

Oct. 25, 1938.

A. G. ROSE

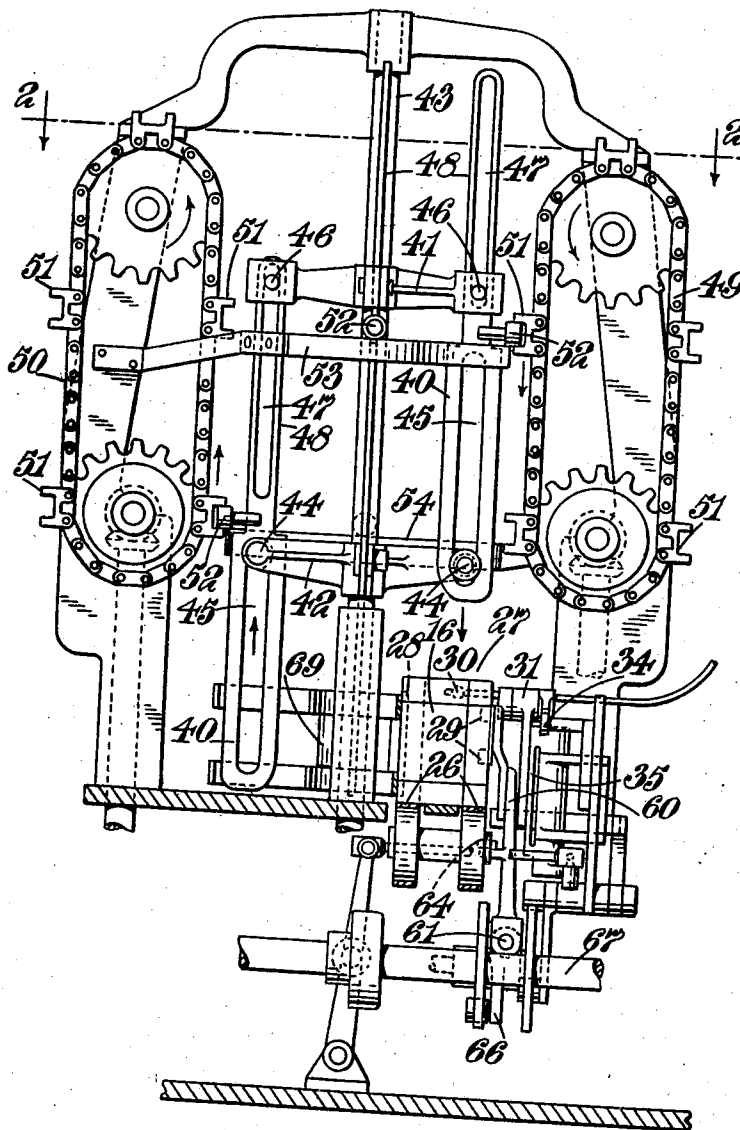
2,134,418

TRANSFER AND SETTING-UP OF COLLAPSED CARTONS

Filed Nov. 16, 1937

4 Sheets-Sheet 1

Fig. 1.



