the egg cartons through the machine is important, because any breakage of eggs that would accompany an intermittent motion is avoided. Closing units heretofore have had to stop the carton at least once during its flight through the machine, and the sudden stopping and starting of the carton has been the cause of many broken eggs in such machines. In our unit the continuous smooth travel of the carton through the machine has eliminated this cause of breakage.

An important feature of the side carrier belt 18 is that its inner reach is set at an angle to press in against the downwardly extending leg 9 of the carton, thereby forcing the side wall 3 outwardly. This makes it easier to insert the tuck 7.

Another important feature of our machine is that the carrier belts are arranged to prevent stresses from being transmitted to the eggs. The lower belt 17 provides a flat rest for the bottom of the carton and no injury to the eggs is possible from this support. This is especially true when using our improved filler, because the filler holds the eggs away from the central portion of the bottom wall, so that pressure applied against the bottom wall can not possibly reach the eggs. The arrangement of the side carrier belts 18 adjacent the junction between the side and bottom walls also prevents injury to the eggs, because the corners against which the belts press are sufficiently strong to resist the belt pressure and prevent stresses from being transmitted to the eggs.

As shown in Figures 1 and 2, the bottom carrier belt 17 is adjustably tightened by an idler 26, and the side belts 18 are tightened by adjustable idlers 27. By referring to Figures 3 and 4, it will be seen that the delivery belt 11 is driven from the rear end of the carrier belt 17 by a drive 28. The speed is changed at this point so that the delivery belt is driven more slowly than the carrier belts. This insures that the carton will be promptly passed through the machine, and prevents any congestion at the point of delivery between the belt 11 and the carrier belts 17 and 18. The delivery belt 11 is also preferably provided with a belt tightener 29, as shown in Figure 3. Another feature of the machine is the provision of adjusting screws 30 at the bottom of the legs 13 for leveling the table.

As a carton approaches the carrier belts 17 and 18, the upright lid 6 is forced inwardly by an inclined rod 31 mounted on a supporting bar 32 which is in turn mounted on the frame of the machine by a suitable bracket 33. The function of this rod is to start the lid downwardly, and insure that it will be in proper position for engagement by subsequent closing elements.

Means are provided for pressing the lid 6 into closed position as the carton advances through the machine. For this purpose a twisted belt 34 is provided above the bed 12 of the machine. At the time the carton is engaged by the carrier belts, the lid 6 lies adjacent the inside reach of belt 34. As shown in Figure 4, the reaches of belt 34 at this time are vertical; the pulley 36 for this end of the belt being hung from the supporting rod 32 and journaled on a vertical axis. The belt 34 extends to the discharge end of the machine, and overlies the inner reach of the side carrier belt, so that the lower reach of

belt 34 works against the carton lid adjacent its hinge connection. Belt 34 is twisted through 90° and finally passes over the pulley 36 mounted on a horizontal shaft 37 at the discharge end of the machine. Because of this twist in belt 34, the inside or lower reach gradually rotates the lid 6 downwardly about its hinge connection, until the lid is pressed down into horizontal position.

In order to give the lower reach of belt 34 a smooth gradual twist, and hold the belt in the proper position and at the proper angle with respect to the carton lid, a curved backing plate 38 is provided to bear against the belt. This plate is held against the lower reach of the belt by suitable brackets 39. Figures 6, 7 and 8 illustrate the changing position of belt 34 as the carton advances through the machine. In Figure 6 the inner reach is substantially vertical, to accord with the initial upright position of the lid. The belt however does not come into operative engagement with the lid until the carton advances somewhat beyond the point where this sectional view is taken. Figure 7 shows an intermediate position, where the belt is partially twisted and the lid partially closed. Figure 8 shows the reach in horizontal position and the lid finally closed. An important feature illustrated by these views is that the belt 34 presses down on the lid 6 adjacent its hinge connection with the side wall. In other words, the pressure on the lid is applied near the corner between the lid and side wall, where the strength is greatest. When so applied, the stresses are readily carried by the carton and are not transmitted to the eggs.

Means are provided for folding the tuck 7 and directing it into engagement with the carton as the lid is closed. This is accomplished by a curved rod 41, also mounted above the path of the carton movement on suitable supports 42. As shown in Figures 1 to 4, this rod curves outwardly and downwardly from its starting point adjacent the head end of the carrier belt. At its starting point the rod engages behind the upstanding tuck 7 of the lid 6, which has just been directed in front of the rod 41 by the guide 31.

