

June 14, 1949.

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2,472,883

METHOD AND APPARATUS FOR PRODUCING CARTONS

Filed Sept. 12, 1946

2 Sheets-Sheet 1

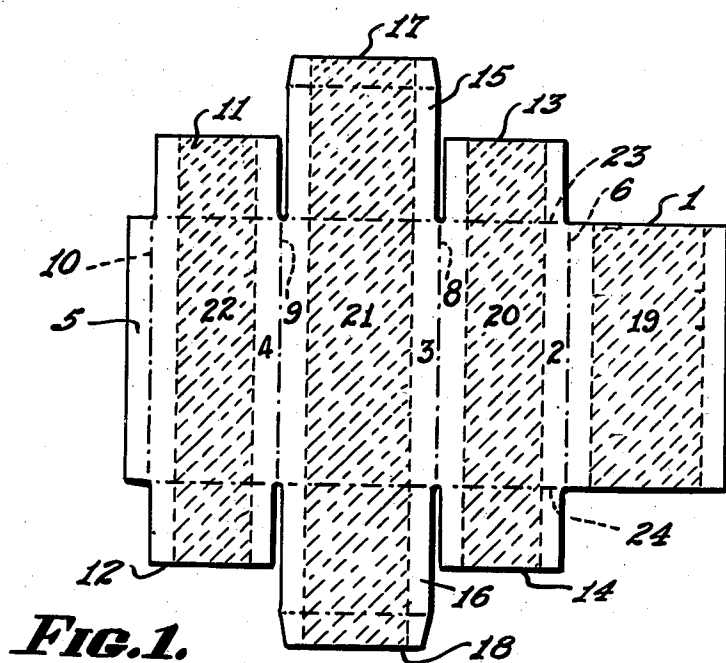


FIG. 1.

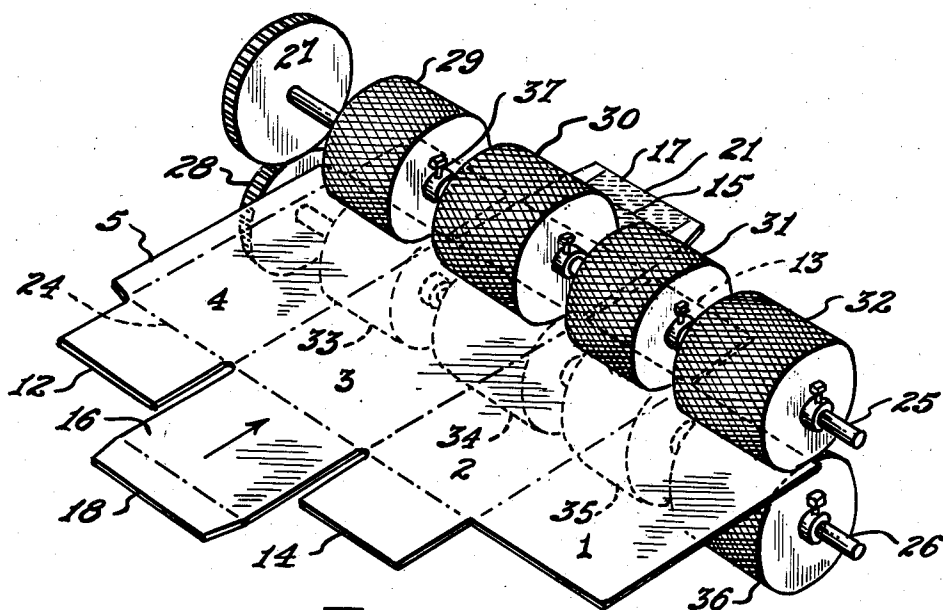


FIG. 2.

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2 Sheets-Sheet 2

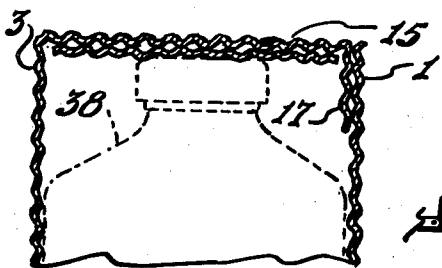


FIG. 3.

