

Aug. 14, 1956

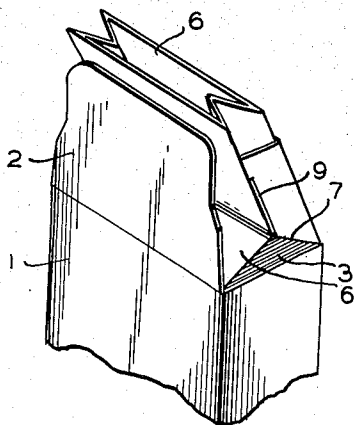
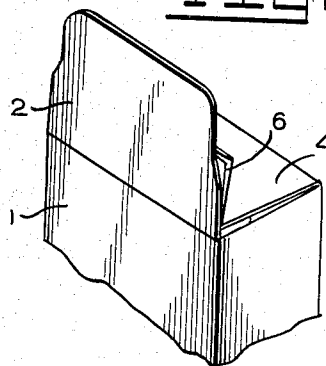
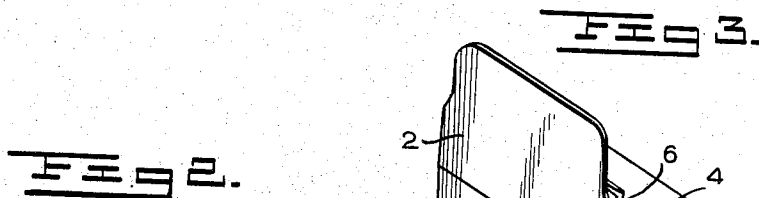
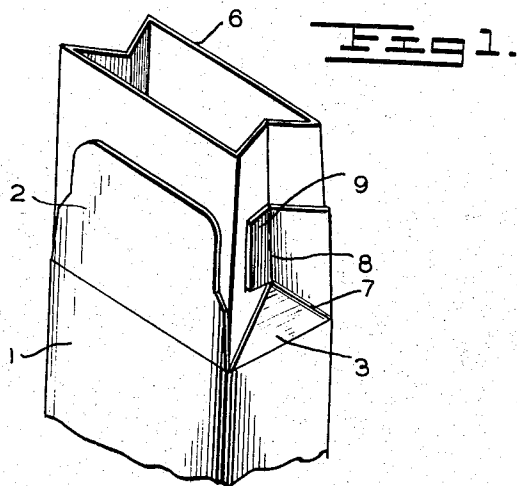
W. HEPWORTH

2,758,520

METHOD FOR THE MANUFACTURE OF LINED CARTONS

Filed Nov. 6, 1951

3 Sheets-Sheet 1



INVENTOR
WILLIE HEPWORTH

BY *Cushman, Parby & Cushman*

ATTORNEYS

Aug. 14, 1956

W. HEPWORTH

2,758,520

METHOD FOR THE MANUFACTURE OF LINED CARTONS

Filed Nov. 6, 1951

3 Sheets-Sheet 2

FIG 4.

