Oct. 22, 1963 R. W. E. MOSSE ETAL 3,107,469

CARTON CLOSING APPARATUS

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FIG. 1.

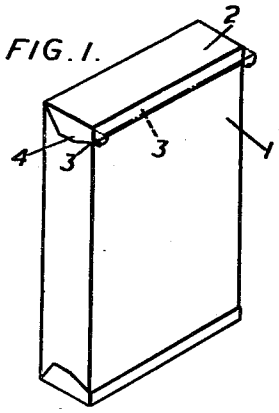
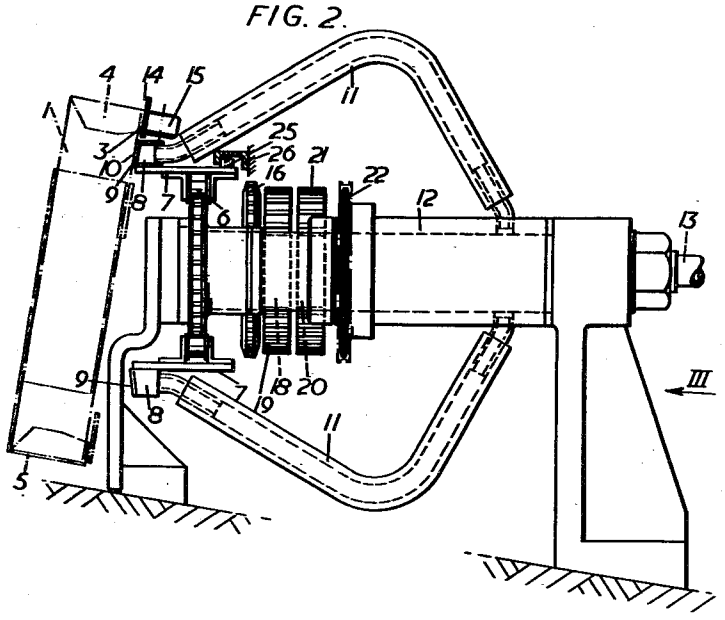


FIG. 2.



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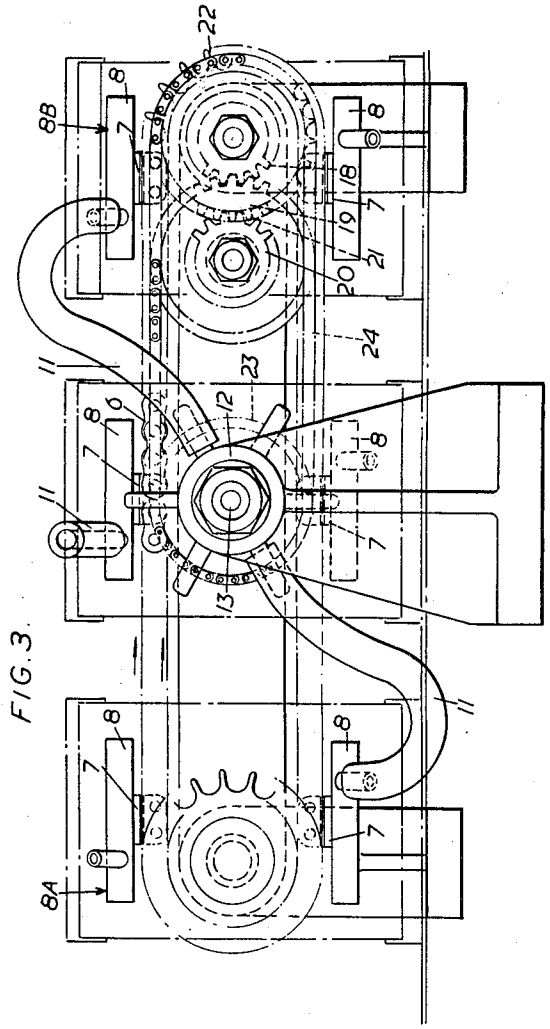


FIG. 3.

