Feb. 10, 1948. R. M. DUNNING 2,435,878

METHOD AND APPARATUS FOR SEALING CARTONS BY SUCTION

Filed Jan. 4, 1945 3 Sheets-Sheet 1

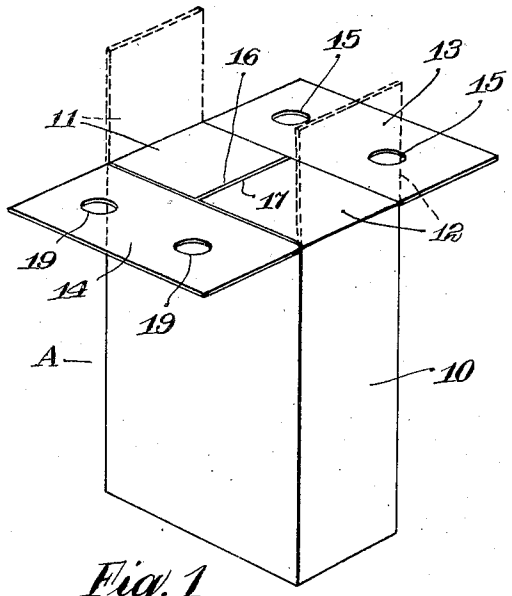


Fig. 1

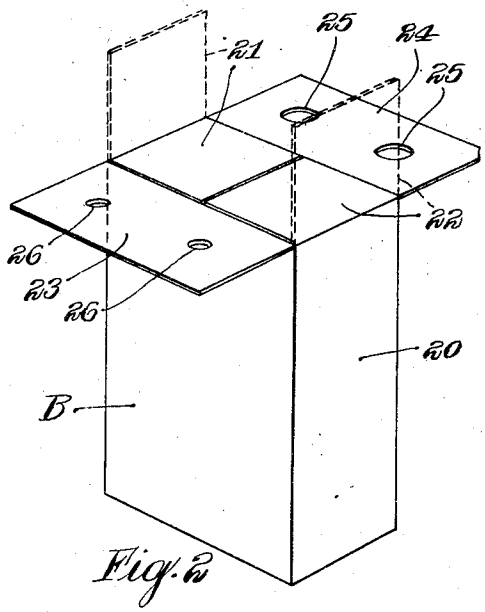


Fig. 2

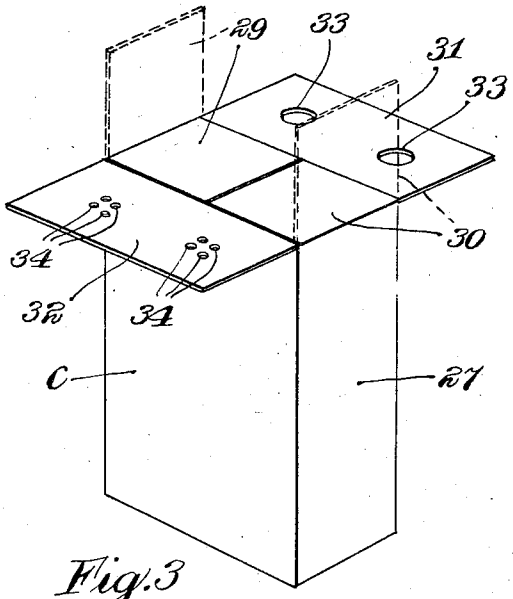


Fig. 3

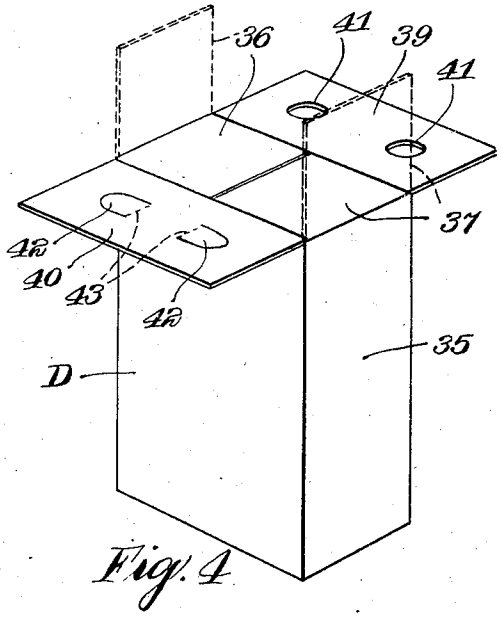


Fig. 4

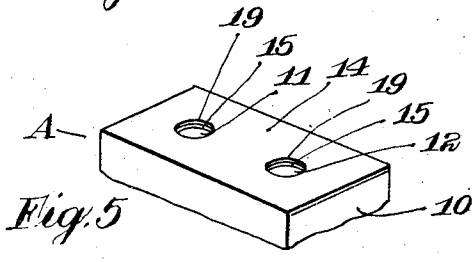


Fig. 5

Inventor

Robert M. Dunning

Attorney

Feb. 10, 1948. R. M. DUNNING 2,435,878

METHOD AND APPARATUS FOR SEALING CARTONS BY SUCTION

