UNITED STATES PATENT OFFICE

2,024,365

CARTON EMBOSNING APPARATUS

William H. Inman and George E. Weinman, Newark, N. Y., assignors to Bloomer Bros. Company, Newark, N. Y., a corporation of New York

Original application January 34, 1933, Serial No. 653,280. Divided and this application January 30, 1934, Serial No. 708,981

6 Claims. (Cl. 101—26)

This invention deals with a carton or container for fragile articles, such as eggs, and has for one of its objects the provision of simple and satisfactory apparatus for manufacturing an improved carton of this character.

Another object is the provision of apparatus so designed and constructed that it may be used readily in conjunction with existing carton making machinery, commonly employed in the art, without necessitating replacement or material changes in the existing machinery and without requiring major changes in existing manufacturing methods.

To these and other ends the invention resides in certain improvements and combinations of parts, all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawing:

20 Fig. 1 is a vertical section taken transversely through an egg carton constructed in accordance with a preferred embodiment of the invention;

25 Fig. 2 is a plan of a fragment of the bottom of such an egg carton, illustrating the cushioning means;

30 Fig. 3 is a vertical section taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is a view of a preferred form of apparatus for use in manufacturing such cartons, in an initial position;

35 Fig. 5 is a similar view of the same apparatus in a second position in which a hole is being formed in the sheet material of which the carton is to be made;

Fig. 6 is a similar view illustrating a third position in which the formation of the hole is completed and the embossing operation is about to begin;

40 Fig. 7 is a similar view of a fourth position at which the embossing operation is completed;

Fig. 8 is a similar view of a fifth position at the end of the operation, at which time the edge of the sheet material around the hole has been compressed or compacted, and

Fig. 9 is a transverse section through the hole forming member of the apparatus.

The same reference numerals throughout the several views indicate the same parts.

45 This application is a division of a copending application for patent on Egg carton, Serial No. 653,280, filed January 24, 1933.

Referring now to Fig. 1 of the drawing, there is illustrated by way of example an egg carton having a bottom 10, a cover flap 11, a back wall 12, a front wall 13, a cover flap 14, and suitable end walls, not shown in the drawing, preferably but not necessarily all made from a single piece of cardboard or other suitable sheet material, as is common practice in the art. Within the body 5 of this carton may be placed a partition structure or filler comprising, for example, cross partitions 15 and longitudinal partitions 11 subdividing the body into any suitable number of compartments each for receiving an individual fragile article such as the egg indicated by the broken line 16.

The bottom 10 of the carton is provided preferably centrally of each compartment, with a hole or opening 20 around which is embossed a 10 raised annular ridge or ring 21 which, in transverse cross section as shown in Fig. 3, extends upwardly from the plane of the bottom 10, and thence curves inwardly and downwardly. The lower edge 22 of the material around the hole 20 preferably terminates in a plane slightly above that of the bottom of the sheet material 19, as indicated in Fig. 3, so that this bottom edge is capable of slight downward movement before it comes into contact with any flat surface on which the carton may be resting.

This construction provides a somewhat resilient seat for supporting the fragile article. A rounded object such as an egg, for example, will rest in the seat formed by the embossed ring 21 and will contact therewith around substantially the entire annular circumference of the seat, so that a greater area of contact is provided than when the fragile article merely rests upon a flat surface. The ring 21 is slightly resilient so that it may cushion the fragile article when the carton is subjected to any jars or jolts. In the course of its cushioning action, the ring may flex downwardly slightly since its inner lower edge 22 is capable of slight downward movement before coming in contact with any supporting surface on which the carton may be placed.

The provision of the hole 20 within the ring is important. It is found that when such a hole is provided, there is not only greater resilience and more cushioning effect, but also the embossing operation may be accomplished easier and more satisfactorily. Apparently this is because the material for forming the embossed ridge may be drawn partly from the center outwardly as well as from the surrounding portion of the material inwardly toward the ridge, whereas if a solid web of material is left within the ring, instead of a hole, then this web of 55
The embossing of the ring 21 and the formation of the hole 20 may be accomplished when the sheet material (such as cardboard or the like) either in its normal dry state, or is dampened by water or steam. Also the embossing or the formation of the holes, or both, may be accomplished while the body of the carton is being formed or folded by machinery of known construction well understood in the art. Thus no separate and distinct time consuming operation is required, and the present invention may be practiced with a minimum of extra expense.

