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C. F. KLEIN ET AL

2,387,272

METHOD OF FORMING A CARDBOARD BOX

Filed June 25, 1942

2 Sheets-Sheet 1

Fig. 1.

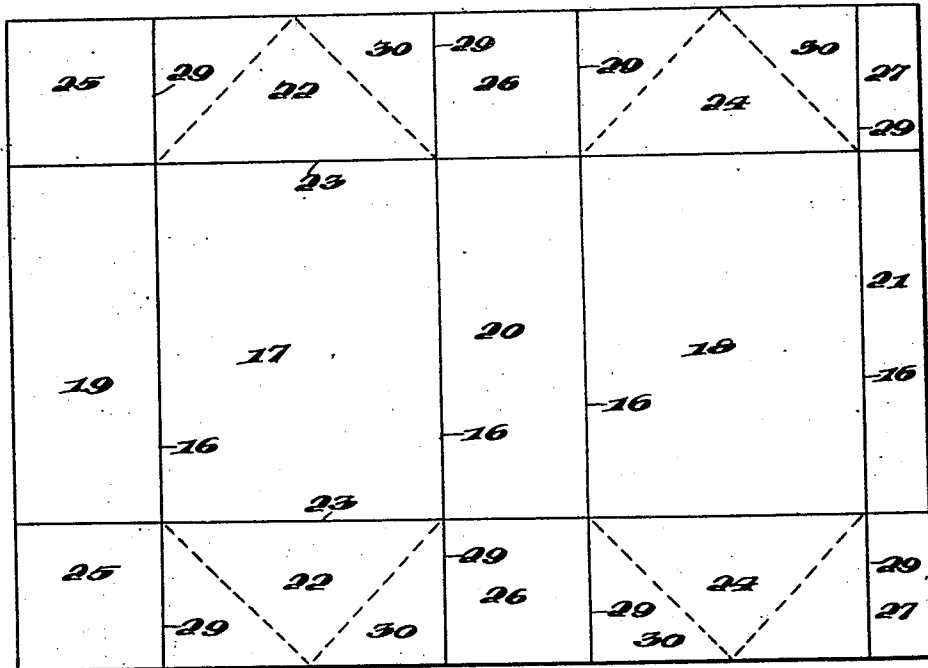


Fig. 2.

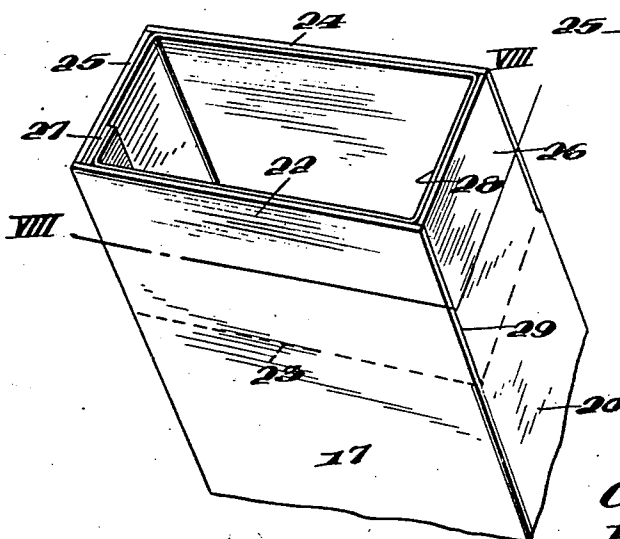


Fig. 8.

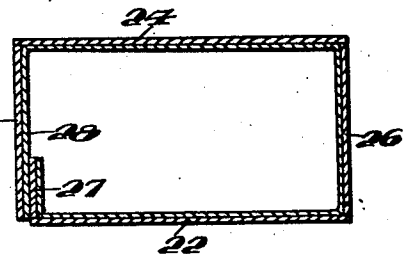
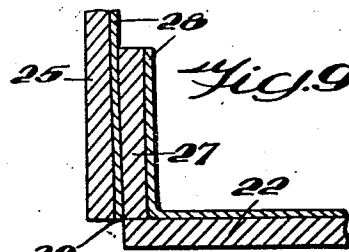


Fig. 9.