As the carton advances and the tuck 7 slides along the rod 41, the latter presses the tuck downwardly and inwardly from a position shown in Figure 6 to the position shown in Figure 7. At this time the tuck is pointed downwardly for engagement inside the side wall, and the pressure belt 34 is in contact with the lid and pressing it closed.

In order to assist in folding the tuck about its hinge connection and to prevent the tuck from folding back too far, a guide rail 43 is provided under the lid adjacent the hinge connection between the tuck and lid. This rail is supported adjacent the head end of the carrier belt by a standard 44, and extends forwardly to an advanced point along the path of movement of the carton, as shown in Figure 2. At this point the carton slides out from under the rail. Another element for assisting in closing the lid is provided by a bar 46, mounted on the rail and extending for a short distance along the path of movement of the carton adjacent the head end of the carrier belt. As best shown in Figure 6, this bar also lies beneath the lid 6, and its inner end is positioned adjacent the hinge connection between the lid and side wall of the carton. This bar insures that the lid will fold along the

hinge connection. Proper starting of the fold is important in containers of this type, where the hinge is usually merely a score line.

Another belt 47 is preferably provided at the discharge end of the machine, along the side opposite the pressure belt 34. This is a short belt and has a horizontal lower reach for firmly pressing the edge of the lid carrying the tuck. Note Figure 8. As was the case with belt 34, this short belt also bears against the junction between the lid and side wall, where the pressure is readily carried by the carton structure. One pulley of the belt 47 is carried on the shaft 37 and the other pulley 48 is mounted on a bracket 49 carried by a rod 51 held by standards 52. The supporting rod 51 is inclined, and the pulley bracket 49 is adjustable, so that the belt 47 may be adjusted relative to the carton.

We claim:

1. A machine for closing a carton having a side wall and a lid hingeably connected to the side wall, and a tuck hingeably connected to the lid, comprising means for advancing the carton through the machine, a guide rail under the lid and having an edge adjacent the hinge connection between said tuck and lid to facilitate folding of the tuck, a rod against which the tuck is slidable for directing the latter into engagement with the carton, and a belt for pressing the lid into closed position while the carton is advancing through the machine.

2. A machine for closing a carton having a side wall, a lid hingeably connected to the side wall, and a tuck hingeably connected to the lid, comprising means for advancing the carton through the machine, means for directing the tuck into engagement with the carton, a belt bearing against the lid adjacent the hinge connection between the lid and side wall for pressing the lid into closed position, and a second belt bearing against the lid adjacent the hinge connection between the lid and tuck for pressing the tuck firmly into engagement with the carton.

3. A machine for closing a carton having bottom, side and end walls, and also having a lid hingeably connected to one of said walls, comprising a plurality of carrier belts for advancing the

carton through the machine, one of said belts engaging the bottom wall and another pair of said belts engaging the side walls at the junctions between the latter and the bottom wall, and means for pressing the lid into closed position while the carton is advancing through the machine.

4. A machine for closing a carton having bottom, side and end walls, and also having a lid hingeably connected to one of said walls, comprising a plurality of carrier belts for advancing the carton through the machine, one of said belts engaging the bottom wall and another pair of said belts engaging the side walls at the junctions between the latter and the bottom wall, means for continuously driving said belts, and means for pressing the lid into closed position while the carton is advancing through the machine.

5. A machine for closing cartons having hingeably mounted lids, comprising a carrier belt for advancing the cartons through the machine, means for pressing the lids of the cartons into closed position while on the carrier belt, a belt for delivering the cartons to the carrier belt, means for driving the carrier belt, and means for driving the delivery belt at a speed slower than the carrier belt.

6. A machine for closing a carton having a bottom, a side wall extending upwardly from the bottom and a leg extending downwardly from the side wall, and also having a lid and tuck, comprising means for closing the lid, and means for pressing inwardly on said leg to force out the side wall for facilitating the insertion of said tuck.

7. A machine for closing a carton having a hingeably mounted lid and tuck, comprising means for advancing the carton through the machine, a twisted belt having a reach turning from a substantially vertical position to a horizontal position and engaging the lid for closing the latter, and means for directing the tuck into engagement with the carton as the lid is pressed down by the belt.

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