Filed Jan. 4, 1945 3 Sheets-Sheet 2

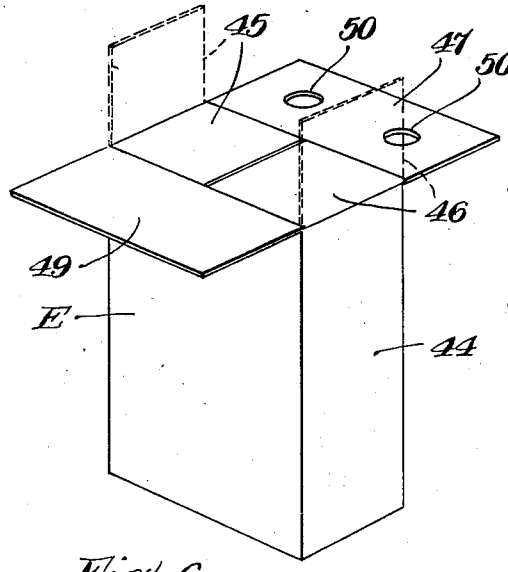


Fig. 6

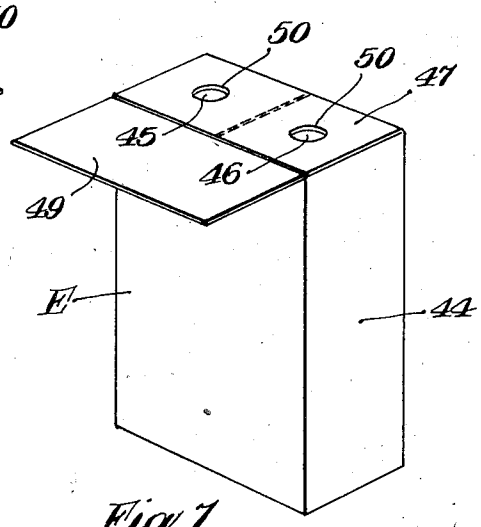


Fig. 7

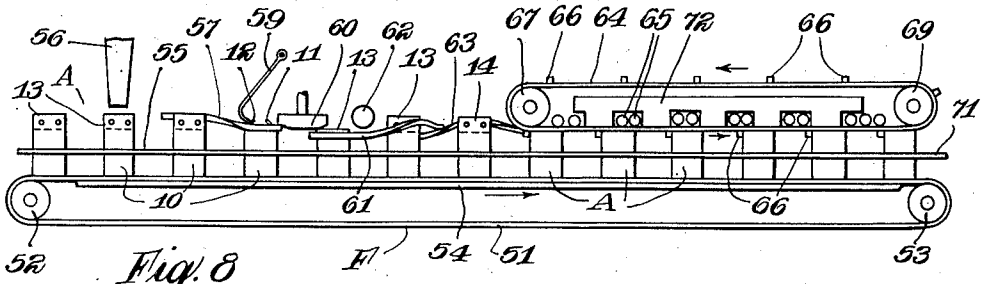


Fig. 8

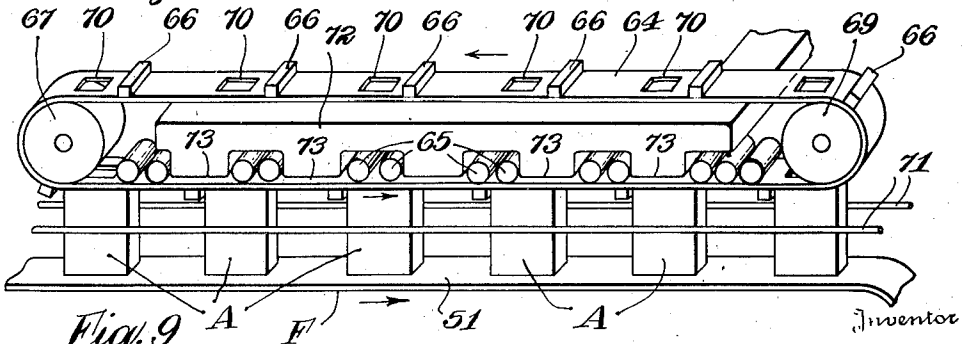


Fig. 9

Inventor

Robert M. Dunning

Attorney

Feb. 10, 1948. R. M. DUNNING 2,435,878

METHOD AND APPARATUS FOR SEALING CARTONS BY SUCTION

Filed Jan. 4, 1945 3 Sheets-Sheet 3

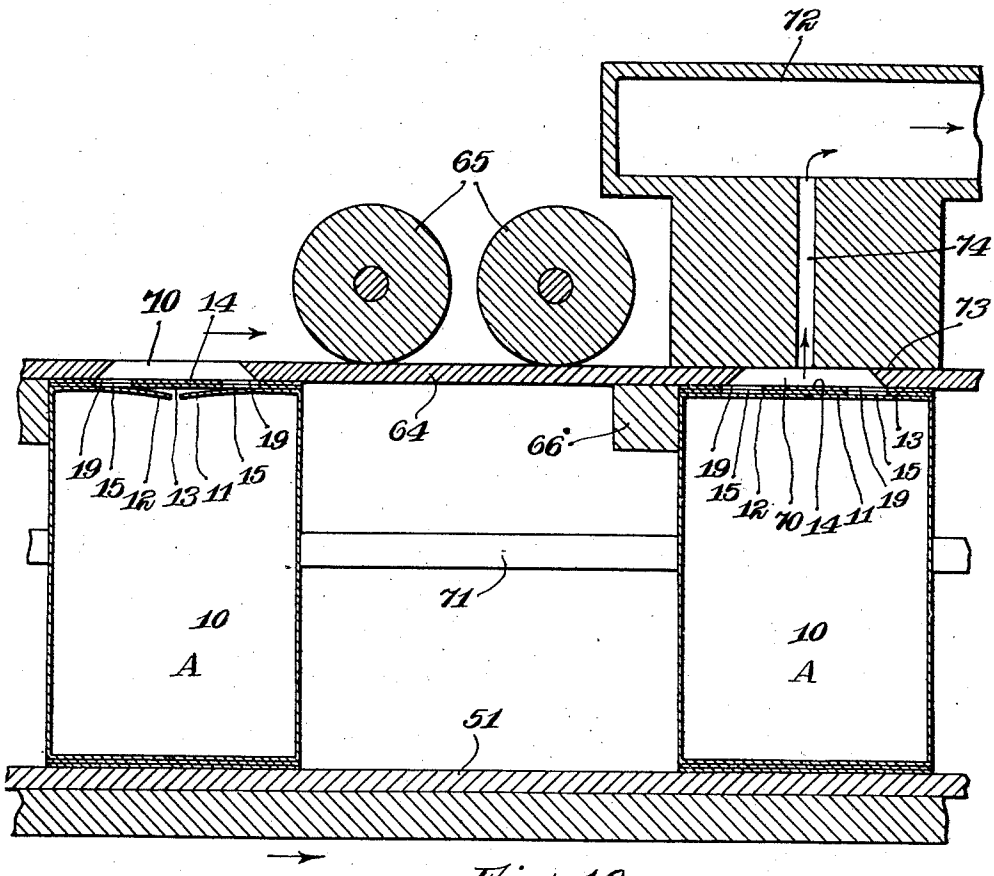


Fig. 10

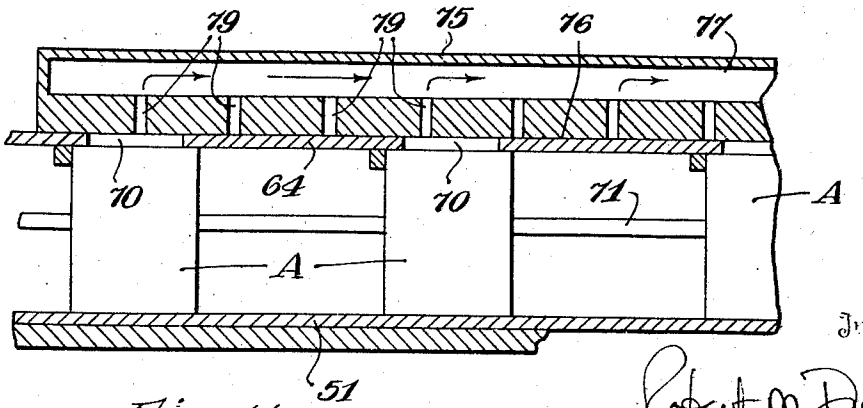


Fig. 11

Inventor

Robert M. Dunning

Attorney

Patented Feb. 10, 1948 2,435,878

UNITED STATES PATENT OFFICE

2,435,878

METHOD AND APPARATUS FOR SEALING CARTONS BY SUCTION

Robert M. Dunning, St. Paul, Minn., assignor to Waldorf Paper Products Company, St. Paul, Minn., a corporation of Minnesota

Application January 4, 1945, Serial No. 571,237½

17 Claims. (Cl. 93—6)

1

My invention relates to an improvement in method of sealing cartons wherein it is desired to produce a tight seal between overlying flaps of a carton through the use of suction.