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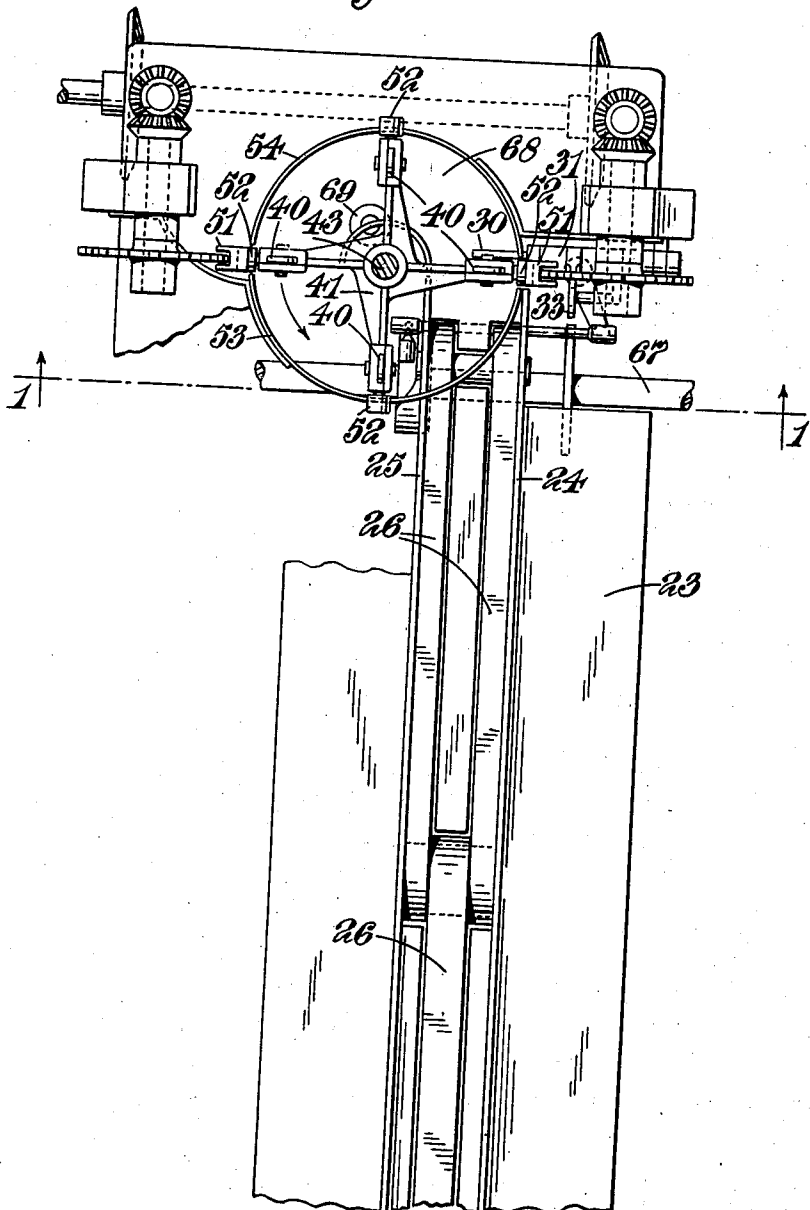
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TRANSFER AND SETTING-UP OF COLLAPSED CARTONS

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4 Sheets-Sheet 2

Fig. 2.



