CARTON FORMING MACHINE

George Goffroy, Paris, France, assignor to La Cellophane, Paris, France, a French company

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1. Claim. (Cl. 93—51)

1. This invention relates to box forming machines and more particularly to a machine for folding and forming reinforced open-top cartons for food products or the like.

An object of the invention is to provide a machine for so folding thin flexible liner blanks that in the folded carton no open seams which require sealing extend below a predetermined level which corresponds to the level to which the carton is to be filled, and inserting the liner in a reinforcing outer member of relatively stiff material such as heavy paper or cardboard.

Another object is to provide a machine of the above type which forms the lined carton in a single stamping operation.

Another object is to provide a machine of the above type having means to strip the folded carton from the forming plunger.

Another object is to provide a machine of the above type having novel and improved details of construction and features of operation.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

In accordance with one embodiment of the invention, the machine includes a forming plate adapted to receive the flat blanks, which is provided with a central, generally rectangular opening having an area corresponding to the bottom of the carton and having a pair of triangular extensions at each end for folding the end flaps. A piston or plunger conforming in section to the bottom of the carton forces the blank through the plate opening to start the folds. Side plates disposed along the path of travel of the piston form the opposite smooth side walls of the carton and a series of guiding and folding members arranged along the path of the piston in the plane of the ends of the carton serve to fold and form the end flaps as the blank is advanced past the various members. Sealing means, such as heated rollers, are provided for sealing the end seams of the carton before the finished carton is removed from the piston.

For stripping the folded cartons form the piston the latter is provided with a separable bottom member which is adapted to be advanced beyond the limit of travel of the piston to push the carton from the piston onto a receiver such as a conveyor having receptacles for the cartons.

The invention also provides a blank of heavy material beneath the liner blank and disposed to be folded to enclose the bottom, ends and sides of the folded carton to the level to which the carton is to be filled.

2. The present invention is an improvement on that disclosed in co-pending application Serial No. 794,981, filed December 31, 1947, now U. S. Patent Serial No. 2,551,186.

Although the novel features which are characteristic of this invention are pointed out more in detail in the claims, the nature of the invention will be better understood by referring to the following description, taken in connection with the accompanying drawings, in which a specific embodiment thereof has been set forth for the purpose of illustration.

In the drawings:

Fig. 1 is a vertical section of a machine embodying the invention showing the parts at the start of a forming stroke;

Fig. 2 is an end elevation of the machine showing the parts as the end of the forming stroke with the finished carton stripped from the forming plunger;

Fig. 3 is a top plan view of the forming plate with the flat blanks in position thereon;

Fig. 4 is a perspective view of a finished carton with parts broken away for clarity;

Fig. 5 is an end elevation of the carton of Fig. 4;

Fig. 6 is a plan view of the blank of reinforcing material; and

Fig. 7 is a partial vertical section similar to Fig. 1, but illustrating another embodiment of the invention.

Referring to the drawings, the carton is formed from a rectangular liner blank A of thin material such as paper, rubber hydrochloride, regenerated cellulose material such as cellophane or the like which may have heat sealing characteristics, and a blank B of reinforcing material such as heavy paper, cardboard, plastic or the like. The folded liner is shown in Figs. 4 and 5 as comprising flat sides 10, ends 11, and a bottom 12. Each end 11 is formed by an upwardly folded bottom flap 13 having a top edge 14 and a pair of side flaps 15 and 16 which are folded over the bottom flap 13 and overlap to form a seam 17 which is secured by a suitable adhesive.

The outer or reinforcing member is formed from the blank B (Fig. 6) having a bottom panel 17a, side panels 18a and end panels 19a separated by score lines 18b and 19b about which the side and end panels are folded against the sides 10 of the liner and the end panels 11a are folded against the ends 11 and beneath the side flaps 15 and 16. The side and end panels may be secured in this folded condi-
tion by any suitable means, as by strips of sealing tape. The side and end panels are of a height about equal to the height of the folded bottom flap 13.

The top of the carton is open to receive the food or other products to be incorporated there-in. The carton contains no seams that require sealing below the top edge of piston 35, hence it is made liquid-tight to this point by the manner in which it is folded. The remainder of the sides and ends of the liner are folded inwardly to close the top of the package after it has been filled to the line 14.

The principles of operation of the machine are illustrated in Figs. 1 to 3. Referring to these figures, the machine is shown as comprising a flat, rectangular forming plate 20 upon which the blanks A and B are placed. The plate 20 is provided with a central opening 21 defined by straight parallel side edges ab and cf spaced apart to conform to the width of the carton, and a pair of trapezoidal edges bcde and fgha at the receptive ends with the edges cd and gh spaced to conform to the length of the carton. A pair of flat vertical side brackets 23 are disposed beneath the plate 20 in the plane of the edges cd and gh above mentioned, with inclined surfaces 27, and with vertical surfaces 26 in the plane of the top of the plate 20 and having edges forming the edges cd and gh above mentioned, with inclined surfaces 27, and with vertical surfaces 26 which are spaced from the brackets 23 to provide clearance for the passage of the end flaps 15 and 16. Beneath each member 25 a pair of triangular folding members 30 are provided, which are secured to the respective brackets 23. The triangular members 30 have inclined top edges 31 which project across the ends of the carton from opposite sides and are curved to form a somewhat flattened cup as shown in Fig. 5. The members 30 may be formed as extensions of the brackets 23 or may be attached thereto. Beneath the members 30 are mounted rollers 33 and 34 which are journaled in the brackets 23 and are adapted to seal the seams 17.

