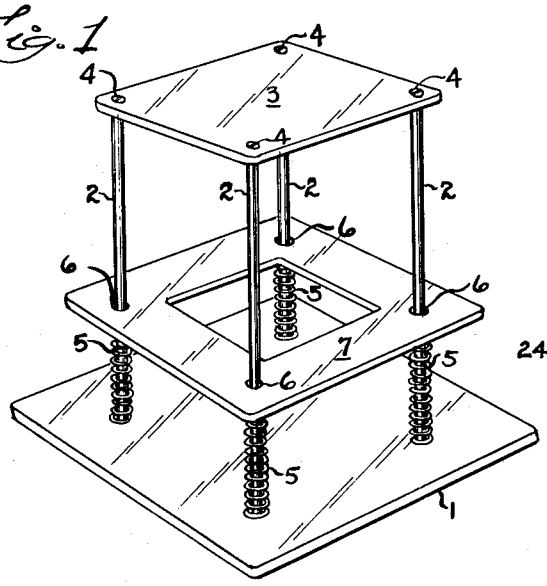
July 26, 1955 E. M. MISCHKE 2,713,812

CARTON-BOTTOM LOCKING MACHINE

Filed March 20, 1953 2 Sheets-Sheet 1

Fig. 1



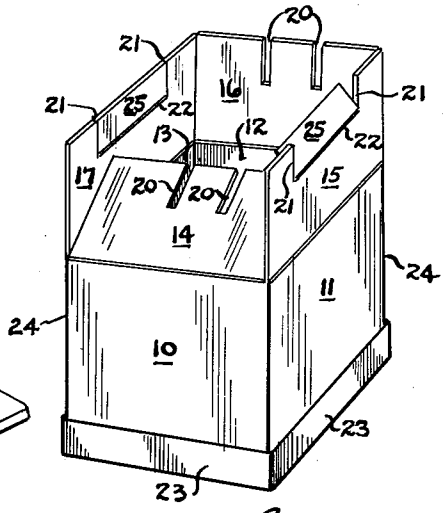
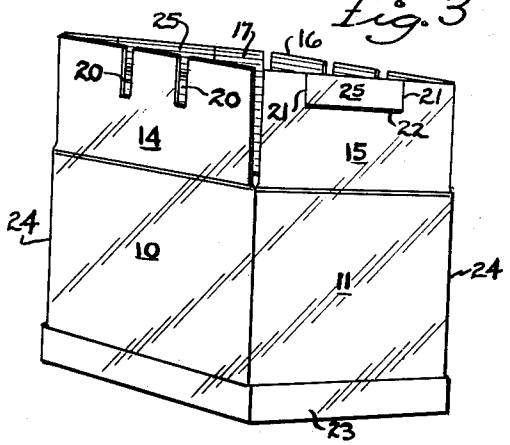


Fig. 2

Fig. 3



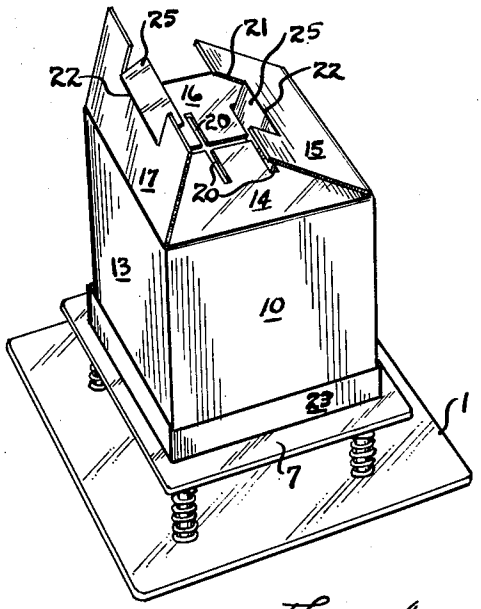


Fig. 4

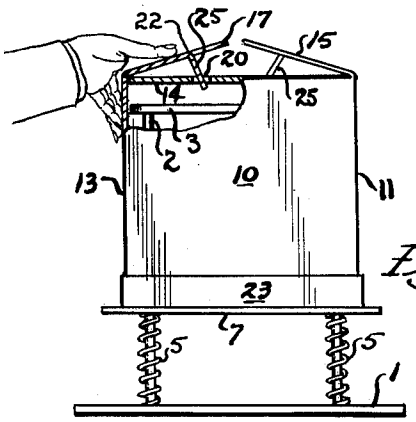


Fig. 5

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CARTON-BOTTOM LOCKING MACHINE

