June 25, 1946. R. GUYER 2,402,548

METHOD OF MAKING LEAKPROOF PACKAGES

Filed May 5, 1943 4 Sheets-Sheet 1

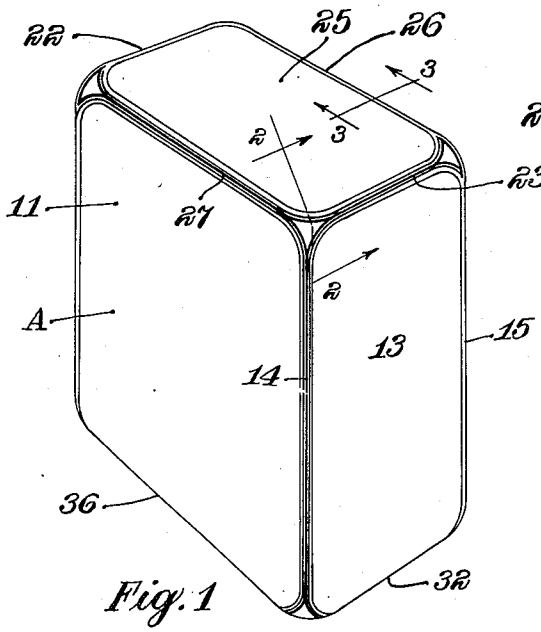


Fig. 1

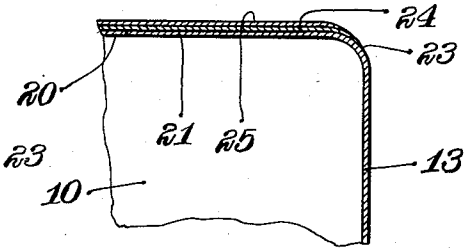


Fig. 2

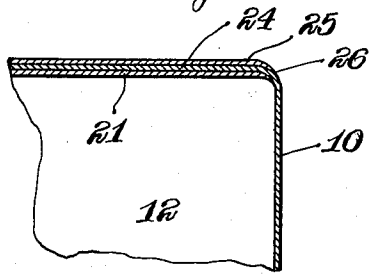


Fig. 3

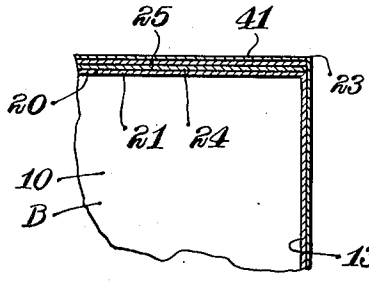


Fig. 4

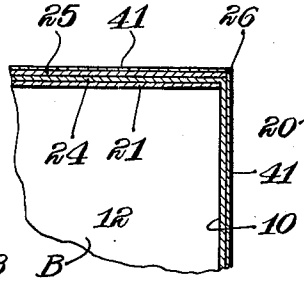


Fig. 5

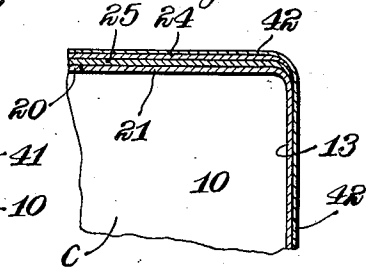


Fig. 8

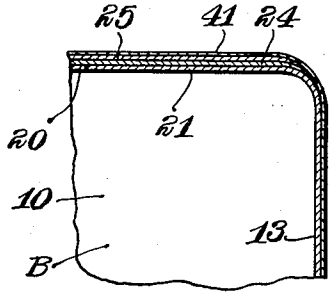


Fig. 6

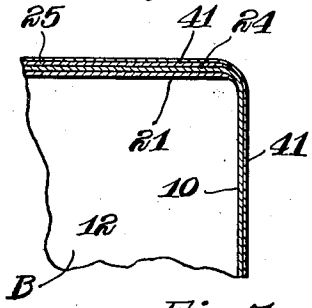


Fig. 7

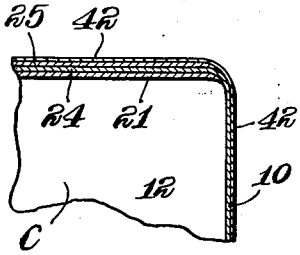


Fig. 9

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June 25, 1946. R. GUYER 2,402,548