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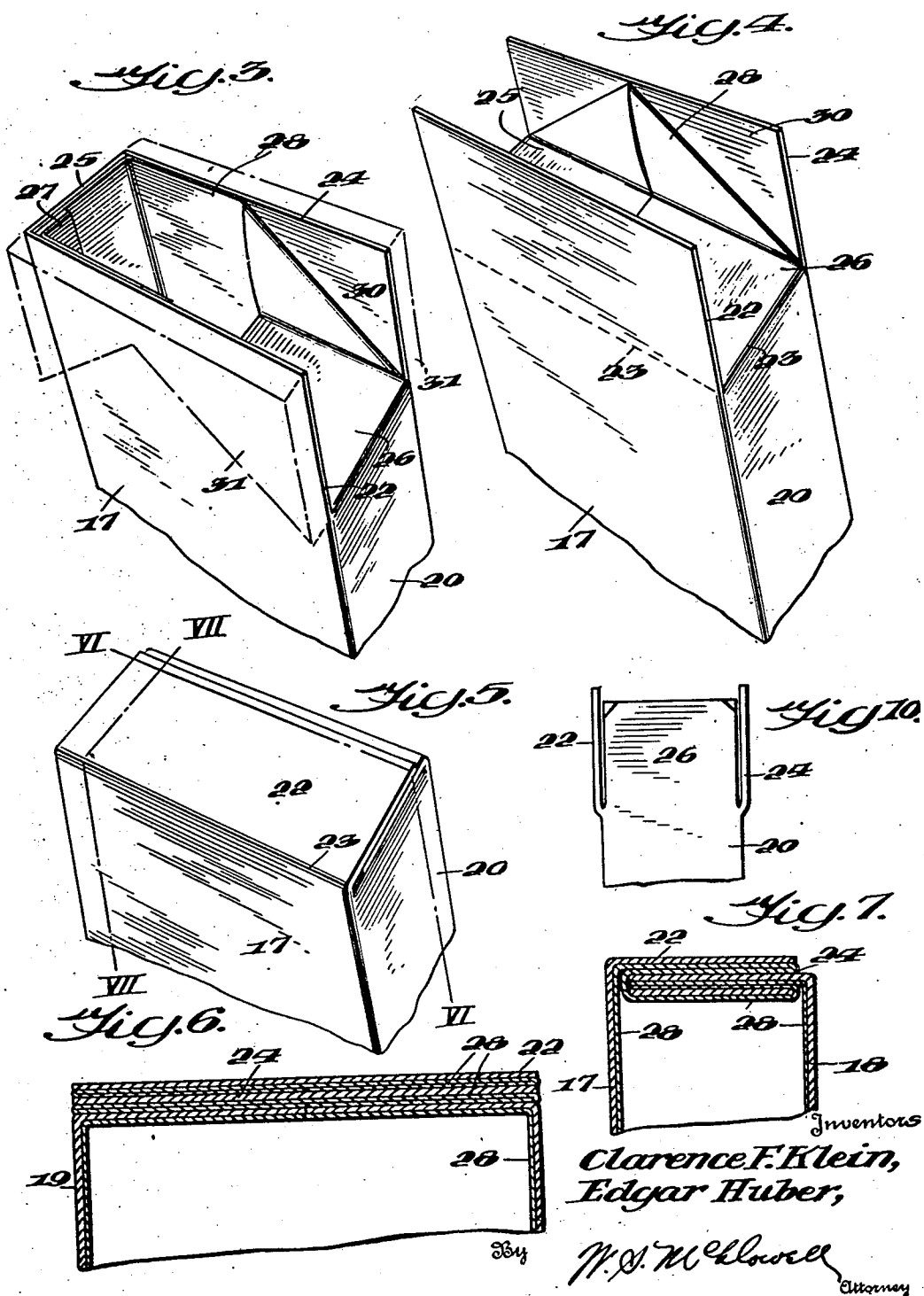
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UNITED STATES PATENT OFFICE

2,387,272

METHOD OF FORMING CARDBOARD BOXES

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Application June 25, 1942, Serial No. 448,452

7 Claims. (Cl. 93—36.01)

This invention relates to foldable boxes or cartons of the type employed in the packaging of various solids, such as those which exist in the finely divided, granular or a more united form. More particularly, the box or carton forming the present invention is of the type having an inner lining of paper and an exterior structure of paper board, which parts are provided with hingedly movable end flaps adapted when interfolded and adhesively joined with each other to seal the contents of the box or carton against deterioration or loss.

In paper lined boxes of this general character proposed by the prior art, it has been customary to cut or stamp the box bodies from sheets of paper board, to then apply an adhesive to the inner surfaces of the box blanks and thereafter secure the inner paper lining to the blanks by means of the adhesive. These operations have been slow and relatively costly to perform with the result that such paper lined boxes or cartons have been used to but a limited extent commercially, the relatively high cost thereof having constituted a strong deterrent to their more general adoption.

