

Oct. 15, 1935.

F. J. BURROW

2,017,583

MACHINE FOR FOLDING CARTON BLANKS

Filed Sept. 14, 1933

3 Sheets-Sheet 1

FIG. 1.

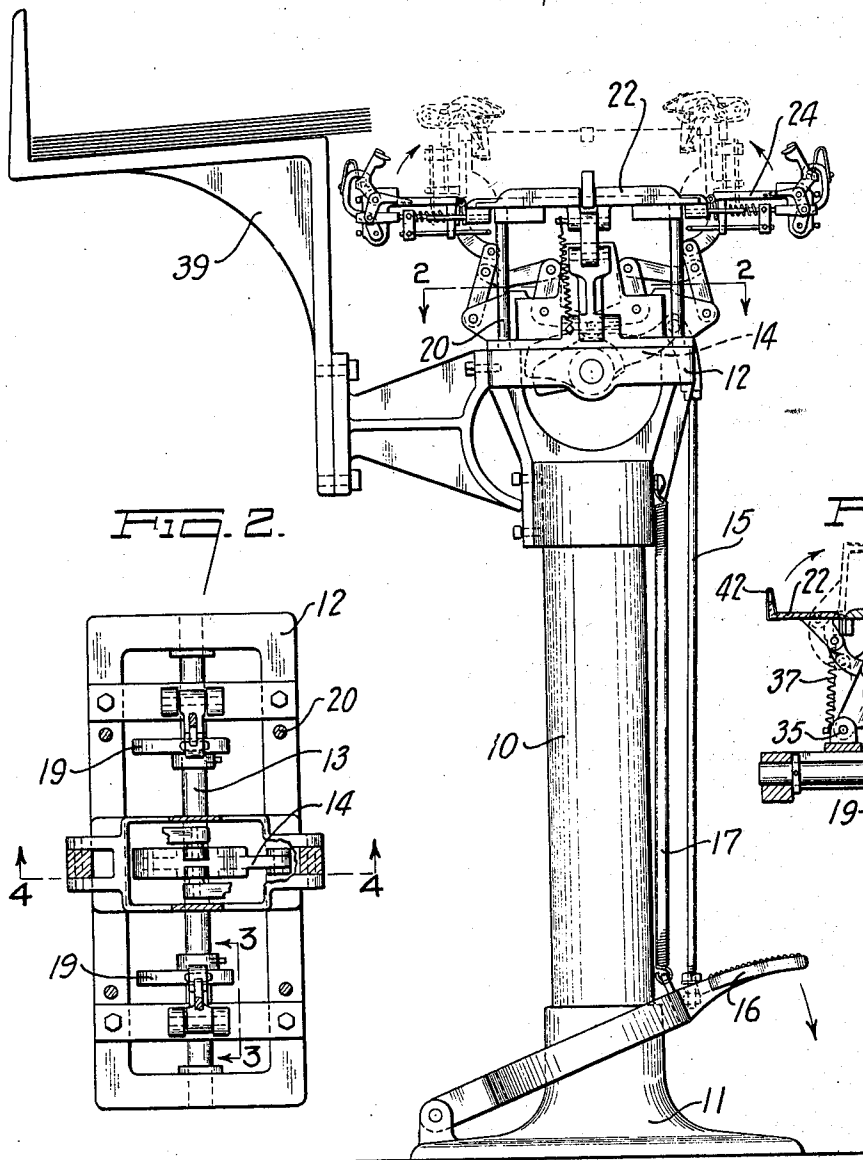


FIG. 2.

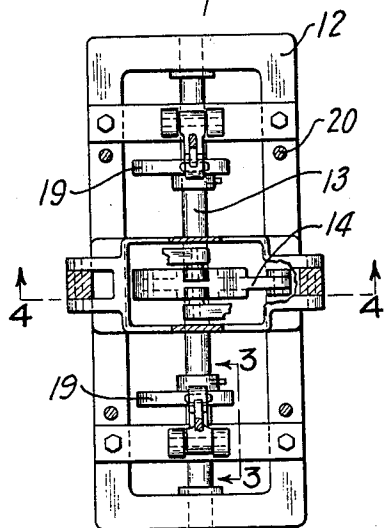


FIG. 3.