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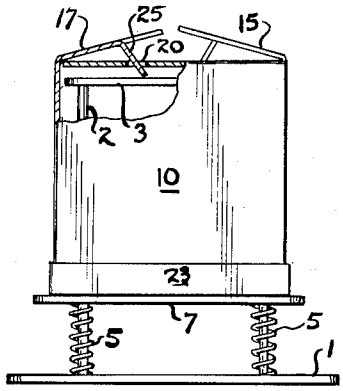


Fig. 6

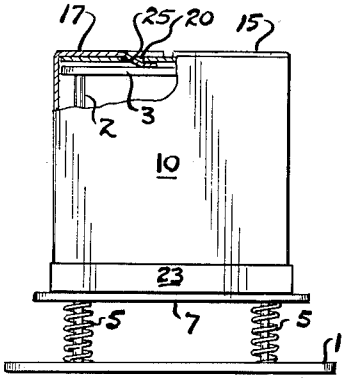


Fig. 7

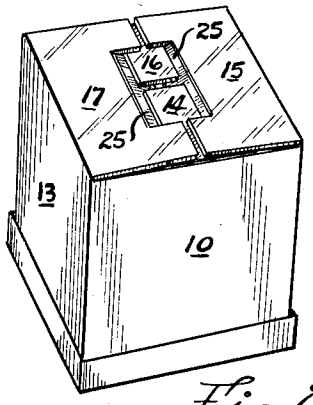


Fig. 8

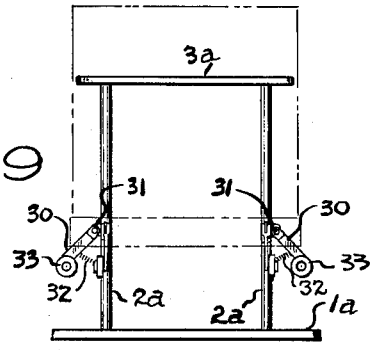


Fig. 9

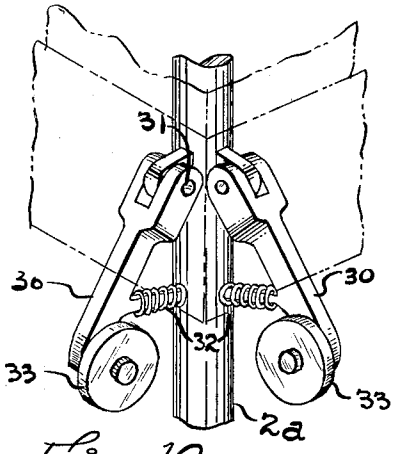


Fig. 10

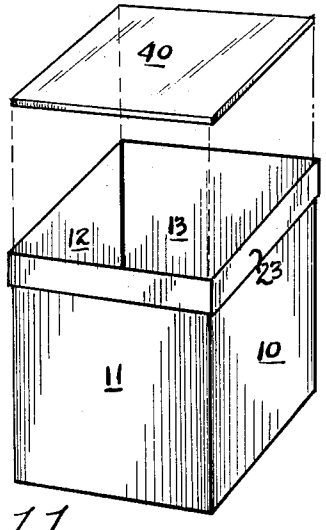


Fig. 11

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CARTON-BOTTOM LOCKING MACHINE

Edward M. Mischke, Appleton, Wis., assignor to Marathon Corporation, Rothschild, Wis., a corporation of Wisconsin

Application March 20, 1953, Serial No. 343,590

3 Claims. (Cl. 93—36)

This invention relates to machines for facilitating the folding and interlocking of the closure flap of a carton or container. The invention is particularly adapted for use with corrugated paperboard cartons or boxes, but may also be used for the folding and interlocking of the closure flaps of boxes made from other types of paperboard or similar material.