METHOD OF MAKING LEAKPROOF PACKAGES

Filed May 5, 1943 4 Sheets-Sheet 2

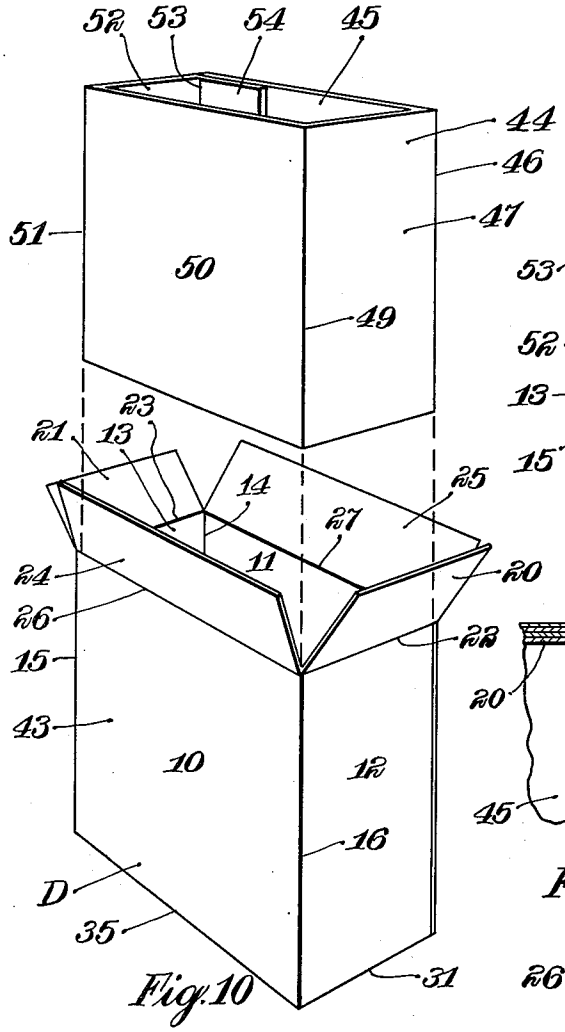


Fig. 10

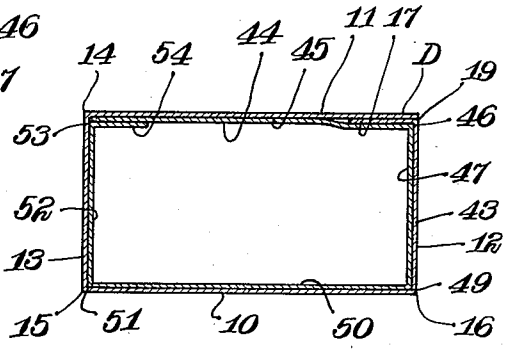


Fig. 11

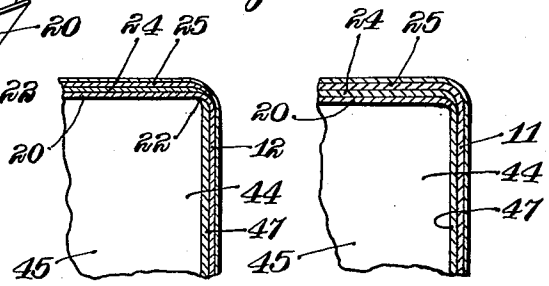


Fig. 12

Fig. 13

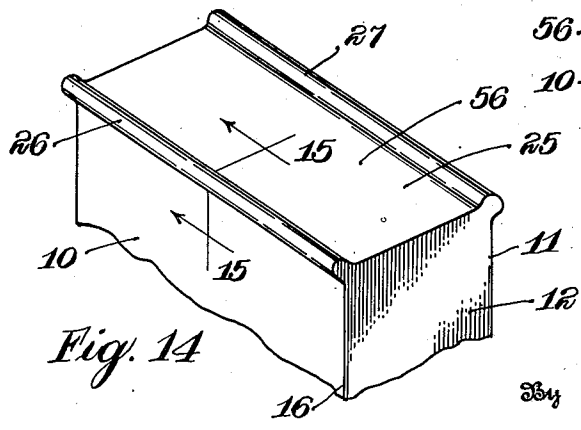


Fig. 14

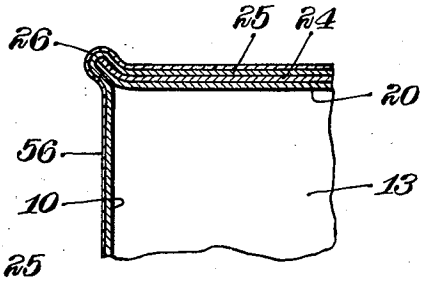


