April 28, 1964 C. D. STRIPLIN ETAL 3,130,649

METHOD OF MAKING LINED CARTONS

Filed Dec. 11, 1961 2 Sheets-Sheet 1

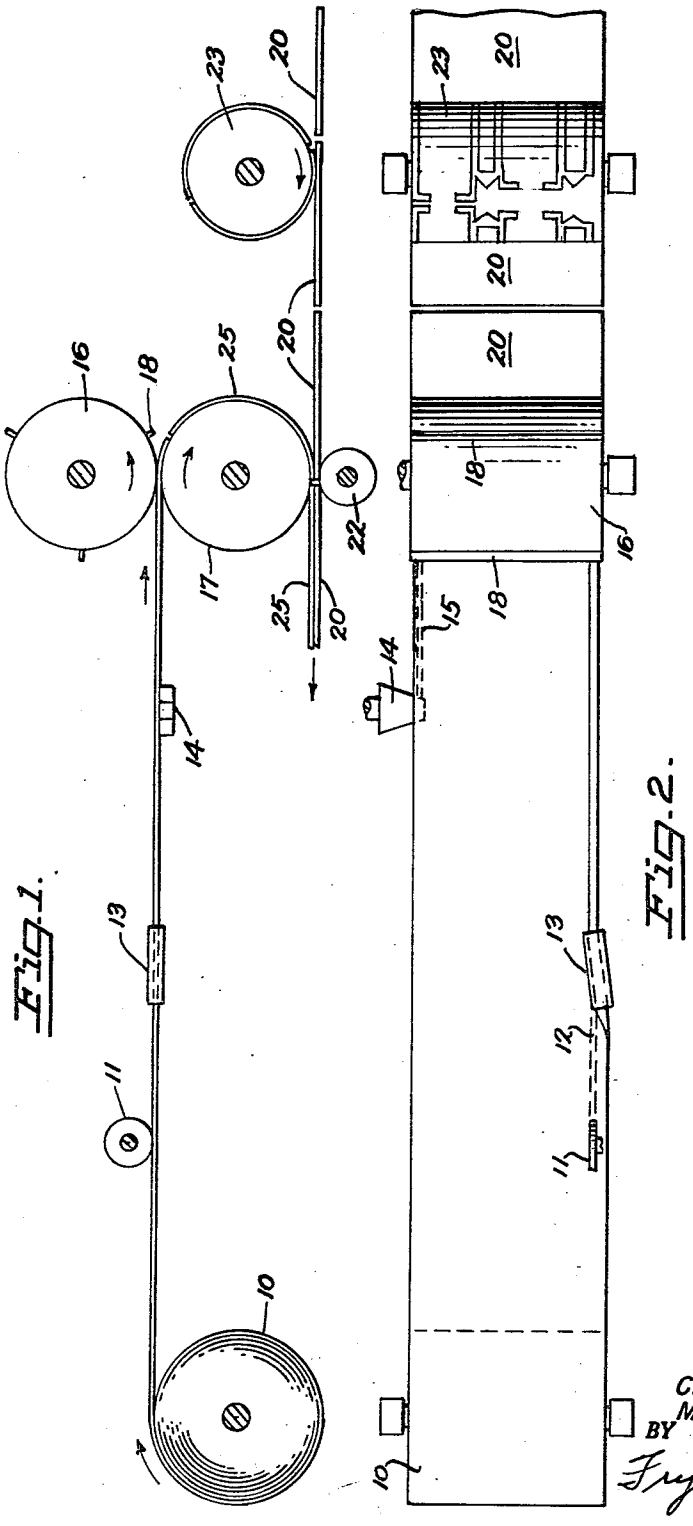


Fig. 1.

Fig. 2.

INVENTORS
CHARLES D. STRIPLIN
MONROE F. SMITH
BY
Fryer & Ijamsold
ATTORNEY

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Fig. 3.

