Jan. 12, 1943. E. G. HOROWITZ 2,308,010

APPARATUS FOR FOLDING AND CLOSING CARTONS

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Fig. 1

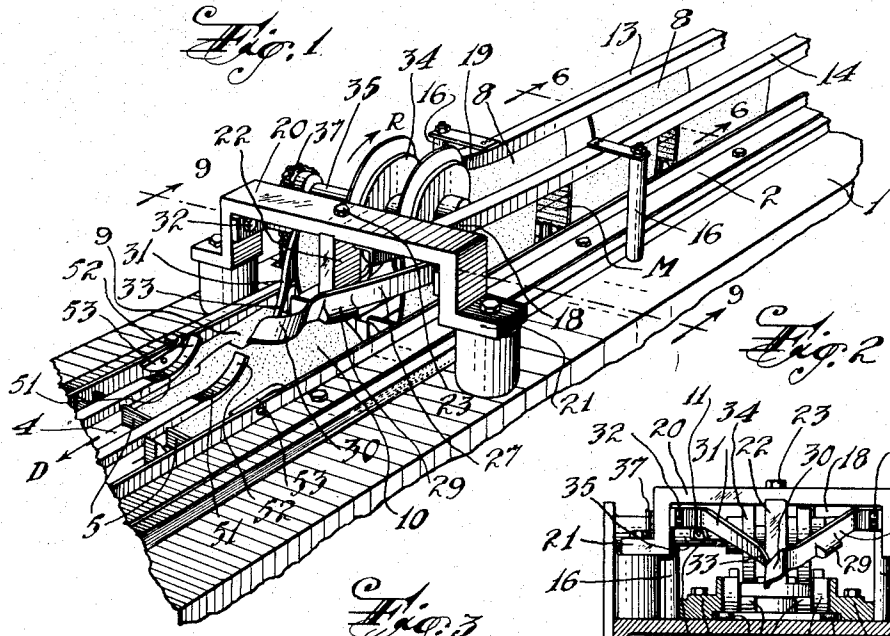


Fig. 2

Fig. 3

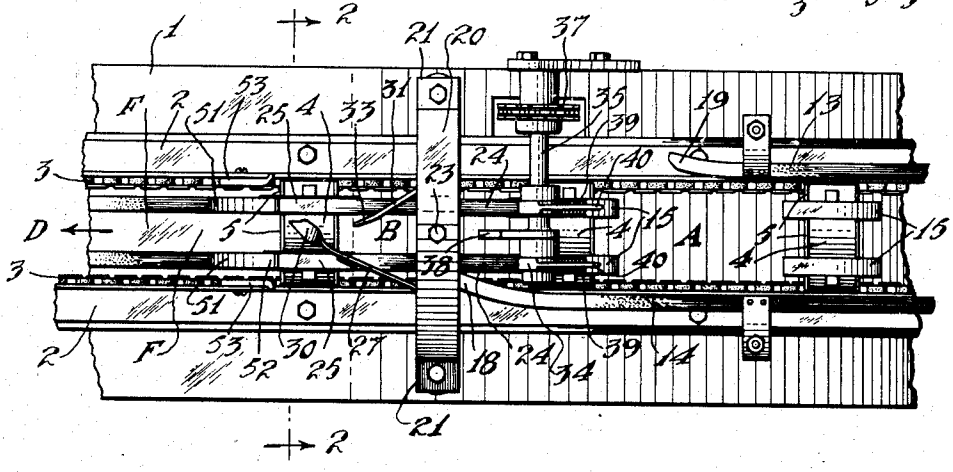
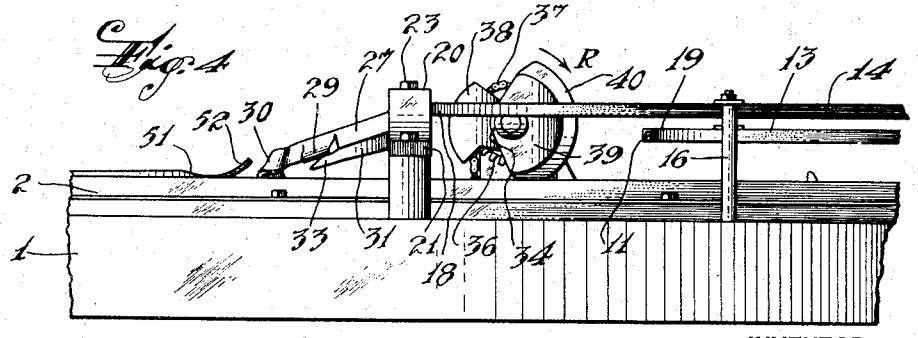