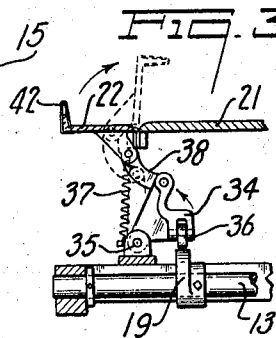
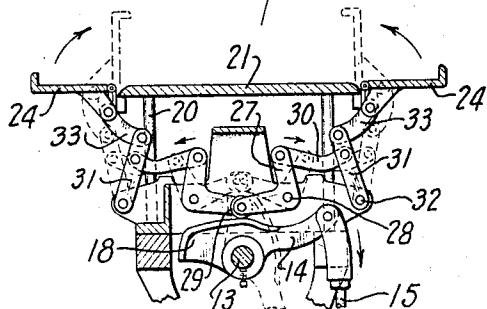


FIG. 4.



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3 Sheets-Sheet 3

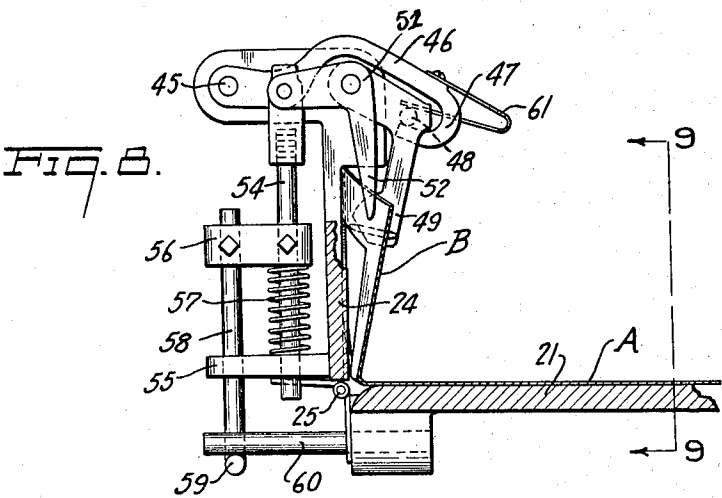
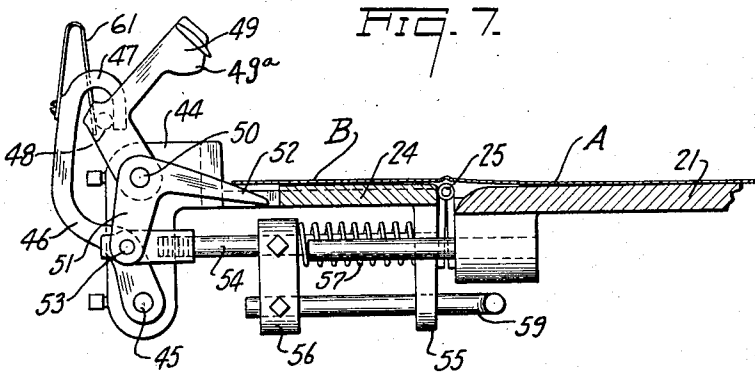
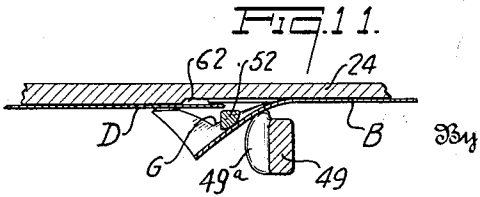
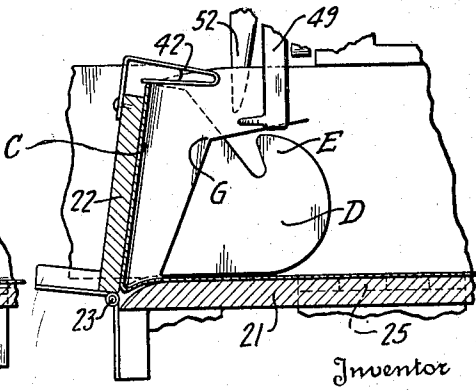
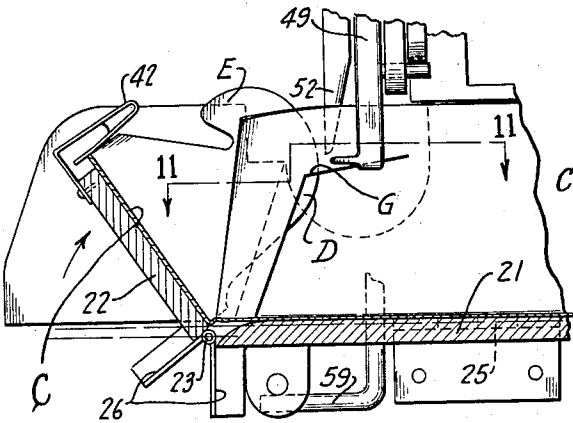


FIG. 9.