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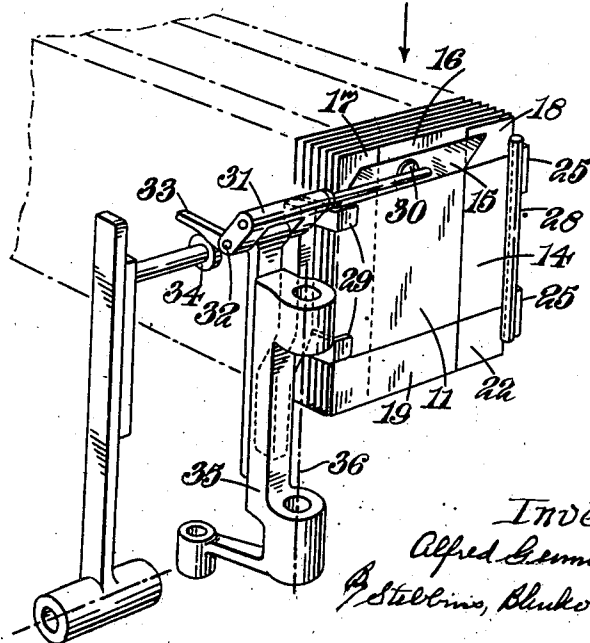
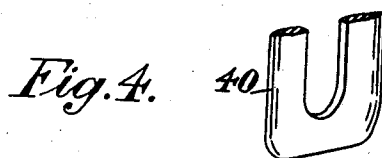
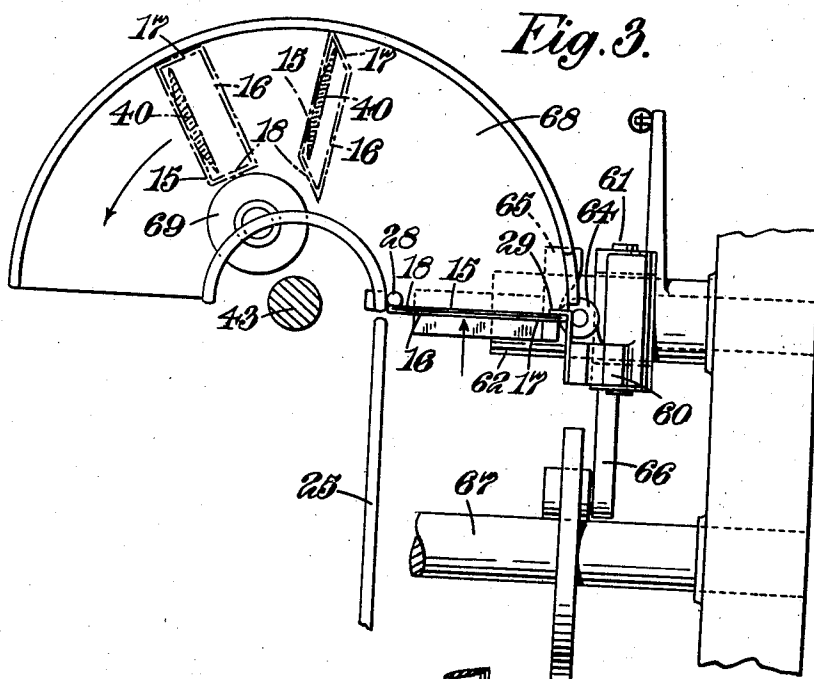
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TRANSFER AND SETTING-UP OF COLLAPSED CARTONS

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4 Sheets-Sheet 3



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TRANSFER AND SETTING-UP OF COLLAPSED CARTONS

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4 Sheets-Sheet 4

Fig. 5.

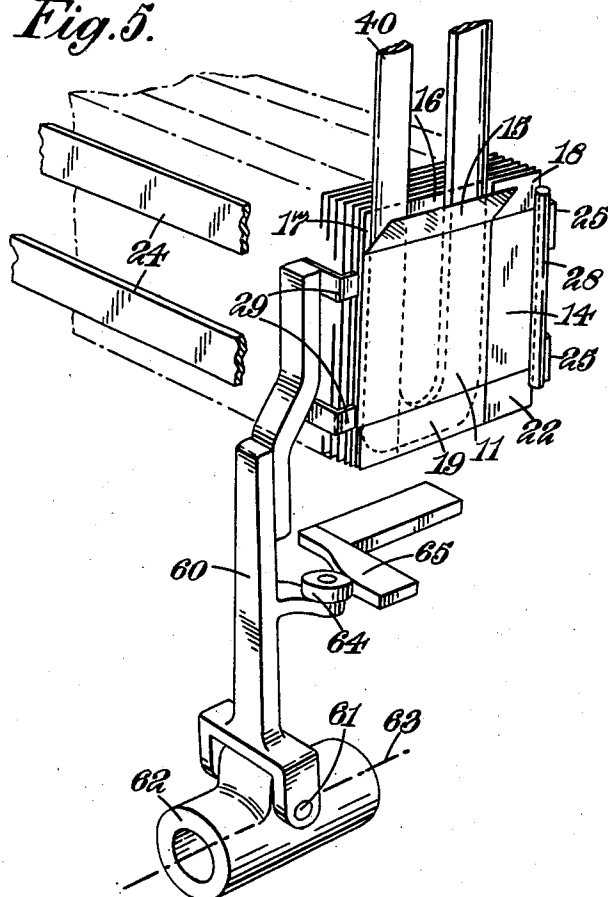


Fig. 6.