Fig. 4



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Fig. 5

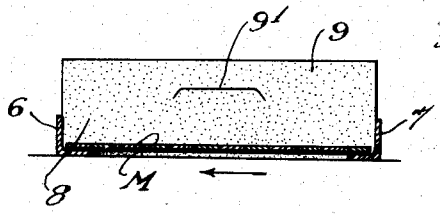


Fig. 5a

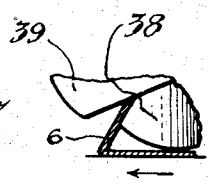


Fig. 5b

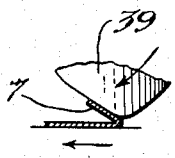


Fig. 6

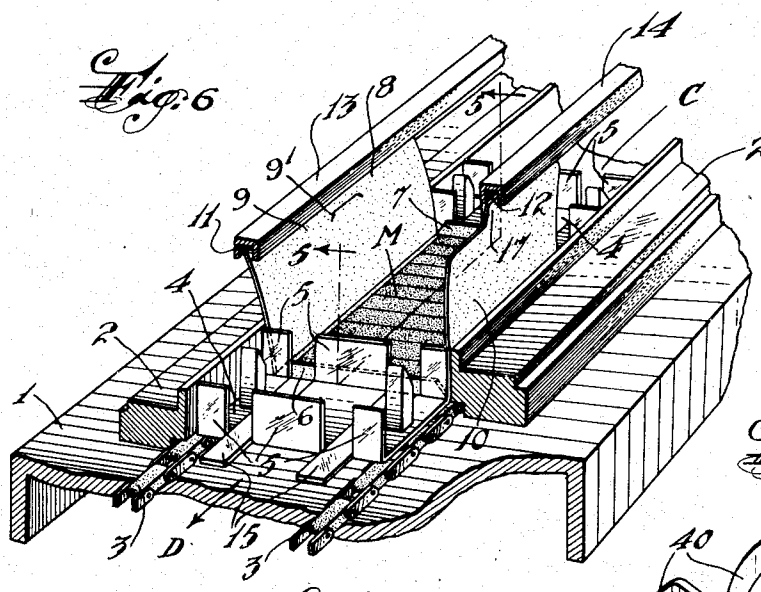


Fig. 7

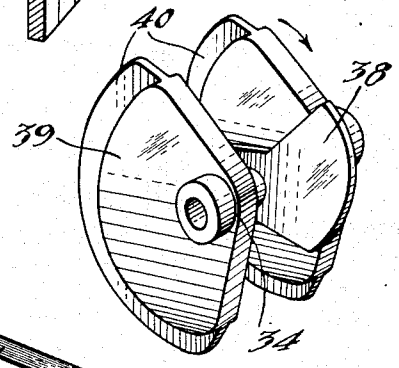


Fig. 8

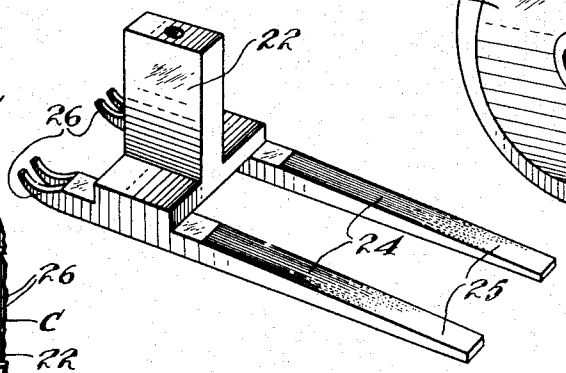
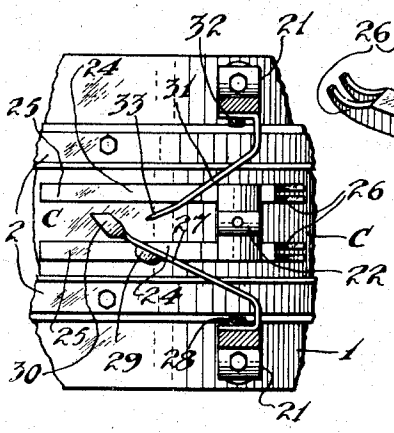