Fig. 15

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June 25, 1946. R. GUYER 2,402,548

METHOD OF MAKING LEAKPROOF PACKAGES

Filed May 5, 1943 4 Sheets-Sheet 3

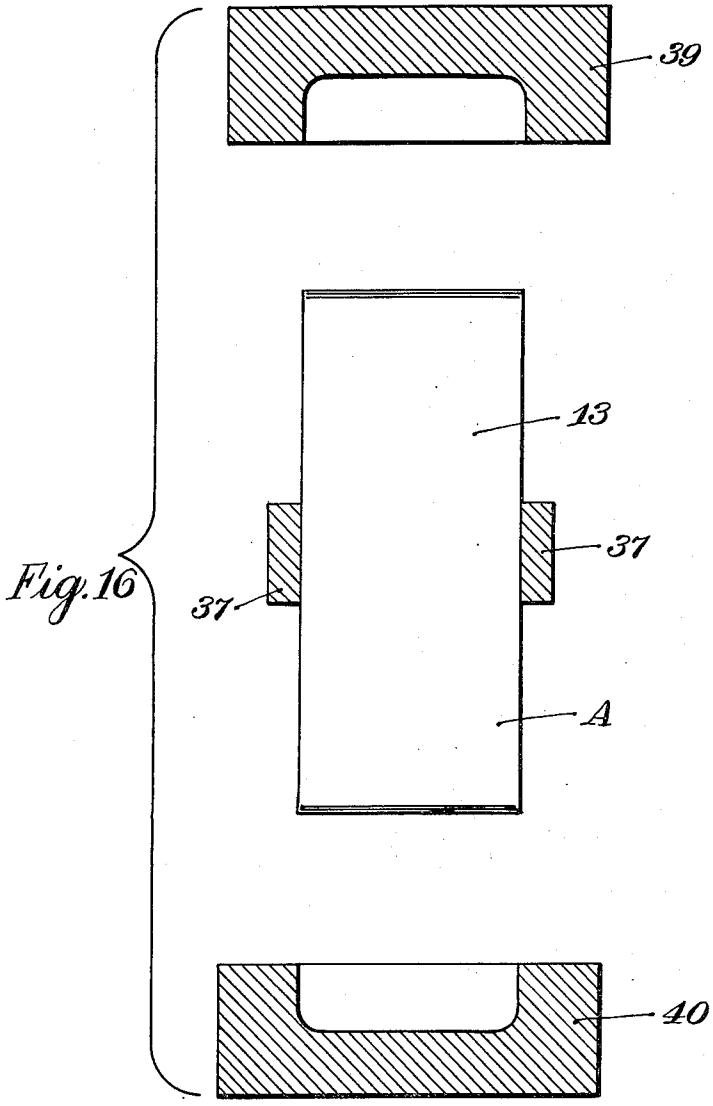


Fig. 16

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June 25, 1946. R. GUYER 2,402,548

