Jan. 1, 1952 D. LEVKOFF 2,581,115

MACHINE FOR SETTING-UP CARTONS

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Fig. 1.

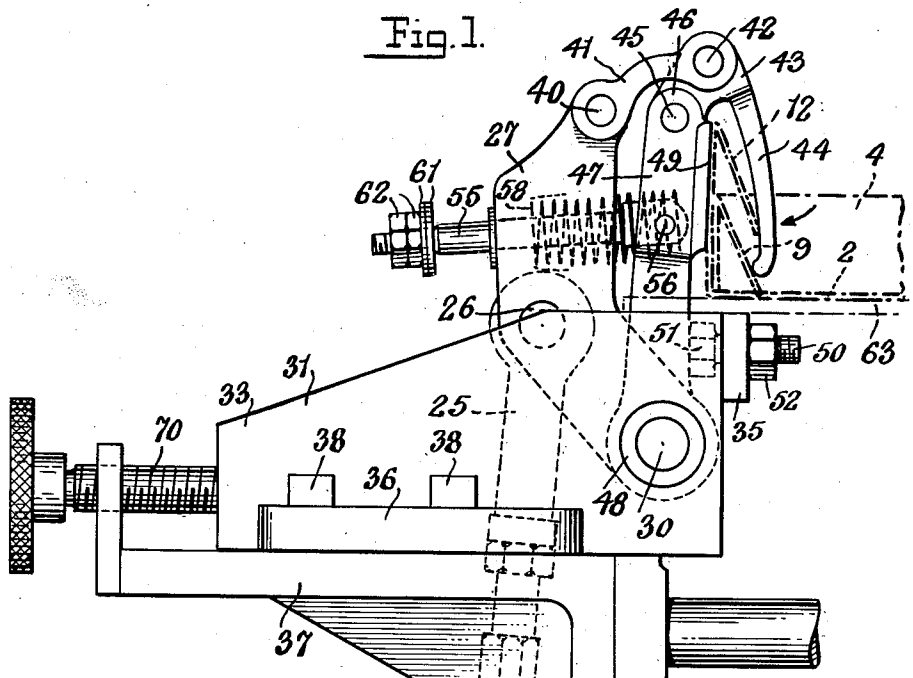
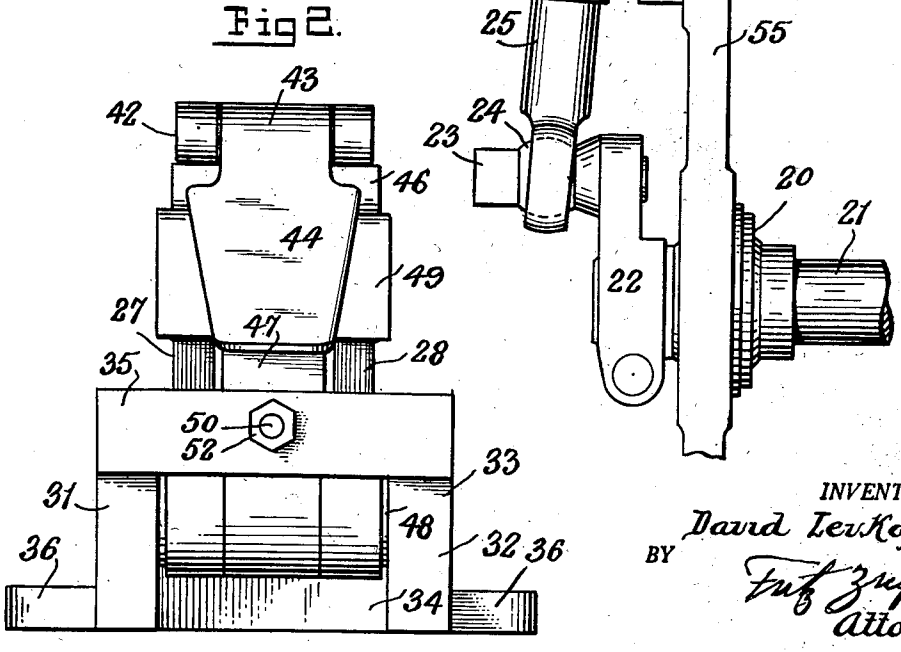


Fig 2.