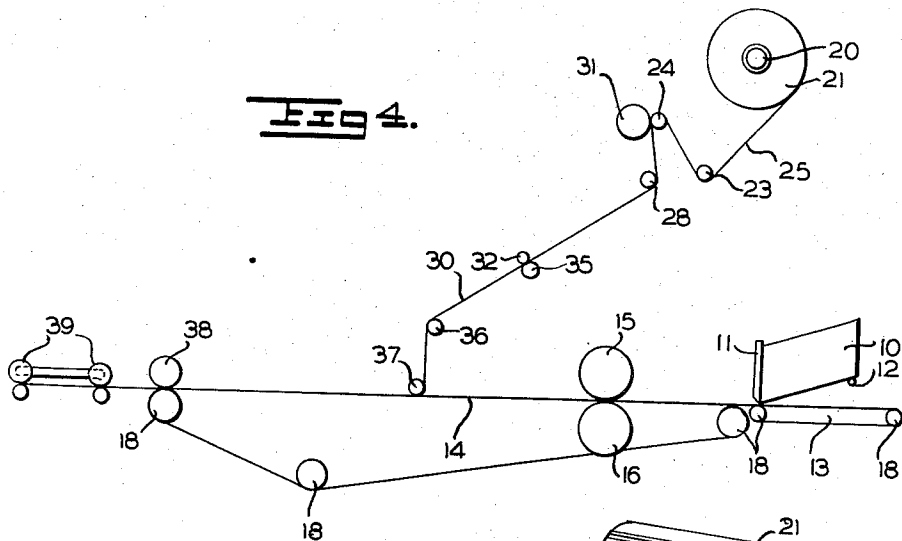
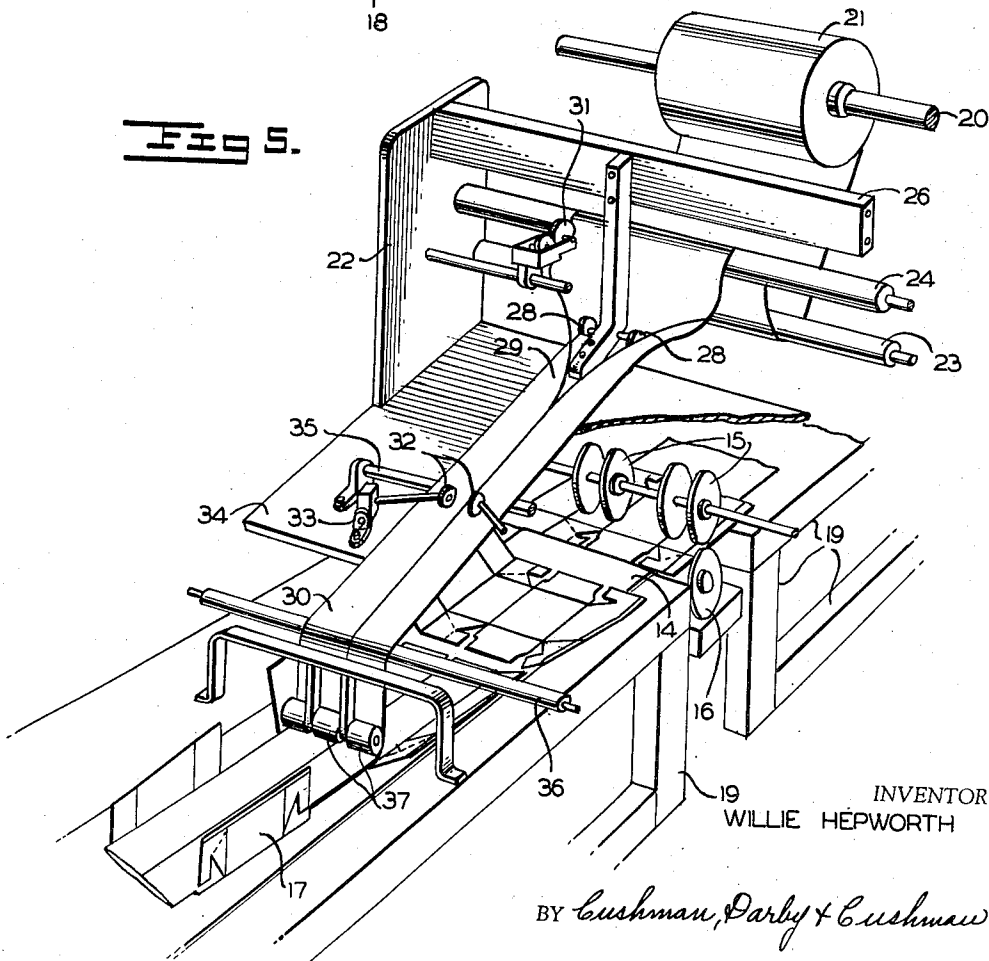


FIG 5.