Fig. 9



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Fig. 10

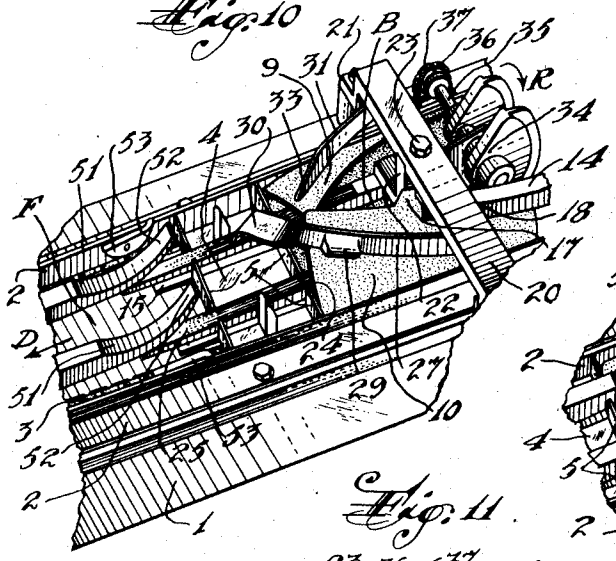


Fig. 13

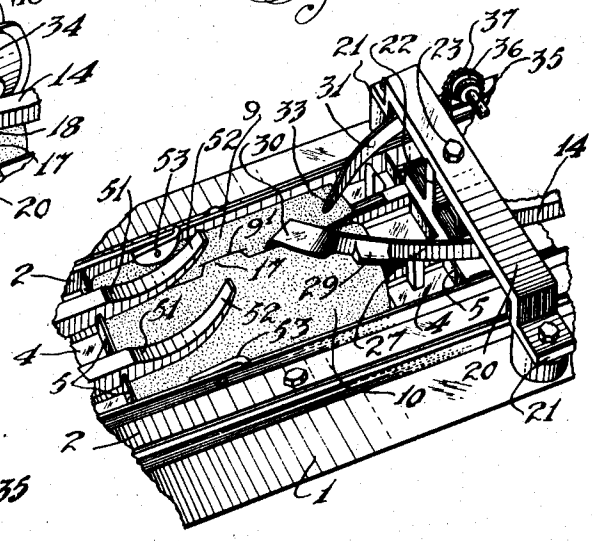


Fig. 11

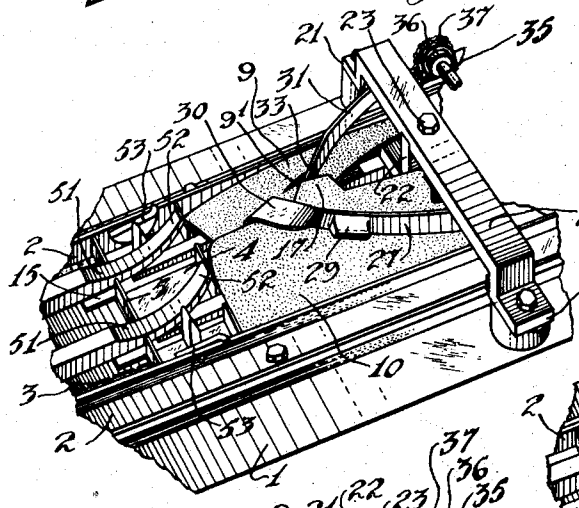


Fig. 14

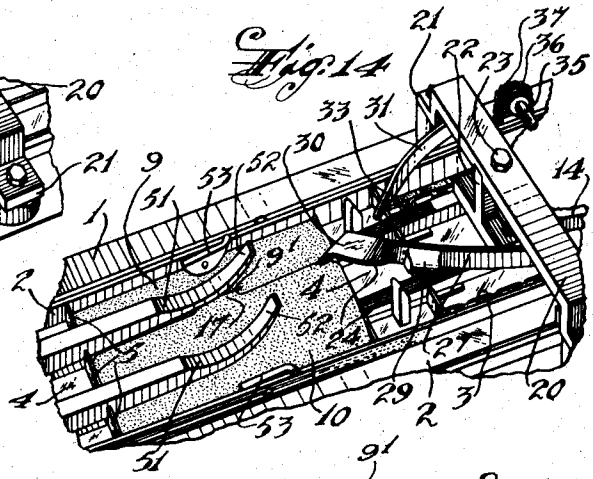


Fig. 12

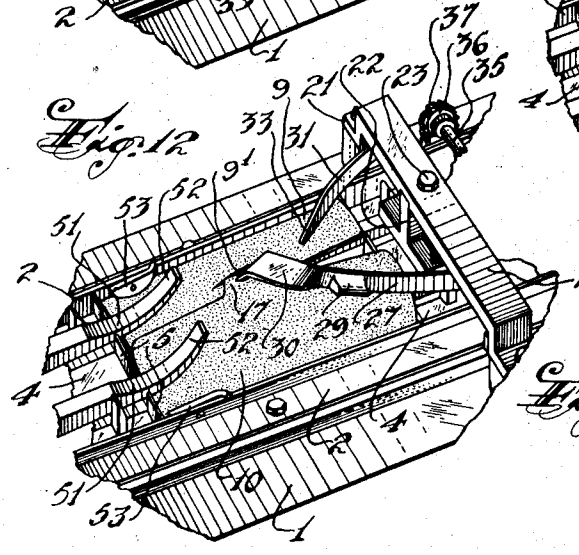
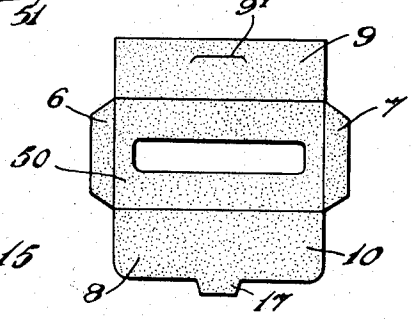


Fig. 15



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Patented Jan. 12, 1943 2,308,010

UNITED STATES PATENT OFFICE

2,308,010

APPARATUS FOR FOLDING AND CLOSING CARTONS

Ephraim G. Horowitz, Brooklyn, N. Y.

Application August 2, 1940, Serial No. 350,008

16 Claims. (Cl. 93—6)

This invention relates to an apparatus for folding and closing cartons by the selective and automatic folding of carton flaps in overlapping and interlocking relation.

A further object of my invention is to provide such apparatus adapted to automatically spread the slit opening in one flap and insert the tab of the other flap therein.

A further object of my invention is to provide an apparatus for the hygienic packaging of articles in cartons in a rapid, efficient and economical manner.

A further object of my invention is to provide an apparatus of this character having novel means for guiding and directing the carton side flaps in the operation of the folding and interlocking the same to close the carton.

These and other advantageous objects which will later appear, are accomplished by the novel and practical construction, combination and arrangement of parts illustrated in the accompanying drawings, showing one convenient embodiment of my invention, wherein:

Fig. 1 is a perspective, fragmentary view of an apparatus embodying my invention,

Fig. 2 is a transverse sectional view thereof taken on lines 2—2 of Fig. 3 in the direction of the arrows,

Fig. 3 is a top plan view of the apparatus shown in Fig. 1, the cartons being eliminated in Fig. 3 for the sake of clarity,

Fig. 4 is a side elevational view thereof,

Fig. 5 is a longitudinal sectional view of the carton passing through my apparatus, taken on lines 5—5 of Fig. 6,

Figs. 5*a* and 5*b* are fragmentary sectional views showing the manner of folding the carton and flaps pursuant to my invention,

Fig. 6 is a fragmentary perspective view taken on line 6—6 of Fig. 1 in the direction of the arrows,

Fig. 7 is an enlarged perspective view of a rotatable vane member adapted for use in my apparatus for folding the end flaps of the carton,

Fig. 8 is an enlarged perspective view of a plate member adapted for use in my apparatus for guiding and directing the carton side flaps in the operation of folding and interlocking the same,

Fig. 9 is a fragmentary top plan view taken on lines 9—9 of Fig. 1 in the direction of the arrows,

Figs. 10–14, inclusive, are fragmentary perspective views showing the position of the side flaps as the carton is fed through the apparatus for folding and interlocking the same, and

Fig. 15 is a plan view of the carton blank in the form in which it is originally received in the apparatus of my invention.