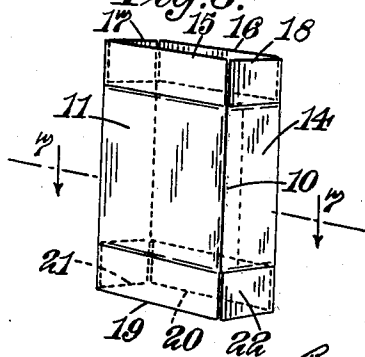
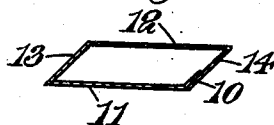


Fig. 7.



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UNITED STATES PATENT OFFICE

2,134,418

TRANSFER AND SETTING-UP OF COLLAPSED CARTONS

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In Great Britain November 19, 1936

7 Claims. (Cl. 93—53)

This invention relates to apparatus for distending or setting up, prior to filling, collapsed cartons of cardboard or similar material and of the well known type comprising a tubular rectangular body portion constituting the four sides of the carton and hinged end flaps which are extensions of the sides and are adapted to be bent over at right angles to form the end closures.

The invention is concerned with carton feeding apparatus of the type in which the empty cartons are fed, e. g. towards a filling machine, in pack formation one behind the other, and each in a flat collapsed condition, that is with the end flaps extending in the same planes as the sides of which they are continuations, and with two conjoined sides and their respective end flaps lying flat against the other two sides and their end flaps.

This invention provides in apparatus of the above type mechanism operable at the front of the pack in succession on the cartons to insert a blade-like element between the front and rear portions of the leading carton, to move said blade forwardly of the pack carrying the leading carton with it, and during such movement to distend the carton towards the open rectangular form.

In its preferred form the mechanism comprises in combination means to insert a blade-like element between the front and rear portions of the leading carton and to position it behind one only of the front sides of the carton, means for moving the blade-like element, while inserted, forwardly from the pack carrying the carton with it, and means operable during the forward movement of the blade to exert back pressure on the other side of the front portion of the carton.

According to a feature of the invention a flap-bending device may be arranged to operate at the front of the pack to bend outwardly about its hinge an end flap on the front portion of the leading carton, and so to present a gap for the insertion of the blade-like element. Conveniently the flap-bending device is in the form of a suction gripper.

A further feature of the invention relates to the provision of a fixed stop arranged at the front of the pack to engage marginally one side of the front portion of the leading carton, and a movable stop arranged to engage the other side of said front portion. The blade-like element is inserted behind the front side engaged by the movable stop, and thereafter the movable stop is withdrawn from its engaging position, the blade is advanced and by the action of the fixed stop on the corresponding carton side, back-pressure is exerted on

that side and the carton is distended. A second fixed stop, e. g. in the form of a roller, may be located at an advanced position in the path of the carton to engage its free front side and complete the distention to rectangular form.

One constructional arrangement according to the invention comprises a carrier wheel located near the front of the pack for rotation about an axis parallel with the face of the pack, a plurality of transfer blades mounted on the carrier wheel in a circumferential series at equal intervals apart, means for rotating the carrier wheel step by step to bring each transfer blade in turn to a separating station offset endwise from the leading carton and in substantially the same plane as it, and temporarily to arrest the blade at said station, means operable at the separating station, in timed sequence with the rotation of the carrier wheel, to move the transfer blade arrested at said station in an endwise direction to insert it between the front and rear portions of the leading carton, and means operable at a subsequent wheel station to effect the endwise withdrawal of the inserted transfer blade from engagement with the carton. The means for effecting end-wise movement of the transfer blades may comprise two endless chains intermittently driven in timed sequence with the step-by-step rotation of the carrier wheel, in combination with fixed arcuate guide rails located circumferentially with respect to the axis of rotation of the carrier wheel, and co-operating projections on the transfer blades arranged to ride on the guide rails during the rotation of the carrier wheel and to be guided thereby into and out of engagement with the endless chains aforesaid.