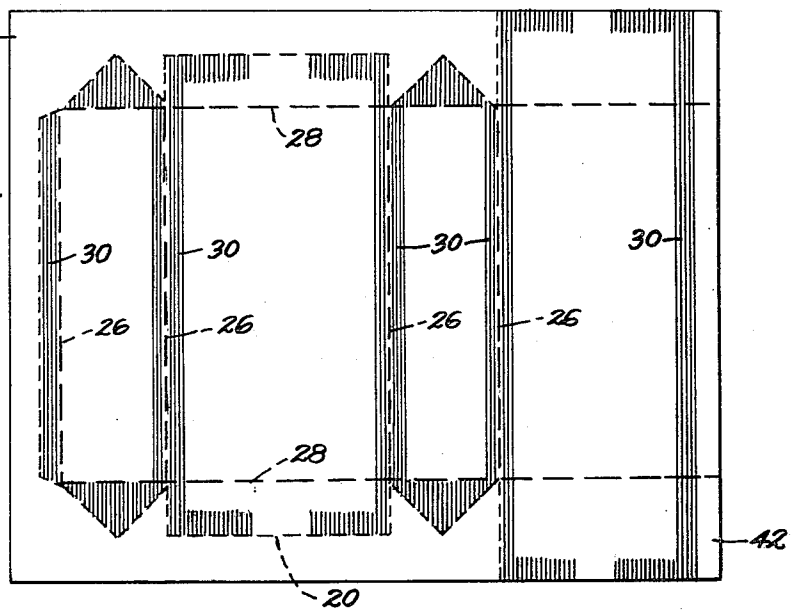


Fig. 4.

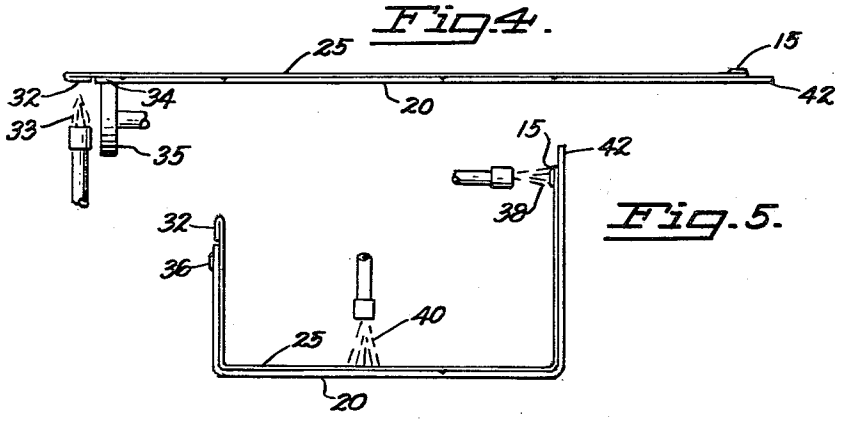
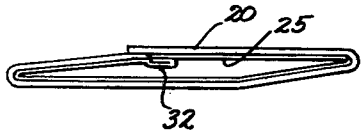


Fig. 5.

Fig. 6.



INVENTORS
CHARLES D. STRIPLIN
MONROE F. SMITH
BY
Fryer & Ignwald
ATTORNEY

United States Patent Office 3,130,649 Patented Apr. 28, 1964

3,130,649

METHOD OF MAKING LINED CARTONS

Charles D. Striplin, Concord, and Monroe F. Smith, Walnut Creek, Calif., assignors to Fibreboard Paper Products Corporation, San Francisco, Calif., a corporation of Delaware

Filed Dec. 11, 1961, Ser. No. 158,289
4 Claims. (Cl. 93—36.01)

This invention relates to a lined carton and to the method of making the same and particularly to a carton made of paperboard or the like and lined with a paper-like liner.

Lined cartons having the general characteristics of that of the present invention are well known for the purpose of packaging foods or other materials which require a barrier against moisture, gas odors and the like. A heat sealable material is used as or in conjunction with the lining and after the carton is filled, its ends are closed by heat sealing. Such cartons are generally made in a tubular flat fold form of paperboard with a tubular liner of similar form also folded flat within the paperboard structure and pasted thereto. The flat folded carton and liner is shipped in quantity to a food packer who sets it up, fills it, closes and seals its ends.

Heretofore there have been two methods most widely used for making such flat fold lined cartons. One method comprises forming a tube of the liner material from a web and heat sealing the seam thereof. The tube so formed is cut to proper lengths and secured within the carton as it is folded from a flat blank to its tubular shape. This method has the disadvantage that the tubular liner is difficult to control in high speed machines and becomes wrinkled within the carton with the result that it fits poorly particularly in the corners of the carton. Often such a liner bridges the corners so that it is easily ruptured in use.