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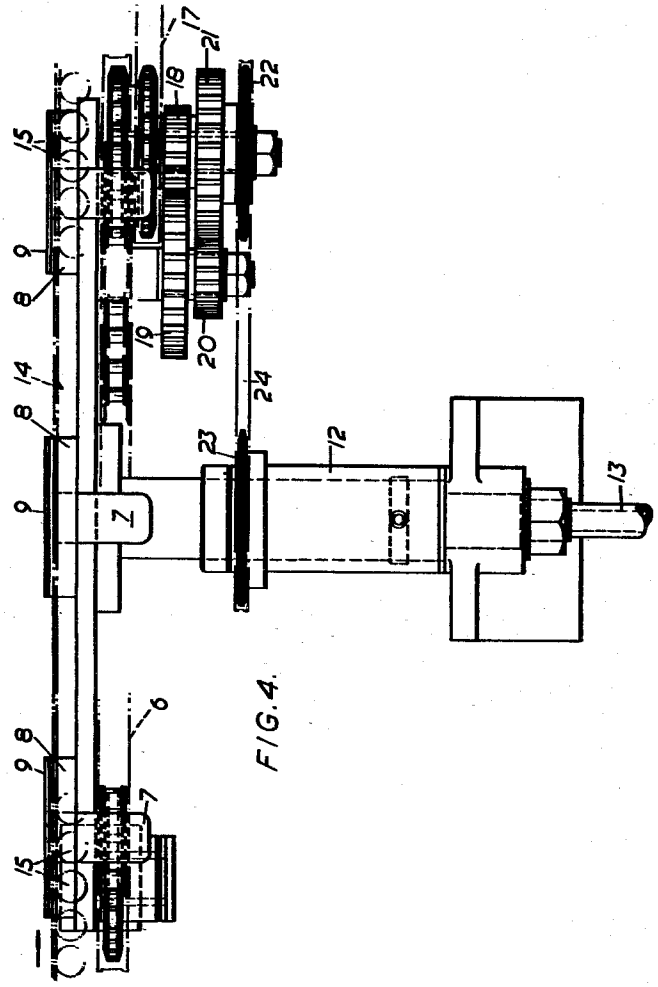


FIG. 4.

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FIG.5.

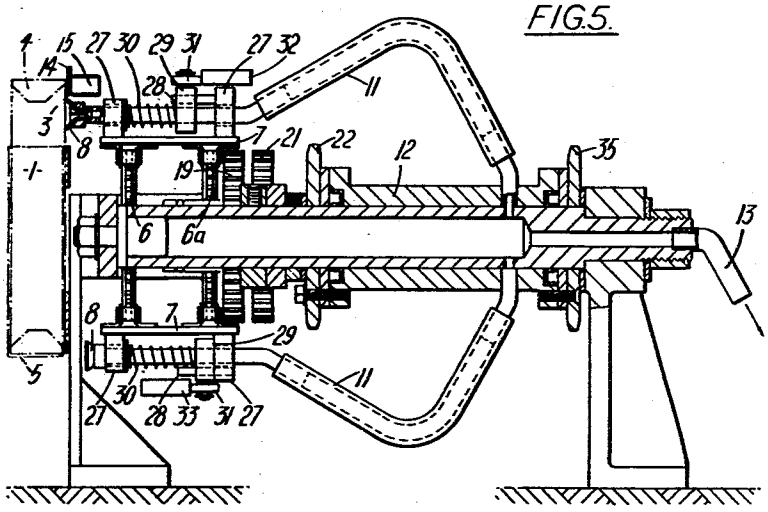
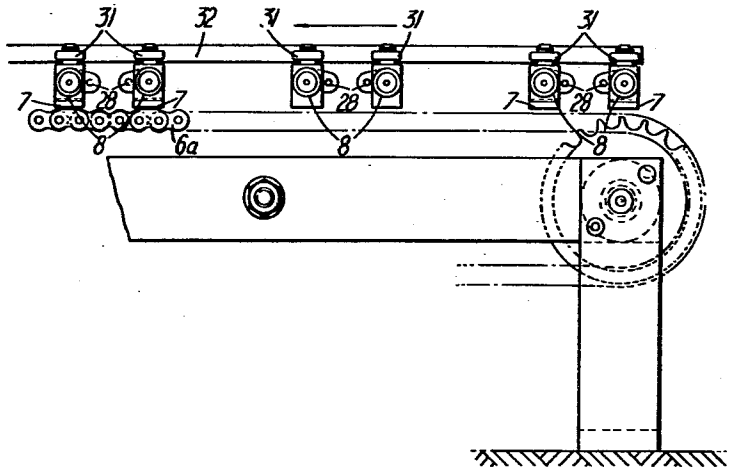


FIG.6.