A machine embodying the foregoing and other features of the invention will now be described by way of example with reference to the accompanying drawings which are to some extent diagrammatic and in which:—

Figure 1 is a vertical section of the machine (taken at the line 1—1 in Figure 2) showing the transfer blade carrier wheel and associated mechanism, but omitting much of the driving gear and other parts which are of known type and form no part of the present invention,

Figure 2 is a sectional plan, with certain parts omitted, at the line 2—2 in Figure 1,

Figure 3 is a fragmentary plan view illustrating the opening out of the carton during its transfer,

Figure 4 is a perspective view illustrating the action of the flap suction gripper.

Figure 5 is a perspective view showing the

action of the movable stop at the separating station,

Figure 6 is a perspective view showing one of the cartons in a partially distended condition, and

Figure 7 is a section at the line 7—7 in Figure 6.

Like reference numerals indicate like parts throughout the drawings.

The cartons on which the machine is adapted to operate are of the type illustrated in Figures 6 and 7. Each carton is of cardboard or similar material made from a one-piece blank, scored to define the edges and folded to tubular form, overlapping portions of the blank being gummed together as at 10 to form the tube. Each carton comprises two broad sides 11, 12, two narrow sides 13, 14, and formed as continuations of these sides, two sets of hinged end flaps—namely upper broad flaps 15, 16 and upper narrow flaps 17, 18, and lower broad flaps 19, 20 and lower narrow flaps 21, 22—adapted to be folded over at right-angles to their respective sides in order to form the end closures.

The present machine is adapted to handle cartons of the above type when in the collapsed condition, that is to say with the end flaps extending in the same planes as the sides of which they are continuations and with the two conjoined sides 11, 14 (hereinafter referred to as the front sides), and their respective end flaps 15, 18 and 19, 22, lying flat against the other two sides 13, 12 (hereinafter referred to as the rear sides) and their end flaps 17, 16 and 21, 20. The cartons are assembled in a horizontal pack on a table 23 between guide rails 24, 25. The cartons are supported end-on at their edges 19, 20, 21, 22 by the table and are fed towards the separating station by means of conveyor belts 26 which extend over the upper surface of the table. The conveyor belts 26 may be arranged either to give an intermittent or slow continuous feed of the carton pack towards the separating station. At this station—indicated generally by the reference numeral 27 in Figure 1—the leading carton in the pack is arrested by means of a fixed stop member 28 in the form of a roller located parallel with the face of the pack and arranged to engage marginally the front narrow side 14 of the carton, and by a movable stop 29 arranged to engage marginally the front broad side 11. Figures 1 and 4 show the two stop members 28, 29 in their engaging positions.

The first operation performed on the leading carton is the bending outwardly of the upper broad end flap 15. This is effected by a suction gripper 30 carried on an arm 31 which is adapted to be rocked about a longitudinal axis 32 by means of a rocker 33 and co-operating tappet 34. The rocker arm 31 is itself carried on a bar 35 movable like a crank about an offset vertical axis 36 to move the sucker arm from a position in front of the pack (Figure 4) into one alongside and clear of the pack. In operation the bar 35 is first swung about the axis 36 to bring the sucker 30 into engagement with the upper broad end flap 15 (then in an upright position flat against the rear end flaps 17, 16), suction is applied and the arm 31 is then rocked about the axis 32 with the result that the sucker is moved outwardly and downwardly carrying the end flap with it, the flap being thus bent about the hinge between it and the corresponding broad front side 11 of the carton—as shown in Figure 4.

