May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 1

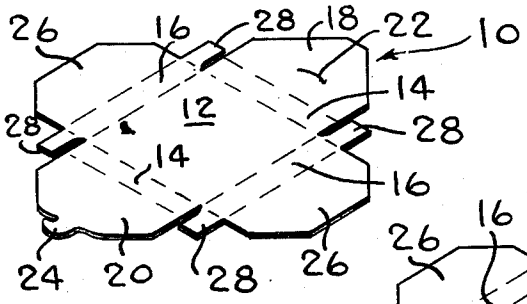


FIG. 1

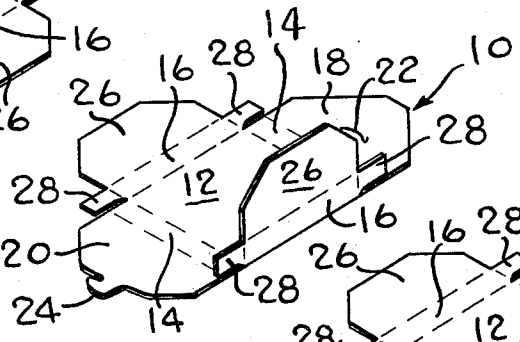


FIG. 2

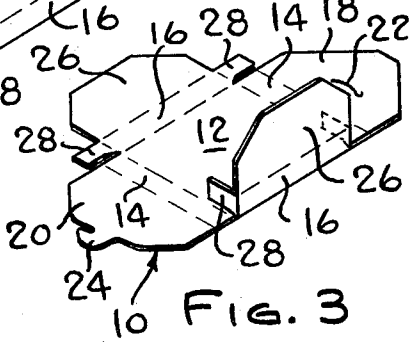


FIG. 3

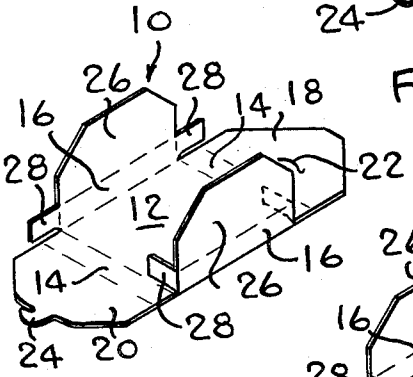


FIG. 4

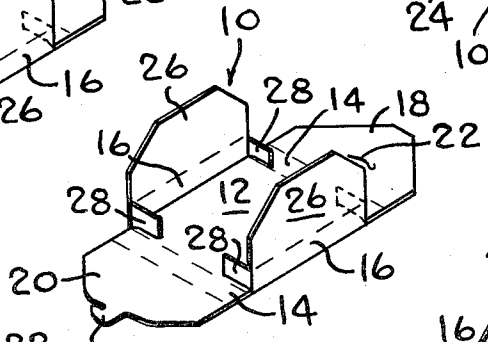


FIG. 5

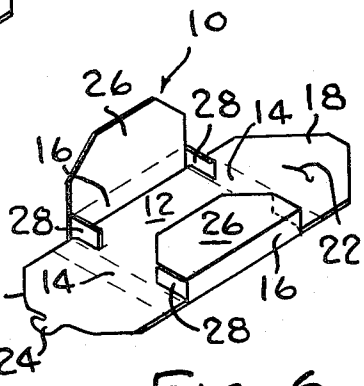


FIG. 6

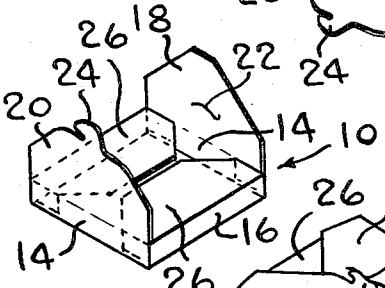


FIG. 7