These cartons or boxes are used in extremely large quantities for the packaging of products for retail sale, for transport, for storage and the like. Because the use is ordinarily in a mass-production quantity, it is necessary that the manufacture and the set-up of the carton be accomplished at the highest possible speed and with all other attainable favorable features of economy. In order to save shipping expense, it is preferable that the carton manufacturer assemble the carton in a flat or "knock-down" condition, before shipment to the manufacturer of the product to be packed in the carton, thereby reducing transportation cost. A manufacturer of the product to be packaged must then be able to set up the carton at a rapid rate for filling with the product to be packaged. This setting-up is frequently done by completely automatic machinery, but in other cases, particularly of the smaller volume product manufacturers, such machinery would require an unwarranted expenditure so that the setting-up of the carton must at least to some extent be a hand operation.

My invention is of particular value to those product manufacturers who, due to relatively small volume or other reason, find it undesirable to invest in the rather expensive automatic machinery, but rather must to some extent accomplish the setting-up of the carton by hand operation. My invention provides an inexpensive machine which facilitates this hand setting-up operation, thus permitting a relatively rapid rate of assembly even for the small manufacturer.

The objects and marked advantages of my invention will be apparent from the following description and the accompanying drawings, in which:

Figure 1 is a perspective view of my machine for interlocking the closure flaps of a carton,

Figure 2 is a perspective view of a carton particularly adapted for use with my invention, with the bottom of the carton in open position,

Figure 3 is a perspective view of the carton shown in Figure 2, with the carton in the collapsed position in which it is customarily shipped from the carton manufacturer to the packer of the product to be contained,

Figure 4 is a perspective view similar to Figure 2, showing an initial stage of the closing operation of the bottom of the carton,

Figure 5 is a side elevation, partially cut away, of the carton of Figure 4 being acted upon by my invention to close the bottom of the carton,

Figure 6 is a side elevation, partially cut away, similar to Figure 5, showing a further stage of the bottom closing operation as effected by my invention,

Figure 7 is another side elevation, partially cut away,

similar to Figure 6, showing the final stage of the bottom closing operation,

Figure 8 is a perspective view showing the assembled carton,

Figure 9 is a side elevation of a modified form of my invention, with the open carton shown in phantom lines thereon in position for the bottom-closing operation,

Figure 10 is a detailed perspective view of a portion of the modified form of my invention illustrated in Figure 9, and

Figure 11 is a top perspective view of the assembled carton, with a separate bottom or end wall which might be inserted internally to provide a more secure bottom or end, and which may be advantageously included in the bottom or end closing operation.

Referring first to Figure 1, it is seen that my invention comprises a base or anchor plate 1 to which are rigidly secured by any suitable means four spaced, perpendicularly-disposed columns or standards 2. A top plate 3 is rigidly secured atop these upright columns 2 by any suitable means such as screws 4. Compression springs 5 encircle each of columns 2 and are supported at their lower ends against base plate 1. If desired, springs 5 may be secured firmly at their lower ends to base plate 1, but this is not essential.

Columns 2 extend through holes 6 in each corner of a rectangular floating plate 7, this plate resting against the upper ends of compression springs 5 and being resistably supported thereby. If desired, plate 7 could be fixed to the upper ends of springs 5, but this is not essential.

Figure 2 illustrates a carton particularly adapted for operation with my invention, showing the open end or bottom of the carton with the end or bottom flaps extending. It is immaterial whether this open portion of the carton be considered the end or the bottom, this depending merely upon the attitude and use of the carton, but for the purposes of this description will be considered the bottom. The carton comprises side walls 10, 11, 12 and 13, hingedly connected together at their side edges, and having bottom flaps 14, 15, 16 and 17 hingedly connected to their respective bottom edges.

Spaced inwardly of the side edges of each of bottom flaps 14 and 16 is a pair of spaced cut-outs or slots 20, and similarly spaced intermediate the side edges of each of bottom flaps 15 and 17 is a pair of cut lines 21. Score lines 22 connect the inner ends of the pairs of cut lines 21. A portion of the opposite ends of the side walls of the carton may be folded or rolled back, if desired, to produce a reinforcing double-end top as at 23.