It is one of the primary objects of the present invention to provide such a paper lined box but to effect its formation in such manner that the manufacturing costs thereof may be reduced to such an extent as to enable the boxes or cartons to compete commercially with boxes offering less protection to the contents they are adapted to receive and enclose.

With present day shortages in various materials which hitherto have been largely used in the packaging of various commodities, there is a demand for an efficient cardboard box which may be used in automatic packaging operations and which will offer superior protection to the commodities so packaged. Many such commodities contain oils and fats which when brought into contact with an innerlined paper board box, permeate through the box and discolor its exterior, producing an unattractive appearance which tends to diminish sales. Often such products are of a finely divided nature, which heretofore have been largely packaged in sheet metal or glass containers and which, because of their finely divided nature, tend to sift through the tiny crevices of an ordinary paper board folding box. In an effort to counteract these conditions, it has also been a common practice in the art to first place such goods or merchandise in sealable bags or wrappers composed of a material such as Cellophane and to then place the bags or envelopes in a foldable paper board box. This practice has also been rather costly, time consuming and difficult to carry out with automatic packaging machinery.

Our improved paper lined box or carton has

been developed with the end in view of overcoming or minimizing the objectionable conditions above noted and others by providing an improved box or carton and method of manufacturing and sealing the same so that a cardboard box or wrapper is produced which, in use, is highly resistant to attack by moisture and internal oils, fats or greases, the box being capable of being sealed so that its contents will not sift out, be subject to insect attack and, when closed and sealed, will be virtually airtight.

It is another object of the invention to provide a box of this character which may be used in connection with standard automatic filling machines, so that the filling of the box and the closing and sealing thereof may be carried out automatically without involving the use of manual operations.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawings, wherein:

Fig. 1 is a plan view of the blank from which our improved box or carton is formed;

Fig. 2 is a fragmentary perspective view of the upper end of the box disclosing the flaps thereof in their open or extended positions providing for the introduction of materials into the interior of the box;

Fig. 3 is a similar view disclosing the step of folding one of the side panel flaps inwardly and further disclosing the operation of locally heating the flaps of the front and back panel sections of the box to partly release the paper lining to permit of the flap folding operation without tearing of the lining;

Fig. 4 is a similar view disclosing both flaps of the side panel sections in their folded positions when enclosing the contents of the box;

Fig. 5 is a similar view disclosing the box in its fully closed and sealed condition;

Fig. 6 is a vertical sectional view taken through the closed and sealed box on the plane indicated by the line VI—VI of Fig. 5;

Fig. 7 is a transverse vertical sectional view on the plane indicated by the line VII—VII of Fig. 5;

Fig. 8 is a horizontal sectional view taken on the line VIII—VIII of Fig. 2;

Fig. 9 is a similar view on an enlarged scale taken through one of the corners of the box;

Fig. 10 is a detail end elevational view showing a modified form of the box wherein the flaps of the side panels are slightly shorter in height than the complementary flaps of the front and back panels.

In forming the box or carton comprising the present invention, paper board stock of suitable weight has fully applied to one of the surfaces thereof, in order to completely cover such surface, a layer or lining of a thin moisture-resisting and fat-repellent paper, such as one of the parchment grades. The union of the lining

with the paper board stock is preferably effected by applying to the stock a thermo-responsive adhesive. This adhesive may be wax or paraffin or one composed principally of wax or paraffin. We have used advantageously an adhesive which has a melting point of the order of 160 to 165 degrees Fahrenheit. The adhesive is uniformly and thinly distributed between the meeting surfaces of the paper board stock and the parchment lining and pressure may be applied to produce a homogeneous union therebetween.

This laminated stock may then be supplied to the box manufacturer in sheets of suitable size and from these sheets there is cut, by the use of standard machinery, box blanks of the type indicated at 15 in Fig. 1, each blank comprising a layer of paper board and an adhesively joined layer of the parchment paper lining, both layers possessing the same dimensions and being securely joined together.

In the operation of cutting the blank into substantially the rectangular configuration disclosed in Fig. 1, the blank is simultaneously scored along the vertically extending parallel lines 16 to provide weakened fold lines. These fold lines divide each blank into a front panel 17, a back panel 18, side panels 19 and 20 and an overlapping attachment panel 21. The front panel 17 has formed at each end thereof a flap 22, the latter being joined with said front panel along the horizontally extending parallel scored or weakened lines indicated at 23. Likewise, the back panel 18 is provided with a corresponding flap 24 and the side panels 19 and 20 are formed with complementary flaps 25 and 26 respectively. Similarly, the attachment panel 21 is provided at its ends with registering flaps 27, all of said flaps 24 to 27 inclusive being hingedly foldable with respect to their adjoining panels along the scored lines 23.

