Sept. 15, 1953 M. FOX 2,652,180

MACHINE FOR FILLING CARTONS

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Fig. 2.

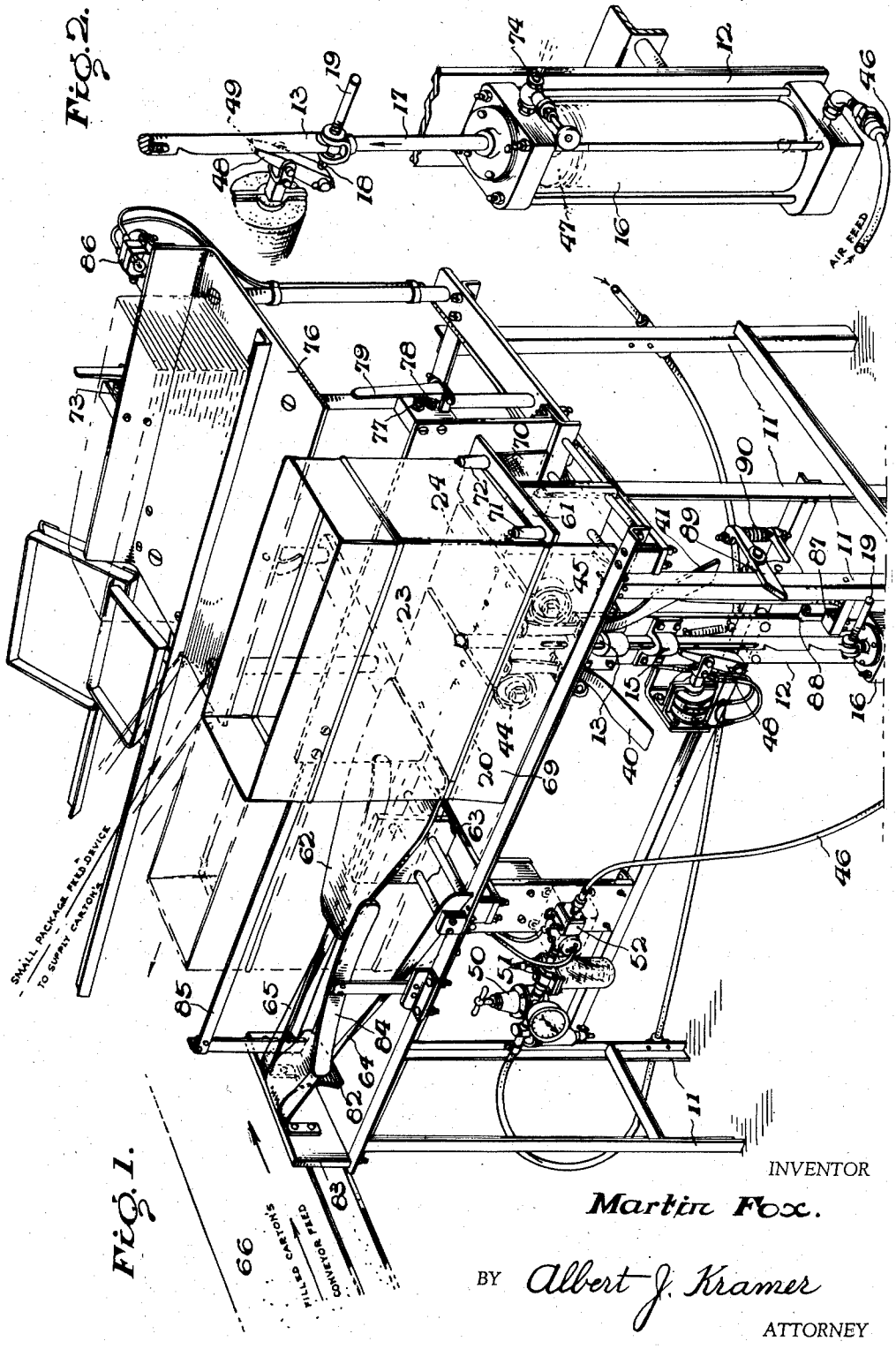



Fig. 1.