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Fig. 3.

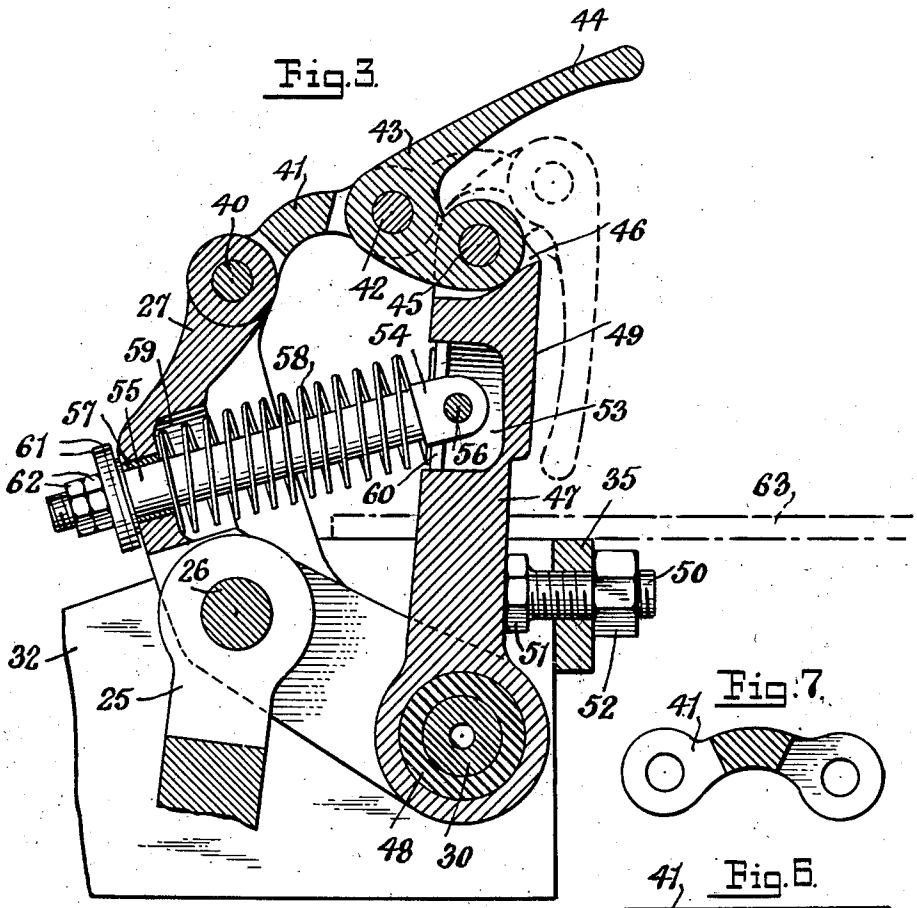


Fig. 7.

Fig. 6.

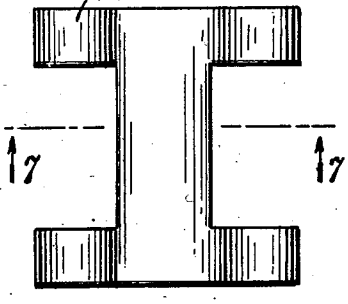


Fig. 4.

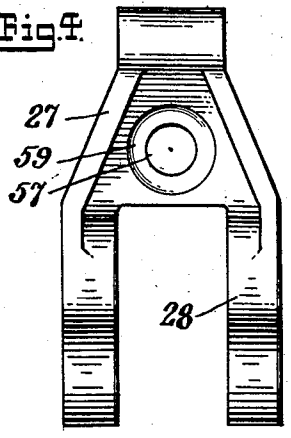
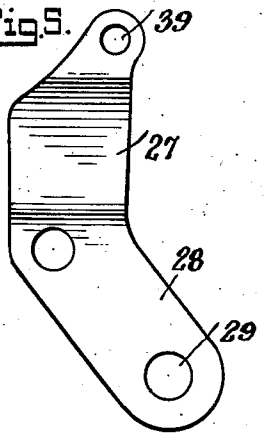


Fig. 5.