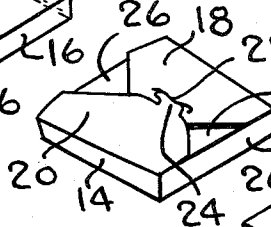


FIG. 8

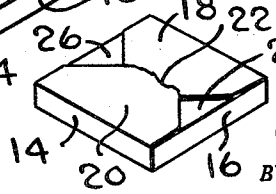


FIG. 9

INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 2

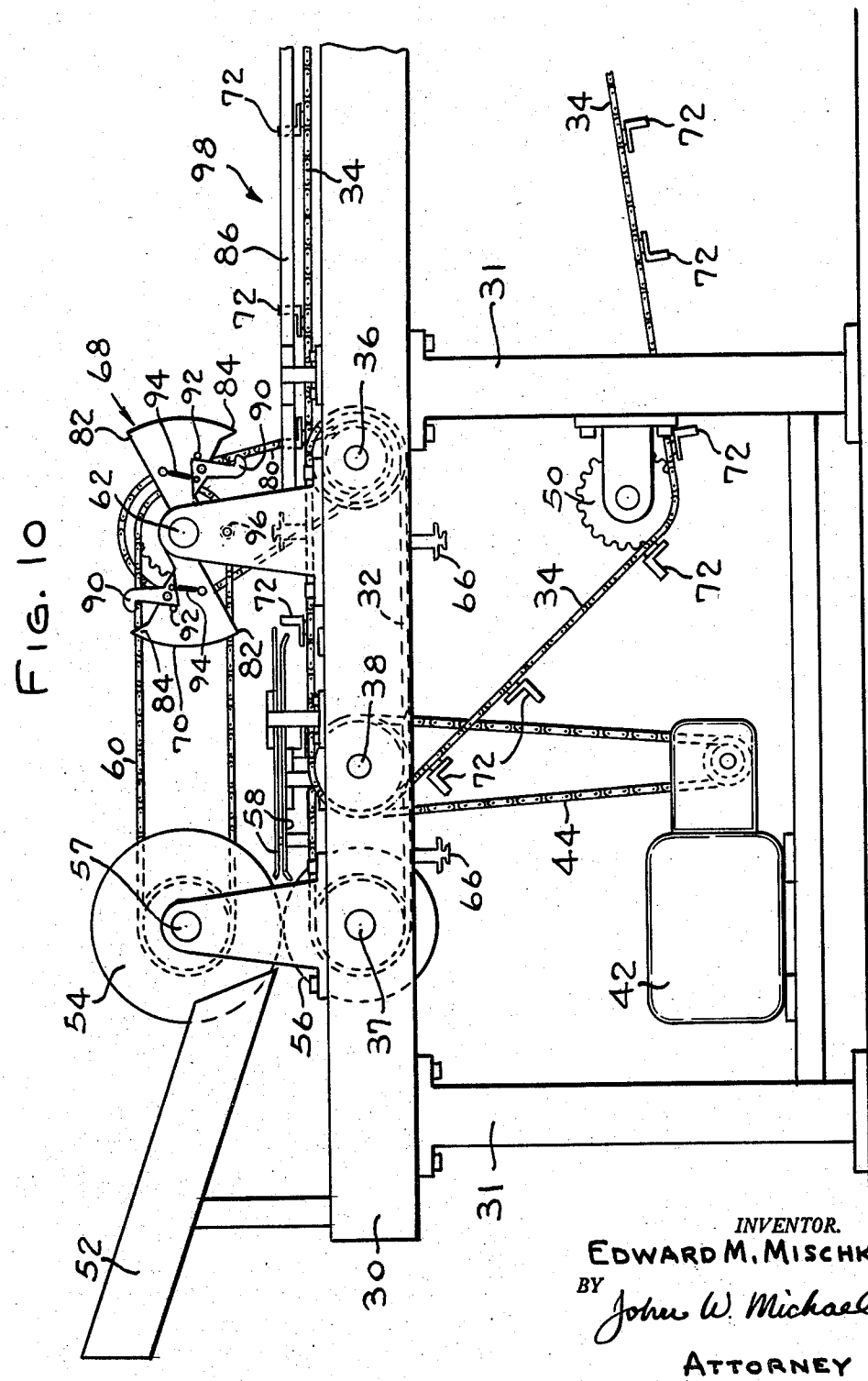


FIG. 10

INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 3

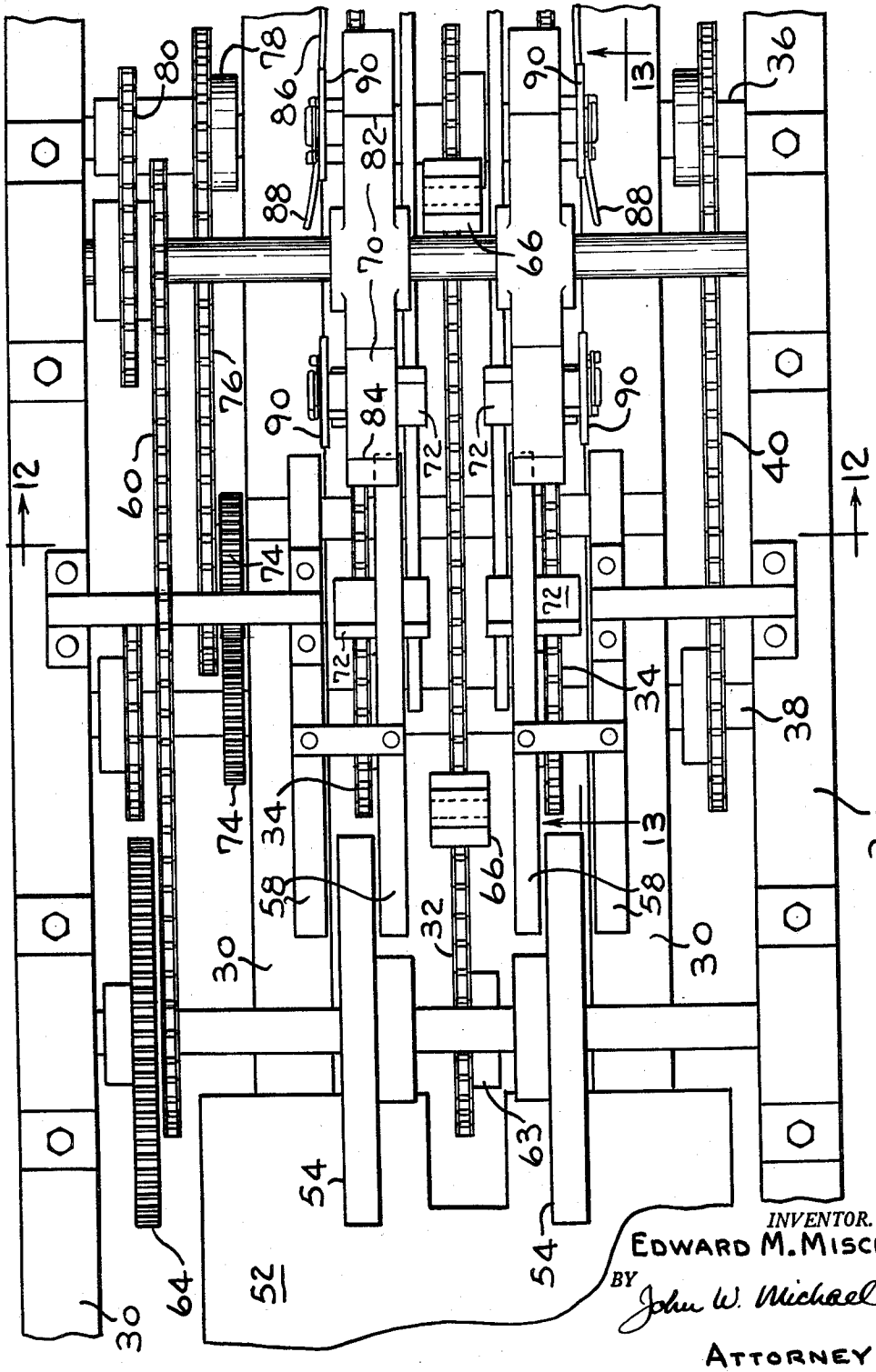


FIG. 11

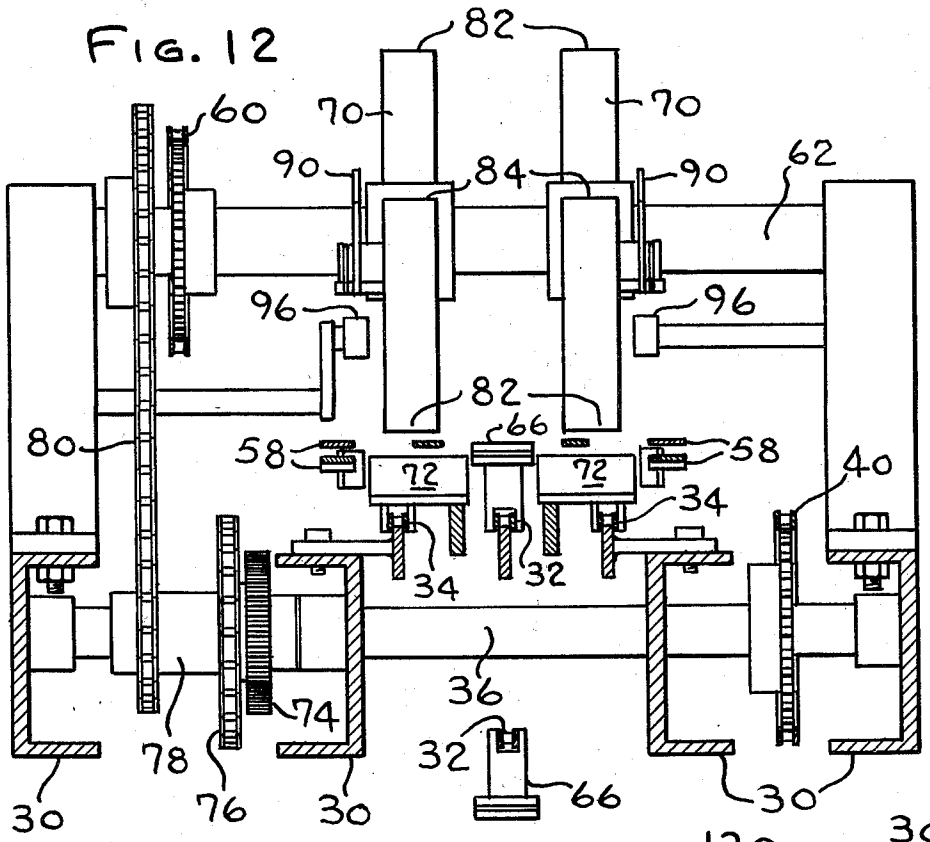
INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 4