A piston 35 having a cross section corresponding to the interior of the folded carton is adapted to engage the inclined surface 37 and engage the opening 31 between the side edges ab and cf and the end edges cd and gh of the plate 20. The piston 35 is shown as having a handle 36 for operating the piston.

The rod 36 is freely slideable in guides 37, 38 carried by the piston 35 (the latter being of hollow tubular construction). The lower end of rod 36 carries a rectangular bottom plate 39 which, on the completion of the upstroke of rod 36, enters the bottom of the piston 35 and abuts a shoulder 40 therein. In this position the piston 35 and its rod 36 are connected together by a latch plunger 41 which is forced by spring 42 into a recess 43 in the rod 36 (Fig. 1). The plunger 41 is carried by guide 37 which is connected to piston 35. When rod 36 is lowered the piston 35 and its rod 36 move together as a unit until the top of the piston is approximately level with plate 20 when upon a further drop of plunger 41 engages an inclined face 47 on the plate 20, thereby withdrawing the plunger 41 from the recess 43 so that the piston and its rod are disconnected. After such disconnection continued downward pressure on rod 36 moves bottom plate 39 away from piston 35 and, the plate 39 being within the reinforced bag, the latter is pushed off of piston 35 to within four iron 50 standing up from an endless belt 51. When rod 39 is raised to bring bottom plate 39 into engagement with piston 35 again the reinforced bag is left on the belt 51. At the top of the piston stroke the plunger 41 re-engages and the cycle of operations described above is repeated.

In the operation of this device the flat sheet A and the blank B are placed upon the plate 20, as shown in Fig. 4, and the piston 35 is moved downwardly to force the sheet and blank through the opening 21. As the sheet passes downwardly through this opening, the edges ab and cf form the sides 19 which are folded upwardly and smoothly by the side brackets 23. At the same time, the end portions of the sheet are folded upwardly by the edges cd and gh to form the bottom end flaps 13 and the edges bc, de, fg and ha initiate the folding of the end flaps 15 and 16 which then extend outwardly from the ends of the carton. The panels 15a and 16a of the blank B are folded up against the sides 14 and end flaps 13. As the piston 35 advances downwardly past the members 25, the flaps 15 are folded upwardly into place and the end flaps 15 and 16 pass downwardly between the edges 26 and the brackets 23.

As the piston continues its advance, the triangular members 30 engage the end flaps 15 and 16 and fold the same over successively to form the ends of the carton as indicated in Fig. 1. As the piston 35 advances further, the carton passes downwardly with the seams 17 of the folded flaps 15 and 16 engaging the rollers 33 and 34. In the event that the sheet A is provided with adhesive 23 at the seam areas, as indicated in Fig. 3, the rollers exert pressure on the folded flaps to seal the seams. In the event that the sheet A is provided with a thermoplastic adhesive, the rollers are heated to melt the adhesive and against the folded flaps so as to heat seal the seam as the carton passes the rollers.

The downward movement of the piston 35 is continued until the entire carton passes the rollers. Continued downward movement of the rod 36 then causes the top of the piston 35 to rest on the plate 20 and the fingers 43 to engage the inclined surface 47 and be retracted thereby, thus releasing the rod 36 and the bottom plate 39 carried thereby. The bottom plate 39 then strips the folded carton from the sides of the piston 35 and deposits the carton in the guides 59 on the belt 51.

On retraction of the rod 36 the bottom 39 again seats in the piston 35 and is secured by release of the plunger 41 to cause the piston and rod to be raised together to their initial position. When the reinforced bag has been filled and closed a lid of pasteboard or other stiff material may be placed on the bag over the upstanding panels of the reinforcement. The lid may be held in position by adhesive bands.

The advantages of reinforcing the bags are that goods may be more easily packed in the bag, that a rigid bag is more easily handled and withstands rougher use, that the reinforcing may be formed with windows or cut-outs used for advertising purposes or to expose the goods to view through a transparent bag, and finally the lid may be removed without exposing the contents of the bag.

In the alternative arrangement illustrated in Fig. 7 the reinforced bag is made by placing the exploded blank B of Fig. 6 on a table 53 which lies below the plate 29 of Figs. 1 and 2. The bag liner is folded from a sheet of material placed on plate 29 and the finished bag on piston 35 is then applied to the blank B on table 55. As the bag
is pushed through the opening 55 in table 55 the blank is carried with it and the panels 10 and 11c of the blank B are folded up against the sides of the liner. The reinforced bag is delivered to the belt 63 as described above.

Although specific embodiments of the invention have been shown and described for purposes of illustration, it is to be understood that various changes and modifications may be made therein as will be readily apparent to a person skilled in the art.

What is claimed is:

A machine for making folded rectangular open top cartons from flat blanks, comprising a flat plate adapted to receive a flat blank and having an opening therein through which said blank is pushed for folding and forming the sides and ends, a hollow piston having side and end walls against which the sides and ends of said cartons are formed, a piston rod slideable in said piston, a bottom member carried by said rod adapted to engage and form the bottom of said cartons, a latch plunger carried by said piston and engaging a detent in said rod to secure the piston to said rod to move with said rod for forming said cartons, means limiting the forming stroke of said piston, and cam means on said plate operable to engage and release said plunger from said rod in said limit position of said piston, whereby said rod and bottom member can be advanced beyond said limit position for stripping said cartons from the sides of said piston.

GEORGES GEFFROY.

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