In the sealing of tubular cartons of the regular glue end type, it is common practice to fold a pair of closing flaps or panels into coplanar opposed relationship and to fold flaps from the remaining opposed walls over the opposed flaps in superimposed relation. It is usually found that one end of such cartons may be tightly sealed due to the fact that the tubular body is placed over a block or mandrel before the sealing operation takes place, which permits the necessary pressure to be applied to seal the various flaps in superimposed relation. In sealing the remaining end of the carton, however, after the contents have been placed therein, it is difficult to obtain a tight seal due to the inherent tendency of the opposed flaps to curl down into the carton when moistened by adhesive and further due to the fact that external pressure against the carton end tends to bend the opposed flaps into the carton. As a result the sifting of the contents of the carton through this last sealed end often occurs.

It is the object of the present invention to produce a tightly sealed carton by preventing the innermost flap or flaps of the carton from folding down into the carton. As a result the various surfaces of the superimposed flaps are tightly adhered together and little or no sifting takes place between the adhered surfaces.

A feature of the present invention lies in the provision of one or a series of apertures in one or more of the flaps overlying the innermost flap or flaps. This flap containing the aperture or apertures is then placed beneath a suction apparatus which operates through the apertures to draw the innermost flap or flaps against the adjacent surface. The atmospheric pressure within the carton then acts to push the innermost flap or flaps against the overlying aperture, which flap or flaps provide a tight bond between these parts.

A feature of the present invention lies in the fact that no unusual carton structure is required to accomplish the desired result and no additional stock is necessary to produce a tightly sealed carton. Thus my carton may be formed as shapely as conventional glued end type cartons without the accompanying disadvantages thereof.

A further feature of the present invention lies in the fact that suction may be applied as the

2

carton is sealed in a conventional type closing and sealing mechanism. It is only necessary to add a suction unit to the conventional gluing apparatus in order to cause the sealing operation to be effected.

A further feature of the present invention lies in the speed with which the sealing operation may take place. If a relatively quick drying adhesive is employed on the cartons, the closing flaps may be folded into carton sealing position and suction applied at the proper time to pull the innermost flaps against the overlying flaps and to produce a tight bond therebetween.

A further feature of the present invention resides in the fact that suction may be intermittently applied if it is so desired. In many instances this arrangement is desirable, as if the inner carton flaps are not pulled into engagement with their overlying flaps when suction is actually applied, additional air may be permitted to enter the interior of the carton so as to maintain atmospheric pressure within the same. The carton may then again be subjected to vacuum, which again tends to draw the innermost flaps against the surfaces to which they should be sealed.

These and other objects and novel features of my invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of my specification:

Figure 1 is a perspective view of a carton in partially closed position showing one type of aperture in the sealing flaps.

Figure 2 is a view similar to Figure 1 showing a different type of aperture which may be used in the sealing flaps.

Figure 3 is a view similar to Figures 1 and 2 showing a single aperture in one sealing flap and a series of relatively small apertures in the outermost sealing flap.

Figure 4 is a perspective view of a modified form of carton showing a different arrangement of apertures in the sealing flaps.

Figure 5 is a perspective view of the carton shown in Figure 1 with the end thereof sealed.

Figure 6 is a perspective view of a carton showing apertures in but one of the superimposed sealing flaps.

Figure 7 is a view of the carton shown in Figure 6 with the apertured flap in closing position.

Figure 8 is a diagrammatic side view of a carton filling, closing and sealing mechanism.

Figure 9 is a perspective diagrammatic view showing the suction apparatus shown in Figure 8.

Figure 10 is a cross sectional view through a portion of the apparatus shown in Figure 9.

Figure 11 is a modified form of apparatus which may be used in place of that shown in Figures 8, 9, and 10.

The carton A, illustrated in Figures 1 and 5 of the drawings, is provided with tubular side wall structure 10 which is shown rectangular in cross section. The tubular wall structure 10 is provided with two opposed closing flaps 11 and 12 and a second pair of opposed closing flaps 13 and 14. In the usual sequence of closing the carton the flaps 11 and 12 are usually folded down into coplanar relation as illustrated in Figure 1 of the drawings in full lines, and the remaining flaps 13 and 14 are then folded to overlie the flaps 11 and 12.

The flap 13 is provided with a pair of apertures 15 through which a portion of the flaps 11 and 12 are exposed. The exposed portions of the flaps 11 and 12 are portions spaced from any edge thereof and are shown in approximately the center of the flaps 11 and 12. In actual practice the apertures 15 may be somewhat closer together than is shown in order to be positioned more closely adjacent the free ends 16 and 17 of the flaps 11 and 12 respectively.

The flap 14 is provided with a pair of spaced apertures 19 which register with the apertures 15 when the flap 14 has been folded to overlie the flap 13. Thus when the carton is sealed as in Figure 5 of the drawings a portion of the flap 11 and a portion of the flap 12 are exposed.

In Figure 2 of the drawings I disclose a carton B which may be substituted for the carton A. The carton B is provided with a tubular body 20 which may be rectangular in shape. From the side walls of the tubular body 20 issue opposed closing flaps 21 and 22 and oppositely disposed closing flaps 23 and 24. The flaps 21 and 22 are usually first folded into coplanar relation as shown in Figure 2. The flap 24 is then folded to overlie the flaps 21 and 22 and to be adhered thereto, and the flap 23 is next folded to overlie the flap 24. Adhesive is applied to some or all of these flaps to seal the same together.