My apparatus comprises a frame 1 which is provided with spaced parallel wall members 2 defining a channel C (Figs. 6 and 9) for the reception of endless chain or belt members 3 provided with equidistantly spaced carton carrying members 4 having upstanding flanges 5 against which the end flaps 6—7 of carton 8 abut and provided with projecting fingers 15 on which the carton is positioned as indicated in Fig. 6. The carrying members 4 progressively move the carton through the apparatus in the direction indicated by the arrows D in Figs. 1, 3, 6, and 10. The carton 8 is originally inserted in the apparatus of my invention in the form of the blank shown in Fig. 15, which is subjected to an initial operation in one station of the apparatus (not shown) to fold the side flaps 9, 10 and end flanges 6, 7 upwardly as indicated in Fig. 6, positioning the carton in this open position on the fingers 15 and between flanges 5 of a pair of carrying members 4. The carrying members 4 are secured to the chains 3 and move therewith, carrying the carton to another station (not shown) wherein the upper edge of the side flap 9 and tab 17 of the side flap 10 are respectively received within the inverted channels 11, 12 of the channel members 13, 14, respectively, the latter being maintained in spaced relation on the frame by spacing elements 16.

At the next station (not shown) an article of merchandise M to be enclosed in the carton is positioned therein and the carton is carried along by chains 3 and the members 4 thereof to the station at which the carton is folded and closed.

Carton Closing and Folding Mechanism

The apparatus for closing and folding the carton is particularly shown in Figs. 1, 3, and 10–14. The channel member 14 is provided with an open end 18, which is directed inwardly toward the channel member 13, the latter having an open end 19 directed outwardly away from the channel member 14 and terminating short of the open end 18 of the latter.

An arch member 20 is secured to the frame 1 by spacing means 21, said arch member spanning the channel wall members 2. Plate 22 is fixed to and suspended from the arch member 20 by any desired or convenient means 23 passing through

the plate and arch member. The lower end of the plate 22 has fixed thereto in spaced parallel relation elongated bars 24, having tapered ends 25 and bifurcated ends 26 (see Fig. 8). The open end 18 of channel 14, which is directed inwardly toward the channel member 13, terminates at the arch member 20 (see Fig. 1); a rod 27 is fixed at one end 28 (see Fig. 9) to the arch member 20, the rod projecting inwardly in spaced relation to the end 18 of the channel 14 (see Fig. 1) in the same general plane as end 18. The rod 27 is also downwardly directed (see Figs. 2 and 4) and is provided, intermediate its length, with offset protuberance 29, the free end 30 of the rod being offset downwardly for a purpose presently explained, and terminating at a point past the medial line of the channel C. The protuberance 29 of rod 27 is offset from rod 27 for engagement with the side flap 10 at a point adjacent the rod proper to further aid the curling action and preclude buckling of the flap, presently explained. Blade 31 at one end 32 is secured to arch member 20 (see Fig. 9) the blade being inwardly directed toward the rod 27, the free end 33 of the blade terminating short of the medial line of the channel C at a higher plane than and spaced from the rod 27, said end 33 being angularly directed toward the end 30 of the rod 27. A unitary member 34 is keyed to a shaft 35 journalled in suitable bearings and keyed to a sprocket 36 adapted to be rotated by an endless chain or belt 37. Member 34 is provided with an intermediate vane 38 and with spaced outer vanes 39, the latter having peripheral ribs 40 adapted to freely rotate in the bifurcated ends 26 of bars 24, the juxtaposition of the parts being clearly shown in Fig. 3.