INVENTOR
WILLIE HEPWORTH

BY *Cushman, Darby & Cushman*

ATTORNEYS

Aug. 14, 1956

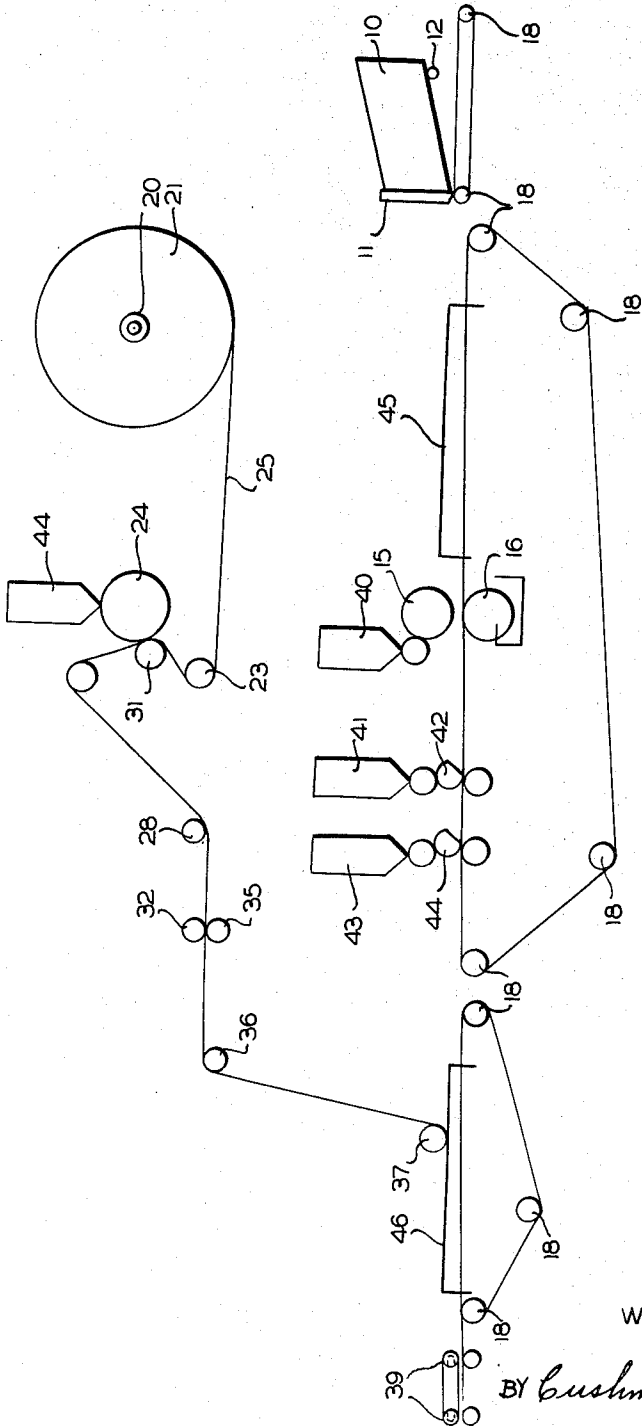
W. HEPWORTH

2,758,520

METHOD FOR THE MANUFACTURE OF LINED CARTONS

Filed Nov. 6, 1951

3 Sheets-Sheet 3



யு

INVENTOR
WILLIE HEPWORTH

BY Cushman, Parley & Cushman

ATTORNEYS

1

2,758,520

METHOD FOR THE MANUFACTURE OF LINED CARTONS

Willie Hepworth, Northwich, England, assignor to Imperial Chemical Industries Limited, a corporation of Great Britain

Application November 6, 1951, Serial No. 255,087

Claims priority, application Great Britain November 6, 1950

5 Claims. (Cl. 93—36.01)

This invention relates to a new and improved lined carton which is suitable for manufacture, filling and sealing on high speed automatic machines, and relates also to a method of and apparatus for the manufacture of such a carton.

It is known that envelopes of paper, cellophane or plastic material can be used as loose liners for drums and bags. Paper-lined cardboard cartons are also known, and one has been made by lining the blank and arranging the end closure of the tubular body so that the folding of the carton ends automatically nips the protruding end of the liner and then folds it over. However, in such cartons there is a gap in the liner at the junction of the side seal and end seal, and there is a section of the carton glue flap which is not protected by the liner; and although such cartons are satisfactory for coarse particles of solid, they leak when used for fine powders, fats or liquids. Furthermore, such cartons need specially designed machinery for their manufacture and/or handling. It has hitherto been impossible to make a fixed liner tube completely covering the inner surface of the carton and use it in automatic filling and sealing machines; either the carton is weak because there is not a proper board-to-board seal or the lining is poorly sealed.