FIG. 10.



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UNITED STATES PATENT OFFICE

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MACHINE FOR FOLDING CARTON BLANKS

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6 Claims. (Cl. 93—49)

This invention relates to carton folding machines, but more particularly to machines for folding cartons having notched flaps insertable in slits formed in the adjacent side wall of the carton to enable the side walls to be interlocked securely for holding the same in useful position.

An object of the invention is to produce a new and improved machine of this character which is operative efficiently to fold the side walls of the carton together and securely interlock the side wall portions.

Another object is to produce a carton-folding machine having the new and improved features of construction, arrangement and operation hereinafter described.

The invention is shown by way of illustration, but not of limitation, in the accompanying drawings, in which:

Figure 1 is a side elevation of a carton folding machine;

Figure 2 is a transverse sectional view on the line 2—2 of Figure 1;

Figure 3 is a sectional view showing one of the end folding plates and operating mechanism therefor;

Figure 4 is a transverse sectional view on the line 4—4 of Figure 2;

Figure 5 is an enlarged top plan view of the folding mechanism;

Figure 6 is a transverse sectional view on the line 6—6 of Figure 5;

Figure 7 is an enlarged sectional view showing the lip opener to provide an opening suitable for receiving a notched flap;

Figure 8 is a view similar to Figure 7 showing the parts in operative position with the slot opened to receive the flap;

Figure 9 is an enlarged sectional view showing the manner in which the end folding plates fold the ends of the carton blank;

Figure 10 is a view similar to Figure 9 showing the position the parts assume after the end flaps are in locked position and the innermost position of the end folding plates; and

Figure 11 is a sectional view on the line 11—11 of Figure 9.

The illustrated embodiment of the invention comprises a carton folding machine having a pedestal 10 mounted on a base 11 and having a supporting frame 12 suitably mounted thereon. The frame 12 is disposed in horizontal position and extends outwardly beyond the opposite sides of the pedestal 10. Mounted on the frame 12 is a shaft 13 to which is fixed an outwardly extending arm 14, which is connected by a ver-

tically disposed link 15 to a treadle 16 mounted on the base 11. An helical spring 17 connected respectively to the pedestal and treadle 16 normally holds the latter in raised position.

Secured centrally to the shaft 13 is a cam 18, and also fixed to the shaft 13 on opposite sides of the cam 18 are cams 19, as will hereinafter appear. The cam 18 is adapted to actuate the side folding plates, whereas the cams 19 actuate the end folding plates, the cams 19 being arranged with respect to the cam 18 so that the action of the cams 19 is delayed substantially until the side folding operation has been accomplished.

Mounted above the frame 12 on legs 20 is a horizontally disposed rectangular flat carton supporting platen 21. Hingedly connected to the platen 21 and disposed at opposite ends thereof are end folding plates 22, which are connected to the platen 21 by hinges 23, and on opposite sides of the platen are side folding plates 24, which are connected to the platen 21 by hinges 25. The pivotal connection between the end folding plates 22 and the platen 21 are disposed slightly beneath the pivotal connection between the platen and the side folding plates 24 for a purpose hereinafter appearing. Normally, the plates 22 and 24 are disposed in their lower position substantially in alignment with the platen 21, each of the hinges being provided with stop plates or extensions 26 for limiting the downward swinging movement to hold them in the desired normal position.

As shown in Figure 4, the side folding plates 24 are conjointly actuated so that upon depression of the treadle 16, both plates 24 swing upwardly substantially to the dotted line position shown in Figure 4. For this purpose, similar mechanism is provided for each of the folding plates 24, and description of one is deemed sufficient. As shown, a bell crank 27 is pivoted at 28 and has a roller 29 engaging the cam 18. Pivoted to the opposite end of the bell crank 27 is a link 30, which is connected at its opposite end to an arm 31 pivoted at 32. The opposite end of the arm 31 is pivoted to an arm 33 secured to the underside of a folding plate 24. It will be apparent that the parts are so constructed and arranged that upon depression of the treadle 16 both systems of links and levers are actuated by the cam 18 simultaneously to swing both plates upwardly, and upon release of the treadle the plates 24 are caused to swing outwardly to normal position.