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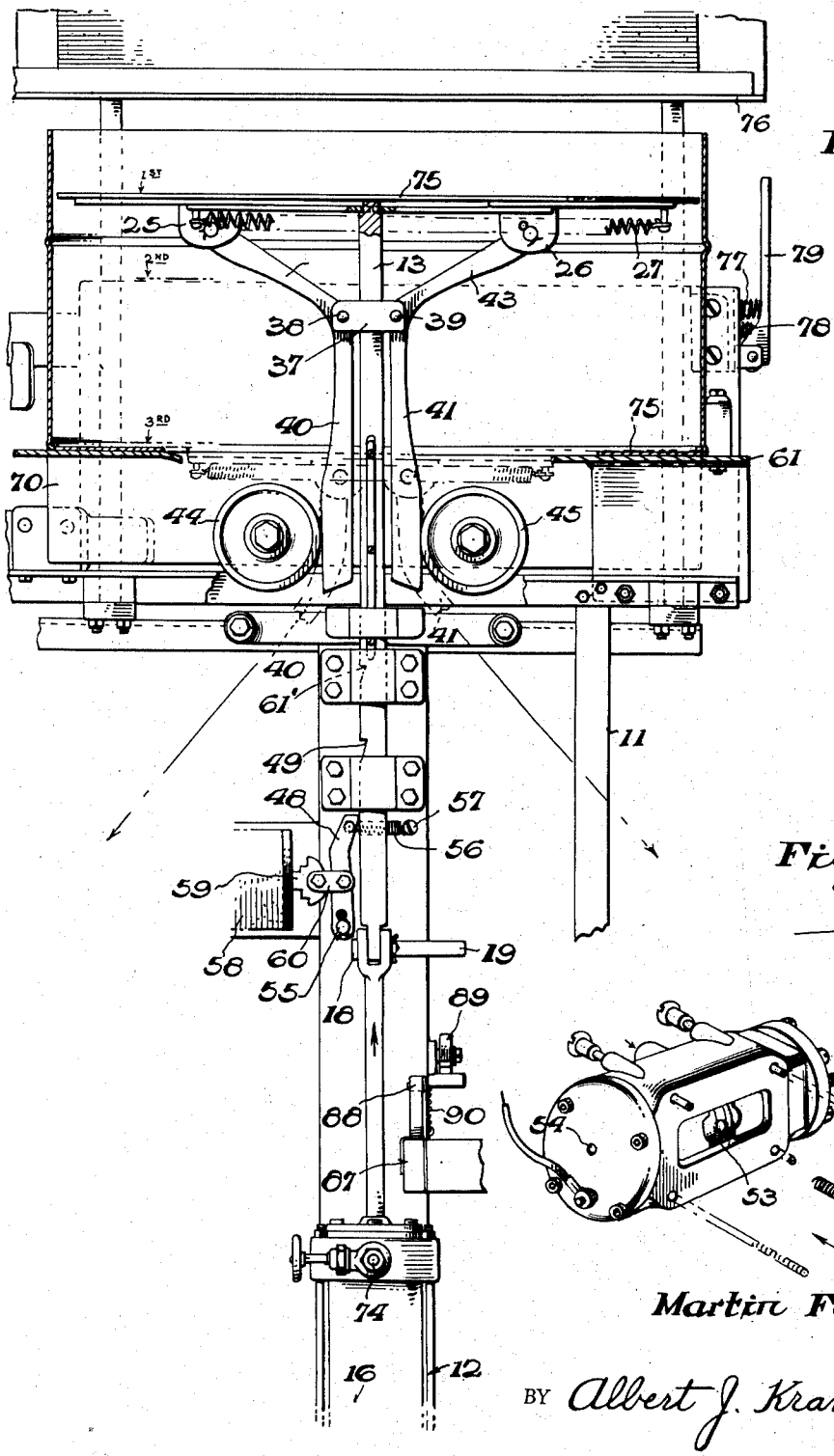



Fig. 3.




Fig. 4.

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Fig. 5.