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MACHINE FOR SETTING-UP CARTONS

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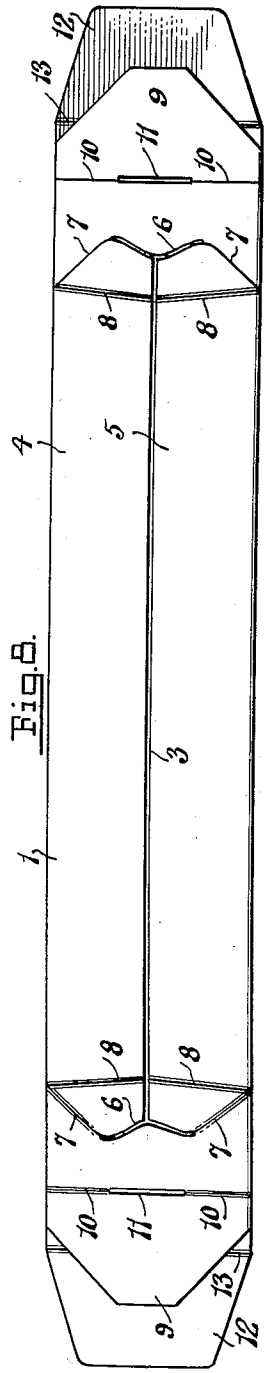


Fig. 8.

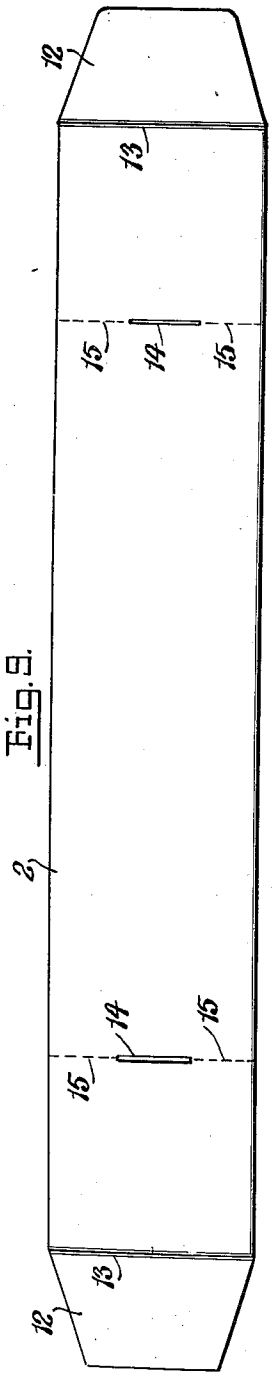


Fig. 9.

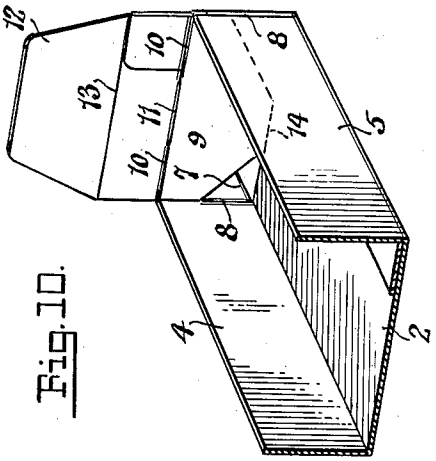


Fig. 10.