The next operation consists in the insertion of a transfer blade through the gap presented by the outwardly bent end flap 15 and into the interior of the carton between the front and rear

portions thereof. The transfer blade mechanism is constructed and arranged in the following way: There are four transfer blades 40 supported by a carrier, comprising upper and lower spider arms 41, 42, rotatable about the axis of the vertical shaft 43. The transfer blades are set at 90° intervals and each is movable vertically in relation to the carrier in guides provided by the spider arms. These guides comprise pins 44 on the lower spider arms engaging in slots 45 in the blades, and pins 46 on the upper spider arms engaging in slots 47 formed in upward extensions 48 of the blades. The blade carrier is rotated step-by-step by a Geneva stop or equivalent mechanism (not shown) to bring each blade in turn up to the separating station 27 and temporarily to arrest it there. Vertical movement of the transfer blades is effected by two endless chains one 49 located at the side of the carrier close to the separating station and the other 50 located diametrically opposite on the other side of the carrier at what will hereinafter be referred to as the withdrawal station. The chains 49, 50 are intermittently driven (by mechanism not shown in the drawings) in timed sequence with the step-by-step rotational movement of the blade carrier. Each chain carries a number of outwardly directed U-shaped claws 51, equally spaced apart in the length of the chain and adapted to co-operate with roller pins 52 which extend radially outwards from the transfer blades, one on each blade. Each pin 52 is located at the upper end of the blade, i. e. at the lower end of the slotted extension 48.

As shown in Figure 1 the endless chains 49, 50 are located with their inside laps, i. e. those adjacent to the carrier wheel, parallel with the transfer blades. The chains are so driven that the inside lap of the chain 49, operating at the separating station will move in a downwardly direction, while the chain 50, operating at the withdrawal station, will have its inside lap movable in an upwardly direction. The blade roller pins 52 are guided into and out of engagement with the chain claws 51 by means of upper and lower curved guide rails 53, 54 located on opposite sides of the wheel respectively. During movement of a blade between the withdrawal station and the separating station (in the direction of the arrow in Figure 2) the roller pin 52 runs along the upper edge of the front upper guide rail 53, and the arrangement is such that when a blade is closely approaching the separating station, the chain 49 will be stationary and one of its claws 51 will be located in a position just above the end of the guide rail 53, so that the roller pin 52 will move smoothly off the end of the guide rail into the gap between the two jaws of the chain claw. During movement as aforesaid between the withdrawal station and the separating station each blade is supported in the elevated position. At the separating station the chain 49, a claw 51 of which is in engagement with the pin 52 of the elevated blade, is operated to move through a distance about equal to the length of the main portion of a blade, with the inside lap travelling in a downwardly direction. When the chain 49 comes to rest the roller pin 52, in the now lowered blade, is opposite the upper edge of the lower rear guide rail 54, and when the blade carrier make its next intermittent movement of partial rotation, the pin 52 moves out of the chain claw and on to the guide rail 54. During movement of each blade round the back of the wheel from the separating to the withdrawal station, the blade

is supported in its lowered position, the roller pin riding along the upper edge of the guide rail 54, and the arrangement is such that as each blade is closely approaching the withdrawal station the chain 50 is at rest and one of its claws 51 is in a position opposite the upper edge of the guide rail 54. As each blade is moved into the withdrawal station its pin 52 rides smoothly off the guide rail into the chain claw. At the withdrawal station the chain 50 is operated to move its inside lap in an upwardly direction thereby elevating the engaged blade, and bringing the engaged pin 52 into a position opposite the end of the upper guide rail 53, so that on the next intermittent movement of the blade wheel the pin 52 will move on to the guide rail 53, and the position of the blade will thereby be controlled in the manner already indicated.

The machine is arranged to operate in the following sequence:— The sucker 30 is first actuated to engage and bend outwardly the broad end flap of the leading carton. At this stage the carrier wheel and chains 49, 50 are stationary, with one of the transfer blades 40 supported in an elevated position at the separating station, the blade being located immediately above the leading carton and in substantially the same vertical plane as that occupied by the carton. The endless chain 49 is now operated to lower the transfer blade through the gap presented by the outwardly bent end flap 15 and into the carton between the front and rear portions thereof. The lowered position of the transfer blade is shown in Figure 5. The transfer blade is of such width and is so presented, that when in the inserted position it will lie wholly within the area immediately behind the broad front side 11 and its attached end flaps 15, 19. In other words the transfer blade, when inserted, is clear of the narrow front side 14 and its attached end flaps 18, 22. At about the same time as the transfer blade is being inserted, or just after its insertion, the suction at the gripper 30 is broken, and the gripper is moved, about the vertical axis 36, into a position alongside the pack and clear of it. At this time also the movable stop 29 is moved out of engagement with the leading carton into a position at the side of the pack. For the purpose of effecting this movement the stop 29 is carried on an arm 60 pivotally mounted at 61 on a sleeve 62 which may be rocked about an axis 63. By partial rotation of the sleeve 63 the arm 60 is moved forwardly of the pack, and at the same time the arm is swung laterally of the pack, about the pivot 61, by means of a roller 64 carried by the arm 60 and co-operating with a fixed cam 65. The sleeve 62 is actuated by cam mechanism 66 from a driven shaft 67.