Modus operandi

The carton 8 to be filled, folded and closed in my apparatus is initially inserted therein in the form of a blank as shown in Fig. 15, having end flaps 6 and 7 adapted to be folded inwardly by the vanes 38 and 39 respectively of member 34 and side flaps 9 and 10, having the slit 9' and the tab 17 respectively. The carton 8 is moved through the apparatus in the direction indicated by the arrow D in Figs. 1, 3, 6, and 10, by means of the endless chains 3 to which carrying members 4 are secured, the endless chains 3 being moved by power driven sprockets (not shown) in continuous path through the channel C on frame 1. On the initial station (not shown) the carton flaps are folded upwardly and the central panel 50 of the carton is positioned on the projecting fingers 15 of a pair of carrying members 4, the end flaps 6 and 7 of the carton abutting the upstanding flanges 5 of said carrying members. The carton is carried on the carrying members 4 with the upper edges of side flaps 9 and of tab 17 of side flap 10 respectively received within the channel members 13 and 14. The articles of merchandise to be enclosed in the cartons are positioned therein and the carton is carried along to the station at which the same is folded and closed pursuant to my invention. I have found, in practice, that the intermittent rather than continuous actuating of the chains 3 is advantageous in permitting independent but simultaneous action to take place at the various stations in the apparatus. This is a matter of convenience to which the invention is obviously not limited. The station indicated in Fig. 6 is that at which the carton has received the merchandise M to be enclosed therein; the carton is folded and closed at the next two stations (from A to B and B to F, Fig. 3), as follows:

First the carton is actuated from position A, Fig. 3 to position B, thus folding the end flaps 6 and 7 (position B of Fig. 3 corresponding to that shown in Fig. 10) and initially bringing the side flaps 9 and 10 into abutment with blade 33 and rod 27.

The member 34 is rotated in the direction indicated by the arrow R, (Figs. 1, 4, and 10) the rotation of member 34 being so synchronized relative to the movement of chains 3 that the end flap 6 will intercept the path of rotation of the rotating vane 38 (see Fig. 5*a*) when the flap is moved under member 34. As member 34 rotates, the flap 6 is folded downwardly thereby as shown in Fig. 5*a* between vanes 38 and 39 and thence to flatly fold same under ends 26 of bars 24. The carton continues its movement under member 34 and when the flap 7 registers with the rotating member 34, the vanes 39 of the latter will have been rotated into position for contacting flap 7 (Fig. 5*b*). The vanes 39 continuing to rotate, fold flap 7 downwardly as indicated in Fig. 5. The carton is now in the position indicated at B, Figs. 3 and 10. During its movement from position A to position B, not only have the end flaps 6 and 7 been folded downwardly, but the side flaps 9 and 10 will at the same time have been moved into position shown in Fig. 10 at which they are subjected to their initial curling folding operation. The flap 9, in being moved from the position A, will have been carried out of the open end 19 of the channel 13, and continuing in the direction D to position B, will have been brought into abutment with the blade 31 and thereby curled toward the flap 10 as indicated in Fig. 10. At the same time, the flap 10 will have moved out of the end 18 of the channel 14; end 18 being directed inwardly toward the channel member 13, will have imparted an inwardly curling movement to the flap 10. On abutment with rod 27, the flap 10 is further curled inwardly and brought into initial overlapping relation with the flap 9. It will be noted (see Fig. 10) that the tab 17 of flap 10 at this position abuts the plate 22.

Movement of the carton to the next station (F) from the position B is illustrated in Figs. 11–14, inclusive. It will be noted (see Fig. 11) that as the flap 9 is carried into further abutment with the blade 31, the latter depresses the area of the flap adjacent the slit 9' therein; at the same time the flap 10 continues to overlap the flap 9 and the tab 17 of flap 10 initially overlaps the angularly directed end 33 of the blade 30. The flaps 9 and 10 also fulcrum over the bars 24 of plate 22 as shown in Figs. 10–14.

Continuing the movement of the carton as indicated in Fig. 12, the tab 17 snaps past the end 33 of blade 31 and is contacted by the angularly downturned end 30 of the rod 27, which being at a lower plane than the end 33 of blade 31 depresses the tab 17 into initial entry into the slit 9' of the flap 9.

Continuing the movement of the carton to the position shown in Fig. 13, the tab 17 fully enters the slit 9' and interlocks the flaps, the end 30 of the rod 27 holds the flaps downwardly in position, and, in collaboration with the angularly directed end 33 of the blade 31, depresses the flaps 9 and 10 into close parallel overlapping relation. Buckling of the flaps is further precluded by cam plates 53 carried by the wall members 2, in alignment with the ends 52 of fingers 51 as shown in Fig. 13, the plates 53 camming over the outer longitudinal edges of the side flaps as the latter are moved therebeneath.

The carton in the final position of the station F is passed under the cam plates 53 and spring fingers 51, the latter being normally urged downwardly and having upwardly curled free ends 52 with which the flaps 9 and 10 have abutting relation to further depress and close the flaps in their folded position as in Fig. 14, the other ends of said spring fingers 51 being secured to the frame 1 by any suitable means to space the same in the channel C at the desired position.