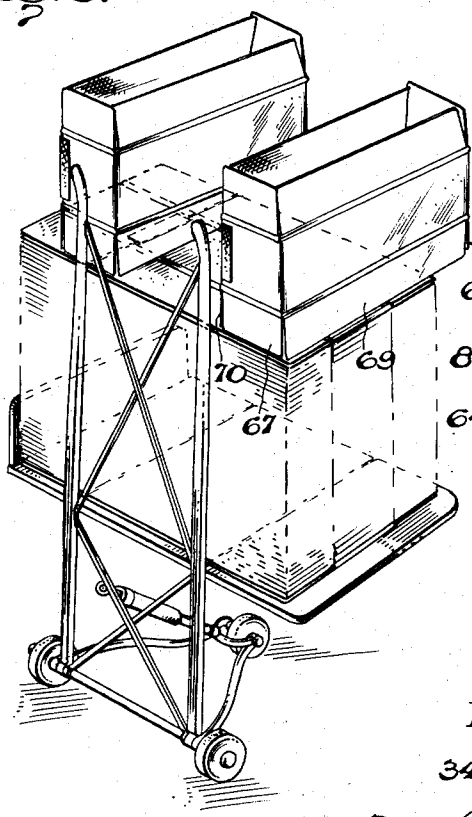



Fig. 6.

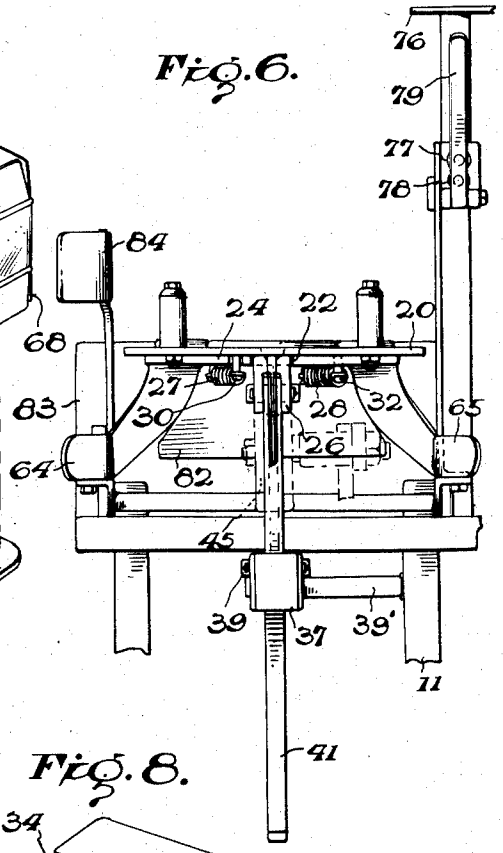
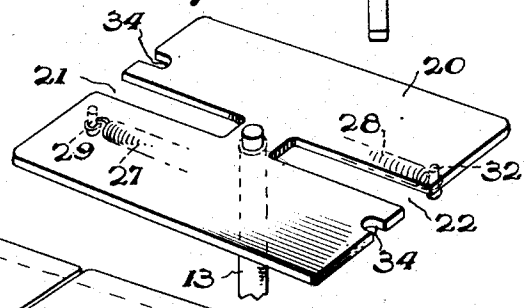



Fig. 8.



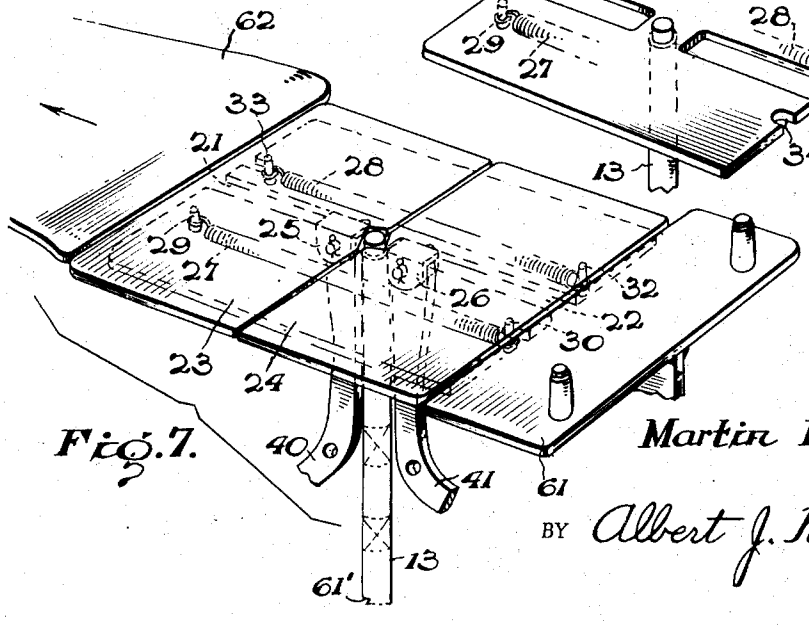




Fig. 7.