After the sucker 30 and movable stop 29 have been moved clear of the leading carton, the blade wheel is operated to move through 90°, and the engaged carton is carried with the blade round a semi-circular track 68. As the leading carton is moved away from the separating station, it will be understood that the fixed stop 28 is located in the path of the narrow front side 14 and its attached end flaps. In this way the fixed stop exerts a back pressure on the free side of the carton, and the latter is swung backwardly into a partially opened position. During the next 90° travel of the carrier wheel the engaged carton is moved past a second fixed stop 69 in the form of a roller adapted to engage the narrow front side 14 of the carton and its attached end flaps, and to complete the distention of the carton to rectangular form as shown in Figure 3. On arrival at the with-

drawal station, the still inserted blade is withdrawn by the action of the chain 50, and from this station the distended carton is conveyed towards mechanism (which forms no part of the present invention) operating to close in and seal the lower end flaps, to fill the carton from the top, and finally to close in and seal the top end flaps.

Immediately a transfer blade is moved clear of the separating station the movable stop 29 is operated to engage the next carton of the pack (by the mechanism 62, 64, 65 already described) and the sucker is operated to engage and bend out the flap 15 of the next carton, and on arrival of another blade at the separating station the same sequence of operations is repeated. It will be understood that at the two wheel stations intermediate of the separating and withdrawal stations on each side of the wheel, no operations are effected on the cartons.

I claim:—

1. In apparatus for feeding rectangular cartons of the type described from a pack in which the cartons are arranged in a flat collapsed condition one behind the other, mechanism comprising in combination a flap-bending device in the form of a suction gripper, means for bringing said gripper into engagement with an end flap on the front portion of the leading carton and for moving the gripper in a direction to bend said flap outwardly about its hinges, means for inserting a blade-like element through the gap presented by the outwardly bent end flap and into the carton to assume a position behind one only of the front sides of the carton and its attached end flaps, means for breaking the suction at the gripper and moving it clear of the pack, means for moving the blade-like element forwardly from the pack to carry the carton with it, and means operable during the forward movement of the blade to exert back pressure on the other side of the front portion of the carton.

2. In apparatus for feeding rectangular cartons of the type described from a pack in which the cartons are arranged in a flat collapsed condition one behind the other, mechanism comprising in combination a fixed stop arranged at the front of the pack to engage marginally one side of the front portion of the leading carton, a movable stop arranged to engage the other side of the front portion of said carton, a flap bending device operable to bend outwardly about its hinges an end flap appropriated to the carton side engaged by the movable stop, means for inserting a blade-like element through the gap presented by the outwardly bent end flap and into the carton behind the front side corresponding to said end flap, means for moving the movable stop clear of the leading carton, and means for moving the blade-like element forwardly from the pack carrying the carton with it.

3. In apparatus for feeding rectangular cartons of the type described from a pack in which the cartons are arranged in a flat collapsed condition one behind the other with the leading carton situated at a separating station, the combination of a carrier wheel located at said station, for rotation about an axis parallel to the face of the pack, a plurality of transfer blades mounted on the carrier wheel in a circumferential series at equal intervals apart, means for rotating the carrier wheel step-by-step to bring each transfer blade in turn up to the separating station and to arrest it temporarily at said station, an intermittently movable endless chain operable

at the separating station to engage the transfer blade there arrested and to move said blade in an endwise direction to insert it between the front and rear portions of the leading carton; 5
 and a second endless chain located at a subsequent wheel station and there operable to engage the inserted transfer blade and effect its endwise withdrawal from the carton.