METHOD OF MAKING LEAKPROOF PACKAGES

Filed May 5, 1943 4 Sheets-Sheet 4

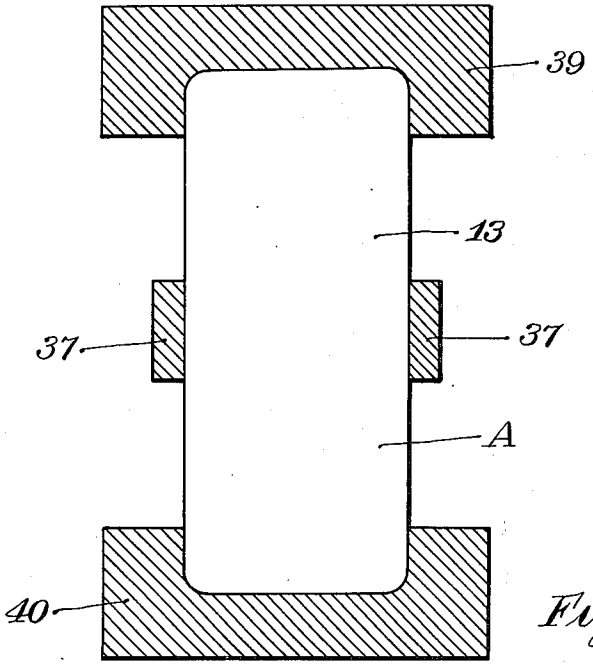


Fig. 17

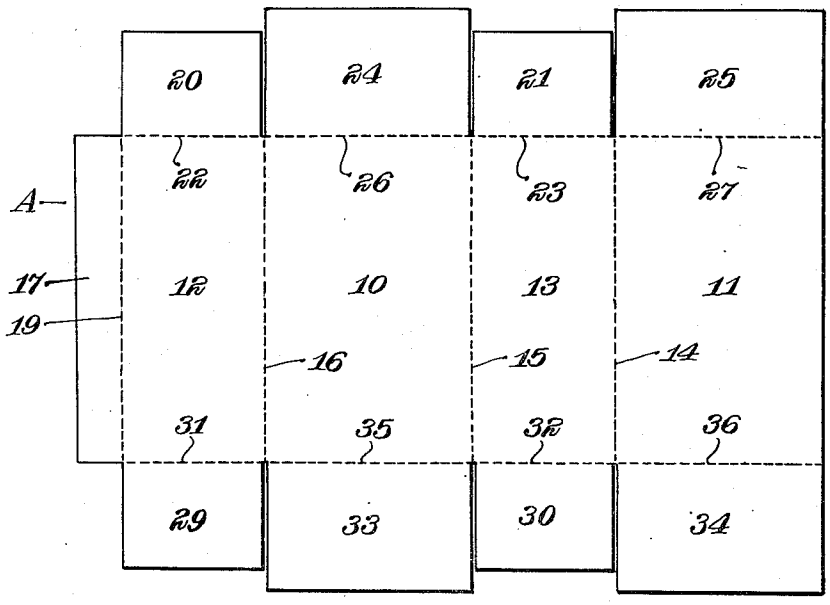


Fig. 18

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Patented June 25, 1946 2,402,548

UNITED STATES PATENT OFFICE

2,402,548

METHOD OF MAKING LEAKPROOF PACKAGES

Reynolds Guyer, St. Paul, Minn., assignor to Waldorf Paper Products Company, St. Paul, Minn., a corporation of Minnesota

Application May 5, 1943, Serial No. 485,726

8 Claims. (Cl. 93—36.3)

1

My invention relates to an improvement in leak-proof package construction and method of forming the same, wherein it is desired to provide a carton which will not leak or sift.