The bottom-closing operation, as facilitated by my invention, may now be described. The carton which is to be filled with the particular product is ordinarily received from the carton manufacturer in a condition illustrated in Figure 3, wherein the carton is collapsed for shipment in the flat condition in order to reduce the transportation expense.

The collapsed carton as shown in Figure 3 may be pressed by hand at opposite side edges 24 to open the carton and square it into the position substantially as shown in Figure 2. The thus-squared carton is then placed over the top plate 3 of my machine, with the reinforced end 23 of the carton down, and dropped down over my machine until this reinforced end rests on spring-supported floating plate 7, as illustrated in Figure 4. As seen in Figure 4, bottom flaps 14 and 16 are then folded inwardly, which causes alignment of opposing pairs of slots 20 in those two flaps. Locking tabs 25, which are defined by cut lines 21 and score lines 22 in bottom flaps 15 and 17, are then folded inwardly about the hinge connection of score lines 22 and their outer edges initially inserted into the space provided by the respectively adjacent opposed pairs of slots 20 (see also Figure 5),

With both of locking tabs 25 inserted in the respective slots 20, hand pressure may be applied to bottom flaps 15 and 17 just below score lines 22, as seen in Figure 5. As this pressure is applied, locking tabs 25 are depressed further into slots 20, and springs 5 are partially compressed by the force applied against floating plate 7 bearing the weight of the carton and the applied pressure, permitting the bottom of the carton as indicated by bottom flaps 14 and 16 in Figure 6 to move downward and closer to top plate 3. With the continuation of the hand pressure, the locking tabs 25 enter the slots 20 completely, permitting bottom flaps 15 and 17 to closely overlie bottom flaps 14 and 16, and as the bottom of the carton is pressed down into close relationship with top plate 3, locking tabs 25 are forced inwardly and toward each other to lie flat againsdt the inner surfaces of bottom flaps 14 and 16 intermediate slots 20.

As will be noted particularly from Figure 6, hinge lines 22 lie very slightly outwardly of the entrances formed by the opposed pairs of slots 20, thus assuring that locking tabs 25 will be directed inwardly of the carton bottom. In actual operation, this bottom set-up operation can be accomplished in a rapid fashion, by applying a sudden pressure to bottom flaps 15 and 17 after the carton has been placed on the machine as shown best in Figure 5. A uniformly strong bottom closure will result as shown in Figure 8, with a requirement of relatively little effort and set-up time, as is desirable if this type of carton is to find commercial success with the relatively small product manufacturer who cannot avail himself of automatic set-up machinery.

From the foregoing description, it will be obvious that my invention may permit of several modifications, and that the essential feature is relative movement between plate 3 and plate 7. Whether floating plate 7 moves downwardly under pressure, or on the other hand top plate 3 moves upwardly while plate 7 and the carton are restrained, is immaterial, the only requirement being that these plates move relative to each other with gravity or other resistance in opposition to such motion as the motion tends to separate them. For example, tension springs connected between plates 3 and 7 might readily be substituted for compression springs 5.

Figure 9 shows a second method of achieving the necessary operation of my invention. Arms 30 are pivotally connected to columns 2*a* as at 31 and are resistably held outwardly at an inclination to columns 2*a* by compression springs 32 interposed between arms 30 and columns 2*a*. The outer ends of arms 30 carry rotatable rollers 33.

In this second embodiment of my invention, arms 30 fill the purpose served by supporting plate 7 in my first embodiment, that is they are so resistably inclined as to contact the reinforced top end 23 of the carton when it is inserted over the top plate 3*a*. As pressure is applied to set up the bottom of the carton, in a manner similar to that previously described, arms 30 are forced to pivot downwardly about their pivot points 31, overcoming the opposition of compression springs 32, permitting carton to ride downwardly as pressure is applied to perform the set-up operation. Rollers 33 permit the withdrawal of the carton after the bottom has been set up without substantial resistance from the pressure of the arms 30 against the side walls of the carton.