Each of the end folding plates 22 is actuated by similar mechanism driven respectively by the cam 19, and description of one is deemed sufficient. As shown, particularly in Figure 3, a bell crank 34 is pivoted at 35 and has a roller 36 at one end, which is held in engagement with the respective cam 19 by a coil spring 37. Pivoted to the opposite end of the bell crank 34 is an arm 38 connected to the underside of an end folding plate 22. It will be apparent that upon turning movement imparted to the shaft 13 by actuation of the treadle 16, both end folding plates 22 swing upwardly to the position shown by dotted lines in Figure 3, but this movement does not take place until after movement has been imparted to the side folding plates 24 in view of the relative arrangement of the cams 19 and 18 heretofore referred to.

This machine is designed to fold cartons having a body portion or bottom wall A, side walls B, and end walls C. Extending laterally from opposite ends of the end walls C are end flaps D having a hook shaped end portion E providing a notch F. Formed in opposite end portions of each of the side flaps B is a substantially L-shaped slit G through which the hooked end E of the flap D is adapted to be inserted and to interlock therein for securely holding the walls of the carton in folded position with the walls thereof disposed substantially at right angles to the body portion A. It will be observed that the slit G provides a flap G', which is folded away from the adjacent wall to admit the flap D as will hereinafter appear. Cartons of this description are well known to those skilled in this art, and further detailed description thereof is not considered necessary. It will be apparent that a carton, a supply thereof being supported on the shelf 39 mounted in any suitable manner on the pedestal 10 and frame 12, is placed in flat or unfolded position on the plates 21 with the end flaps C resting on the end plates 22 and side flaps or walls B resting on the side folding plates 24. It will be noted that a flange 40 extends along the free edge of each of the folding plates 24 against which the free edge of the side walls B may abut. These flanges serve to properly position the carton blank on the machine.

It will also be noted that a flange 41 is provided on the free edge of each of the end folding plates 22 for a similar purpose, and also mounted on each of the end plates is a spring 42. As shown in Figure 6, the spring 42 is secured at one end to the back of each folding plate 22 by a rivet 43, the opposite end portion of the spring being folded upon itself and positioned frictionally to engage the adjacent free edge of the end flap or wall C of the carton.

From the above description, it is apparent that the carton can be readily and conveniently disposed in the proper position upon the platen 21, and, upon depression of the pedal 16, the side folding plates 24 swing upwardly. Following this movement, the end folding plates 22 swing upwardly, thereby to fold the walls of the carton into a position substantially at right angles to the bottom wall or body A of the carton.

Mechanism is provided for opening the slot G by bending portions of the carton walls in opposite directions in order freely to admit the insertion of the end flap B. Such mechanism is disposed in the region of each of the slots G and two devices of this structure are carried by each of the side folding plates 24. As shown, a boss 44 is formed on each end portion of the folding plates 24 and pivoted at 45 to the boss 44 is a

lever 46 which has a hooked end 47. The hooked end 47 hooks over a pin 48 secured to an intermediate portion of a substantially V-shaped abutment arm 49 which is pivoted to the boss 44 at one end on a pin 50. The arm 49 has a curved or rounded nose 49^a at the free end. Also pivoted on the pin 50 for movement independent of the abutment arm 49 is a bell crank lever 51 having a pointed opening finger 52 at one end. The opposite end of the bell crank 51 is pivotally connected at 53 to the lever 46 adjacent the pivotal connection 45. Secured to the pin 53 is a rod 54, the free end of which slides through a flange 55 depending from the underside of the folding plate 24 adjacent the inner end thereof. Fixed to the rod 54 is a collar 56 and disposed on the rod 54 between the collar 56 and the flange 55 is a coil spring 57. Also fixed to the collar 56 and passing through the flange 55 is an arm 58, which has a hook shaped end 59 adapted to engage a rod 60, which is secured to the underside of the platen 21 and projects outwardly beyond the edge thereof.

In operation, when the folding plates 24 are swung upwardly each of the side walls or flaps B are folded upwardly at substantially right angles to the bottom or body portion A, and, during such movement, the folding finger 52 engages the outer side of the carton wall B in the region of the slotted portion G substantially as shown in Figure 8. At the same time the nose 49^a of the abutment arm 49 abuts against the inner side of the flap G' and urges the same toward the folding plate 24. Thus, it is apparent that the abutment lever 49 is moved inwardly toward the side folding plate 24, but the finger 52, which engages the outer side of the carton wall B, is forced in the opposite direction or inwardly, thereby opening the slit G in the desired manner.