Station F is shown in Figs. 3 and 10. As one carton reaches station F the succeeding carton will be at station B, the relative position of the parts being clearly shown in Fig. 10.

From station F the cartons, which now are filled, closed and sealed, may be ejected from the apparatus in any desired or convenient manner.

In résumé, it will be noted that the movement of the cartons through my apparatus is in the direction D, the side flaps 9 and 10 being held in their open position by their engagement with the channel members 13 and 14 until the merchandise M has been positioned in the carton. Then the carton is moved to a position at which its end flaps 6 and 7 are folded by member 34 and side flaps 9 and 10 pass beyond the channel members. The blade 31 is interposed in the path of movement of the carton flap 9 and the rod 27 is interposed in the path of movement of the carton flap 10 so that on the continued movement of said carton the blade and rod will cause the flap 10 to overlap flap 9, the end 33 of blade 31 depressing the slit area 9' while the end 30 of rod 27 causes the tab 17 of flap 10 to enter said slit and interlock the flaps. The invention is intended for the interlocking of members and is adapted for use not only with cartons of the blank form shown in Fig. 15 but also for other cartons and devices to which the apparatus may be adapted.

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

1. An apparatus for folding the upright spaced flaps of a carton, comprising a frame provided with means for moving the carton thereon, and a blade and rod secured to said frame and directed toward each other with their free ends spaced apart in different planes and interposed in the path of movement of said carton for selective engagement by the carton flaps to curl and fold them into overlapping relation as the carton is moved into engagement therewith.

2. An apparatus for inserting the tab of a carton flap into the slit of a complementary carton flap, comprising a frame provided with means for moving the carton thereon, a blade secured to said frame and interposed in the path of movement of the slitted flap, said blade having an angularly directed free end adapted to depress and open the slit area as the carton is moved into engagement with said blade end, and a rod secured to said frame opposite the blade in the path of movement of the tab flap, said rod being provided with a free, downturned end spaced from the blade and projecting therebeyond and therebelow adapted to depress the tab of the flap into the slit as the tab is moved into engagement with said rod.

3. An apparatus for folding the upright spaced flaps of a carton, comprising a frame, an arch member secured thereto, a plate medially suspended from said arch member, a blade and rod secured to and projecting from the arch member at opposite sides of the plate, said blade and rod being angularly directed toward each other, and means for moving a carton on the frame and through the arch with the carton flaps passing at opposite sides of the plate, the flaps being guided, by their engagement with said plate, into selective engagement with the blade and rod to curl and fold the flaps into overlapping relation as the carton is moved past the said plate, blade and rod.

4. In an apparatus for inserting the tab of a carton flap into the slit of a complementary flap, means secured to said apparatus for depressing the slit area, and a rod secured to said apparatus and provided with a downwardly directed end spaced from and terminating at a lower plane than said means, adapted to be engaged by the carton tab flap, to depress the tab into said slit to interlock the flaps as the carton tab is moved into engagement with said rod.

5. In an apparatus for inserting the tab of a carton flap into the slit of a complementary flap, means secured to said apparatus for depressing the slit area, and a rod secured to said apparatus and provided with a downwardly directed end spaced from said means, adapted to be engaged by the carton tab flap, to depress the tab into said slit to interlock the flaps as the carton tab is moved into engagement with said rod, said rod being further provided with a protuberance offset from the rod adapted for engagement by the flap at a point adjacent the rod proper to preclude buckling of the tab flap and facilitate the interlocking of the flaps.

6. In an apparatus for inserting the tab of a carton flap into the slit of a complementary flap, means secured to said apparatus for depressing the slit area, and a rod secured to said apparatus and provided with a downwardly directed end spaced from said means adapted to be engaged by the carton tab flap to depress the tab into said slit to interlock the flaps as the carton tab is moved into engagement with said rod, and cam plates carried by the apparatus and spaced from the said means and rod adapted for longitudinal engagement by the flaps to facilitate the interlocking of the flaps.