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Patented Sept. 15, 1953

2,652,180

# UNITED STATES PATENT OFFICE

2,652,180

## MACHINE FOR FILLING CARTONS

Martin Fox, Baltimore, Md.

Application July 2, 1951, Serial No. 234,715

11 Claims. (Cl. 226—16)

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This invention relates to the filling of cartons with layers of material, such as with articles or packages of food, soap, clothing, medicines, tools, chemicals, and the like, and is more particularly concerned with machines to facilitate the filling or loading of such cartons.

Paper or cardboard cartons of the rectangular type as commonly used in industry, are manufactured and delivered for packaging in a collapsed form. They normally consist of two side panels, two end panels, and closure flaps extending from the top and bottom of each panel, a total of eight flaps, four at the top and four at the bottom. In order to fill these cartons with the articles they are to carry, the customary practice has been to open each collapsed form, fold under the four bottom closure flaps and secure them in position by stapling, stitching, gluing, gum taping, or other means, thus providing a bottom support for the articles to be placed in the carton. When the carton is filled, the top flaps are folded down and secured in the closed position to complete the operation.

The procedure described above has certain disadvantages. One of the principal disadvantages is the fact that a separate operation is required to secure the bottom flaps in position before the carton is filled. For mass operations, this has the further disadvantage that, in order to insure a supply of cartons for the filling operators, a number of cartons are stored in the open position with the bottom flaps folded under and secured together. This requires the use of a large storage space for empty cartons, space which could more profitably be employed for other purposes.

Another difficulty in the procedure described above is in the actual filling of the cartons themselves, particularly in the case of multi-layers in deep cartons. The placing of the bottom layers is more difficult than the top layers and the person filling the cartons must not only observe more care and more caution, but is required to exert greater effort and employ more intricate maneuvers with the bottom layers than with the top layers. This is due to the sides of the carton interfering with the movement of the hands and arms in placing the bottom layers, particularly in the case of deep, narrow cartons. This condition causes considerable inefficiency in the filling of such cartons.

Accordingly, one of the objects of this invention is the provision of a machine to facilitate the filling or loading of cartons and which obviates the difficulties mentioned above.

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Another object of the invention is the provision of a machine for the purpose indicated which does not require the securing of the bottom flaps in a position to form a bottom prior to the filling of the carton and, hence, does not require the storage of empty open cartons.

A further object is to provide a machine of the type mentioned by means of which the bottom layers can be placed in the carton with the same ease as the top layers.

A still further object is to provide such a carton in conjunction with flap folding means for use after the carton is filled.

A still further object of the invention is the provision of a machine for filling cartons comprising a frame, a horizontal platen mounted for vertical reciprocation on the frame, the platen having outwardly extendable portions, means for moving these portions outwardly when the platen is elevated from a given normal position, means for moving the portions inwardly when the platens are lowered to the normal position and means for supporting a carton on the frame of the machine about and independently of the platen.

Still further objects are the provision of such a machine which is positive and dependable in use, simple and economical to operate, and sturdy in construction.

These and other objects and advantages of the invention will appear more fully from the following description considered together with the accompanying drawing.

In the drawing:

Fig. 1 is a perspective view of an embodiment of the invention, partly broken away, with a carton in position thereon.

Fig. 2 is a perspective view of the air cylinder forming a part of the embodiment.

Fig. 3 is a front elevational view of a portion of the machine.

Fig. 4 is a partially exploded view in perspective of the air valve.

Fig. 5 is a perspective view of a stack of folded cartons ready to be placed on the machine for filling, two of the cartons being open.

Fig. 6 is an end view of a portion of the upper part of the embodiment.

Fig. 7 is a perspective view of the platen assembly and appurtenant parts.

Fig. 8 is a perspective view of the lower platen.

Referring with more particularity to the drawing in which like numerals designate like parts, the embodiment illustrated comprises a suitable open frame structure supported on legs 11. On

one side of the machine, a vertical panel 12 is secured within the framework and on which a vertical shaft or ram 13 is slidably mounted in collar bearings 14 an 15.

Below the shaft 13, there is mounted on the bottom of the panel 12 an air cylinder 16 containing a reciprocating piston connected to an upwardly projecting push rod 17. The upper end of the push rod and the lower end of the shaft 13 are connected together by means of a bolt having a finger extension 19 on one side, the purpose of which will be explained more fully hereinafter.