Another method more easily practiced with high speed machines comprises pasting together a carton blank and sheet of lining material in flat form, then folding them into a flat fold tube simultaneously. The edges to be secured together in the formation of the tube may then be secured with an ordinary adhesive. The ordinary liquid adhesive which is applied without heat is undesirable as a securing means for the liner which may be a plastic film, a polyethylene coated paper or other heat sensitive material. A defective seam results in the liner and the joint does not have the barrier qualities of the film material. The use of conventional heat sealing for a lined carton formed by the later method has also been found undesirable because the heat must be applied through the paperboard of the carton on one of the larger walls thereof which is printed for advertising and display purposes. The heat sometimes discolors the paperboard, may cause wax to melt and be damaged or may discolor or damage lacquers or inks. The resulting carton would then be unacceptable for its intended purpose.

It is an object of the present invention to provide a lined carton and a method of making the same which overcome the above mentioned disadvantages and in which a heat sealable lining material is securely and perfectly arranged within the carton with a heat or flame sealed seam accomplished without detrimental effect to the appearance of the carton.

Further and more specific objects and advantages of the invention and the manner in which it is practiced are made apparent in the following specification wherein reference is made to the accompanying drawings.

In the drawings:

FIG. 1 is a schematic view in side elevation of apparatus for forming sheets of liner material for the carton of the present invention and combining them with precut and prescored carton blanks;

FIG. 2 is a plan view of the apparatus shown in FIG. 1;

FIG. 3 is a plan view of a typical carton blank and liner therefor adhesively secured thereto in accordance with the present invention;

FIG. 4 is an edge view of the carton blank and liner viewed as from the lower edge of FIG. 3;

FIG. 5 is a view similar to FIG. 4 but showing the carton blank in partially folded condition; and

FIG. 6 is a similar view showing the carton in substantially full flat folded position which is its completed form prior to opening, filling and sealing by a user.

Referring first to FIG. 1 of the drawings, a roll of liner material for use in cartons is shown at **10**. The particular material employed for lining the carton of the present application is paper having a polyethylene coating on one side. Although this particular lining material is not essential to the invention at least one side or portions thereof should be formed of a material subject to being heat sealed at the side seam and at each end. The polyethylene or plastic coated surface of the sheet being withdrawn from the roll **10** faces downwardly and passes first beneath a glue wheel shown at **11** in FIGS. 1 and 2 which is of conventional construction and deposits a strip of glue shown at **12** in FIG. 2 adjacent one edge of the paper surface side of the sheet prior to its entering a folder **13** which folds the extreme edge of the sheet inwardly upon itself and over the strip of glue **12** which secures the fold in place.

A hot melt extruder or other hot melt adhesive application equipment, the nozzle or applicator of which is shown at **14**, underlies the opposite edge of the sheet **10** to deposit a strip or bead of heat softenable material in the position indicated in dotted lines at **15** directly adjacent the edge of the sheet. The hot melt material is composed of fused plastic and is commercially available in varying compositions for use with different types of plastics. It is characterized by its ability to set and form a strip or bead on a plastic surface which later may be softened or melted by the application of heat to form a seal with the lining material. When the web from the roll **10** has been so treated, it is passed between the nip of a cutter roll **16** and a vacuum roll **17** and spaced knives **18** on the cutter roll cut the strip into suitable lengths which are held by the vacuum roll until they come in contact with and are pasted to carton blanks shown at **20** as they pass between the nip of the vacuum roll and a pressure roll **22**. The carton blanks **20** have previously been fed beneath a glue roll **23** which applies glue to the blanks in a pattern presently to be described so that the blanks and liners are securely held together after passing between the vacuum roll and the pressure roll and are then delivered to a folder in which they are folded to a flat fold tubular form.

A combined blank and liner such as issues from between the nip of the vacuum roll and pressure roll of FIG. 1 is illustrated in FIG. 3 wherein the carton blank **20** is illustrated as lying beneath a sheet of liner material **25**. The carton blank is of a conventional type designed to provide a rectangular carton having two large and two small panels divided by parallel score lines which are shown as four in number at **26**. Score lines **28** disposed at right angles to the score lines **26** separate end tabs adjacent opposite ends of the four panels which form the four main walls of the carton and these end tabs serve to close the ends of the carton in a well known manner. Their particular configuration and construction will not be referred to herein in further detail as it forms no part of the present invention and end tabs of different configurations may be employed.