The object of this invention is to provide a lined carton which is easily made in standard machines with a special attachment, and which lies flat for transport before filling, and can be filled and sealed in automatic machines to give a water-tight carton. We have discovered that with cartons having means for holding the liner during closure in such a manner as to cause a pleat in each side piece and nip the protruding end of the liner for sealing while preventing re-entrants of the liner elsewhere, a tubular liner can easily be fixed in the carton during assembly, and the carton has the desirable features described above.

Our invention comprises a foldable, stiff, rectangular carton with a preformed tubular sleeve or liner fastened into it and protruding at both ends, the ends of the carton being so shaped that when the carton is opened for filling the ends can be folded in such a way that they nip the ends of the liner with a pleat in each side, leaving the nipped ends protruding for sealing.

Preferably the preformed tubular liner comprises a folded strip or sheet with adherent overlapping margins and the carton comprises a folded blank having a longitudinal seam (e. g. at one corner of the carton) which is laterally spaced from the adherent overlapping edges of the liner.

The present invention provides also a method of manufacture of a lined carton as set forth above wherein a continuous strip or web of lining material has adhesive applied to one longitudinal margin and is thereafter folded to a continuous tubular form with adherent overlapping margins, and wherein the continuous tubular lining is applied in succession to a series of carton blanks which are folded round and secured to the tubular lining

2

and the latter thereafter severed at positions between the successive cartons.

Conveniently in such a method the carton blanks are carried in succession in spaced relationship on an endless support to which a continuously advancing tubular lining is applied after formation from the strip or web.

The present invention will be seen further to provide apparatus for carrying out the method last described and comprising a base frame carrying an endless support to which carton blanks are fed in spaced relationship, means for applying adhesive to the carton blanks and devices to fold the carton blanks while carried on the support, in combination with a support for a continuous web of lining material, forming and adhesive applying devices for continuously converting the web into a tubular lining, feed rollers for applying the formed tubular lining to the carton blanks on the endless support prior to their engagement with the folding devices and a cutting device for severing the tubular lining between the folded and lined cartons.

The best form of carton in accordance with the present proposals has a rectangular body of cardboard having at each end, as equal extensions of the sides, one separate closing flap, two nearly square flaps on the narrow sides of the carton joined by vertical folds to the fourth flap and having one semi-diagonal cut and one semi-diagonal perforation at the bottom of each of the two square flaps, and a vertical perforation at the top of them so that the three portions of the square flaps can be folded down flat on the end of the opened carton to be superimposed on one another. The two square flaps are also cut away sufficiently at their edges adjacent to the free flap to avoid forcing that part of the liner inwards. The cut-away preferably leaves nearly a quarter of the flap and an almost square lug connected to the rest only by a further vertical perforated fold, in the middle of the flap and parallel to its edge. The preformed tubular liner is glued to the carton along the two lines of the lugs and on to the back panel, there being no glue between the liner and the closing flap.

A carton of this type containing a lining has the advantage that each end consists of a separate closing flap which is used for the final closure and also of three end panels joined together which hold the liner. This holding effects a folding of the portions of the liner in contact with these end panels, so that the folding is entirely endwise and draws these portions of the lining towards each other while keeping them stretched. The nip thus formed between the extremity of the middle of one of these three end panels and the end of the box is held in place where it can be glued or otherwise sealed. After this sealing the free end flap is folded over and further holds it in position so as to make it quite watertight. It is not practicable to effect such a watertight seal without a tubular sleeve or liner. In such lined cartons as have hitherto been known it is customary to fasten a flat sheet of lining material on to the cardboard carton blank, or alternatively to insert a separate liner inside the formed carton. In the former case it is impossible to seal up the cardboard carton as well as sealing up the liner unless the operation is carried out by hand; and it is highly advantageous to use continuous gluing or other sealing machines when making cartons. The latter case involves the separate manufacture of a liner and its insertion in the cartons, which again is an expensive proceeding. The advantages of our invention are therefore that there is no possibility of leakage through a side seal or an end seal in the liner, and furthermore that it can readily be made on the standard types of folding and gluing carton-making machines. A further advantage is that when the blank has been folded and glued, but before the ends are sealed, the carton containing the

tubular liner folds flat and can be readily transported without damaging the carton or the liner.

Any known type of lining material can be used in this carton provided that it can be folded and sealed. Suitable materials include paper and greaseproof paper which can readily be sealed by gluing and can be attached to the cardboard of the carton by gluing, and cellophane and thermoplastic film-forming materials which can be heat-sealed. Of these, paper is the preferred material.