The paper board stock at the time of the blanking operation is cut completely through (without cutting the paper lining 28) along the parallel lines indicated at 29 so that the contiguous edges of the flaps will be completely separated, permitting each flap to be folded independently of the remaining flaps. The slitting of the paper board blank as at 29 is accomplished by the use of die cutters which, in the cutting or blanking machine, are so set and their movement limited as to effect complete penetration of the paper board stock along the lines 29, without penetrating or scoring the paper lining.

With the blank 15 so cut and formed, the box is folded to assume, first, the formation disclosed in Fig. 2, wherein a substantially cubical formation is provided with the end flaps open, the box being substantially rectangular in horizontal section, as shown in Fig. 8. This configuration is maintained by suitably cementing the outer panel 21 to the inner surfaces of the side panel 19 and, likewise, the flap extensions 27, to the flap extensions 25. The bottom flaps may then be folded and sealed in the same manner as will be presently described with reference to the upper set of flaps, the upper flaps being left open in order that the box may receive its contents. While the folding, melting and sealing may be effected by manual operations, if desired, the construction of the box is such as to be adaptable to many standard box handling and filling machines, wherein the folding, filling and sealing operations are executed automatically in proper sequence.

Following the folding and sealing of the bottom flaps, and the filling of the box with the

desired contents, the upper flaps are closed and sealed in the same manner as the lower flaps. This is accomplished, as shown in Fig. 3, by locally heating the flaps 22 and 24, preferably over the triangular regions indicated at 30. Such heating may be accomplished while the boxes are being advanced through the packaging machine. For instance, such heating may be performed (Fig. 3) by applying to the flaps 22 and 24 an electrically heated shoe or other instrumentality of the type indicated at 31. This shoe heated to a temperature of the order of 350 degrees Fahrenheit when maintained in contact with the flaps 22 and 24 for a period of approximately one second's duration will melt the paraffin base adhesive used in securing the lining 28 to the paper board stock, thereby loosening the paper lining from the flaps 22 and 24 in the regions engaged by the heated shoe. It will be understood that the shoe may be heated in any suitable manner instead of being heated electrically, as by the use of steam or the like.

This virtually instantaneous release of the paper lining from the flaps 22 and 24 in the regions 30, enables the flap 26 of the side panel 20 to be turned inwardly and downwardly, as in Fig. 3, folding the paper lining triangularly where connected with the flap 26, but not in any manner tearing or interrupting the structure of the lining. Simultaneously with this operation or immediately thereafter, the flap 25 of the side panel 19 is turned inwardly, as in Fig. 4, in order to close the top of the box, with both flaps 25 and 26 lying in the same horizontal plane. Before the flaps 22 and 24 are folded, a suitable cement is applied to the triangular surfaces 30 of the flaps 22 and 24 which have been left exposed by the triangular fold of the paper lining. To these inner exposed surfaces of the flaps 22 and 24, and to the exposed and downwardly folded surfaces of the lining 28, there is applied the cementing material by means of which the flaps 22 and 24 are firmly united together in their inter-folded order, shown in Fig. 5, thereby tightly sealing the box and protecting its contents.

In view of the foregoing, it will be seen that the present invention provides a paper-lined box which may be economically manufactured and which, in service, will offer superior protection to the materials placed therein. The use of the parchment paper lining, as previously stated, protects the contents of the box from deterioration from moisture attack and, also, if such materials contain constituent oils or greases, the same will not be transmitted to the paper board outer members of the box to discolor or disfigure the same. Since the paper lining is not cut, to permit of the folding of the end flaps, the contents of the box cannot sift out through fine crevices or openings, a feature which renders additionally the box sealed against the entrance of insects as well as excluding extraneous atmospheres. Economy in the manufacture of the box is obtained largely by applying the parchment paper lining to the cardboard sheets prior to the blanking of the sheets into box-forming order. This laminated sheet, composed of the cardboard and the paper lining, constitutes in effect a single sheet, which may be cut or blanked with the use of the same machinery and with the same manufacturing speed as if the blank were formed from a single sheet of cardboard.

Another important feature of the invention is the employment of the paraffin base adhesive

in uniting the paper lining with the cardboard body. While the adhesive firmly secures the lining to the body, nevertheless, when locally heated for but a short period of time, the adhesive softens or melts so that the lining may be removed from contact with localized regions of the box to facilitate the folding of the side panel flaps without any tearing, weakening or other form of deterioration of the lining.