The flap 24 is provided with a pair of spaced apertures 25 therein, which expose portions of the flaps 21 and 22 spaced from any edge thereof. The flap 23 is provided with relatively small apertures 26 in registry with the apertures 25. Thus when the carton is closed relatively small apertures 26 may be noted in the uppermost panel 23 while larger apertures 25 are found in the panel 24 beneath the panel 23.

In Figure 3 of the drawings I disclose a carton C which may be used alternatively with the cartons A or B. The carton D is provided with a tubular wall structure 27 which is shown as rectangular in shape. Two closing flaps or panels 29 and 30 issue from oppositely disposed side walls of the body and flaps 31 and 32 issue from the remaining opposed carton walls to fold over the flaps 29 and 30. The flap 31 is preferably first folded and the flap 32 is preferably uppermost. The flap 31 is provided with spaced apertures 33 which in folded position of the flap overlie portions of the flaps 29 and 30 spaced from any edge thereof. The flap 32 is provided with a series of relatively small perforations 34 arranged to overlie the apertures 33. The apertures 34 thus communicate with the apertures 33 and permit a partial evacuation of the air from the apertures 33.

The carton D, illustrated in Figure 4, is also

an alternate construction to the cartons A, B, and C. The carton D includes a substantially rectangular body 35 having a pair of closing flaps 36 and 37 issuing from two opposed sides into coplanar relation and a pair of overlying flaps 39 and 40 which fold sequentially over the flaps 36 and 37. Spaced apertures 41 are provided in the flap 39 to expose portions of the flaps 26 and 37 exposed from any edge thereof. Tabs 42 are partially cut from the body of the flap 40, being connected thereto along hinge lines 43. The tabs 42 when elevated or hinged along the fold lines 43 form an aperture in the flap 40 through which air may pass from the apertures 41. However, when the carton is sealed the tabs 42 may lie in coplanar relationship with the remainder of the flap, leaving no aperture in the exposed flap.

In Figures 6 and 7 of the drawings I disclose a carton E which similarly may be sealed by suction. The carton E includes a tubular body 44 preferably rectangular in cross section which is provided with a pair of opposed sealing flaps 45 and 46, which are shown bent into coplaner relationship. A second pair of opposed flaps 47 and 49 are hingedly attached to the remaining side walls of the tubular body 44 and are designed to fold into superimposed relation with the flaps 45 and 46. The flap 47 is provided with a pair of spaced apertures 50 extending therethrough which are spaced to expose portions of the flaps 45 and 46 spaced from any edge thereof. The flap 49 is designed to fold over the flap 47 when the carton is completely sealed so as to cover the apertures.

In this form of carton E, the suction is applied after the flap 47 has folded into sealing position as shown in Figure 7 of the drawings and before the flap 49 has been folded to cover the same. Obviously this structure has the advantage of leaving no exposed apertures when the package is completely closed, but on the other hand the structure has the disadvantage of requiring a separate sealing operation to seal the flap 49. In most sealing methods the flaps 47 and 49 are folded at almost the same time and pressure is then applied to hold the flaps in superimposed relation. With the structure shown in Figures 6 and 7 the flap 47 must first be folded into the position shown in Figure 7, suction and pressure applied so as to seal the flaps 45, 46 and 47 together. Subsequently adhesive must be applied to the flap 49, this flap folded to overlie the flap 47, and pressure applied to hold the flap 49 against the sealed remaining end structure.

In Figures 8 and 9 of the drawings I disclose diagrammatically a form of sealing apparatus by means of which the cartons may be filled and sealed. This structure is merely diagrammatic and illustrates the principle, rather than the precise construction of the parts. The sealing mechanism F includes a conveyor 51 which is supported by end pulleys 52 and 53. The top surface of the conveyor is preferably supported by any suitable means such as by spaced rollers or by a fixed support 54 as shown. Cartons such as the cartons A, for example, are fed upon the upper surface of the conveyor 51 and are guided in their path between guide rails such as 55. The cartons successively pass beneath a sealing hopper such as 56 by means of which the cartons are filled.

After the filling operation the opposed flaps 13 and 14 having apertures therein are folded outwardly into right angular relation with the

side walls of the carton by means of folding horns or bars 57. The opposed flaps 11 and 12 are subjected to the action of a hook shaped plate 59 and a pressing foot 60 which acts to fold the flaps 11 and 12 into the position shown in Figure 1 of the drawings.

While the flaps are in the position shown in Figure 1, the flaps 13 and 14 being supported by a folding bar 61, the carton top may pass between glue wheels 62 which apply glue to the upper surfaces of the flaps 13 and 14 and also to the opposed flaps 11 and 12. The folding bar 61 then acts to fold the flap 13 into position overlying the flaps 11 and 12.