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2,581,115

MACHINE FOR SETTING-UP CARTONS

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Application June 15, 1949, Serial No. 99,297

9 Claims. (Cl. 93—53)

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This invention relates to a folding mechanism forming part of a machine for folding cardboard box blanks, and setting up or erecting the walls of the box into position for receiving the articles or goods to be packed in the box. A machine of the character to which the present folding mechanism is particularly adapted to be applied is disclosed in my co-pending application Serial No. 49,543, filed September 16, 1948. The boxes upon which the folding mechanism is operative are tray-like containers, examples of which are shown in U. S. Patents Nos. 2,274,714 and 2,342,-551, although the mechanism to be hereafter described is readily applicable to and useful in connection with operations upon boxes of other construction.

In the apparatus shown in the above-mentioned application for patent, the box blanks in collapsed or flattened form are successively removed from the bottom of a stack and are moved to end-folding means where the end walls and side walls of the box or tray are erected or folded upwardly to vertical position, and then have end flaps downfolded and tucked into slits located at the junctions of the box bottom and end walls. In said application, lengthy flap-tucking fingers are employed, the same crossing one another and each in-tucking a flap on the box at the end of the box remote from the pivotal point of the finger. That is to say, in the there-disclosed structure, a finger pivoted near the right end of the box tucks in the flap of the box located at the left end, while the finger at the left end tucks in the right flap of the box.

The present invention contemplates the provision of wall-erecting and flap-tucking means in which a simplified construction is presented and in which relatively short tucking fingers are employed, thus dispensing with the lengthy crossed fingers of the structure heretofore described. In the present structure, each finger folds down and tucks in the flap at the end of the box located adjacent to the pivot for the finger. The invention further contemplates the provision of means by which the operation of the machine is speeded up and the folding and flap-tucking effectively performed.

These and other objects are attained by the described apparatus, a more particular description of which will be hereinafter set forth and pointed out in the claims appended hereto.

In the accompanying drawings, wherein an illustrative embodiment of the invention is disclosed, Fig. 1 is a front elevation of a portion of the machine constructed according to the invention, the view showing the mechanism for erecting one end of the carton and tucking in the flap at that end, it being understood that a similar mechanism is employed at the opposite side of the machine; Fig. 2 is a view of one of the folding devices, looking at the same from the right of Fig. 1; Fig. 3 is a vertical sectional view through one of the folding devices; Fig. 4 is a view of one of the levers employed in the folding device; Fig. 5 is a side elevation of said lever; Fig. 6 is a top plan view of a link employed in the folding device; Fig. 7 is a sectional view, taken on the line 7—7 of Fig. 6, looking in the direction of the arrows; Fig. 8 is a top plan view of the collapsed or flattened carton; Fig. 9 is a view looking at the bottom of the flattened carton, and Fig. 10 is a perspective view in section, of the erected carton, showing one of the end walls in its upstanding position and with its retaining flap tucked in place.

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The box which is erected by the mechanism hereafter described, is disclosed in detail in Figs. 8 to 10 inclusive, and the operation of the mechanism will be more readily comprehended when the construction of the box and the blank from which it is formed, are fully understood.

The box blank in its flattened condition and as supplied to the machine for erection, is shown at 1 in Fig. 8. In the form disclosed, it is of tubular shape, the bottom of the box or tray being shown at 2. The top or upper face of the blank is centrally and longitudinally split at 3 to form the two panels 4 and 5 which are subsequently raised or erected to vertical position, as shown in Fig. 10 to form the side walls of the box or tray. It will be noted that the central lengthy slit 3 has its ends connecting with transverse curved slits 6, the ends of the latter slits meeting the ends of score lines 7. Score lines 8 also extend across the panels 4 and 5 at the locations clearly seen in Fig. 8.