The preferred form of carton and preferred methods of and apparatus for manufacture thereof will be described by way of example with reference to the accompanying drawings in which:

Figure 1 shows one end of the carton in perspective before starting to seal it;

Figure 2 shows the partially sealed end of the carton; and

Figure 3 shows the end of the carton ready for final sealing.

Figure 4 is a diagrammatic representation in side view of an arrangement for carrying out the method;

Figure 5 is a view in perspective and with certain parts broken away of apparatus for carrying out the method, and

Figure 6 is a diagrammatic representation in side view of a modified arrangement for carrying out the method.

Like reference numerals are employed in the drawings to denote like parts.

Referring to Figures 1 to 3 showing one end of a carton the tubular body 1 terminates in a loose end flap 2 and in three other connected end flaps two of which are seen at 3 and 4. The blank contains a sleeve which protrudes beyond the end of these end flaps and is shown at 6. The opposed interconnected end flaps (one of which is seen at 3) are cut away and perforated. The sleeve is glued to the carton on the side which terminates in the end flap 4 and is also glued to the lug 9 shown on the end flap 3 and to a corresponding lug on a similar formed end flap opposite to the flap 3. In order to close the carton these two end flaps are folded in by pressing at the centre where the perforations 7 and 8 join. The triangular portion of the flap bends inwards and draws with it the vertical portion which is fixed to the other flap 4, thus closing the end. At the same time, the lug 9 bends outwards and, being sealed to the liner, thus grips the corner of the liner tightly into the corner of the carton. As the flap 3 and its opposed flap fold inwards they are covered by the flap 4 so that eventually the end of flap 4 nips the laterally collapsed liner as shown in Figure 3 so that it can be glued or otherwise sealed while the free flap 2 is held clear of it. The free flap is then folded over the top of 4 and secured thereto, thus further bending the liner and holding the sealed end securely in place.

Certain minor additions or modifications in the form of the carton may be effected, and for example in the form shown in the drawings the end closure flap 2 may be secured by adhesive to the flap 4. A tongue and slot interconnection between the flaps 2 and 4 may, however, be provided for with a tongue cut in the material of flap 2 to engage a slot in flap 4. Also a free corner of the flap 2 may be cut away so as to expose perforations or lines of weakness arranged as a semicircle on interconnected flaps 3 and 4 with a centre located at the junction of these flaps with a pair of side walls of the carton. When these lines of weakness or perforations of the filled and closed carton are ruptured, the corner portion of the flaps 3 and 4 can then be folded outwardly to form a pourer or dispenser for the carton contents, the lining also being ruptured for this purpose. Adhesives of a special character such as moisture-proof or waterproof adhesive may also be employed in forming the tubular lining according to the nature of the contents to be placed in the carton. Such an adhesive may

be employed for the lining without alteration of the normal adhesive employed for the outer carton.

Manufacture of the cartons is preferably carried out by a method in which carton blanks stamped or cut from a sheet or web of cardboard are carried continuously and in succession on a main driving belt while being subject to further forming operations. Such a method is represented diagrammatically in Figure 4 in which a supply stock of carton blanks 10 are held by a gate 11 and roller support 12 for supply by the feed belt 13 to the main driving belt 14 driven at a faster speed than belt 13. The carton blanks are fed individually so that the main driving belt 13 receives carton blanks at regularly spaced intervals. The gate 11 may be in the form of any of the known feed or feed control devices for the individual supply of sheets of paper or the like from a stock pile. The spaced carton blanks carried by the main driving belt 14 are first contacted by wheels 15 and 16 for applying adhesive, the wheel assembly 15 serving to apply lines of adhesive to the interior surface of the carton blank for the purpose of securing a lining to the carton, and the wheel 16 serving to apply adhesive to a flap of the carton forming a longitudinal seam for the latter when folded on itself. The arrangement of the wheels 15 and 16 is seen more clearly from the perspective drawing of Figure 5 where individual carton blanks 17 are shown supported by the main driving belt 14, supporting rollers 18 (Figure 4) for the driving belts being carried in the machine frames 19 seen in Figure 5. After application of adhesive a tubular lining is applied to the carton blanks in the manner to be described hereafter and the carton blanks carried by the main driving belt 14 past shaped formers which are not shown in the drawings and which serve to fold the cartons laterally so as to embrace the tubular lining.