The manner of pasting the liner sheet **25** to the carton

blank, however, is pertinent and particularly so because in accordance with the present invention glue represented by the broken line areas **30** is disposed in immediate vicinity of all of the score lines **26** as well as the edges of the blank which will be brought together to form its tubular structure. The glue is illustrated herein as extending throughout the full length of each of the parallel score lines. However the glue pattern may be intermittent or otherwise varied so long as it is generally in the immediate area of the score lines and particularly at the ends thereof. Through this expedient close conformity of the liner to the inside of the carton is insured and particularly at the corners of the carton. Glue may also be, and is preferably, provided on all of the end tabs of the carton so that when the carton is finally set up and the end tabs closed, the liner will close with them in an orderly and well known manner to permit eventual heat sealing of the ends of the carton.

The combined carton and blank as shown in FIG. 3 is then passed through a conventional folding and gluing machine. No details of construction of which are shown herein because the machine insofar as folding a flat blank into a rectangular carton shape is well known in the art. The function of the machine, after first pre-breaking the score lines of the carton to facilitate folding at these lines, is to carry the carton through folding stages from its original flat position shown in FIG. 4 to the partially folded condition shown in FIG. 5 and then to the finished flat fold illustrated in FIG. 6. In FIG. 6, the carton is shown as slightly separated from its final flat fold position to more clearly illustrate details of construction. The polyethylene coated side of the folded edge of the liner formed by the folder **13** of FIG. 1 and shown at **32** is heated by passing over a flame **33**. In practice, the heat is provided by a plurality of aligned gas burners or other heat source and is sufficient just to soften the polyethylene coating on the marginal flange **32**. A glue of the type used for paperboard cartons also is applied to a narrow flange **34** by a glue wheel **35** and occupies the position where it is shown in exaggeration at **36** in FIG. 5.

Further advancing of the blank and liner, which it is to be understood is in continuous motion in the folding machine, swings the panels adjacent its opposed edges upwardly to a position somewhat as shown in FIG. 5 at which time heat is applied as by a row of gas flame, one of which is shown at **38** to the bead of heat fusible material **15** which was applied by the hot melt extruder **14** shown in FIG. 2. Thus when the carton is completely folded to the position of FIG. 6, the warmed area **32** and the fused material **15** will be brought together to form a heat seal of the character sometimes referred to as a flame seal.

After the application of heat to the fusible material **15** as shown in FIG. 5, it is desirable to apply a spray of water by a nozzle **40** to the inside of the liner **25** directly beneath the area where the heat of the seal is brought into contact with the inside of the carton. This water or

other suitable coolant directed in a fine fog against the polyethylene surface of the liner provides sufficient cooling to prevent melting of the wax with which the paperboard carton is treated, to prevent softening of the polyethylene coating on the liner **25** and also to prevent any possibility of adhesion between the material **15** and the polyethylene coating of the liner in this area should the material be extruded as it is passed between pressure rollers when the carton is in its flat form. The application of pressure between such rollers makes a perfect seal between the plastic coated liner and also serves to perfect the seal between the flange **34** to which glue has been applied as at **36** and a marginal edge **42** of the carton which is not covered by the liner.

The order of application of glue, heat and a coolant above described in connection with FIGS. 4 to 6 is not critical though it is desirable that the coolant be applied just prior to the final folding operation.

We claim:

1. The method of forming a flat fold tubular carton with a liner of paper having a coating of heat sealable material on one side thereof which comprises folding one edge of a blank of said material back upon itself to present a coated strip along one edge of the uncoated side of the blank to extend beyond the edge of a prescored carton blank, securing the liner blank to the prescored carton blank with the coated side facing inwardly and said strip facing outwardly of the carton blank beyond an edge thereof, preheating said coated strip and the opposite edge of said liner, and immediately thereafter folding the blank and liner to form a flat fold carton with said opposite edge in contact with said strip.

2. The method of claim 1 in which a coolant is applied directly to the area of the liner against which the heated seam will lie when the carton is in flat fold form.

3. The method of claim 1 in which the edges of the liner are heated and coolant is applied directly during folding of the blank and liner.

4. The method of claim 1 in which a fog of liquid coolant is applied to the area of the liner against which the heated seam will lie when the carton is in flat fold form.

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