Located beyond the score lines 8 are the end walls of the box, said walls including the locking flaps 9, transversely scored at 10, and slit through the central portion of the score line as indicated at 11. The bottom 2 of the box has the flaps 12 at its opposite ends, said flaps being each provided with the transverse score line 13. The bottom 2 of the box is also transversely scored as at 15 and also slit on these score lines as indicated at 14. Said slits 14 are intended to receive the ends of the locking flaps 9 when the box is erected, as shown in Fig. 10. To erect the box blank the same is folded upwardly upon the score lines 15, and this upward folding movement of the

opposite ends of the blank causes the panels or box side walls 4 and 5 to fold upwardly to vertical position, or away from one another, on the angular score lines 7 and also on the score lines 8. When the side walls 4 and 5 reach their vertical position, it will be found that they have raised the opposite ends of the box, consisting of the parts of the box blank located beyond the fold lines 15, to a substantially vertical position. To maintain all of the four walls of the box in vertical position, the locking flap 9 is folded downwardly upon the fold line 10 to the inside of the carton to have its free end tucked or inserted into the slit 14 in the bottom 2. When this is done, the walls of the carton are maintained in vertical position and they retain the carton in rigid, tray-like form in readiness to receive its contents. After the carton is filled, it is usually customary to place a wrapping of transparent material around it, the same holding the end flaps 12 infolded over the top of the contents of the carton.

In the apparatus of which the mechanism shown herein forms a part, the box blanks, in the flattened condition shown in Figs. 8 and 9, are maintained in a stack from which they are successively removed by conveyor means operative below the bottom of the stack, and which removes the blanks successively from the bottom of the stack and transports them to folding means which folds the end walls of the carton to an erect or upright position, which movement serves to simultaneously fold the side walls also to an upright position. The folding means, shown in Figs. 1, 2 and 3, includes a pivoted finger at each end of the box, which fingers enter into the box and fold down the locking flaps 9 to cause them to be tucked into the slits 14 provided in the bottom 2 of the box.

In the machine of which the improved flap-folding mechanism forms a part, a frame is provided which includes two side frame members, one of which is shown at 55 in Fig. 1. These side frame members are arranged in properly spaced relation and suitably braced. Mounted in bearings 20 in the frame members is a cam shaft 21, which has a crank arm 22 secured at each of its ends. One of these crank arms is shown in Fig. 1, it being understood that the same is duplicated at the opposite end of the shaft 21 and that the cam shaft is properly rotated. The crank-arm 22 has its pin 23 attached with a ball-and-socket connection 24 to the lower end of an adjustable pitman 25 having its upper end pivotally connected at 26 to a clevissed lever 27, the details of construction of which will be seen in Figs. 4 and 5.

It will be therein noted that the lever 27 is provided at its lower end with the clevis 28, the legs of which are apertured at 29 to receive a pivot pin 30 on which the lever 27 is pivoted, said pin extending between the vertical walls 31 and 32 of a supporting bracket 33. Said bracket is provided with a rear end wall 34 through which the adjusting screw 70 extends, and at its front end with a cross-brace 35. Extending laterally from the vertical walls 31 and 32 of the bracket 33 are slotted lugs 36 by means of which the bracket is adjustably fastened by the screws 38 to the stationary bracket 37 attached to the side frame 55 of the machine. At its upper end, the lever 27 is apertured as shown at 39 for the reception of a pivot pin 40 extending through one end of an H-shaped link 41 and pivotally coupling said end of the link to the upper end

of the lever 27. At its opposite end, said link 41 is intermediately pivoted at 42 to an angular folding-finger 43. Said finger is of substantially bellcrank shape and at one end is formed with the finger portion 44 and has its other arm pivoted on a pin 45 located in the clevissed end 46 of an arm 47. Said arm 47 pivotally operates to raise or erect the end of the box blank to vertical position, and the finger 44 pivoted on the arm 47 acts to descend to the position substantially as shown in Fig. 1, and by such pivotal descent, it folds the flap 9 downwardly and causes the end of the same to enter the slit 14.

The end of the arm 47 remote from the pin 45 is pivoted at 48 between the walls 31 and 32 of bracket 33. Said arm 47 is provided with a face portion 49 which contacts with the end of the carton and upon swinging movement of the arm to the substantially vertical position shown in Fig. 3, folds the end of the carton on the line 15 to vertical position. Swinging movement of the arm 47 in a direction toward the end of the carton, is limited by an adjustable stop member 50 threadable through the cross member 35 and having a head 51 against which the arm 47 impinges to limit the swing of the arm. A locking nut 52 on the stop member 50 maintains said stop member in any set position.