The machine frame also carries uprights to support a spindle 20 for a supply reel 21 of a paper or like web of which the carton lining is to be formed. Further machine frame uprights, of which one is seen at 22 in Figure 5, provide end bearing supports for guide rollers 23 and 24 round which is passed the paper web 25 from the reel 21. A cross member 26 between the uprights 22 carries a bracket 27 having rollers 28 for engaging the web 25, rollers 28 being located at a heel of the bracket 27 which also carries a sock or tube forming plate 29 round which the web 25 is folded laterally so as to be discharged from the free end of the plate 29 as a sealed tube or sock 30. For the formation of the tube or sock 30 a wheel 31 is employed to apply adhesive to one margin of the web 25, the wheel 31 engaging the web 25 in opposition to the supporting roller 24. Presser wheels 32 carried in adjustable brackets 33 on the bed 34 between the uprights 22 serve to ensure a correct continuous folding of the web 25 to the tube form 30 round the forming plate 29, a supporting roller 35 also carried by the bed 34 serving to support the web and former plate. The presser wheels 32 ensure a proper overlap of the longitudinal margins of the web 25 so that such margins become adherent by virtue of the adhesive applied by wheel 31. The formed sock or tube 30 represents a preformed lining for the carton blanks 17 carried by the main driving belt 14 and is passed over a guide roller 36 and under guide rollers 37 which feed the tube 30 on to the carton blanks 17 just prior to the folding of the latter so that the carton blanks 17 are thus folded by the formers round the tube 30 so as to enclose the latter as a preformed lining for the blanks 17.

The formed and folded carton blanks 17 enclosing the tube 30 are finally passed under pressure rollers 38 to secure satisfactory adhesion of the preformed liner to the cartons and of the carton seams, and finally a guillotine 39 serves to cut the tube 30 at positions between the carton blanks 17 so that separate lined cartons are thereby provided. The form of carton so provided is that described with reference to Figures 1-3 and it will be noted

5

that the preformed lining can be completed with the use of suitable methods of adhesion between the longitudinal margins, e. g. by the use of suitable adhesives, such as to resist penetration by any contents of the carton liable to cause deterioration of the adhesion of the seam of the carton blank. While the latter seam will normally be located at one corner of the carton, the seam of the preformed liner may be arranged to lie along the face of one panel of the carton so as to be laterally spaced from the carton seam. The adhesive lines applied to the carton blank for securing the preformed lining thereto are preferably also so disposed that the lining tube fits snugly into the corners of the carton and also adheres to the opposed free flaps 9 at the ends of the form of carton shown in Figures 1-3, so as to ensure a suitable folding of the lining to a position where the latter can readily be sealed when the lined carton is filled and closed. As an additional precaution in ensuring a satisfactory folding of the lining on closure of the carton, transverse paste or glue lines may be applied to the carton blank before the tubular liner is fed thereto, the transverse lines of adhesive being applied at the ends of the side panels of the carton, for example as described with reference to Figure 6.

In the apparatus including adhesive applying wheels for transverse lines of adhesive the endless belt 18 is extended, or an addition section of similar endless belting is inserted between the feed gate 11 and the adhesive applying rollers 15. Associated with the extended belting is an assembly of adhesive applying rollers driven to synchronize with the passage of the carton blanks and to apply the desired transverse lines of adhesive through a final roller which is chined or shaped to contact the carton blanks longitudinally of the roller only along an appropriate chine or shaped portion of the roller which may receive adhesive from an appropriate transfer roller. The extended or inserted portion of the main driving belt may also be associated with folding cams, arms and/or belts for both folding and unfolding the carton blank prior to the application of any adhesive, so that the carton blank is readily folded to its final form after application of adhesive and lining.