4. The combination claimed in claim 3 combined with fixed arcuate guide rails located circumferentially with respect to the axis of rotation of the carrier wheel, and co-operating projections on the transfer blades arranged to ride on the guide rails during the rotation of the carrier wheel and to be guided thereby into and out of engagement with the endless chains aforesaid. 10
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5. In apparatus for feeding rectangular cartons of the type described from a pack in which the cartons are arranged in a flat collapsed condition one behind the other with the leading carton situated at a separating station, the combination of a carrier wheel located at said station for rotation about an axis parallel to the face of the pack, a plurality of transfer blades mounted on the carrier wheel in circumferential series at equal intervals apart, means for rotating the carrier wheel step-by-step to bring each transfer blade in turn up to the separating station and to arrest it temporarily at said station, a flap-bending device in the form of a suction gripper located near the separating station, means for bringing said gripper into engagement with an end flap on the front portion of the leading carton and for moving the gripper in a direction to bend said flap outwardly about its hinge, means operable at the separating station, in timed sequence with the rotation of the carrier wheel and with the operation of the flap-bending device, to move the transfer blade arrested at said station in an endwise direction to insert it through the gap presented by the outwardly bent end flap and into the carton to engage behind one only of the front sides of the carton and its attached end flaps, means for breaking the suction at the gripper and moving it clear of the pack, means operable during movement of the transfer blade away from the separating station to exert back pressure on the non-engaged side of the front portion of the carton, and means operable at a subsequent wheel station to effect the endwise withdrawal of the inserted transfer blade from engagement with the carton. 20
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6. In apparatus for feeding rectangular cartons of the type described from a pack in which the cartons are arranged in a flat collapsed condition one behind the other with the leading carton situated at a separating station, the combination of a carrier wheel located at said station for 55

rotation about an axis parallel to the face of the pack, a plurality of transfer blades mounted on the carrier wheel in a circumferential series at equal intervals apart, means for rotating the carrier wheel step-by-step to bring each transfer blade in turn up to the separating station and to arrest it temporarily at said station, a fixed stop arranged at the separating station to engage marginally one side of the front portion of the leading carton, a movable stop arranged to engage the other side of the front portion of said carton, a flap-bending device operable to bend outwardly about its hinge, an end flap appropriated to the carton side engaged by the movable stop, means operable at the separating station to move the transfer blade arrested at said station in an endwise direction to insert it through the gap presented by the outwardly bent end flap and into the carton behind the front side corresponding to said end flap, means for moving the movable stop clear of the leading carton, and means operable at a subsequent wheel station to effect endwise withdrawal of the inserted transfer blade from engagement with the carton. 5
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7. In apparatus for feeding rectangular cartons of the type described from a pack in which the cartons are arranged in a flat collapsed condition one behind the other with the leading carton situated at a separating station, mechanism comprising in combination a plurality of transfer blades spaced apart at equal intervals around a closed path, means for translating the blades together uni-directionally round said path to bring each blade in turn up to a position at the separating station offset endwise of the leading carton and in substantially the same plane as it, and temporarily to arrest the blade at said station, a flap-bending device in the form of a suction gripper, means for bringing said gripper into engagement with an end flap on the front portion of the leading carton and for moving the gripper in a direction to bend said flap outwardly about its hinge, means operable at the separating station in timed sequence with the translation of the blades and with the operation of the flap-bending device, to move the transfer blade arrested at the separating station in an endwise direction to insert it through the gap presented by the outwardly bent end flap and into the carton to engage behind one only of the front sides of the carton and its attached end flaps, means for breaking the suction at the gripper and moving it clear of the pack, and means operable during movement of the inserted transfer blade away from the separating station to exert back pressure on the non-engaged side of the front portion of the carton. 30
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