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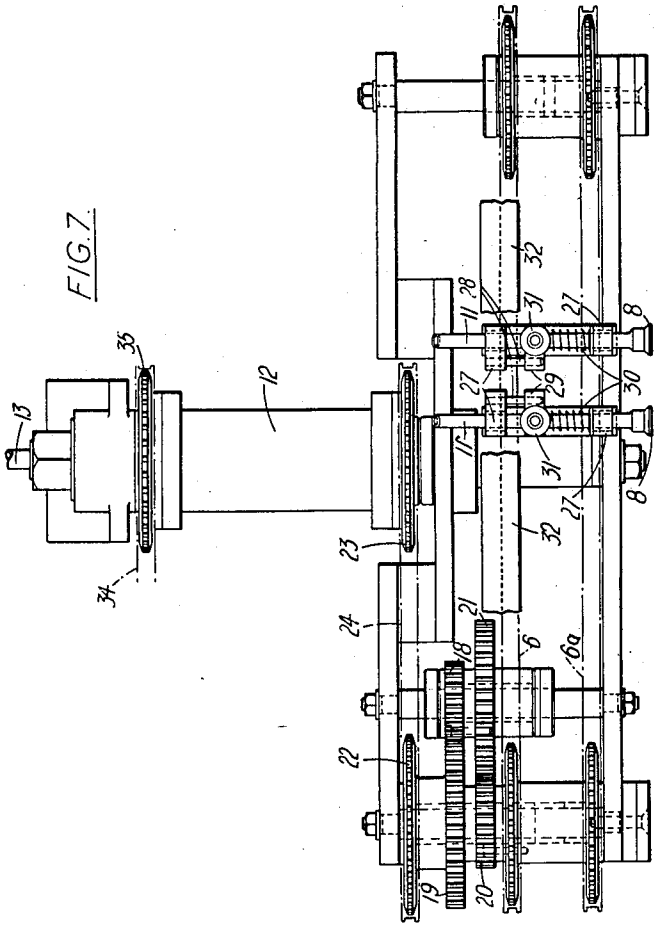
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FIG. 7.



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United States Patent Office 3,107,469 Patented Oct. 22, 1963

3,107,469

CARTON CLOSING APPARATUS

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Claims priority, application Great Britain July 5, 1960
8 Claims. (Cl. 53—376)

This invention relates to carton closing apparatus and in particular to a method of and apparatus for securing an adhesively coated closure flap to the exterior of a side of a carton.

It is a main object of the present invention to provide a method of and apparatus for securing an adhesively coated closure flap to the exterior of a side of a carton when the carton does not possess sufficient inherent rigidity to withstand the external sealing pressure necessary to ensure efficient bonding of the closure flap to the carton and when it is not possible to provide a pressure reaction member inside the carton.

According to the invention there is provided the method of securing an adhesively coated closure flap to the exterior of a side of a carton by applying suction to the exterior of said side in close proximity with the flap and constraining said side against inward movement while causing engagement of the flap with a sealing element.

Further according to the invention there is provided apparatus for securing an adhesively coated closure flap to the exterior of a side of a carton, comprising sealing means operable to engage and press the closure flap against the exterior side of the carton, and suction means arranged to engage the exterior of said side in close proximity with the position of engagement of the closure flap with said side to constrain said side of the carton against inward movement while the flap is engaged by said sealing means.

If desired the cartons may be movable in spaced relation by a carton conveyor and a plurality of said suction means be supported in spaced relation for movement by an auxiliary conveyor in a path parallel with that along which cartons are moved by the carton conveyor, said suction means being movable at the linear speed of the cartons and arranged to co-operate with successive cartons to constrain the sides thereof during engagement of the flaps by the sealing means.