Formed in the arm 47 is a cavity 53 in which the end or head 54 of a pin 55 is pivotally mounted on the cross-pin shown at 56. Said pin 55 slidably extends through a bushed aperture 57 in the lever 27 above the pitman connection 26. Surrounding the pin 55 is a coil spring 58 which has one end seated in the cavity 59 in the lever 27 and its opposite end seated against ledges 60 provided in the cavity 53 in the arm 47. Washers 61 and lock nuts 62 are provided on the threaded end of the pin 55, as clearly seen in Figs. 1 and 3.

From the foregoing, the operation of the folding and erecting means will be readily comprehended. Each blank is carried from the stack by suitable conveying means until the same reaches a point between two of the arms 47, one of which is at each end of the carton. On the way from the stack to the folding means, the ends of the cartons may, if necessary, be preliminarily upwardly flexed at the transverse score lines 15 and at the flap folds 10 and 13 by suitable means in the machine to facilitate the later folding or erection of the cartons at these points. When the carton reaches a point between the two arms 47 and is supported upon a plate or other support diagrammatically indicated at 63, the pitman 25 moves upwardly to thus swing the lever 27 as well as the arm 47 on the pivot 30—48 to bring the arm 47 to its elevated position as defined by the stop 51. The end wall of the box is thus elevated or upwardly folded by contact with the surface 49 of the arm 47 which has moved to vertical, or slightly more than vertical, position. This taking place at each end of the box, results in both ends of the box being folded upwardly to vertical position on the fold lines 15. Because of the fold lines 7 and 8, the vertical movement of the end walls also raises the side walls 4 and 5 to vertical position. As further upward movement of the pitman continues, the lever 27 continues to swing on its pivot 30, and through its link coupling 41 with the finger 43, it causes said finger to begin to swing in the pivot 45 and move downwardly as shown in Fig. 1, or to the position shown in dotted lines in Fig. 3. This downward swing of the finger 43, causes its portion 44 to force the flap 9 downwardly until

the tip or extremity of said flap enters into the carton and is forced into one of the slits 14 in the bottom of the carton. It is of course, understood that this operation takes place simultaneously at the opposite ends of the catron.

At the conclusion of the operation above described, the folding means is swung by operation of the pitman, out of the way of the then erected carton, which is then moved forwardly away from the folding fingers when it is directed into a slide or chute and thence into a collection receptacle at the front of the machine.

The structure described is such that the folding or erection of the cartons takes place with speed and accuracy, and each carton is uniformly erected. While I have herein suggested that the carton upon which the improved erecting and folding mechanism operates shall be one in which the ends are provided with locking flaps to be tucked into slits, it will be apparent that the means described may be utilized for the erection of cartons of other construction. Hence, in describing the operation of the machine in connection with a special type of carton, I do not wish to be understood as limiting the invention to the use of such carton.

While I have described one embodiment of the invention, it is obvious that the same is not to be restricted thereto, but is broad enough to cover all structures coming within the scope of the annexed claims.

What I claim is:

1. In a machine for erecting tray-like cartons, a support for a carton, a bracket at one end of the support, an arm pivotally mounted in the bracket and provided with a face which is brought into contact with an end of the carton by pivotal movement of the arm to thereby fold said end to an upright position, a finger pivoted at the end of said arm, a lever pivoted in the bracket, a link pivoted at one end to the lever and at its other end to the finger, and means coupled to the lever for swinging the same upon its pivot to cause the arm to swing to a position to fold the end of the carton to an upright position, and then swing the finger downwardly into the carton to fold down a flap on said end of the carton and direct said flap within the carton.