FIG. 12



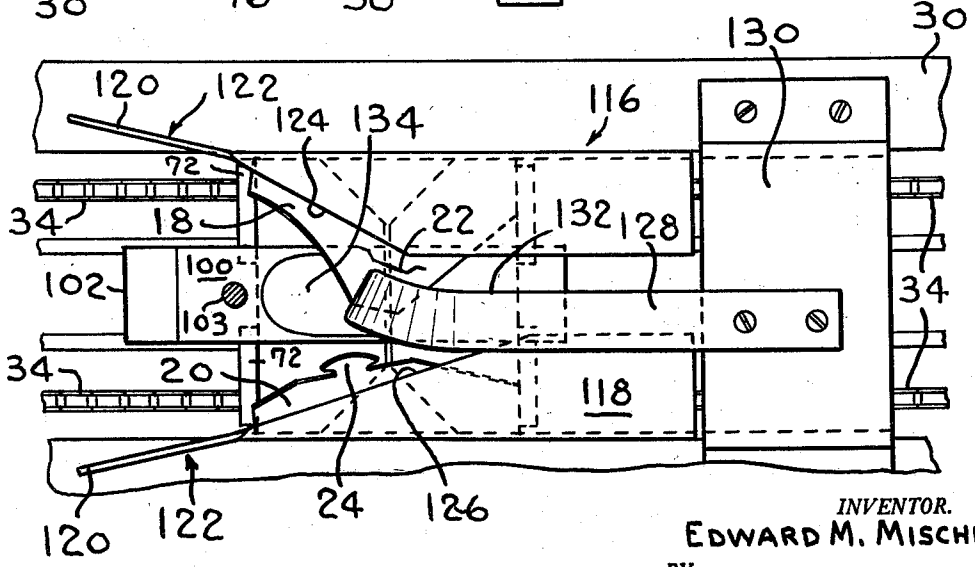


FIG. 23

INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 5

FIG. 13

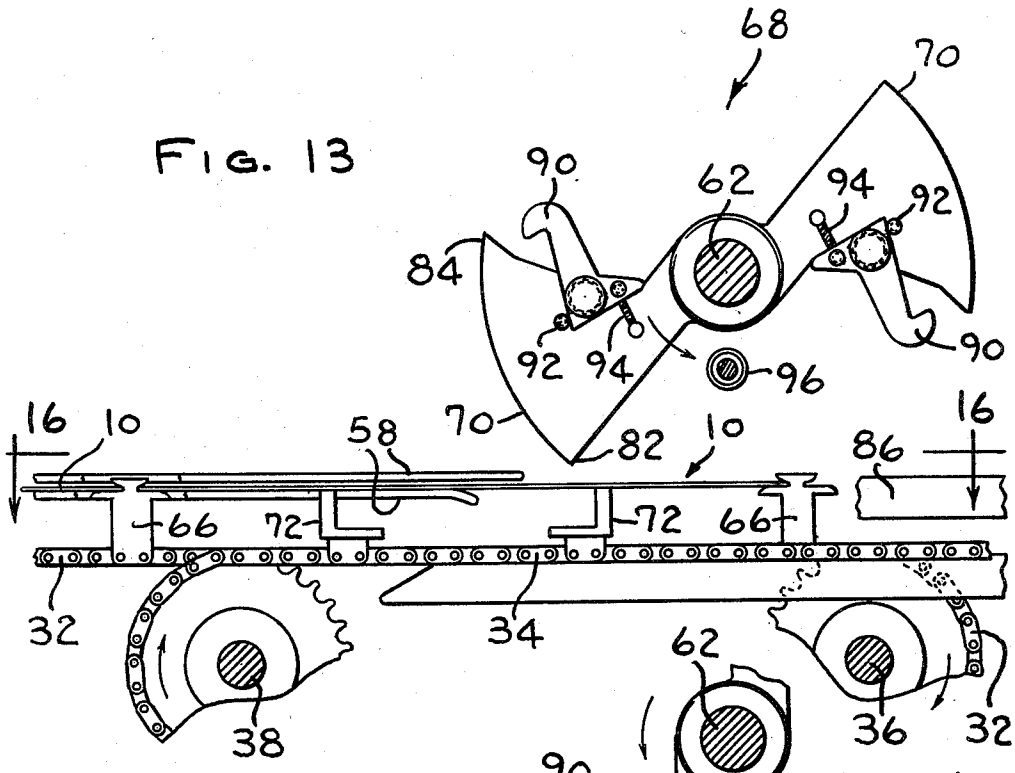


FIG. 14

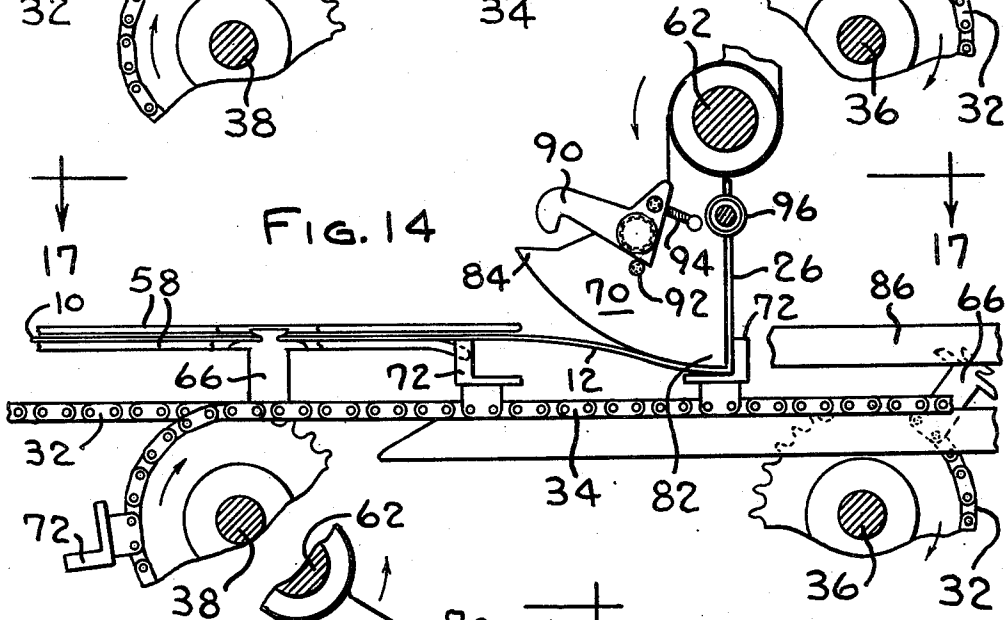
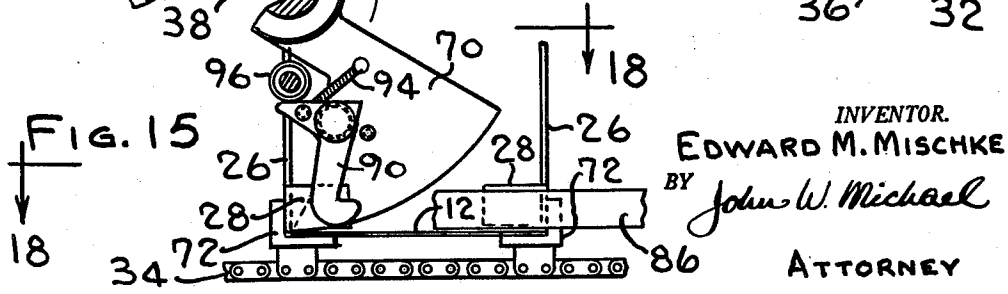