In the latter method and in apparatus for carrying out the method as diagrammatically represented in Figure 6 a separate machine section is conveniently included between the feed gate 11 and a further machine section for effecting the application of the preformed tubular sock to the glued carton blanks by roller 37, and for effecting the final folding of the cartons round the tubular lining. The first separate machine section carries the cartons on an endless support passing round rollers 18 from the gate 11 past folding arms, cams or belts (represented diagrammatically at 45) such as to effect a folding of the carton blank followed by the unfolding thereof to its original blank form prior to the application of any adhesive. This treatment ensures that the carton blank is readily foldable to its final form after application of adhesive and lining. After treatment by the formers 45 the carton blanks pass to the glue applying rollers 15 and 16, the upper rollers 15 being supplied from the glue container 40. Further glue applying rollers 42 and 44 feed from containers 41 and 43 respectively are also provided and driven to synchronize with the passage of the carton blanks so as to apply the desired lines of adhesive transversely of the cartons at positions on the carton panels near the transverse folds of the carton. The rollers 42 and 44 are shaped or chined to contact the carton blanks only along an appropriate longitudinal portion of the roller so that a transverse line of glue is applied as required. The glue applying rollers may be fed from suitable transfer rollers.

In the further machine section apparatus such as that shown in Figure 5 may be employed for forming a tubular lining and applying the formed lining 30 to the carton blanks which are finally folded by the guiding and folding means 46. The lined cartons are finally shaped by the guillotine 39. The apparatus for forming the tubular lining may be arranged longitudinally in the further ma-

6

chine section disposed above the endless support carrying the glued carton blanks ready for application of the tubular lining 30 by rollers 37, the tubular lining being formed round a horizontally disposed former plate with rollers 28 at one end to form a heel for the web 25 to be folded. In the diagram of Figure 6 the horizontally arranged tubular lining forming mechanism is disposed above the pre-folding and gluing section for the carton blanks, and the web 25 from supply reel 21 passes guide roller 23 to gluing rollers 24, 31 fed from container 44. A glue line is thereby applied to one margin which is overlapped by the other margin on passage of the glued web past the horizontal sock forming plate with heel rollers 28, presser rollers 32 and supporting roll 35. The formed sock passes from guide roll 36 to roller 37 which supplies the sock to the glued cartons which are thereafter folded by guides 46 and the cartons separated by guillotine 39 which cuts the lining between the cartons. The guillotine operates in synchronism with the arrival of the spaced cartons which may operate a switch mechanism for solenoids operating or regulating the guillotine.

I claim:

1. A method for the manufacture of folded, stiff, rectangular cartons, each having secured therein a lining protruding at both ends and having the end of the carton shaped for folding into the ends of the liner with a pleat in each side and leaving the nipped ends protruding for sealing, which comprises continuously folding a continuous strip of lining material into a continuous tubular form with overlapping margins, pressing and sealing said overlapping margins, advancing in a line in horizontally spaced relationship directly below said continuous tubular lining a series of disconnected, longitudinally spaced carton blanks having adhesive applied to predetermined areas of their upwardly facing surfaces and having flaps at both of the ends of the blanks, pressing said continuous tubular lining upon said upper surfaces of the spaced carton blanks to adhere the lining thereto over said predetermined areas and with the lining spanning the spaces between said end flaps and interconnecting the blanks, successively folding said carton blanks around said tubular lining while the same is maintained in continuous condition, to form said carton blanks into a plurality of interconnected rectangular folded cartons, each having a lining adhesively secured therein and projecting beyond the end flaps at both ends thereof, and transversely severing said tubular lining in the spaces between the said folded cartons and on lines well spaced from the end flaps thereof, to leave said tubular lining projecting a substantial distance beyond the flaps at both ends of each folded carton.

2. A method as recited in claim 1 in which the adhering overlapping margins of said tubular liner are positioned so that when the carton blank is folded to form a carton, the said overlapping margins will lie along the face of one panel of the carton to laterally space said overlapping margin from the seam of the carton.