In order that the invention may be celarly understood two embodiments thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 illustrates one form of carton for closing by apparatus according to the invention,

FIG. 2 is an elevation of apparatus according to the invention,

FIG. 3 is a view looking in the direction of arrow III, FIG. 2, and

FIG. 4 is a top plan of FIG. 3,

FIG. 5 is an elevation, partly in section, of a modified form of the apparatus shown in FIG. 2,

FIG. 6 is a side view of a part of the apparatus shown in FIG. 5, and

FIG. 7 is a broken top plan of the apparatus.

Like references refer to like or similar parts throughout the drawings.

FIGURE 1 illustrates a carton made of cardboard or similar material to contain a product, such as a powdered detergent or a granular material such as cornflakes, the nature of which is such that it is necessary that a headspace be provided within the top of the carton.

The top of the carton 1 is closed by an end flap 2 which is secured in the closed position thereof by a closure flap 3 which is adhesively secured to the exterior of a side of the carton across the width thereof, and by ears 4, only one of which is shown, which are adhesively secured to the opposite narrow end walls of the carton. It will be understood that sealing pressure to ensure the adherence of the flaps 3 and ears 4 must be applied from the exterior of the carton and that it is not possible to apply pressure reaction members to the interior of the carton. Usually, the end walls of the carton are of such a narrow width that it is possible to apply adequate sealing pressure to the ears 4 without the provision of a pressure reaction member but in the case of the flap 3 this is engaged with a relatively wide side of the carton in the region of the head-space within the carton and it is difficult to apply an adequate sealing pressure thereto to ensure that the flap 3 is securely bonded to the side of the carton. The apparatus to be described below is intended primarily for sealing the flap 3 but it will be understood that if necessary a similar apparatus may be employed for effecting the sealing of the ears 4.

Referring to FIGS. 2 to 4, cartons to be sealed are movable in spaced relation by a carton conveyor, indicated by broken lines 5, FIG. 2, of known construction and are moved by the conveyor past folding elements, of known form not shown, which cause the end flap 2 to overlie the open top of the carton, and sealing means, also of known form not shown, are arranged to seal the ears 4 to the narrow sides of the carton. With the end flap 2 folded to the closed position thereof the closure flap 3 extends outwards from the carton as indicated in broken lines in FIG. 1 and liquid adhesive is applied, in known manner not shown, to the underside of the flap. Alternatively, if the flap is to be sealed by a thermoplastic adhesive pre-applied to the carton blank the thermoplastic adhesive may be subjected to heat to condition it for the sealing operation.

One run of an endless auxiliary chain conveyor 6 is arranged to be moved in a path parallel with that along which cartons are moved by the carton conveyor 5 and the auxiliary conveyor supports a plurality of equi-spaced carriages 7. Each carriage 7 has mounted thereon for movement therewith suction means formed by a rigid hollow member 8 having a surface 9 provided with an aperture or a row of perforations 10, FIG. 2, which extends lengthwise of said surface and which communicate with the interior of the hollow member 8. Flexible tubes 11 connect the hollow members 8 with a rotary valve 12, of known form, which is connected by a pipe 13 with a source, not shown, of negative air pressure.

The flap 3 of a carton is folded into engagement with the side of the carton by any suitable known means such as a folder belt 14 which has a component of movement in the direction of movement of the carton by the carton conveyor 5, the belt being caused to assume a plough form to effect down-turning of the closure flap 3 and thereafter to be parallel with the flap to form with pressure rollers 15, or a rigid bar, sealing means which engage the side of the carton, as indicated in FIG. 2, and cause the flap 3 to be bonded to the side of the carton. The suction applied to the side of the carton by the member 8 constrains the side of the carton against inward movement during engagement of the flap 3 by the sealing means 14, 15.

The auxiliary conveyor 6 is driven by a sprocket 16 and chain 17 from a main shaft, not shown, in a manner such that the hollow members 8 are moved at the linear speed of the cartons to be sealed and co-operate with successive cartons carried by the carton conveyor 5. Rotation of the valve 12 is effected by gears 18, 19, 20, 21, sprockets 22, 23 and chain 24.