A folding bar 63, similar to the bar 61, but the reverse thereof, underlies the flaps 14 of the successive cartons as they travel along the conveyor 51, and acts to fold the flaps 14 in position to overlie the flaps 13. The cartons A then are fed beneath a cooperating conveyor 64 which acts to apply the necessary pressure to hold the flaps in their superimposed position. Pressure rollers 65 may act against the undersurface of the conveyor 64 so as to hold this conveyor against the tops of the cartons. Blocks 66 or cleats may, if desired, be provided on the conveyor 64 to engage against the rearmost edge of the carton so as to cause proper registration between the cartons A and the conveyor belt 64.

As will be noted in Figure 8 of the drawings the conveyor 64 is mounted upon end pulleys 67 and 69 and is provided with spaced apertures 70 therein designed to overlie the center portion of the top of each carton as it successively moves between the conveyors 64 and 51. The apertures 70 are of large enough size to communicate with the spaced openings 19 in the uppermost carton flap 14, but these apertures are somewhat smaller in area than the top of the carton so as to apply pressure marginally along all of the edges of the carton top closures. The cartons are guided from movement laterally of the conveyors by means of suitable fixed guide bars 71.

Overlying the upper surface of the lower portion of the conveyor 64 I provide a suction conduit 72 which extends into contact with the upper surface of the conveyor belt 64 in opposed relation to the surface engaging the tops of the cartons A. This suction conduit overlies the belt surface at spaced points along the length of travel of the belt and permits suction to be communicated to the apertures 70 in the conveyor belt. In other words, air from within the apertures 70 and accordingly the communicating apertures 15 and 19 in the top flaps of the carton A may be partially evacuated by means of this suction conduit 72.

With reference now to Figure 10 of the drawings it will be noted that the suction conduit 72 is provided with a relatively large undersurface 73 in contact with the conveyor belt 64 and a relatively narrow suction passage 74. This structure is designed to prevent the loss of vacuum through communication between the passage 74 and the outer atmosphere as the apertures 70 in the conveyor belt pass beneath the same. It is desirable to have the entire aperture 70 closed by the undersurface 73 of the suction conduit 72 before this aperture comes into communication with the passage 74. This passage 74 may be relatively wide, however, so as not to restrict the free passage of air therethrough.

As each successive carton A passes beneath the undersurface 73 of the suction conduit the apertures 70 are first sealed from the surrounding atmosphere and then are subjected to evacuation by communication with the passage 74. While the passage 70 is in communication with the passage 74, air will be partially evacuated from the apertures 70 and from the apertures 19 and 15 in the carton flaps 14 and 13 respectively. This action lowers the pressure above the opposed flaps 11 and 12 and permits the normal atmospheric pressure within the carton to urge the flaps into contact with the undersurface of the flap 13. As a result the normal tendency for the flaps 11 and 12 to curl inwardly is obviated.

An observation of the carton at the left side of Figure 10 shows that the flaps 11 and 12 have curled downwardly to some extent away from the overlying flaps 13 and 14. This tendency to curl inwardly is caused by the moistening of these flaps by the adhesive and also by the application of external pressure against the top of the carton. This tendency, however, is overcome by partially evacuating the air above the upper surfaces of the flaps 11 and 12 so that these flaps are forced into engagement with the adhesive on the undersurface of the flap 13.

It will be noted upon an observation of Figure 9 of the drawings that the various belt contacting surfaces 73 differ at various points from the spacing of the cartons A upon the conveyor belt. This arrangement is sometimes desirable as by this structure only a limited number of the suction passages 74 communicate with apertures 70 at one time. For example in the arrangement diagrammatically illustrated in this figure, only the passage 74 in the surface 73 at the extreme right hand end of the suction conduit is in communication with an aperture 70. Thus all of the capacity of the vacuum supply may be directed against a single carton or a limited number of cartons at one time, requiring a suction pump of much less capacity than would otherwise be necessary. The remaining suction passages 74 are closed by contact with the conveyor belt 64.

In the operation thus described each carton is successively subjected to the action of suction on its upper surface, this suction being intermittent in its action. Between the belt contacting surfaces 73 of the suction conduit 72 the apertures 70 are open to atmosphere if it is so desired, thus producing a structure in which the tops of the cartons are alternately subjected to partial vacuum and atmospheric pressure. While this arrangement is not always essential, it has certain definite advantages in actual practice.