3. A method for the manufacture of folded, stiff, rectangular cartons, each having secured therein a lining protruding at both ends and having the end of the carton shaped for folding into the ends of the liner with a pleat in each side and leaving the nipped ends protruding for sealing, which comprises continuously applying adhesive to at least one longitudinal margin of a continuous strip of lining material, continuously folding said continuous strip of lining material into a continuous tubular form with adherent overlapping margins, pressing said overlapping margins to cause said overlapping margins to adhere to one another, advancing in a line in horizontally spaced relationship directly below said continuous tubular lining a series of disconnected, longitudinally spaced carton blanks having adhesive applied to predetermined areas of their upwardly facing surfaces and having flaps at both of their ends, pressing said continuous tubular lining upon said upper surfaces of the spaced carton blanks to adhere the lining thereto over said predetermined

areas and with the lining spanning the spaces between said end flaps and interconnecting the blanks, successively folding said carton blanks around said tubular lining while the same is maintained in continuous condition, to form said carton blanks into a plurality of interconnected rectangular folded cartons, each having a lining adhesively secured therein and projecting beyond the end flaps at both ends thereof, and transversely severing said tubular lining in the spaces between the said folded cartons and on lines well spaced from the end flaps thereof, to leave said tubular lining projecting a substantial distance beyond the flaps at both ends of each folded carton.

4. A method for the manufacture of folded, stiff, rectangular cartons, each having secured therein a tubular lining protruding at both ends and having the end of the carton shaped for folding into the ends of the liner with a pleat in each side and leaving the nipped ends protruding for sealing, which comprises continuously folding a continuous strip of lining material into a continuous tubular form with overlapping margins, pressing and sealing said overlapping margins, feeding from a stack a series of carton blanks, each comprising two front and back face panels and two side panels and four end flaps at both ends connected thereto, certain of the end flaps being interconnected and one face panel-connected end flap being separate and independent from the others, advancing said blanks in a line in horizontally spaced relation directly below said tubular lining, pressing said continuous tubular lining upon the upper surfaces of said spaced carton blanks, and adhering the lining to two adjacent face and side panels and to one side panel-connected end flap, and with the lining spanning the spaces between the end flaps of the successive blanks, successively folding the two other panels and the connected end flaps around said tubular lining, adhering to the lining the last-mentioned panels and the other side-panel connected end flap, to form said carton blanks into a plurality of interconnected, folded rectangular cartons, each having a lining therein, secured to said panels and to the two end flaps which are connected to the side panels, and transversely severing said tubular lining in the spaces between said folded cartons and on lines well spaced from the end flaps thereof, to leave said tubular lining projecting a substantial distance beyond the flaps at both ends of each folded carton.

5. A method for the manufacture of folded, stiff, rectangular cartons each having secured therein a tubular lining protruding at both ends and having the end

of the carton shaped for folding into the ends of the liner with a pleat in each side and leaving the nipped ends protruding for sealing, which comprises continuously applying adhesive to at least one longitudinal margin of a continuous strip of lining material, continuously folding said continuous strip of lining material into a continuous tubular form with adherent overlapping margins, pressing said overlapping margins to cause the same to adhere to one another, feeding from a stack a series of carton blanks, each comprising four body panels and four end flaps at both ends connected thereto, certain of the end flaps being interconnected and one being separate and independent from the others, applying adhesive over predetermined areas to the body panels and to at least those end flaps which are to be adjacent to said fourth end flap in the finished carton, advancing said blanks in a line in horizontally spaced relation directly below said tubular lining with the adhesively coated surface facing upwardly, pressing said continuous tubular lining upon the upper surfaces of said spaced carton blanks with the lining spanning the spaces between the end flaps of successive blanks, successively folding said carton blanks around said tubular lining while moving the same continuously to form said carton blanks into a plurality of interconnected, folded rectangular cartons, each having a lining therein secured to said body panels and to the two end flaps, which are adjacent to the separate, independent end flap, and transversely severing said tubular lining in the spaces between the said folded cartons and on lines well spaced from the end flaps thereof, to leave said tubular lining projecting a substantial distance beyond the end flaps at both ends of each folded carton.

References Cited in the file of this patent

UNITED STATES PATENTS

2,095,910	Bergstein	Oct. 12, 1937
2,166,388	Bergstein	July 18, 1939
2,216,527	Weiss et al.	Oct. 1, 1940
2,296,896	Bergstein	Sept. 29, 1942
2,382,573	Moore	Aug. 14, 1945
2,432,053	Waters	Dec. 2, 1947
2,435,806	Tibbetts	Feb. 10, 1948
2,463,313	Ringler	Mar. 1, 1949
2,533,642	Vergobbi	Dec. 12, 1950
2,558,918	Zinn	July 3, 1951
2,576,697	Roach	Nov. 27, 1951
2,599,708	Gottesman	June 10, 1952