Figure 10 shows the previously set-up carton with a separate reinforcing bottom 40 which may be inserted internally of the carton to lie flat against locking tabs 25 and bottom flaps 14 and 16. When the carton is filled with the product to be packaged, this bottom, since it lies flat against internally-extending locking tabs 25, serves to reinforce the locked position of the bottom of the carton. This reinforcing bottom 40 may be inserted after the carton is formed as previously described, or it may be placed in position prior to the actual setting-up of the bottom of the carton on my machine. In such latter event, the first step in the setting-up operation is

to place the bottom 40 upon top plate 3, and then to place the carton upon my machine as previously described and carry out the setting-up operation as stated above. The reinforcing bottom 40 in such event merely serves as an extra layer atop top plate 3, and in no way interferes with the operation of my machine. If the reinforcing bottom 40 is cut to fit rather snugly inside the finished carton, there will be no tendency of it to stay on top of top plate 3 when the set-up carton is removed from the machine, but rather frictional force will maintain the reinforcing bottom 40 in the bottom of the carton.

Other modifications of my invention may be made without departing from the spirit of my invention. It is therefore to be understood that no limitations are to be imposed upon my invention except as are specifically set forth in the following claims.

I claim:

1. A carton-bottom locking machine, the carton comprising opposed pairs of side walls, opposed pairs of bottom flaps connected to the bottom end edges of said side walls, an opposed pair of said bottom flaps having locking tabs hinged thereto, the other pair of said flaps having slots for interlocking engagement with said tabs when said tabs are inserted internally of the carton through the slots, said machine including a fixed plate adapted to be positioned within said carton below the bottom thereof in carton-inverted position, a plurality of spaced columns supporting said plate in fixed position, a yieldable plate upon which the top of said inverted carton rests in carton-supporting position and adapted to yieldably resist relative movement of the bottom of said inverted carton toward said fixed plate, said yieldable plate containing a plurality of holes through which said columns are disposed for guidance of the yieldable plate in slidable relationship, and a plurality of compression springs encircling said columns and supported thereby below and in yieldable supporting relation with said yieldable plate, whereby when said inverted carton is pressed downwardly with said tabs inserted through the slots against the force of said yieldable plate to make contact between said tabs and the fixed plate the bottom lock is thereby effected.

2. A carton-bottom locking machine, the carton comprising opposed pairs of side walls, opposed pairs of bottom flaps hinged to the bottom edges of the side walls, one pair of said flaps having locking tabs hinged thereto, each flap of the other pair of said flaps having a pair of spaced slots disposed intermediate of its side edges and extending inwardly of the end edge thereof, said slots when the other pair of flaps are folded inwardly to close the bottom of the carton being aligned in opposing pairs to form two spaced slots disposed centrally of the thus-closed carton bottom, said locking tabs being disposed to enter said two spaced slots to form a locked carton-bottom closure, said machine including a plurality of fixed, upright, spaced columns, a yieldable plate containing a plurality of holes through which said columns are slidably disposed, said yieldable means being adapted to supportably contact the top edge of the carton in carton-inverted position for yieldable support thereof, compression springs encircling said columns below said yieldable plate for yieldable support thereof, and a plate fixed atop said columns and adapted to be disposed inwardly of the inverted carton below the bottom thereof, whereby said inverted carton with the locking tabs inserted through said two spaced slots may be pressed downwardly against the yieldable supporting force of said yieldable plate to establish contact between said tabs and the fixed plate and thereby press the tabs against the inner surfaces of said other pair of bottom flaps to effect the locked carton-bottom closure.

3. The method of machine-locking the bottom of a carton, the carton comprising opposed pairs of side walls, opposed pairs of bottom flaps connected to the bottom end edges of the side walls, one opposed pair of said bot-

tom flaps having locking tabs hinged thereto, and the other pair of said flaps having slots for interlocking engagement with said tabs when the tabs are inserted internally of the carton through the slots, the machine including fixed first means and yieldable second means disposed below said first means a distance substantially less than the height of the carton, the method comprising inverting the carton over said first means with the top of the carton resting on the yieldable second means, folding said other pair of flaps over the open bottom end of the carton to effect a closure, folding said one pair of flaps inwardly over the folded other pair, inserting the remote free ends of said tabs into said slots, and pressing downwardly on said one opposed pair of bottom flaps to

force the tabs through the slots and thereafter with continued pressure force the carton downwardly against said yieldable means to contact the ends of the tabs against said first means to position the tabs flat against the bottom of the carton internally thereof to thereby effect the bottom lock.

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