One form of apparatus suitable for carrying out the method is illustrated diagrammatically in Figs. 4 to 9 inclusive. There is provided, for this purpose, a lower plate or member 31, an intermediate plate or member 32, and an upper plate or member 33 assembled in fixed relation to each other. Mounted preferably in fixed relation to these members, in a cavity within the members 32 and 33, is a sleeve 34, which is surrounded by the annular die 35 having a rounded upper edge for contacting with the lower side of the sheet material to shape the under side of the embossed ring. The annular die 35 is slidable longitudinally of the sleeve 34, and resilient means such as the spring 36 surrounding the sleeve 34, presses upwardly on the die 35 and tends to hold it in its uppermost position as illustrated in Fig. 4, in which it projects materially beyond the upper end of the sleeve 34. The die is capable of being moved downwardly against the action of the spring 36, however, until the lower end of the die comes into contact with the shoulder 37 on the sleeve.

The upper or movable die 40 is fixed to a plunger 41 capable of upward and downward reciprocation, the die and plunger being shown in their uppermost position in Fig. 4 and in their lowermost position in Fig. 8. The upper die 40 has an annular concave surface indicated at 41 for cooperation with sheet material placed between the two dies, to form the upper surface of the embossed ring 21.

A member 42 projecting downwardly from the center of the upper die 40 is preferably in all cases, and especially when the hole in the sheet material is to be formed concomitantly with the embossing operation. Where the hole has been formed previously as a separate operation, the member 42 may have a smooth pointed or beveled lower end which, when the hole is to be formed concomitantly with the embossing, the member 42 preferably has a sharply pointed tapered or conical lower end which is provided with a series of longitudinally extending ribs or flutes 45 with sharp edges.

The member 42, as it comes down, pierces the sheet material 10 and forms a hole therein, and the sharp ridges 43 assist in expanding the size of this hole and especially in causing it to expand substantially uniformly in all directions without undue tearing of the sheet material. Also the lower end of the member 42 is such that it has a snug sliding fit within the sleeve 34.

It will be understood that the rings may be embossed one at a time, but preferably all of the required cushioning rings on the bottom of each carton are embossed in one single operation. To this end, the required number of lower dies 35 are preferably affixed to a single base, and the required number of upper dies 40 are affixed in proper position to a single plunger 41, so that one downward movement of the plunger 41 is sufficient to emboss at one operation the required number of cushioning seats on a piece of sheet material placed between the two dies.

A stripping member 45 may be provided, operating in known manner to strip the sheet material from the upper die when the die is raised after each downward movement. The stripping member 45 has its lower surface materially below the upper die 40 when the dies are in the uppermost position as shown in Fig. 4, in order to strip the sheet from the die and the member 42, but as the upper die moves downwardly the stripping member is brought up against the bottom of the plunger 41 in the position shown in Figs. 5 to 9 inclusive, so that it does not interfere with the embossing operation.

The operation of the embossing apparatus is as follows. The sheet 10 of cardboard or other suitable material is placed between the dies when they are in their initial or normal position as shown in Fig. 4. As the plunger 41 moves downwardly, the sharp lower end of the member 42 pierces the sheet material and begins the formation of the hole therein as shown in Fig. 5, if a hole has not already been formed in the material. Continued downward movement of the plunger and upper die enlarges the size of the hole to the diameter of the shank of the member 42, the sharp ridges 43 assisting in expanding the hole evenly in all directions without undue tearing of the material. At the same time, the edges of the material around the hole are turned down inside the lower annular die 35, as plainly indicated in Fig. 6.

Still further downward movement of the parts causes the upper rounded edge of the lower annular die to force the sheet material up into the concave groove 47 of the upper die, thus embossing the ring 21. At this stage of the operation, the parting line between the members 42 and 45 is illustrated diagrammatically in Fig. 7. It is to be noted that in the embossing of the ring, the material for forming the ring may be drawn partly from the inside of the ring as well as partly from the outside. That is, the sheet material which had been drawn into the die 35 can slide slightly upwardly out of the die to provide some of the necessary slack for forming the ring.