In packaging powdered or pulverized material in cartons formed of cardboard sheet material, or the like, difficulty has been experienced in so sealing the cartons as to render them sift-proof. In the use of rectangular cartons to contain finely powdered or pulverized material, most of the difficulty is experienced at the corners of the carton and adjacent the corners thereof. I have found that if the carton corners can be effectively sealed, such boxes will, for the most part, be rendered sift-proof.

It is the object of the present invention to provide a carton or box construction formed of flat sheet-like material and having the corners thereof molded by pressure, and preferably with heat to effectively seal these corners. As a result the points where sifting is most likely to occur are rendered leak-proof and sift-proof, and most of the difficulty experienced through the use of such cartons may be eliminated.

Most types of cardboard cartons used for containing powdered or pulverized material are provided with rectangularly arranged side walls having end flaps hingedly secured thereto. These end flaps are ordinarily folded to overlie one another and sealed with a suitable adhesive. The present invention also embodies the idea of molding the exposed free edges of such closing flaps so as to effectively seal these free edges to the body of the carton to prevent sifting between these flaps, and between the flaps and the body of the carton.

A further feature of the present invention lies in the fact that the portions of the carton to be molded may be moistened before the actual molding operation. Cartons formed of cardboard and the like, composed of fibrous cellulosic materials, often have a tendency to soften when wet. When in this softened condition the pulp or fibrous cellulosic material can be effectively molded together under pressure and heat. Thus the fibers of the various layers of material found at the corners of the carton will, to some extent, unite together when pressure and heat is applied so as to cause a bond between the various layers of cellulosic material which will prevent separation between layers.

A further feature of the present invention lies in the fact that a coating placed upon the surface of the carton after the same is sealed may be caused to impregnate the cellulosic fibers along

2

the corners and edges of the carton when heat and pressure are applied. For example, a carton formed of cardboard, when dipped in a water-proofing coating of wax or similar material, may be subjected to heat and pressure to cause the wax or like substance to impregnate into specified areas of the cellulosic material. Such a carton after being dipped may be compressed by suitable die means to cause the water-proofing coating to impregnate into the area of the carton contacted by the die. This is particularly true when the die is heated. The coating therefore not only acts to coat the outer surfaces of the carton, but also to fill any interstices between adjacent flaps or carton portions to prevent sifting of the material contained.

When filled in the usual manner, a carton may sift at the corners, particularly upon compression of the sides of the container in a manner to tend to decrease the volume thereof. After such a carton has been dipped into a coating solution so as to provide a substantially continuous exterior coating the carton may still sift to some extent. However, I have found that when such a carton is compressed in a heated die so as to press the corners of the carton together and so as to seal the edges of the superimposed sealing flaps, all of the interstices through which the powdered or pulverized material ordinarily sifts may be effectively sealed. This action is caused by the molding of the fibrous material together and also by the impregnation of the coating into the fibrous material in a manner to form an effective bond so as to seal the laminations together.

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 embodying the features of my invention.

Figure 2 is a sectional view through a corner of the carton, the position of the section being indicated by the line 2—2 of Figure 1.

Figure 3 is a sectional view through the top and bent side of the carton, the position of the section being indicated by the line 3—3 of Figure 1.

Figure 4 illustrates a sectional view similar to Figure 2, but showing a coated carton before the molding operation has taken place.

Figure 5 is a sectional view similar to Figure 3, but showing a coated carton before the molding operation has taken place.

Figure 6 is a view similar to Figure 4 showing

the construction after the molding operation has taken place.

Figure 7 is a sectional view similar to Figure 5 showing the construction after the molding operation has taken place.

Figure 8 is a sectional view similar to Figure 2 showing a box or carton which has been molded and then coated with a water-proof coating.

Figure 9 is a view similar to Figure 2 showing a sectional view of a molded carton which has been coated after the molding operation.