7. In an apparatus for folding upright spaced flaps of a carton in overlapping relation, a frame, an arch member secured thereto, a plate secured to and suspended from said arch member, bars fixed to the plate in spaced relation to the frame, a pair of members secured to said arch member and directed toward each other above said bars, and means for moving the carton on the frame through the arch member with the flaps of the carton at opposite sides of the plate over the elongated bars thereof adapted to have fulcruming engagement with the bars and to be engaged by said pair of members, to curl and fold them into overlapping relation.

8. In apparatus for folding upright spaced flaps of a carton in overlapping relation, a frame, an arch member secured thereto, a plate secured to and suspended from said arch member, bars fixed to the plate in spaced relation to the frame, a pair of members secured to said arch member and directed toward each other above said bars, and means for moving the carton on the frame through the arch member with the flaps of the carton at opposite sides of the plate over the elongated bars thereof and in engagement with said pair of members, to curl and fold the flaps into overlapping relation, and cam means secured to said frame beyond the arch member and

spaced from the elongated bars for complementary action therewith in the folding of the carton flaps.

9. An apparatus for folding two pair of flaps of a carton comprising a frame provided with means for moving the carton on the frame in a predetermined path, a rotatable member provided with vanes adapted to selectively engage one pair of flaps during the movement of the carton on the frame, and a pair of members secured to the frame and directed toward each other and interposed in the path of movement of the carton beyond the rotatable member adapted to be selectively engaged by the other pair of flaps to fold the same in overlapping relation.

10. In an apparatus for folding upright spaced flaps of a carton in overlapping relation, a frame, an arch member secured thereto, a plate secured to and suspended from said arch member, bars fixed to the plate in spaced relation to the frame, means for moving the carton on the frame through the arch member with the side flaps of the carton at opposite sides of the plate over the elongated bars thereof, and means for engaging the flaps to curl and fold them in overlapping relation on the bars.

11. In an apparatus for folding upright spaced flaps of a carton, a frame, means for moving the carton on the frame, and a pair of inverted channel members secured to the frame in spaced relation thereto for the reception of the upper edges of the flaps of the carton, one of said members being provided with an open end directed toward the other member, the latter having an open end directed outwardly away from the first mentioned member.

12. In an apparatus for folding upright spaced flaps of a carton, a frame, means for moving the carton on the frame, and a pair of inverted channel members secured to the frame in spaced relation thereto for the reception of the upper edges of the flaps of the carton, one of said members being provided with an open end directed toward the other member, the latter having an open end directed outwardly away from the first mentioned member, and terminating short of the open end of the first mentioned member.

13. In an apparatus for folding upright spaced flaps of a carton, a frame, means for moving the carton on the frame, and a pair of inverted channel members secured to the frame in spaced relation thereto for the reception of the upper edges of the flaps of the carton, one of said members being provided with an open end directed toward the other member, the latter having an open end directed outwardly away from the first mentioned member, and terminating short of the open end of the first mentioned member, and means secured to said frame beyond said open ends for interlocking said flaps.

14. In an apparatus for folding upright spaced flaps of a carton, a frame, means for moving the carton on the frame, and a pair of inverted channels secured to the frame in spaced relation thereto for the reception of the upper edges of the flaps of the carton, one of said channels being provided with an open end directed toward the other, the latter having an open end directed outwardly away from the first mentioned channel and a pair of members secured to the frame and directed toward each other interposed in the path of movement of the carton beyond the open ends of the channels, adapted to be selectively engaged by the flaps passing through said open ends to fold the same in overlapping relation.

15. In an apparatus for folding upright spaced flaps of a carton, a frame, means for moving the carton on the frame, a pair of inverted channels secured to the frame in spaced relation thereto for the reception of the upper edges of the flaps of the carton, said channels being provided with open ends, a pair of members directed toward each other, and a plate positioned intermediate and spaced from said pair of members, said pair of members and plate being secured to said frame in spaced relation thereto, in the path of movement of the carton beyond the open ends of the channels, for engagement by the carton flaps passing through said open ends to fold them into overlapping relation as the carton is moved into engagement therewith.

16. An apparatus for folding the upright spaced flaps of a carton, comprising a frame provided with means for moving the carton thereon, a pair of members directed toward each other, and a plate positioned intermediate and spaced from said pair of members, said pair of members and plate being secured to said frame in spaced relation thereto in the path of movement of the carton for engagement by the carton flaps to fold them into overlapping relation as the carton is moved into engagement therewith.

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