As can be seen from FIG. 2, the hollow members 8 are so supported by the carriages 7 and conveyor 6 that

the surfaces 9 thereof engage the sides of cartons in close proximity with the down-turned flaps 3 which are to be secured thereto. With the arrangement illustrated in the drawings, a hollow member 8 is engaged iwth a carton at position 8A, FIG. 3, and the valve 12 is arranged at this position to apply to the side of the carton so as to draw the side outwards against the surface 9 of the hollow member and against the sealing pressure which is exerted on the flap 3 by the belt 14 and pressure rollers 15. As the hollow member approaches position 8B the valve cuts-off the negative air pressure and the hollow member is disengaged from the carton. Thus it will be understood that the closure flap 3 is caused to adhere to the side of the carton by pressing the flap against the side of the carton while constraining the side of the carton against inward movement.

To constrain the chain conveyor against wandering during engagement of cartons by the members 8 each carriage 7 supports freely rotatable rollers 25 which are engaged by a rigid stationary guide 26, FIG. 2, which acts to constrain the carriage 7 against movement towards the path of the cartons.

FIGS. 5 to 7 illustrate a modified form of the apparatus described above with reference to FIGS. 2 to 4 in which the suction means comprise pairs of suction pads 8 instead of the hollow members described above. Except as hereinafter described, the apparatus of FIGS. 5 to 7 is similar to that of FIGS. 2 to 4. Each pair of suction pads is mounted on a carirage 7 which is supported by an endless auxiliary conveyor formed by two chains 6, 6a. The suction pads 8 are movable axially in bearings 27 mounted on the carriage and are guided by rods 28, FIG. 7, carried by one of the bearings and extending into a bracket 29 movablew ith the suction pad. A spring 30 extends between the bracket 29 and one of the bearings 27 and the bracket carries a cam follower 31 arranged to co-operate with stationary cams 32, 33 which extend lengthwise of the path of the auxiliary conveyor 6, 6a. The cam 32 urges the sucker pads into engagement with the carton while the pads are moved along the upper run of the auxiliary conveyor and the cam 33 retains the suction pads on the retracted positions thereof while the pads are moved along the lower run of the conveyor. The apparatus is driven by a chain 34, FIG. 7, and sprocket 35 from the drive for the carton conveyor 5.

The pads 8 may be connected to the rotary valve either individually or in pairs as desired.

We claim:

1. Apparatus for securing an adhesively coated closure flap to the exterior of a side of a carton, comprising a carton conveyor operable to move cartons in spaced relation, sealing means operable to engage and press the closure flaps of cartons carried by the carton conveyor against the exterior sides of the cartons, an auxiliary conveyor movable in timed relation with said carton conveyor and in a path parallel with that along which cartons are moved by the carton conveyor, a plurality of suction means each connectable with a source of suction and supported by the auxiliary conveyor for movement therewith at the linear speed of cartons carried by the carton conveyor and for engagement with exterior sides of successive cartons carried by the carton conveyor at positions in close proximity with the positions of enagement of the closure flaps with said sides thereby to constrain the carton sides against inward movement while the flaps are engaged by said sealing means, a carriage for each of said suction means, said carriage being mounted on the auxiliary conveyor, a stationary guide element extending lengthwise of the path of the auxiliary conveyor, and elments carried by each said carriage and arranged to co-operate with said guide element to constrain the carriage against movement towards the carton conveyor.

2. Apparatus for securing an adhesively coated closure flap to the exterior of a side of a carton, comprising a carton conveyor operable to move cartons in spaced relation, sealing means operable to engage and press closure flaps of cartons carried by the carton conveyor against the exterior sides of the cartons, an auxiliary conveyor movable in timed relation with the carton conveyor and in a path parallel with that along which cartons are moved by the carton conveyor, a plurality of hollow members each connectable with a source of suction and each having a perforate surface communicating with the interior of the member, a carriage for each of said hollow members, said carriages mounted on the auxiliary conveyor for movement therewith at the linear speed of cartons carried by the carton conveyor and for engagement with cartons carried by the carton conveyor at positions in close proximity with the positions of engagement of the closure flaps with said sides thereby to constrain the carton sides against inward movement while the flaps are engaged by said sealing means, a stationary guide element extending lengthwise of the path of the auxiliary conveyor, and elements carried by each said carriage and arranged to co-operate with said guide element to constrain the carriage against movement towards the carton conveyor.