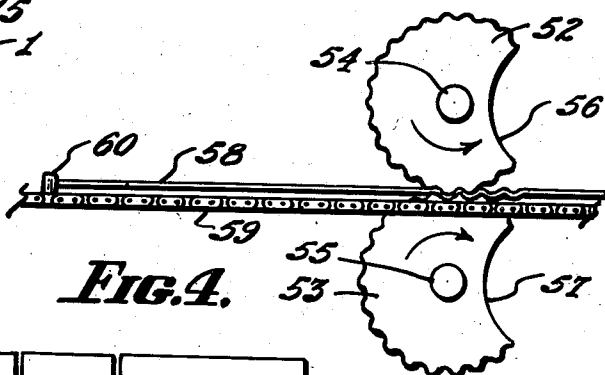


FIG. 4.

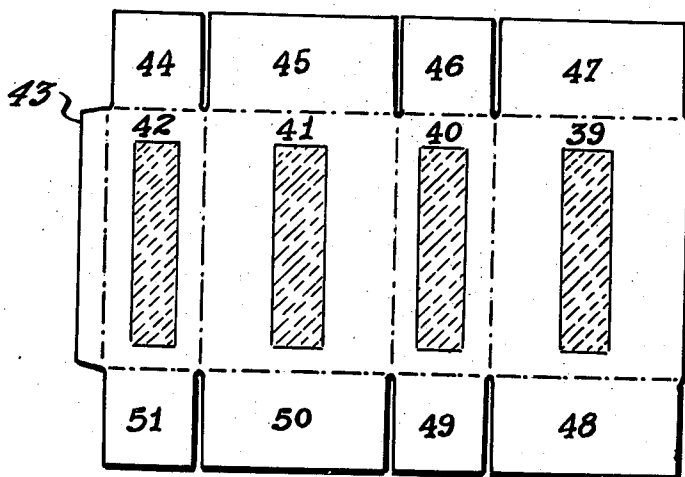


FIG. 5.

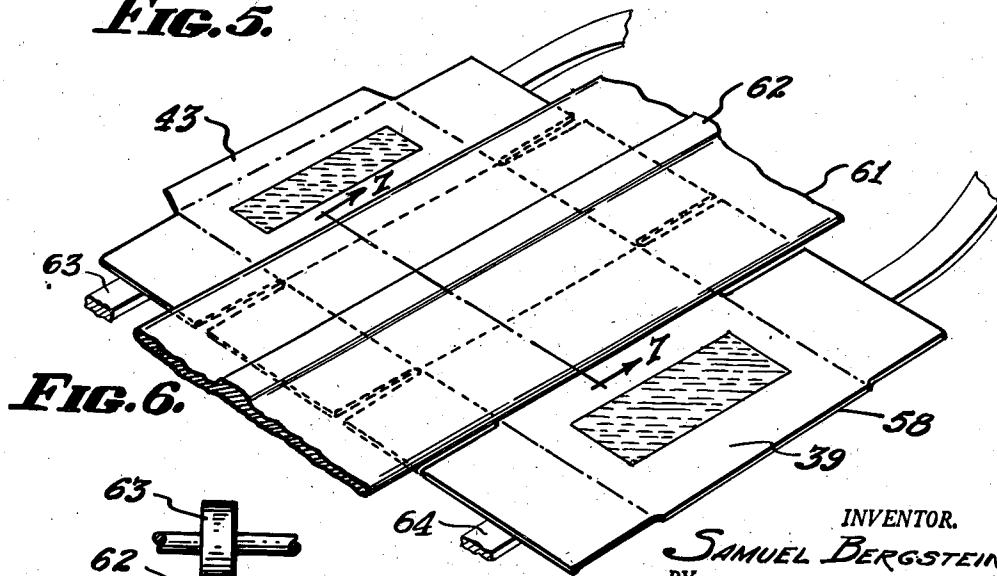


FIG. 6.

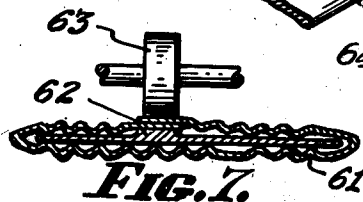


FIG. 7.