As shown in Fig. 10, it may be desirable when the boxes are handled by certain types of filling machines, to form the side panel flaps 25 and 26 so that the same are somewhat shorter in length than the complementary flaps 22 and 24. This is done so that the guides of the packaging machine may engage and grip the upper longitudinal edges of the flaps 22 and 24 as the box is advanced through the packaging machine.

It will be apparent that various other modifications may be resorted to without departing from the spirit and scope of the invention as the latter has been defined in the following claims.

What we claim is:

1. The method of producing a paper-lined box which comprises securing to one side of a sheet of cardboard by the use of a heat-softening adhesive a lining sheet of paper, the latter covering the full surface area of the face of the cardboard sheet on which the lining paper is applied and being uniformly secured thereto over said full surface area by the adhesive, thereafter cutting the combined cardboard and paper sheets to produce a box blank having front, back and side panels which are foldable into box formation along scored lines and which panels terminate at each end thereof in foldable flap extensions, and completely cutting through the cardboard body of the blank along a plurality of parallel lines to sever the contiguous edges of said flap extensions so that the latter are independently foldable, such cutting through of the blank being limited to the cardboard sheet and without cutting the contiguous regions of the paper lining.

2. The method of producing a paper-lined box which comprises securing to one side of a sheet of cardboard by the use of a heat-softening adhesive a lining sheet of paper, the latter covering the full surface area of the face of the cardboard sheet on which the lining paper is applied and being uniformly secured thereto over said full surface area by the adhesive, thereafter cutting the combined cardboard and paper sheets to produce a box blank having front, back and side panels which are foldable into box formation along scored lines and which panels terminate at each end thereof in foldable flap extensions, completely cutting through the cardboard body of the blank along a plurality of parallel lines to sever the contiguous edges of said flap extensions so that the latter are independently foldable, such cutting through of the blank being limited to the cardboard sheet and without cutting the contiguous regions of the paper lining, and applying heat to the flap extensions joined with the front and back panels to release locally the adhesive bond joining the lining with said last-named flap extensions, whereby to permit the flap extensions of the side panels to be folded inwardly without tearing the paper lining.

3. The method of producing a paper-lined box which comprises securing to one side of a sheet of cardboard by the use of a heat-softening adhesive a lining sheet of paper, the latter cover-

ing the full surface area of the face of the cardboard sheet on which the lining paper is applied and being uniformly secured thereto over said full surface area by the adhesive, thereafter cutting the combined cardboard and paper sheets to produce a box blank having front, back and side panels which are foldable into box formation along scored lines and which panels terminate at each end thereof in foldable flap extensions, completely cutting through the cardboard body of the blank along a plurality of parallel lines to sever the contiguous edges of said flap extensions so that the latter are independently foldable, such cutting through of the blank being limited to the cardboard sheet and without cutting the contiguous regions of the paper lining, applying heat to the flap extensions joined with the front and back panels to release locally the adhesive bond joining the lining with said last-named flap extensions, whereby to permit the flap extensions of the side panels to be folded inwardly without tearing the paper lining, and thereafter applying a cementing material to the surfaces of the front and back panel flaps from which the paper lining was released by the heating step, and folding the last-named flap extensions upon the side panel flap extensions and sealing the same thereto by said cementing material.

4. In the production of folding carton blanks from a sheet of paper board having a sheet of a lining material secured thereto over substantially its entire area by means of a heat-softening adhesive, the improvement which comprises cutting through said paper board sheet along selected lines within the confines of each of said blanks without cutting the lining material thereon.

5. In the production of folding carton blanks having flaps on each of the side wall panels thereof adapted to be folded into carton closing position, said blanks being cut from a sheet of paper board and having a sheet of lining material secured thereto over substantially its entire area by means of a heat-softening adhesive, the improvement which comprises cutting through said paper board sheet along lines defining contiguous flaps on each of said blanks without cutting the lining material thereon.

6. In the production of folding carton blanks from a web of paperboard having a thin sheet of paper lining secured thereto over substantially its entire area by means of a heat-softening adhesive, the improvement which comprises cutting completely through said paperboard web along selected lines within the confines of each of said blanks, such cutting being arrested in the plane of the adhesive and without penetrating the lining material.

7. In the production of folding carton blanks having flaps on each of the side wall panels thereof adapted to be folded into carton-closing position, said blanks being cut from a web of paperboard which has a thin sheet of lining material secured thereto over substantially its entire area by means of a heat-softening adhesive, the improvement which comprises in a single operation cutting completely through said paperboard web along lines defining contiguous flaps on each side of said blanks, such cutting being terminated in the plane of the adhesive and without cutting said lining material.

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