Figure 10 is a perspective view of a carton and liner which is suitable for molding purposes.

Figure 11 is a cross-sectional view through the carton and liner illustrated in Figure 10.

Figure 12 is a sectional view of the carton shown in Figures 10 and 11 after the molding operation.

Figure 13 is a sectional view showing the carton of Figures 10 and 11 after the molding operation.

Figure 14 is a perspective view of a modified form of molded carton construction.

Figure 15 is a sectional view through the top and side of the carton shown in Figure 14, the position of the section being indicated by the line 15—15 of Figure 14.

Figure 16 is a diagrammatic view, partly in section, showing a die arrangement for molding the corners of a completed carton.

Figure 17 is a view similar to Figure 16 showing the die in its molding operation.

Figure 18 is a diagrammatic plan of the carton blank for the particular carton illustrated.

The carton A, illustrated in Figure 1 of the drawings, may be of any common or usual type. In the figures illustrated the carton A is generally rectangular in form, having parallel front and rear panels 10 and 11 connected by parallel side panels 12 and 13. The panel 11 is connected to the panel 13 along the fold line 14. A side panel 13 is connected to a front panel 10 along the fold line 15. The panel 10 is connected to the side panel 12 along the fold line 16. The panel 12 is connected to an overlapping glue flap 17 along the fold line 19.

End closing flaps are provided for the box A. These flaps may be of any suitable or usual type and in the construction illustrated, a pair of opposed sealing flaps 20 and 21 are connected to the top of the sides 12 and 13 along fold lines 22 and 23. Similarly, closing flaps 24 and 25 are connected to the upper edge of the panels 10 and 11 along fold lines 26 and 27.

Opposed closing flaps 29 and 30 are connected to the lower edges of the sides 12 and 13 along fold lines 31 and 32. Similarly, closing flaps 33 and 34 are connected to the lower edge of the panels 10 and 11 along fold lines 35 and 36. In the construction illustrated, the walls 10, 11, 12 and 13 are folded into rectangular shape and the pairs of opposed flaps 20 and 21, and 29 and 30 on the upper and lower edges respectively, of the box are folded inwardly into substantially abutting relationship. One of the other sealing panels at each end of the box, such as the flaps 24 and 33 are folded to overlie the opposed side flaps and are adhered thereto. The remaining flaps 25 and 34 are folded to overlie the flaps 24 and 33 and are adhered thereto.

A rectangular carton of usual or common construction is thus formed. While a specific type of carton has been described it is obvious that this particular type of carton is not important to the invention and that other types may be substituted therefor.

In a rectangular carton of the type disclosed it is difficult to prevent finely divided material such as powder and the like from sifting out of the box, particularly at the corners thereof and through the external seams. Little sifting usually takes place between the glue flap 17 and the panel 11 due to the fact that this seam is glued while the carton is flat and sufficient pressure may be applied at the seam to effectively seal the flap 17 to the panel 11. In gluing the various closing flaps, however, in production it is difficult to apply a compression force sufficient to glue the various flaps together throughout their entire area. This difficulty is increased by the tendency of the flaps to curl when moistened with the glue. I therefore desire to mold the corners of the carton so as to more effectively connect the various laminations of material at the corners and to seal any small openings through the carton at the corners which might otherwise result in sifting of the contents of the package.

There are several types of apparatus which may be used to accomplish the desired result. An ironing means which is preferably heated and which engages the corners of the box to bend the same inwardly will accomplish the result. For the sake of speed of production, however, it is usually preferable to mold all of the corners of the carton simultaneously in some type of die means, such as that diagrammatically illustrated in Figures 16 and 17 of the drawings.