FIG. 15



INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 6

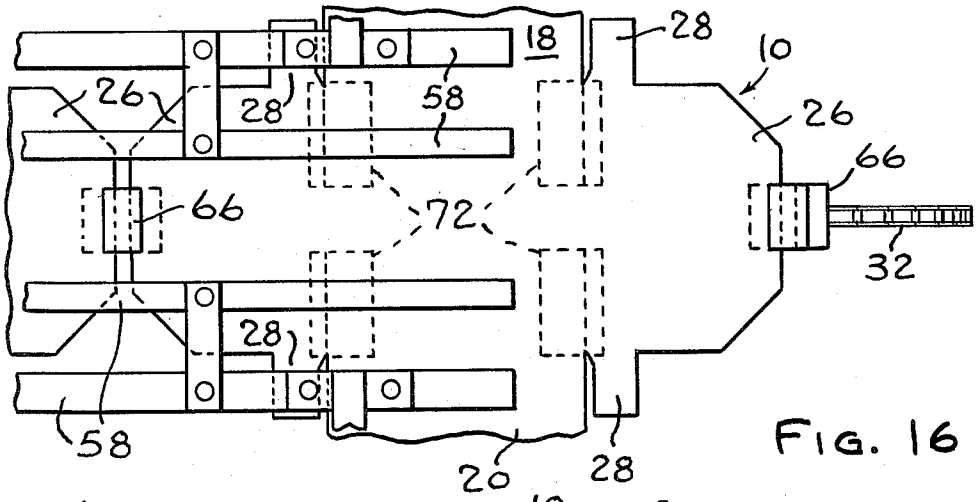


FIG. 16

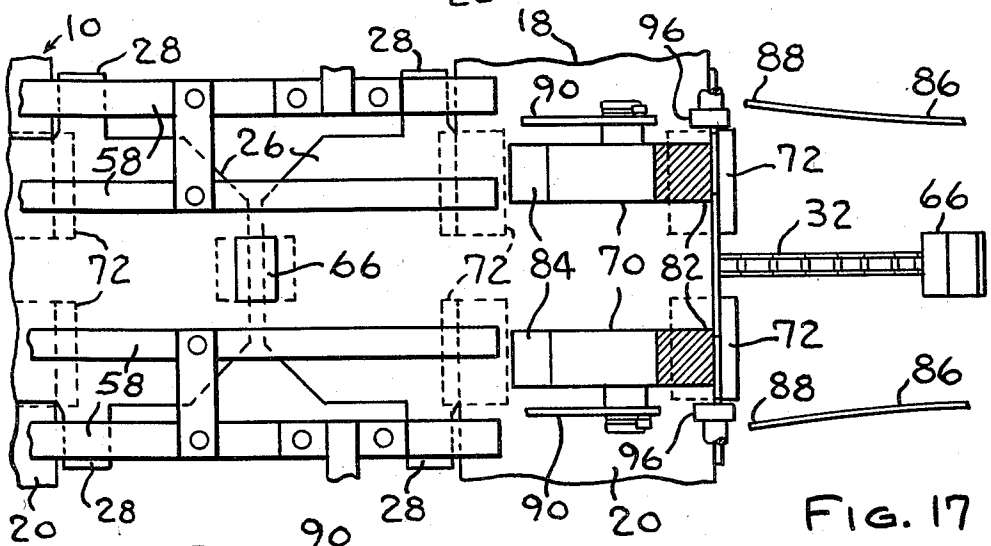


FIG. 17

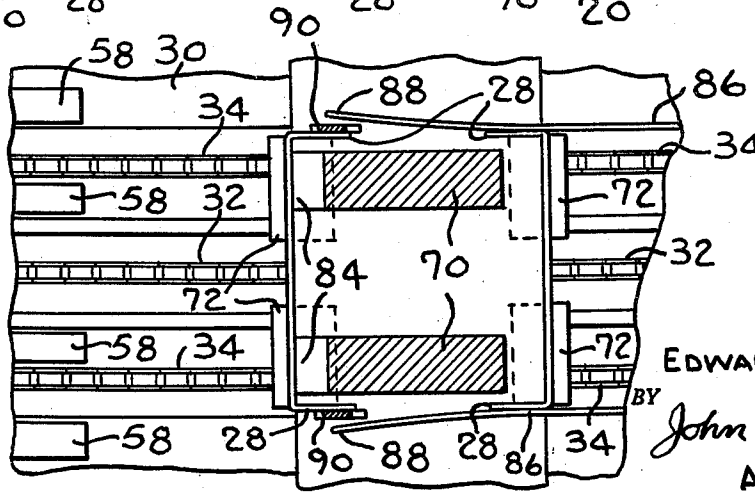


FIG. 18

INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 7

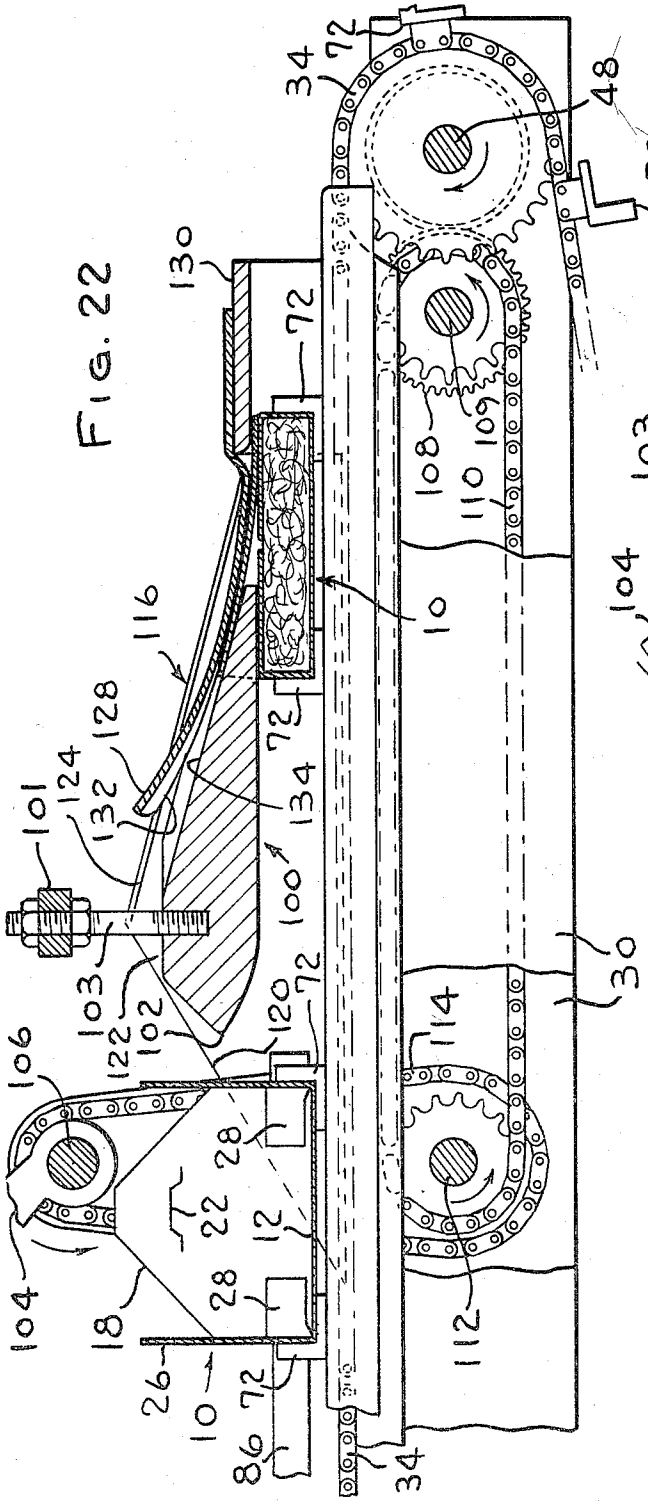


FIG. 22

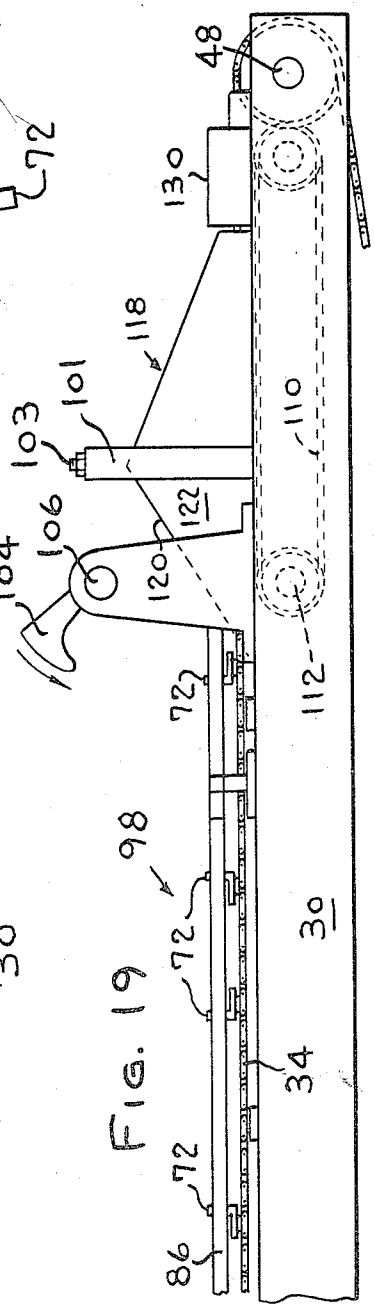


FIG. 19

INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 8

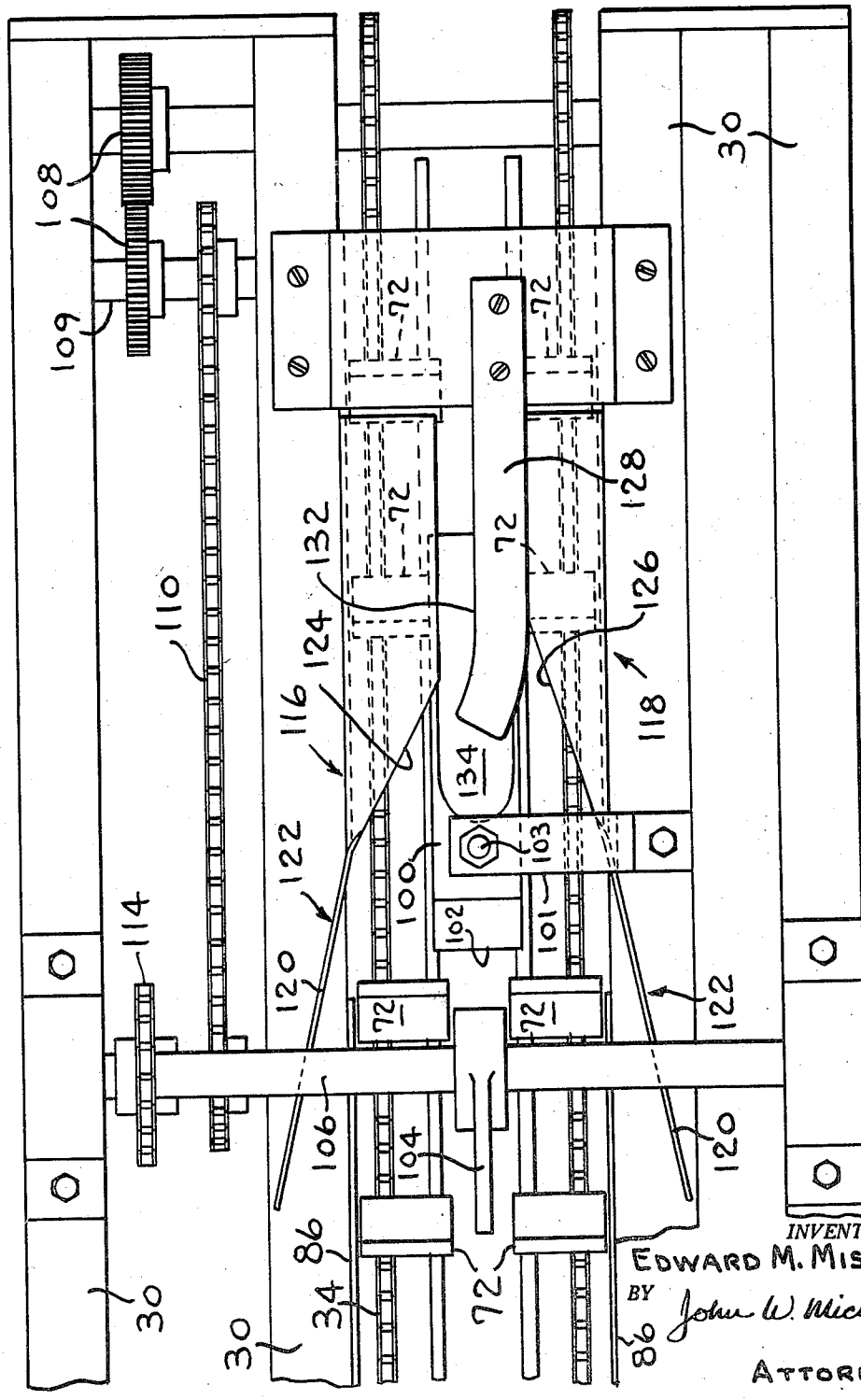