3. Apparatus according to claim 2, including a rotary valve operable in timed relation with the carton and auxiliary conveyors and connected with said hollow members by flexible tubes, said valve being connectable with a source of suction and operable to effect connection between such source and each of the hollow members in turn for a predetermined interval of time.

4. Apparatus for securing an adhesively coated closure flap to the exterior side of a carton, comprising a carton conveyor operable to move cartons in spaced relation, sealing means operable to engage and press closure flaps of cartons carried by the carton conveyor against the exterior sides of the cartons, an auxiliary conveyor movable in timed relation with said carton conveyor and in a path parallel with that along which cartons are moved by the carton conveyor, a plurality of pairs of suction pads connectable with a source of suction, bearings for each pair of pads supported in spaced relation by said auxiliary conveyor for movement thereby at the linear speed of the carton conveyor and in a path parallel with that along which cartons are moved by the carton conveyor and for movement relative thereto into and out of engagement with the sides of cartons carried by the carton conveyor at positions in close proximity with the positions of engagement of the closure flaps with the sides of the cartons thereby to constrain the carton sides against inward movement while the flaps are engaged by the sealing means, cam followers movable with the suction pads relative to the auxiliary conveyor, and stationary cams engageable by said cam followers to control movement of the suction pads relative to the auxiliary conveyor.

5. Apparatus according to claim 4, including a rotary valve operable in timed relation wth the carton and auxiliary conveyors and connected with said suction pads by flexible tubes, said valve being connectable with a source of suction and operable to effect connection between such source and each pair of suction pads in turn for a predetermined intreval of time.

6. Apparatus for securing an adhesively coated closure flap to the exterior side of a carton, comprising a carton conveyor operable to move cartons in spaced relation, sealing means operable to engage and press closure flaps of cartons carried by the carton conveyor against the exterior sides of the cartons, an auxiliary conveyor movable in timed relation with said carton conveyor and in a path parallel with that along which cartons are moved by the carton conveyor, a plurality a pairs of suction pads supported in spaced relation by said auxiliary conveyor for movement thereby at the linear sped of the carton conveyor and in a path parallel with that along which cartons are moved by the carton conveyor and for movement relative thereto into and out of engagement with the sides of cartons carried by the carton conveyor at posi-

tions in in close proximity with the positions of engagement of the closure flaps with the sides of the cartons thereby the constrain the carton sides against inward movement while the flaps are engaged by the sealing means, a rotary valve operable in timed relation with the carton and auxiliary conveyors and connected with said suction pads by flexible tubes, said valve being connectable with a source of suction and operable to effect connection between such source and each pair of suction pads in turn for a predetermined interval of time, and actuating means co-operating with the pairs of suction pads to effect said movements thereof relative to the auxiliary conveyor.

7. Apparatus for securing an adhesively coated closure flap to the exterior of a side of a carton, comprising a carton, comprising a carton conveyor operable to move cartons in spaced relation, sealing means operable to engage and press the closure flaps of cartons carried by the conveyor against the exterior sides of the cartons, an auxiliary conveyor movable in time relation with said carton conveyor and in a path parallel with that along which cartons are moved by the carton conveyor, suction means arranged to engage the exterior of said side in close proximity with the position of engagement of the closure flap with said side to constrain said side of the carton against inward movement while the flap is engaged by said sealing means, and a rotary valve operable in timed relation with the carton and auxiliary conveyors and connected with said suction means by flexible tubes, said valve being connectable with a source of suction and operable to effect connection between such source and each said suction means in turn for a predetermined interval of time.

8. Apparatus for securing an adhesively coated closure flap to the exterior of a side of a carton, comprising a carton conveyor operable to move cartons in spaced relation, sealing means located alongside a part of the path of the carton conveyor and operable to engage and press the closure flaps of cartons carried by the conveyor against the exterior sides of the cartons, suction means movable in timed relation with said conveyor and each operable to engage the exterior of the side of a carton engageable by the closure flap of the carton at a position in close proximity with said position of engagement, and valve means connectable with a source of suction and operable in timed relation with the conveyor and suction means to connect each suction means with said source for a predetermined interval of time while the closure flap of a carton is engaged by the sealing means thereby to constrain the side of the carton against inward movement while the closure flap is engaged by the sealing means.

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