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METHOD AND APPARATUS FOR PRODUCING
CARTONSSamuel Bergstein, Cincinnati, Ohio, assignor to
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Application September 12, 1946, Serial No. 696,489

11 Claims. (Cl. 93—52)

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There has hitherto been an extensive manu-
facture of indented paperboard for packing pur-
poses. The product is formed by passing paper-
board through rolls having various arrangements
of relatively small protuberances, the protuber-
ances of the respective rolls being arranged in an
interdigitating fashion. As a consequence board
passed through the rolls is in interspaced small
areas distorted from its original plane toward
both sides, the effective thickness of the board is
increased; and the indented board is able to pro-
vide a cushioning effect for fragile articles in
shipment and storage. Frequently the board
prior to embossing, has been wetted or steamed,
but it has been known that satisfactory effects
may be obtained without any pretreatment of
the board.

Hitherto such indented or embossed board has
been used as a wrapping for fragile articles, or
has been used in the making of independent
wrapping or covering structures. If individual
articles were required to be packaged in cartons
or containers, the indented or embossed board was
employed as an independent lining for such car-
tons or as an independent wrapping for the ar-
ticles.

It is an object of my invention to provide
paperboard cartons of tubular common knock-
down form intended for the shipment or han-
dling of fragile articles where the carton itself
and substantially without any additional cost,
furnishes the desired cushioning effect for the
contents.

It is an object of my invention to provide car-
tons having the function described above, which
cartons are of knock-down form and may be han-
dled, shipped and used in the usual way for
knock-down paperboard cartons.

It is an object of my invention to provide a
knock-down tubular carton structure which in
addition to the advantages referred to, possesses
the natural advantages of appearance of paper-
board cartons as known in the art.

These and other objects of my invention which
will be set forth hereinafter or will be apparent
to one skilled in the art upon reading these speci-
fications, I accomplish by that structure and ar-
rangement of parts and in those procedures of
which I shall now describe exemplary embod-
iments.

Reference is made to the accompanying draw-
ings wherein:

Figure 1 is a plan view of the blank for one
type of carton made in accordance with my in-
vention.

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Figure 2 is a diagrammatic perspective view of
apparatus in accordance with my invention, with
which I may impart the desired cushioning ef-
fect to the carton structure.

Figure 3 is a partial sectional view of an erected
and closed paperboard carton made from the
blank of Figure 1, and showing in dotted lines
exemplary contents therein.

Figure 4 is a diagrammatic sectional view of
a modified apparatus for treating cartons.

Figure 5 is a plan view of a blank for another
form of carton falling within the scope of my in-
vention.

Figure 6 is a partial perspective view of ap-
paratus which may be employed in tubing the
cartons of my invention.

Figure 7 is a diagrammatic sectional view re-
lated to the section line 7—7 in Figure 6.

This invention thus relates to the problem of
imparting to knock-down tubular paperboard
cartons the desired cushioning effect which has
been referred to above. Other characteristics of
the tubular paperboard carton, including its size
and shape, do not form a limitation on the in-
vention excepting as set forth in the appended
claims.

I have found that by embossing practices, but
without any presoftening of the board, it is pos-
sible to impart the embossed and cushioning con-
dition to cartons or carton structures in the ways
hereinafter set forth. Embossed or indented
boards have hitherto been made usually of the
cheapest kind of chip board or the like; but the
imparting of indentations to the better classes of
boxboard such as are normally employed for the
production of printed cartons, is readily possible
without any presoftening. Furthermore, if the
cartons are preprinted the embossing does not
destroy the effect of the printing in good paper-
board materials, but on the contrary, in some in-
stances enhances it.

It is not, however, possible to emboss the board
in bulk since if this is done it not only becomes
impossible to print it, but grave, if not insuper-
able difficulties are encountered in attempts to
cut and score the carton blanks and in attempts
to fold and glue them. Nor is it possible to print,
cut and score the carton blanks first and then
emboss them throughout since many of the same
difficulties arise. In a satisfactory knock-down
tubular structure it is necessary that the longi-
tudinal score lines remain in free or unembossed
sections of the board or difficulties will be en-
countered in erecting the cartons either by hand
or by machinery.

I have found that entirely satisfactory results may be obtained for example, by forming a carton blank and then embossing the blank in such fashion that the indentations are confined to longitudinal central portions of the body walls of the carton, leaving the board adjacent the longitudinal score lines free of indentations and likewise leaving the glue flap and the corresponding outer edge of the opposite wall free of indentations so that an adequate adhesive seam may be obtained. Tubular cartons will normally have closure flaps at the ends of the body walls, or some of them. The indentations may, if desired, be omitted from the closure flaps entirely, but it is also possible to continue them into the closure flaps. The reason for this is that while the longitudinal score lines of the blank must lie in non-embossed sections of the board, those score lines by which the closure members are articulated to the body walls may be covered and partially obliterated by indentations without difficulty, due to the superior folding action attained with flaps in a squared up or erected carton body.