These figures of the drawings show a pair of gripping fingers 37 for supporting the carton A and a pair of vertically reciprocable die members 39 and 40 positioned above and below the carton A respectively. By reciprocating these die members 39 and 40 together from the position illustrated in Figure 16 of the drawings, the dies may engage the opposite ends of the carton A, as illustrated in Figure 17 of the drawings, thus compressing the carton between the dies and ironing the ends of the box so as to round the corners and edges thereof. This action tends to compress the fibrous material of which the box is formed inwardly, condensing the fibrous structure along the upper and lower edges of the carton and particularly at the corners thereof, squeezing the fibrous material of which the box is formed together at these points, and closing any openings through the carton at this point.

In accomplishing my method in the simplest form, I desire first to merely compress or iron the ends of the container by compressing them between the die means 39 and 40 after the cartons have been filled and sealed. I have found it preferable, however, to moisten the material of which the box is formed so as to revert the fibrous material into combinable form before the molding operation. If the surface of the container adjacent the corners and external seams is moistened, this moisture softens the fibrous structure of the paper and provides a tendency for the individual fibers forming the carton sheet material to separate. When placed in the forming die, which is preferably heated, not only does the moisture simplify the molding operation, but also the heated die tends to unite the compressed fibers together under pressure in a manner to cause the fibers to remain in molded shape.

Figure 2 illustrates a section through a corner of the container after the molding operation. It will be noted that three laminations of material form the top of the carton due to the manner in which the flaps are folded. By moistening the fibrous material at the corner the fibers of

the various flaps 21, 24, and 25 are caused to unite together to some extent to form a more unitary construction in which the laminations are virtually integral. This is also true of the edges of the box as illustrated in Figure 3. The moistened laminations when subjected to heat and pressure have a tendency to knit together along the compressed edge, thus tightly sealing the laminations together, particularly where external seams occur.

In Figures 4 through 7 of the drawings I disclose a carton construction B, formed by a method very similar to that used in the formation of the carton A. Figure 4 is a section through a corner of the carton before the molding operation. A carton is formed from the blank illustrated in Figure 18 and this carton is then dipped in a coating material. Paraffin wax has been used for this purpose and other coating materials have also been found useful. As the carton is identical to that illustrated in Figure 18, similar numerals will be used to identify the various parts thereof, the coating on the exterior surface of the carton being identified by the numeral 41. I have found that when a carton is dipped in coating material such as wax for example, and then subjected to heat and pressure by dies, such as those illustrated in Figures 16 and 17 of the drawings, a portion of the wax coating will be forced into the laminations of material at the corners and along the edges of the carton in a manner to impregnate the material with a water-proofing compound. Furthermore, this water-proofing compound has a tendency to stiffen or reinforce the corners and edges of the carton tending to maintain the rounded construction of the carton at the corners and edges. I have found that cartons formed of ordinary cardboard dipped in paraffin wax and molded as illustrated in Figures 6 and 7 of the drawings will resist moisture transmission to the interior of the carton even though the carton be submerged in water. Similar cartons not having molded corners and edges have similarly been dipped in wax, but have been unable to withstand transmission of moisture.

In Figures 8 and 9 of the drawings, I disclose diagrammatically a carton C which is identical with the carton A, with the exception that after the corners of the carton have been molded the same is dipped into a water-proofing solution such as wax. The carton C thus differs from the carton B only in the time at which the wax coating is applied. The coating 42 of the carton C is applied after the molding operation, while the coating 41 of the carton B is applied before the molding operation.

In Figures 10 through 13 I disclose a carton D which differs from the carton A only in the fact that the carton is provided with an interior reinforcing sleeve. The carton D comprises a shell 43 which is identical with the carton A formed from the blank illustrated in Figure 18 of the drawings. A rectangular shell 44 is slipped into the shell 43 in order to reinforce the same during the molding or compression operation.

The sleeve 44 includes a rear panel 45 connected along a fold line 46 to a side panel 47. The panel 47 is connected along a fold line 49 to the front panel 50. The front panel 50 is connected along the fold line 51 to the side panel 52. The panel 52 is connected along a fold line 53 to a glue flap 54 which underlies a portion of the panel 45 which is secured thereto by means of a suitable adhesive.