2. In a machine for erecting tray-like cartons, a carton support, a bracket at one end of the support, an arm pivoted in said support, said arm having a face that is brought into contact with an end portion of the carton to fold said end portion upwardly and into upright position, a finger pivoted on said arm, a lever pivoted in the bracket, a link pivoted at one end to the lever and at its other end to the finger, means coupled to the lever for pivotally moving said lever to first cause the arm to fold the end of the carton upwardly and then cause the finger to be swung downwardly and inside the carton to direct a flap on the end of said carton within the carton and into engagement with a slit in said carton.

3. In a machine for erecting cartons, means for supporting a carton, a folding mechanism adjacent each end of the carton, each mechanism comprising a bracket, a lever pivotally mounted therein, means coupled to the lever for pivotally moving the same, an arm pivoted in the bracket on the same pivot as that on which the lever is mounted, a finger pivoted at the end of the arm, a link pivoted at one end to the finger and at its other end to an end of the lever, and a spring interposed between the arm and the lever.

4. In a machine for erecting cartons, a folding device comprising, a bracket having spaced walls, a lever pivoted at one end between said walls, an arm pivoted at one end between said walls and on the same pivot as the pivot for the lever, a finger pivoted at the opposite end of the arm, said finger having a free end, a link pivoted at one end to the finger at a point between the free end of said finger and its pivotal attachment to the arm, the opposite end of the link being pivotally attached to an end of the lever remote from the pivotal attachment of the lever to the bracket, a pitman connected to the lever for swinging said lever on its pivot, and a spring interposed between the arm and the lever.

5. In a machine for erecting cartons, a support for a flattened carton, a pivoted arm adjacent each end of the carton, said arm being swingable to substantially vertical position, a face portion on said arm engageable against an end wall on the carton to thereby fold said end wall to upright position, a lever pivoted adjacent to the arm and independently swingable relatively to the arm, a coupling between said lever and arm whereby said lever and arm are swung in company for a portion of the swing of the lever, a pivoted finger on one end of the arm and a coupling between said finger and the lever whereby said finger will be pivotally swung by pivotal movement of the lever occurring after pivotal movement of the arm has halted.

6. In a machine for erecting cartons, as provided for in claim 5, wherein the lever and the arm are mounted on the same pivot, the coupling between the lever and arm consisting of a pin pivotally attached to the arm and in slidable engagement with the lever, a spring located between the lever and arm and surrounding said pin, the pivoted finger being swung downwardly by pivotal movement of the lever occurring after pivotal movement of the arm has halted.

7. In a machine for erecting cartons, a support for a carton, a folding and erecting device at one end of the carton located on said support, said device including a bracket, an arm pivoted therein, a face portion on said arm directed toward the end of the carton, a lever pivoted in the bracket on the same pivot as that upon which the arm is pivotally mounted, a link pivoted at one end to the upper end of the lever, a finger pivoted to the upper end of the arm, the second end of the link being pivotally attached to the finger, a pin pivotally attached to the arm at a point between the attachment of said arm to the finger and to the bracket, said pin being slidable through the lever, a coil spring surrounding the pin and having one end operative against the arm and its other end operative against the lever, and means coupled to the lever for swinging said lever on its pivot to the bracket.

8. In a machine for erecting cartons, a bracket, a pair of elements pivoted in said bracket, the first of said elements carrying a pivoted flap-folding finger, a link pivotally coupling the finger to the second element, a spring disposed between the elements, a stop for the first element, means coupled to the second element for swinging the same in company with the first element and then independently thereof after the latter element has halted, to thereby cause the finger to be pivoted downwardly.

9. In a machine for erecting cartons, a bracket, an element pivoted in said bracket, a second element pivoted in said bracket and on the same pivot as the first element, the first element carry-

ing a pivoted finger, the second element being pivoted to one end of a link, the second end of the link being pivoted to the finger, stop means for the first element, spring means interposed between the two elements, and operating means engaging one of the elements for first swinging both elements in company and then imparting a further swinging movement to the second element to cause the same to swing the finger downwardly.

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REFERENCES CITED

The following references are of record in the file of this patent:

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Number	Name	Date
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