Hence in the practice of my invention, I prefer first to form the carton blanks and then to emboss these blanks after the manners hereinafter described, prior to the tubing operation performed on the carton blanks. It is possible to gain an effect by first tubing a carton blank and then embossing it but, due to the fact that the longitudinal score lines must be left in free or unembossed board sections, it will be seen that such operation is restricted to tubular carton bodies in which the width of all body walls is equal, so that in the tubed structure the score lines come together.

The embossing may be carried on in the cartons of my invention to limit lines lying quite close to the longitudinal score lines; and cartons formed in this fashion have been found to be quite adequate for the reason that the cushioning effect is normally obtained throughout all portions of the carton walls which contact the article packed within. The corner portions of a carton have a natural cushioning effect by reason of their construction, and furthermore the packed article does not normally contact the body walls of a carton out to the very edges of these body walls. Exemplary uses for my cartons are in the packaging of such articles as bottles, radio tubes, incandescent bulbs and the like. Where round or cylindrical articles are enclosed in cartons, it will be appreciated that the area of contact of such articles with the carton walls is quite small. Hence, it is frequently possible to confine the embossings in the carton walls to quite narrow bands, as has been illustrated in Figure 5.

In Figure 1 I have shown a paperboard carton blank having body walls 1, 2, 3 and 4, and a glue flap 5, articulated together by the usual longitudinal score lines 6, 8, 9 and 10. The particular form of carton shown is a so-called tuck end tubular carton in which flaps 11, 12, 13 and 14 are articulated to the ends of body walls 2 and 4, and in which top and bottom walls 15 and 16 are articulated to the ends of an intermediate body wall 3. These top and bottom walls carry tuck flaps 17 and 18. This blank will have been cut and scored as is usual in the manufacture of paperboard containers, and will have been printed if and as desired.

The next step in the practice of my invention is the provision of embossed or indented areas indicated at 19, 20, 21 and 22. These areas extend longitudinally of the respective body walls

but terminate short of the free edge of wall 1, and the intermediate score lines 6, 8, 9 and 10. The glue flap 5 has not been embossed. It will be noted that in this particular embodiment the embossing has been extended across the lateral score lines 23 and 24, by which the closure flaps are articulated to the body walls, and that it has been continued across the closure flap structures themselves. This enables me to carry on the embossing in an untimed, continuously acting apparatus.

Elements of this apparatus are illustrated diagrammatically in Figure 2, and comprise a pair of shafts 25 and 26 geared or otherwise connected together as by pinions 27 and 28, one of the shafts being arranged to be driven by means not shown. The shafts are indicated as carrying respectively an upper set of embossing members 29, 30, 31 and 32 and a lower mating set of embossing members 33, 34, 35 and 36. These embossing members are individual elements replaceable as desired when different widths of embossing are desired. They are spined on the shafts 25 and 26, and are rendered adjustable therealong as by means 37, so that their position may be changed for cartons of different sizes. It may be pointed out that for most uses the cushioning effect does not need to extend as respects any body wall substantially to the score lines which demark it. A central strip of indentations is ordinarily sufficient. Hence apparatus elements as diagrammatically illustrated in Figure 2 will be found adjustable to cover and treat quite a wide range of carton sizes.

The operation illustrated in Figure 2 is an untimed operation and the carton blanks may be fed forward and introduced into the apparatus by hand or by the normal untimed frictionally moving means provided on standard carton folding and gluing machines. In fact, the apparatus of Figure 2 may be added to or installed on the standard carton folding or gluing machine ahead of the feed hopper, but prior to the adhesive applicator and folding instrumentalities, i. e., it will be folded on a pair of intermediate score lines such as the scores 6 and 9, with an adhesive union of the glue flap 5 to the free edge of the body wall 1. The carton will then be in tubular knock-down condition suitable for shipment to the carton user.

Figure 3 is a partial cross-sectional view of the erected and closed carton, like parts being given like index numerals, the figures showing the cushioning effect upon exemplary contents such as a bottle 38.