In the event the reduction of pressure above the flaps 11 and 12 is not sufficient to move these flaps into engagement with the undersurface of the flap 13 when first subjected to the action of vacuum, a passage may be provided between the flaps 11 or 12 and 13, which would tend to partially evacuate the air from the carton. It is possible that part of the contents of the carton may be raised by this suction. In order to prevent any such difficulty in the event the flaps 11 and 12 are not entirely raised by the first application of suction, the apertures 70 are thereafter subjected to atmospheric pressure. This atmospheric pressure is transmitted into the interior of the carton through the passage between the flap 13 and one or more of the underlying flaps 11 and 12. The carton top is then again subjected to the action of suction and this second application of reduced pressure above the carton may suffice to bring the carton flaps into proper sealing relation. As

a result with my structure even though the flaps are not properly sealed after the first application of suction, they will be properly sealed by subsequent reductions of pressure above the tops of the carton.

On the other hand, if suction is constantly employed and if the flaps are not properly sealed at the first application of suction, reduced pressure will be transmitted into the interior of the carton and there will be insufficient pressure within the carton to pull the opposed flaps into sealing relation. It is for this reason that I have found the intermittent application of suction to be somewhat advantageous.

In Figure 11 of the drawings I disclose a modified form of construction in which continuous suction is applied to the upper ends of the cartons. In this arrangement the cartons A are carried by conveyors similar to the conveyors 51 and 64 and accordingly these conveyors have been given similar identifying numbers. The only difference in the structures shown in Figures 10 and 11 lies in the suction conduit, which in Figure 11 is identified by the numeral 75.

The suction conduit 75 has an undersurface 76 which is in constant contact with the upper surface of the lower portion of the conveyor belt 64. This suction conduit 75 is provided with an air passage 77 therethrough and a series of spaced apertures 79 connect the air passage 77 with the surface 76. The passages 79 are spaced apart a distance shorter than the length of the apertures 70 in the belt 64 so that after the apertures 70 are sealed from the outer atmosphere these apertures are in constant contact with one or another of the passages 79. Thus a continuous reduced pressure is provided above the cartons throughout the length of the suction conduit holding the opposed flaps 11 and 12 into sealing relation with the superimposed flap 13.

All of the cartons A through E are provided with a lower sealed end of any suitable type. In the various cartons illustrated the lower closures are formed by sealing end flaps in superimposed relation, preferably over a mandrel so that sufficient pressure may be applied to hold the various flaps in sealing relation until the adhesive has set.

Any of the cartons A through D, may be sealed in the sealing mechanism shown in Figures 8 through 11. In the case of the carton D, the partial vacuum above the carton first pivots the tabs 42 upwardly so as to provide a communicating air passage with the apertures 41 so that the air above the opposed flaps 36 and 37 may be partially evacuated.

A slight modification in the sealing apparatus is necessary to seal the carton E shown in Figures 6 and 7. In order to seal the carton E it is only necessary to remove the folding plate 63 from the position shown in Figure 8 and to accomplish this flap folding operation after the carton has passed beneath the conveyor 64. As the mechanism required to fold the flap 14 at the end of the suction action is believed obvious, the applicant has not illustrated this modification of the structure.

In the foregoing method the cartons are shown in spaced relation on their respective conveyors. Obviously, however, the cartons may comprise a continuous row of cartons if it is so desired. In such an event any preferred mechanism may be employed to synchronize the conveyor 64 with the cartons on the conveyor 54.

In accordance with the patent statutes, I have described the principles of construction and operation of my method of sealing cartons by suction, and while I have endeavored to set forth the best embodiments thereof, I desire to have it understood that obvious changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. The method of sealing cartons having closures consisting of flap means in surface contact, certain of the flap means outwardly of an inner flap means having aperture means therein, the method including the steps of applying a partial vacuum to the closure of the carton in a manner to urge the said inner flap means into contact with the next adjacent flap means.

2. The method of sealing a carton having an end structure comprised of flap means in surface contact, certain of said flap means outwardly of an inner flap means having aperture means therethrough, the method including the steps of applying adhesive to selected surfaces of said flap means and applying partial vacuum to the aperture means in the flap means outwardly of the said inner flap means so as to urge the said inner flap means against the next adjacent flap means.

3. The method of sealing a carton having a closure structure comprised of at least two flap means in surface contact, the flap means next outwardly of an inner flap means having aperture means therethrough, the method including the steps of applying a coating of adhesive on a selected surface between the said inner flap means and the next adjacent flap means, and applying partial vacuum to the apertures of the flap means next outwardly from the said inner flap means so as to urge the said inner flap means against the next above flap means.

4. The method of sealing tubular cartons having sealing flap means foldably connected to the walls thereof and adapted to fold into surface contact relation, and aperture means in a flap means outwardly of an inner flap means, the method including the steps of folding the said inner flap means across the open end of the container, folding the apertured flap means upon the said inner flap means, and subjecting the apertures to partial vacuum so as to draw the said inner flap means against the apertured flap means.

5. The method of sealing a tubular carton having end flap means on the walls thereof arranged to fold into superimposed relationship, one of said flap means above the lowermost flap means having aperture means therein, the method consisting of folding the lowermost flap means across the open end of the carton, applying adhesive thereto, folding the apertured flap means over the lowermost flap means, and applying partial vacuum to the apertures to hold the lowermost flap means against the next adjacent flap means to adhere the same together.