This movement is accomplished upon engagement by the hooked end 59 of the arm 58 and the rod 60, which, upon further movement of the parts, operates to swing the arm 46 in a clockwise direction (Figures 7 and 8), which, through a spring 61 disposed between the arm 46 and the pin 48, imposes a yieldable pressure on the abutment arm 49 to actuate the arm in the same direction. At the same time movement is imparted to the bell crank 51, causing the same to move in a counter clockwise direction to swing the finger 52 upwardly (Figure 7). During this movement of the parts, the spring 57 will have been compressed so that upon release of the treadle to allow the parts to return to normal position, the abutment lever 49 and finger 52 snap in opposite directions away from the folded carton.

As indicated in Figure 11, a portion of the folding plates 24 is recessed at 62 to receive the side wall or flap B in order to allow the end flap D to move freely through the slot G without striking against the free edge of the wall B. As above pointed out, the end folding plates 22 move after movement has been imparted to the side folding plates 24. Since the pivotal mounting of the end folding plate 22 is below that of the side folding plates 24, the operation is to impart a downward swinging movement to the flaps D to insure their proper insertion into the slitted portions G, which, as above described, have been opened properly to freely admit the same. It will be apparent from an inspection of Figures 9 and 10, that as the end folding plates 22 swing upwardly, the end flaps D are forced inwardly and downwardly in such manner that they are

freely inserted into the slitted portions G. After the hooked end E is moved well within the slitted portion, the end walls will have moved slightly past vertical position, and, upon release of the treadle 16, the side plates 24 swing outwardly away from the carton, and also the end folding plates 22 move in the same direction. Since the spring 42 is in frictional engagement with the end walls of the carton, they impart a slight retrograde or reverse movement to the end walls C to interlock the flap D in the side walls B, as will be readily apparent from an inspection of Figure 10.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention, especially as defined in the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a machine for folding cartons having slitted side walls adapted to receive hook flaps on end walls thereof, a support for a carton blank, means for folding the sides and ends of the blank, means operable conjointly with said folding means for inserting each flap through the adjacent slip and causing the parts to lock together, said folding means being operable slightly to buckle a portion of the end walls to enable the flaps to be forced freely into the respective slitted portions, and means to impose retrograde movement to the end walls to insure inter-engagement between the hook flaps and slitted side walls.

2. In a machine for folding cartons having hook flaps and slitted portions in the walls thereof, means to bend the walls of the carton at right angles to the body portion, and means coacting with said folding means for simultaneously inserting each hook flap into its respective slitted portion, said inserting means including means frictionally engaging the walls having the flaps for imparting retrograde movement thereto for insuring inter-engagement between the hook portions and slitted portions.

3. In a machine for folding cartons having

hook flaps and slitted portions in the walls thereof, means to bend the walls of the carton at right angles to the body portion, means coacting with said folding means for simultaneously inserting each hook flap into its respective slitted portion, said inserting means including elements operable in opposite directions for opening the slitted portions to receive the flaps respectively, and means to impose retrograde movement to the walls having flaps to insure inter-engagement between the hook portions and slitted portions.

4. In a machine for folding cartons having hook flaps and slitted portions in the walls thereof, means to bend the walls of the carton at right angles to the body portion, said bending means including end and side folding plates, the end-folding plates being adapted to swing on a different radius from the side folding plates to impose a buckling action on the end portion of the carton walls to facilitate insertions of the hook flaps, and means coacting with said folding means for simultaneously inserting each hook flap into its respective slitted portion.

5. In a machine for folding cartons having hook flaps and slitted portions in the walls thereof, means to bend the walls of the carton at right angles to the body portion, means coacting with said folding means for simultaneously inserting each hook flap into its respective slitted portion, said inserting means including an abutting arm engageable with one side of a carton wall adjacent a slitted portion and an opening finger engageable with the opposite side of such wall, and means to actuate the arm and finger in opposite directions.

6. In a machine for folding cartons having hook flaps and slitted portions in the walls thereof, means to bend the walls of the carton at right angles to the body portion, means co-acting with said folding means for simultaneously inserting each hook flap into its respective slitted portion, and means for causing retrograde movement of said hook flaps to insure inter-engagement thereof with their respective slitted portions.

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