Referring to Figure 5, I have shown a carton of the so-called seal-end type having body walls 39, 40, 41, 42, and a glue flap 43. The body walls have in articulation at their ends, closure flaps 44—51 as indicated. Such a carton may be treated in exactly the fashion which has been described for the carton blank of Figure 1. The flaps 44—51 will in this event become embossed, but it is usually possible by the use of suitable adhesives, preferably thermoplastic, to bring about sufficient adhesion between embossed flaps to produce a strong enough closure.

However, where it is desired to leave the closure flaps in an unembossed condition, this may be accomplished in a timed embossing operation by mechanism such as is shown in Figure 4. Here the upper and lower embossing means 52 and 53 on shafts 54 and 55, are cut away or configured as at 56 and 57, so as to emboss areas of specific length. It is necessary here that the

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carton blank generally indicated at 58, be sent through the apparatus in timed relationship to the operation of the embossing means. This will be accomplished by a timed conveyor or moving means of which a suitable form comprises a moving chain 59 having pins 60 for engaging the carton blank. Such an embossing means and its timed feed may again be inserted in a standard carton folding and gluing machine ahead of the feed hopper and prior to the folding and gluing instrumentalities.

The use of a timed feed and non-continuous embossing means is not limited to any particular type of carton. By way of example, in the tuck-end style of Figure 1, the bands of embossing 22 and 20 may run continuously through the body walls 4 and 2 and their respective flaps as shown, but the area 21 may be confined to the body wall 3, leaving the end and tuck flaps 15, 16, 17 and 18 free of embossings. Cushioning at the ends of the carton will be provided by flaps 11, 12, 13 and 14, but the carton will have plain or unembossed outer end walls and thus may stand up better upon its ends.

In most instances the adhesive applying and folding devices of standard carton folding and gluing machines may be relied upon for the tubing operation. However, it will be remembered that the embossing effectively thickens portions of the body walls of the cartons, and where such thickening tends to prevent the attainment of adequate and adequately continued pressure on the glue flap and opposite wall, in the machine or in the stacker, I make the following described provision in the machine to overcome this difficulty.

In place of the normal swords on which the blank is folded (as by folding sweeps 63 and 64) as to its longitudinal score lines, I provide a former 61 as illustrated in Figure 6 and shown there in relation to the unfolded blank 58. The former is provided with a raised rib 62, so positioned as to lie beneath the glue flap 43 as is clearly shown in Figure 7. This gives a support capable of sustaining pressure, and I provide an upper roller 63, or series of rollers which engage the free edge of the wall 39, and press it against the glue flap. With the use of quick-set thermoplastic adhesives, complete adhesion may be attained in this fashion prior to the time the folded cartons come off the end of the former. The roller or rollers 63 may be cooled if desired. They not only effect the pressure aforesaid, but assist in moving the carton over the former. The former may be made in a plurality of adjustable parts and the position of the rib or pressure sustaining device 62 may likewise be made adjustable. It is not without the spirit of my invention to use a longitudinally extending pressure sustaining member along with the swords which are standard in carton folding and gluing machines, and without the provision of a complete former as illustrated.

My invention is applicable to cartons made of any suitable boxboard printed or unprinted, and to box boards to which surfacing materials such as the non-fibrous films of commerce have been plied. The particular kinds of closure flaps provided constitute no limitation on the invention. In the case of structures which are to be wrapped or which have been plied to cellophane or the like, where the cellophane extends beyond the ends of the body walls so as to provide means for forming end closures, closure flaps may be omitted entirely.

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Modifications may be made in my invention without departing from the spirit of it.

Having thus described my invention in certain exemplary embodiments, what I claim as new and desire to secure by Letters Patent is:

1. A process of producing protective cartons which comprises producing otherwise finished cut and scored paperboard carton blanks comprising enclosing body walls and a glue flap and end closure means articulated to certain at least of said body walls, then passing said blanks continuously through a carton folding and gluing machine in the direction of the extent of said body walls, and prior to folding and gluing passing said blanks through rotating embossing elements in said machine, said elements being so spaced from each other laterally of the blank as to emboss central portions of said body walls and closure means while leaving the paperboard unembossed in areas adjacent and including the lines of articulation between body walls, and then folding said blanks and gluing said glue flaps to a marginal portion of the opposite wall therein.

2. A process of producing protective cartons which comprises producing an otherwise finished cut and scored carton blank including body walls articulated together along longitudinal score lines, and thereafter as an incident to folding and gluing, embossing the paperboard of said blank to provide a cushioning effect for contents, while leaving the paperboard adjacent and including said longitudinal score lines free of said embossing, said embossing being accomplished during the passage of said blank through a folding and gluing machine.