Upon still further downward movement to the final position illustrated in Fig. 8, the lower die 35 is depressed, but until its lower end comes in contact with the shoulder 37 on the sleeve 34, when downward movement of the die ceases. This downward movement of the lower die relative to the sleeve 34 brings the upper edge of the sleeve 34 to a position close to the mouth of the die, as shown in Fig. 8. Since the lower turned down edge of the sheet material is confined between the member 42 on the inside and the annular die 35 on the outside, it cannot escape laterally, and consequently the upper edge of the sleeve 34 comes into contact with the lower edge of the sheet material. The diameter of the member 42 is such that it has a snug sliding fit within the sleeve 34.

It will be understood that the rings may be embossed one at a time, but preferably all of the required cushioning rings on the bottom of each carton are embossed in one single operation.
that subsequently the embossed ring 21 may flex downwardly as above described.

After reaching the position shown in Fig. 8, the plunger 41 is moved upwardly through the reverse stroke of its reciprocation, and the stripping member 46 is effective to strip the perforated and embossed sheet material 18 from the upper die and from the member 42. As above stated, this embossing operation may be performed during the operation of folding or forming the carton or container. Thus it does not interfere substantially with any of the other operations in the manufacture or assembly of the carton. Some forms of carton forming machinery already in use are provided with reciprocating plungers, and in many instances the upper dies and perforated members used in the present apparatus may be affixed to the existing plungers of the existing forming machines and the lower dies may be installed without material changes in such machines. Thus the existing machinery is not rendered obsolete by the apparatus of the present invention, and no extraordinary expense is involved as would be the case if it were necessary to install entirely new machinery either to replace or to supplement existing machinery.

It is to be noted that the cushioning means of the present invention does not in any way affect the filler or partition structure of the carton, which may still be made and used as heretofore, without any change whatsoever. Also, the present cushioning means, being formed merely from the sheet which constitutes the bottom of the carton, requires no additional material whatever and thus does not increase the expense of material used in the manufacture of the carton.

While one embodiment of the invention has been disclosed, it is to be understood that the inventive idea may be carried out in a number of ways. This application is therefore not to be limited to the precise details described, but is intended to cover all variations and modifications thereof falling within the spirit of the invention or the scope of the appended claims.

We claim:

1. Apparatus for operating upon cardboard and the like to make a support for fragile articles, comprising means for embossing a raised ring around a hole in sheet material such as cardboard, and means for compressing the edge of said sheet material around said hole.

2. Apparatus for operating upon cardboard and the like to make a support for fragile articles, comprising means for forming a hole with a ragged edge in sheet material such as cardboard, means for embossing a raised ring around said hole, and means for compacting the edge of sheet material around said hole to make said ragged edge substantially smooth.

3. Apparatus for operating upon cardboard and the like to make a support for fragile articles, comprising two die members relatively movable toward and away from each other to emboss a ridge around a hole in a piece of sheet material such as cardboard placed between said die members, and an abutment member within one of said die members for contacting with the edge of said sheet material around said hole to compress said edge in a direction transverse to the thickness of said sheet material.

4. Sheet embossing apparatus comprising a base, a die movably mounted in said base, resilient means tending to project said die from said base, a second die movable toward said first mentioned die to act upon said material placed between said two dies and to move said first mentioned die against the action of said resilient means, and a member within said first mentioned die and mounted on said base for contacting with and compacting a predetermined part of said sheet material.

5. Apparatus for operating upon cardboard and the like to make a support for fragile articles, comprising an annular die, a second die cooperating therewith to turn a portion of a piece of sheet material down into said annular die, and a member within said annular die for pushing upwardly on the downturned portion of said sheet material.

6. Apparatus for operating upon cardboard and the like to make a support for fragile articles, comprising a base, a sleeve mounted on said base, an annular die encircling said sleeve and slidable along said sleeve, resilient means tending to move said die to a position projecting substantially beyond one end of said sleeve, a second die movable toward said annular die in a direction longitudinally of said sleeve, to emboss a piece of sheet material placed between said two dies and to shift said annular die along said sleeve against the action of said resilient means, and a projection on said second die effective during said movement of said second die to enter said annular die and said sleeve to turn a portion of the sheet material into said annular die and to hold the turned portion in alignment with said sleeve so that it may be acted upon by said end of said sleeve.

WILLIAM H. INMAN.

GEORGE E. WEINMAN.