Fig. 20

INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

May 10, 1960 E. M. MISCHKE 2,935,832

BOX MAKING MACHINE

Filed Feb. 3, 1958 9 Sheets-Sheet 9

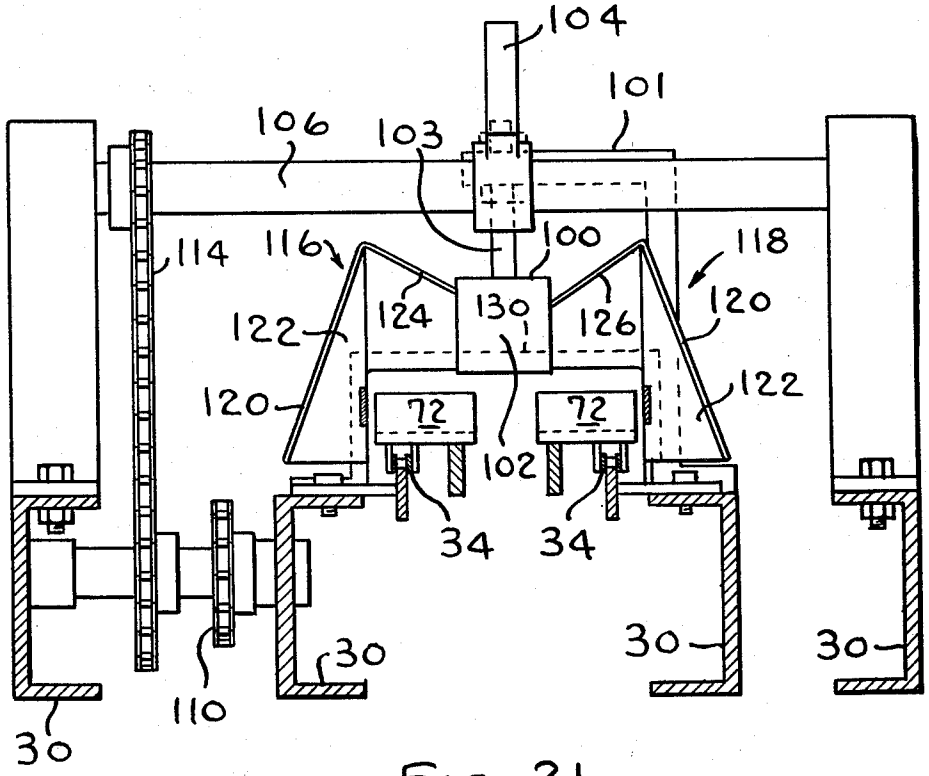


FIG. 21

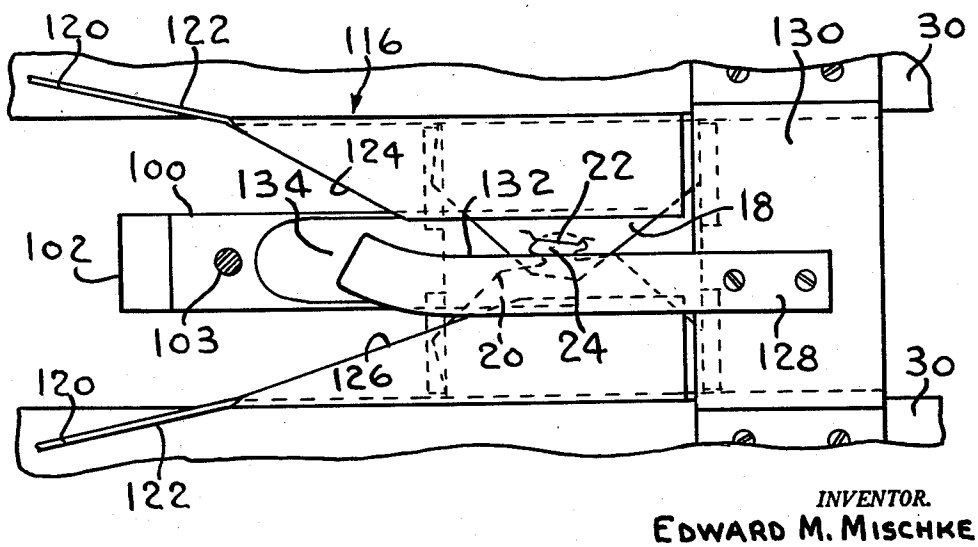


FIG. 24

INVENTOR.
EDWARD M. MISCHKE
BY John W. Michael
ATTORNEY

United States Patent Office

2,935,832

Patented May 10, 1960

2,935,832

BOX MAKING MACHINE

Edward M. Mischke, Appleton, Wis.

Application February 3, 1958, Serial No. 712,809

3 Claims. (Cl. 53—374)

This invention relates to box making machines and particularly to improved apparatus for forming and locking a cardboard carton of the "envelope" or "wallet" type.

It is an object of this invention to provide apparatus of this type which is completely automatic.

Another object is to provide apparatus of this type which is simple, safe, inexpensive, reliable, and requires very little floor space.