6. The method of sealing a tubular carton having rectangularly arranged side walls, two opposed side walls having flaps foldable into coplanar relationship, flaps on the remaining opposed side walls at least one of which is provided with aperture means therethrough arranged to expose a portion of each of said first folded flaps spaced from the edges thereof, the method consisting of folding the first mentioned flaps into coplanar relationship, applying adhesive to selected flap surfaces and folding the apertured flap over the opposed flap and subjecting the aperture means to partial vacuum so as to draw the opposed flaps against the apertured flap.

7. The means of sealing a carton having end flap means arranged to fold in superimposed rela-

tion, at least one flap means above the lowermost flap means having aperture means therethrough, the method consisting of applying adhesive to selected flap surfaces, folding one of said flap means to extend over the open end of the carton, folding the apertured flap means over the first folded flap means, one of the adhesive surfaces being between said folded flap means, and applying partial vacuum to the aperture means of the last folded flap means while simultaneously holding the last folded flap means in folded position to draw the first folded flap means against the last folded flap means.

8. The method of sealing a tubular carton having one pair of opposed flap means designed to fold into coplanar relationship and a second pair of flap means on the the remaining opposed side walls of the carton adapted to overlie the coplanar first folded flap means, at least one of said overlying flap means having aperture means therethrough, the method consisting of folding the first named flaps into coplanar relation, applying adhesive to selected surfaces of the flap means, folding the apertured flap means to overlie the coplanar flap means, applying partial vacuum to the apertures while holding the apertured flap means in folded position so as to draw the coplanar flap means into sealing engagement with the apertured flap means.

9. The method of sealing a carton having flaps arranged to fold in superimposed relation, at least one of the flap means above the lowermost flap means having aperture means therethrough, the method consisting of applying adhesive to at least one surface of said flap means between said lowermost flap means and said aperture flap means, and intermittently applying suction to said aperture means to draw said lowermost flap means into sealing relation with said apertured flap means.

10. The method of sealing a carton having superimposed closing flap means, at least one flap means above the lowermost flap means having aperture means therethrough, the method consisting of applying adhesive to a flap surface between the lowermost flap means and the apertured flap means, and alternately subjecting the aperture means to partial vacuum and atmospheric pressure.

11. The method of sealing a carton having a series of superimposed closing flap means, at least one flap means above the lowermost flap means having aperture means therethrough, the method consisting of applying adhesive to a flap surface between the lowermost flap means and the apertured flap means, holding the apertured flap means in folded position and intermittently applying partial vacuum to said aperture means.

12. The method of sealing a carton having a series of superimposed closing flap means, at least one flap means above the lowermost flap means having aperture means therethrough, the method comprising applying adhesive to a surface between the lowermost flap means and the apertured flap means, and alternately subjecting the apertures to partial vacuum and atmospheric pressure.

13. The method of sealing a carton having superimposed flap means, all of said flap means above the lowermost flap means having registering openings therethrough, the method consisting of applying adhesive to flap surfaces between the superimposed flap means, and subjecting the openings to partial vacuum to draw the lowermost flap means against the next adjacent flap means.

14. The method of sealing a carton having superimposed flap means, all of said flap means above the lowermost flap means having registering openings therethrough, the method consisting of applying adhesive to flap surfaces between the superimposed flap means, and intermittently subjecting the openings to partial vacuum to draw the lowermost flap means against the next adjacent flap means.

15. The method of sealing a carton having superimposed flap means, all of said flap means above the lowermost flap means having registering openings therethrough, the method consisting of applying adhesive to flap surfaces between the superimposed flap means, and alternately subjecting the openings to partial vacuum and atmospheric pressure to draw the lowermost flap means against the next adjacent flap means.

16. The method of sealing a carton having at least three thicknesses of flap means in superimposed relation to act as a closure, the intermediate flap means having apertures therethrough, the method comprising folding the lowermost flap means over the end of the carton body, applying adhesive to a surface between the lowermost flap means and the apertured flap means, folding the apertured flap means to overlie the lowermost flap means, applying partial vacuum to the apertures to draw the lowermost flap means against the apertured flap means, applying partial vacuum to the apertures to draw the lowermost flap means against the apertured flap means, applying adhesive to a surface between the apertured flap means and the next adjacent flap means, and folding the next adjacent flap means to overlie the apertured flap means.

17. A carton sealing apparatus for use with tubular cartons having end flaps arranged to fold into superimposed relationship, at least one of the flap means above the lowermost flap means having aperture means therethrough, the apparatus comprising means for folding the flap means into superimposed relation, means for applying adhesive between the superimposed flap means, and means engageable with the apertured flap means to communicate partial vacuum thereto.

ROBERT M. DUNNING.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,309,485	Price	July 8, 1919