3. A process of making protective cartons which comprises providing an otherwise finished carton blank, comprising body walls in articulation along longitudinal score lines, and closure elements articulated to ends of body walls along lateral score lines, and passing said blank continuously through spaced pairs of rotary embossing means whereby to produce in said blanks bands of embossings to provide a cushioning effect, while spacing and relating said embossing means to said blank in such fashion as to leave the paperboard thereof adjacent and including said longitudinal score lines free of embossings, said bands of embossings covering said lateral score lines.

4. A process of producing protective cartons which comprises providing otherwise finished carton blanks having enclosing body walls in articulation along longitudinal score lines and closure elements articulated to ends of body walls along lateral score lines, and passing said blanks continuously through sets of cooperating embossing means of rotary character in timed relation, and configuring said embossing means and spacing the cooperating sets thereof whereby to confine the embossings to said body walls and terminate the embossings short of the said longitudinal and lateral score lines.

5. A process of producing protective cartons which comprises providing otherwise completed carton blanks including enclosing body walls in articulation along longitudinal score lines and a glue flap, embossing central portions of body walls of said blank while leaving said blank unembossed in areas adjacent and including said longitudinal score lines a free edge of a wall at one side of the blank and said glue flap, and thereafter tubing said blank by folding with the application of adhesive, and producing pressure on said glue flap and the free edge of said wall

in superposition by pressure means acting from the outside of the blank against a rib-like support located interiorly of the tubed blank.

6. The process claimed in claim 5 including the application of a heat softened thermo-plastic adhesive for joining said glue flap and the free edge of said wall.

7. In apparatus for the purpose described, parallel shafts, means for driving said shafts in timed relationship, pairs of rotary embossing means splined to said shafts to rotate therewith, means for spacing said pairs along said shaft and means for passing carton blanks between the embossing elements of said pairs, the embossing elements of said pairs being configured to form less than continuous bands of embossings, and said means for passing carton blanks therebetween comprising timed conveyor apparatus.

8. In apparatus for the purpose described, parallel shafts, means for driving said shafts in timed relationship, pairs of rotary embossing means splined to said shafts to rotate therewith, means for spacing said pairs along said shaft, and means for passing carton blanks between the embossing elements of said pairs, in combination with folding means for tubing said blanks, said folding means comprising a pressure element located within the tube initially formed by folding said blanks, and a pressure element externally located to press lapped portions of said blanks against said first mentioned pressure means.

9. In apparatus for the purpose described, parallel shafts, means for driving said shafts in timed relationship, pairs of rotary embossing means splined to said shafts to rotate therewith, means for spacing said pairs along said shaft and means for passing carton blanks between the embossing elements of said pairs, the embossing elements of said pairs being configured to form less than continuous bands of embossings, and said means for passing carton blanks therebetween comprising timed conveyor apparatus in combination with folding means for tubing said blanks, said folding means comprising a pressure element located within the tube initially formed by folding said blanks and a pressure element externally located to press lapped portions of said blanks against said first mentioned pressure means.

10. In apparatus for the purpose described, parallel shafts, means for driving said shafts in timed relationship, pairs of rotary embossing means splined to said shafts to rotate therewith, means for spacing said pairs along said shaft,

and means for passing carton blanks between the embossing elements of said pairs, in combination with folding means for tubing said blanks, said folding means comprising a pressure element located within the tube initially formed by folding said blanks, said pressure element comprising a former having a raised rib extending longitudinally of said former and positioned so as to lie beneath lapped portions of said blanks, and a pressure element externally located to press lapped portions of said blanks against said first mentioned pressure means.

11. In apparatus for the purpose described, parallel shafts, means for driving said shafts in timed relationship, pairs of rotary embossing means splined to said shaft to rotate therewith, means for spacing said pairs along said shaft and means for passing carton blanks between the embossing elements of said pairs being configured to form less than continuous bands of embossing, and said means for passing carton blanks therebetween comprising timed conveyor apparatus, in combination with folding means for tubing said blanks, said folding means comprising a pressure element located within the tube initially formed by folding said blanks, said pressure element comprising a former having a raised rib extending longitudinally of said former and so positioned as to lie beneath lapped portions of said blanks, and a pressure element externally located to press lapped portions of said blanks against the first mentioned pressure means.

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