Other objects and advantages will be pointed out in, or be apparent from the specification and claims, as will obvious modifications of the single embodiment shown in the drawings, in which:

Fig. 1 is a perspective view of the blank for the exemplary carton;

Figs. 2 through 9, inclusive, are perspective views of the carton showing the several operations performed by the machine;

Fig. 10 is a side elevation view of the front portion of the machine showing the means for feeding the cartons onto the machine and the means for setting-up the end walls and flaps of the cartons;

Fig. 11 is a plan view of the portion of the machine shown in Fig. 10;

Fig. 12 is a sectional view taken along line 12—12 of Fig. 11;

Figs. 13, 14 and 15 are fragmentary sectional views taken on line 13—13 of Fig. 11 showing the operating sequence of the mechanism for setting-up the end walls and end flaps of the cartons;

Figs. 16, 17 and 18 are fragmentary sectional views taken on lines 16—16, 17—17 and 18—18 of Figs. 13, 14 and 15, respectively;

Fig. 19 is a view in side elevation of the rear portion of the machine, showing mechanism for final folding, locking and squaring up the cartons;

Fig. 20 is a plan view of the rear portion of the machine shown in Fig. 19;

Fig. 21 is a sectional view taken on line 21—21 of Fig. 20;

Fig. 22 is a sectional view taken on line 22—22 of Fig. 20; and

Figs. 23 and 24 are fragmentary sectional plan views taken along line 23—23 of Fig. 19 showing the operation of the locking mechanism.

The "envelope" or "wallet" type carton employed for purposes of illustration is commonly used for packaging various food products such as pressed luncheon meats, cheese, etc. and for packaging various dry goods such as handkerchiefs, sockets, etc. The carton may be given various sizes and shapes for a variety of uses and various sub-combinations of the apparatus disclosed may be employed in folding and locking cartons of other types than the exemplary one.

Carton blanks are generally manufactured from cardboard which is printed as desired and sent through a cutting and scoring press. The carton blank 10 shown in

Fig. 1 has a bottom wall 12, side walls 14, and end walls 16. The side walls have side flaps 18 and 20 with a slot 22 and a tab 24, respectively, and each end wall has an end flap 26 and a pair of support flaps 28. The bottom, walls and flaps are articulated along score lines shown as dotted lines.

A consideration of the steps through which the carton passes in the machine will help in understanding the mechanism subsequently described. The first operation is that of setting up the end walls and flaps of the carton whereby it is brought into the condition shown in Fig. 5. When cartons having support flaps 28 are used, the support flaps are folded as shown in Fig. 5 in the first operation. The cartons are then carried through the work area in this condition for insertion of the contents into the erected carton from the top. Next, the end flaps are folded over the contents and the side walls and flaps are set up to the condition shown in Fig. 7. The side flaps are then folded and locked as shown in Fig. 9, and finally the completed package is squared-up for storage and shipment.

The various operating mechanisms of the machine are supported on a suitable bench consisting generally of four horizontal channels 30 supported on vertical legs 31. The cartons are carried by a feed conveyor 32 (single chain) and a main conveyor 34 (double chain). The feed conveyor is supported between shafts 36 and 37 journaled in outer channels 39 of the bench and driven from shaft 36 which, in turn, is driven from the main drive shaft 38 by a chain 40. The main drive shaft 38 is driven (clockwise as viewed in Fig. 10) be an electric motor (and gear reducer) 42 by means of chain 44. The main conveyor 34 is driven directly from main drive shaft 38 and extends the length of the machine where it is supported by a shaft 48 (Fig. 19) and guided beneath the bench by an idler wheel 50.

The apparatus for feeding blank cartons one at a time onto feed conveyor 32 includes a rack 52 in which the blanks are stacked and two pairs of oppositely rotating feed wheels 54 and 56 which feed cartons 10 from the stack between guide bars 58 onto the feed conveyor. Feed wheels 54 mounted on shaft 57 are driven by a chain 60 from a shaft 62 driven (counter-clockwise as viewed in Fig. 10) by main drive shaft 38 as more fully explained hereinafter. Lower feed wheels 56 mounted on shaft 37 are driven (clockwise) from shaft 57 by reversing spur gears 64 (Fig. 11, showing upper gear only). The feed conveyor chain 32 is supported on shaft 37 by a sprocket 63 which idles on the shaft to allow the feed conveyor chain to run at a different speed from that of feed wheels 56 and shaft 37.

The carton blanks fed from the rack by the feed wheels are engaged by hold-down lugs 66 carried by feed conveyor chain 32. Lugs 66 capture the edges of end flaps 26 (Fig. 13) to slide the blanks between guide bars 58 and properly space the blanks for the setting-up operation which follows.

The setting-up mechanism 68 includes two pairs of rotating shoes 70, mounted on shaft 62, which cooperate with L-shaped forming lugs 72 fastened to main conveyor chains 34 to erect or set-up the end walls 16 and end flaps 26 of the cartons. Shaft 62 is driven counter-clockwise from main drive shaft 38 (rotating clockwise) by means (Fig. 11) of reversing spur gears 74, chain 76, idler collar 78 (on shaft 36) and chain 80.

As shown in Figs. 13–18, the flat carton blanks are carried beneath rotating shoes 70 by lugs 66 and overlie the transversely spaced pairs of forming lugs 72 facing each other and lying directly below the score lines between the bottom portion 12 and end walls 16 of the carton. During this period of carton travel the feed

and main conveyors overlap one another with the single feed conveyor chain traveling between the spaced chains of the main conveyor. This arrangement permits the feed conveyor 32 and hold-down lugs 66 to securely hold and properly position the cartons for accurate folding thereof between forming shoes 70 and lugs 72 carried by main conveyor 34. The angular movement of shoes 70 is timed so heel portions 82 and toe portions 84 thereof will act with forming lugs 72 (as shown in Figs. 14 and 15) to successively fold the leading and trailing end walls 16 and flaps 26 at right angles to bottom 12. The carton conditions shown in Figs. 2 and 5 correspond to those shown in Figs. 14 and 15.

Sometimes it is desirable to use a carton having support flaps 28 on the end walls (Fig. 1), particularly when the contents to be packaged will not provide adequate internal support to the carton or when the content is such as to require greater protection from pressure and bumps received in normal handling.

The support flaps 28 on the upright leading end wall 16 (Fig. 2) are folded (Figs. 16 and 17) by means of a pair of spaced stationary side bars 86 having ends 88 which engage the moving support flaps and fold them parallel to the guide bars to the condition shown in Fig. 3. The support flaps 28 on the erected trailing end wall 16 (Fig. 4) are folded by a pair of flippers 90 pivotally mounted on shoes 70 and biased against stops 92 by springs 94 (Fig. 14). The flippers are tripped at the proper time by stationary stop bars 96 (Fig. 15) to fold the support flaps parallel to side bars 86 and hold them in such position until the entire carton is firmly between the said bars. The carton has now been folded to the condition shown in Fig. 5 with the end walls held firmly between a pair of forming lugs 72 (Fig. 15) for continued movement along the machine by main conveyor 34. The side walls 14 and side flaps 18 and 20 are still flat and extend to either side through the space between side bars 86 and the bottom face of the forming lugs 72 as shown in Figs. 15 and 18.