As illustrated in Figure 11 of the drawings the sleeve 44 fits closely within the shell 43 and acts to reinforce the sides of the shell so that this outer shell may be formed of relatively thin material. At the same time, however, the shell 44 will effectively support the shell 43 when the corners thereof are molded in any one of the manners previously described. In the construction illustrated the carton is dipped in wax after the sealing operation thereof and the ends of the carton are subsequently molded into the form illustrated in Figures 12 and 13 of the drawings after the dipping operation.

In Figures 14 and 15 of the drawings I disclose a modified form of construction in which opposed edges of the container are molded in a somewhat different manner. In this form of construction, as in all of the other forms thereof, the carton molded may be of any usual type such as the one illustrated in Figure 18 of the drawings. In the form illustrated, pressure is applied to the laminated top of the box and other front and rear panels thereof 10 and 11 respectively, to compress the edges thereof together. For example, opposed rollers may engage the carton along the fold lines 26 and 27 to compress these edges together. The rollers are preferably heated so that the edges 26 and 27 are compressed by heat and pressure which tends to mold the laminations forming the carton together at these points. The carton is preferably moistened before the molding operation and if a coating such as 56 is desired, this coating may be applied either before or after the molding operation.

In following my process it is possible to eliminate the moistening operation. This is particularly true if the carton is coated before the molding operation and the coating usually liquifies to some extent during the molding operation and acts in somewhat the same manner as water to loosen the fiber structure of the carton forming material before the molding operation.

In accordance with the patent statutes, I have described the principles of construction of my carton and the method of forming the same, 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 a carton of fibrous material having a plurality of panels connected together, three adjoining panels coming together to form a corner therebetween; the method consisting of applying inward pressure to the apex of the corner to compress the material inwardly toward the interior of the carton and to compact the fibrous structure at the corner, the pressure being sufficient to compact the fibers and insufficient to rupture the fibrous structure.

2. The method of sealing a carton of fibrous material having a plurality of panels connected together, three adjoining panels coming together to form a corner therebetween; the method consisting of applying inward pressure and heat to the apex of the corner to compress the material inwardly toward the interior of the carton and to compact the fibrous structure at the corner.

3. The method of sealing a carton of fibrous material having a plurality of panels connected together, three adjoining panels coming together to form a corner therebetween; the method consisting of coating the carton, and applying inward pressure to the apex of the corner to compress

the material inwardly toward the interior of the carton and to compact the fibrous structure at the corner.

4. The method of sealing a carton of fibrous material having a plurality of panels connected together, three adjoining panels coming together to form a corner therebetween; the method consisting of coating the carton, and applying inward pressure and heat to the apex of the corner to compress the material inwardly toward the interior of the carton and to compact the fibrous structure at the corner.

5. The method of sealing a carton of fibrous material having side walls and end closing means which comprises applying pressure inwardly to the corners of the carton to press the apex of the corner inwardly toward the interior of the carton and to compact the fibrous structure at these corners.

6. The method of sealing a carton of fibrous material having side walls and end closing means which comprises applying heat and pressure inwardly to the corners of the carton to press the apex of the corner inwardly toward the interior

of the carton and to compact the fibrous structure at these corners.

7. The method of sealing a carton of fibrous material having a plurality of panels connected together, three adjoining panels coming together to form a corner therebetween, the carton having a coating thereon; the method consisting of applying inward pressure to the apex of the corner to compress the material inwardly toward the interior of the carton and to compact the fibrous structure at the corner, the pressure being sufficient to compact the fibers and insufficient to rupture the fibrous structure.

8. The method of sealing a carton of fibrous material having a plurality of panels connected together, three adjoining panels coming together to form a corner therebetween, the carton having a coating thereon; the method consisting of applying inward pressure and heat to the apex of the corner to compress the material inwardly toward the interior of the carton and to compact the fibrous structure at the corner.

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