The carton now moves into the filling area 98 (Figs. 10 and 19) of the machine where the contents are inserted into the top of the carton. The side bars 86 perform the important function here of providing a completely walled-in area into which the contents are placed. The side walls and flaps remain flat and thereby do not get in the way during the filling operation. The cartons can be filled by any suitable method, either mechanically or by hand, no specific filling means being disclosed herein.

The next operation is to bend the upright end flaps 26 (Fig. 5) downwardly over the contents in the carton (Figs. 6 and 7). The leading end flap is folded first by the action of a stationary locking shoe 100 supported from above from arm 101 by vertically adjustable post 103. Shoe 100, as will be explained hereinafter, performs several functions. As shown in Fig. 22, the front tip 102 of shoe 100 will fold the leading end flap downwardly as the carton is moved underneath the shoe. The trailing end flap is folded downwardly by a rotating tucker arm 104 and held in this position until the flap moves under the shoe. Tucker arm 104 is mounted over the conveyor on a shaft 106 driven from shaft 48 at the end of the machine by spur gears 108, shaft 109, chain 110, shaft 112 and chain 114 (Figs. 20 and 22).

As the end flaps are folded as described above, the side walls 14 and side flaps 18 and 20 are also folded by a pair of stationary angle members 116 and 118 mounted on opposite sides of the conveyor. The side walls and flaps are folded upwardly as the carton is moved between the angles by the downwardly and outwardly sloping edges 120 of legs 122 extending outwardly from the front of the angles (Fig. 22). Continued movement of the carton between the angles will first cause side flaps 18 and 20 to be successively folded downwardly over the top of shoe 100 by the action of edges 124 and 126 of the downwardly sloping horizontal portions of the angles. As shown in Fig. 20, edge 124 angles rearwardly at a greater angle than does edge 126 to cause flap 18 to be folded under flap 20.

The side flaps 18 and 20 are locked as they are folded by means of a locking finger 128 overlying shoe 100 (Figs. 23 and 24). Locking finger 128 is mounted on bracket 130 and bends upwardly therefrom toward the moving carton and is twisted downwardly slightly toward side flap 18 (Fig. 22). As side flap 18, followed by side flap 20, is folded downwardly between finger 128 and shoe 100 the lower edge 132 of the finger will act with shoe 100 to cause slot 22 in flap 18 to open to receive tab 24 on flap 20. Tab 24 is guided into slot 22 by the underside of finger 128 (Fig. 24). As shown in Fig. 22, there is a hollow 134 extending lengthwise in the top surface of shoe 100 which allows finger 128 to bend flaps 18 and 20 over the top edges of the shoe to thereby insure proper opening of slot 22 and insertion of tab 24 therein.

After the side flaps have been locked the filled carton passes under U-shaped bracket 130 which squares up the carton to aid in storage and shipment. The filled cartons are then removed from the machine or allowed to drop off the end thereof onto a chute, conveyor, etc. for further handling.

A brief review of the operation of the machine is as follows:

A carton blank 10 (Fig. 1) is fed from rack 52 by feed wheels 54 and 56 onto feed conveyor 32 where it is engaged by hold-down lugs 66 fastened to the feed conveyor. The feed conveyor carries the carton through guide bars 58 to the setting-up mechanism 68 with the carton properly aligned with forming lugs 72, fastened to main conveyor chains 34. Mechanism 68 first sets up or erects the leading end wall 16 and end flap 26 as shown in Fig. 2 by the action of heel portions 82 (of rotating forming shoes 70) with the mating forming lugs 72. The support flaps 28 on the leading end wall 16 are then folded to the position shown in Fig. 3 by the ends 88 of spaced side bars 86. The trailing end wall and end flap are then erected by the toe portions 84 of rotating shoes 70 as the carton continues to move under the rotating shoes. The carton has now reached the condition shown in Fig. 4, at which time the support flaps 28 on the trailing end wall are folded by the action of flippers 90 as they are tripped by stationary stop bars 96 to produce a carton as shown in Fig. 5.

The carton now passes to the filling area 98 with the side walls and flaps extending flat underneath the guide bars 86. The contents of the package are inserted from the top with the side bars acting as side walls to provide an enclosed space into which the contents are inserted. The side bars, therefore, allow the carton to be filled with the side walls and flaps lying flat to thereby provide easier filling in that there is nothing in the way to obstruct the filling operation from either side of the machine.

The carton then moves to the folding and locking mechanism where the erected end flaps are successively folded over the contents by stationary shoe 100 and rotating tucker arm 104. While the end flaps are being folded the side walls 14 and side flaps 18 and 20 are erected by the action of legs 122 of stationary angle members 116 and 118 mounted on opposite sides of the conveyor. Continued movement of the carton between the angles will cause side flaps 18 and 20 to be folded downwardly successively over the top of shoe 100.

Side flaps 18 and 20 are locked as they are folded by means of locking finger 128 acting in cooperation with shoe 100 to first open slot 22 in flap 18 and thereafter guide tab 24 on flap 20 into the slot. The filled and locked carton then passes beneath U-shaped bracket 130 which squares-up the carton.

Although but one embodiment of the present invention has been illustrated and described, it will be apparent to

those skilled in the art that various changes and modifications may be made therein without departing from the spirit of the invention or from the scope of the appended claims.

I claim:

1. Apparatus for folding the side walls and folding and locking the side flaps of an envelope-type carton blank, one of the side flaps having a slot therein and the other side flap having a tab thereon, comprising, a conveyor for carrying a carton blank thereon, a pair of stationary folding members mounted on opposite sides of said conveyor, a stationary locking shoe mounted lengthwise of said conveyor and between said folding members, and a stationary locking finger mounted over said shoe and extending lengthwise thereof, said folding members having a pair of inclined edges extending upwardly and rearwardly along the travel of the carton for folding said side walls and flaps upwardly, said folding members also having a pair of edges extending horizontally inwardly and rearwardly from either side of said conveyor along the travel of the carton to fold said side flaps downwardly over said shoe and beneath said fingers, said finger being cocked slightly along its longitudinal axis to provide a lower edge which bends one side flap over said shoe to open a slot therein, the tab on the other side flap being guided into said slot by the sloping underside of said finger to thereby lock said side flaps to each other.

2. Apparatus according to claim 1 in which the top surface of said shoe over which said locking finger extends is hollowed-out slightly lengthwise of said shoe.

3. Apparatus for setting up the end walls and flaps of an envelope-type carton blank comprising, a conveyor for carrying a carton thereon, a rotatably mounted forming shoe having a heel portion and a toe portion, and a pair of L-shaped forming lugs carried by said conveyor and lying beneath said carton blanks with the lower legs of said L-shaped lugs extending towards each other in a plane parallel to that of said carton blank, said heel and toe portions of said shoe depressing said carton into said L-shaped forming lugs from above as said shoe is rotated.

References Cited in the file of this patent

UNITED STATES PATENTS

2,209,111	Chalmers	July 23, 1940
2,625,778	Wood	Jan. 20, 1953