On the upper end of the shaft 13, there is fixed a horizontal platen 20 which is provided with two U-shaped slots 21 and 22 on either side. On top of the platen 20, two movable horizontal half-platens 23 and 24 are disposed, to the bottom of each of which is secured a bracket 25 and 26, respectively. Said brackets fit and are slidably disposed in the slots 21 and 22, respectively. The half-platens 23 and 24, in normal position, abut or nearly abut each other at the transverse center of the lower platen and are adapted to move outwardly. However, they are urged to the normal or retracted position by a pair of front and rear coil springs 27 and 28. The coil spring 27 is connected at one end to a stub post 29 projecting from the bottom of one side of the lower platen 20, the other end being attached to a stub post 30 on the bottom of the half-platen 24. A recess 31 is provided in the side of the platen 20 to receive the post 30 in the normal retracted position of the half-platens. Similarly, spring 28 is anchored at one end to a post 32 projecting from the bottom of the other side of the platen, the other end of the spring being attached to a post 33 of the half-platen 23, a recess being provided in the other side of the fixed platen 20 for the post 33.

The brackets 25 and 26 are each pivotally connected to the upper end of a cam lever 35 and 36, respectively. Said cam levers are in the general shape of a boomerang and are fulcrumed like bell-cranks with pin connections 38 and 39 to a sleeve 37. Said sleeve is slidably mounted on the shaft 13. The lower arms of the cam levers, that is the portions 40 and 41 below the fulcrums, extend outwardly and downwardly in normal position so that when they are moved toward each other, they have the effect of moving the upper arms 42 and 43 outwardly and thereby force the half-platens 23 and 24 outward against the yieldable restraining action of the springs 27 and 28. To provide for this movement, a pair of rollers 44 and 45 are mounted in a fixed position on the frame of the machine in contact with the outer surface of the arms 40 and 14, respectively, substantially as shown. By these means, when the shaft is elevated, the arms 40 and 41 are forced toward each other by the rollers 44 and 45 and cause the upper half-platens to spread outward. Conversely, when the shaft 13 is dropped to its lower position, the springs force the half-platens back into normal position.

The shaft is driven to its upper position by the air cylinder 16. Air under pressure from a source (not shown) is led into the bottom of the cylinder through a feed line 46, thereby forcing the piston 47 in the cylinder upward and hence the push rod 17 and shaft 13. The shaft 13 is held in the uppermost position by the air pressure in the bottom of the cylinder. The air line contains, in series, a pressure regulator 50, and oil pick up or feeder 51 the purpose of which is to lubricate the cylinder 16, and a double throw magnetic or solenoid valve 52. In one position of the valve slide 53, air is delivered to the cylinder 16 from the source of supply and in the other position, the supply is cut off and the air in the cylinder communicated with the atmosphere through the exhaust port 54, thereby releasing pressure on the bottom of the piston in the cylinder and permitting it to drop under the influence of gravity.

The lower end of the detent is pivoted to the panel 12 by a pin 55 and the upper end is yieldably urged toward the shaft 13 by means of a spring 56 anchored to the panel at 57. A solenoid 58 has a movable core 59 connected by a link 60 to the detent so as to momentarily release or trip it from the shaft notches against the action of the spring 56. Additional notches, such as the notch 61, may be provided above the notch 49, whereby the shaft 13, upon tripping of the solenoid 59, falls by gravity through intervals represented by the distance between successive notches. Release of the detent from the uppermost notch in this manner permits the shaft and parts attached thereto to drop to its lowermost position, which is the normal position.

On one side of the platen 20, there is secured to the frame of the machine a leaf 62 and on the other side a skidway 63. Said leaf and skidway are in substantially the same horizontal plane as the half-platens 23 and 24 and perform the function of supporting the ends of the cartons while being filled. Beneath the skidway 63, there is provided a pair of outwardly convergent guides 64 and 65 to engage the bottom side flaps of the cartons, after the cartons are filled and moved thereover to a receiver, such as a conveyor belt 66.

The size of the platen 20, the leaf 62 and skidway 63 are proportioned relative to the size of the cartons to be filled. In operation, the bottom end flaps 67 and 68 are folded under in a horizontal plane and the carton is placed in the position shown in Fig. 1 with the bottom side flaps 69 and 70 projecting below the platens. The bottom edge of one end panel of the carton rests on the leaf 62 and the bottom edge of the other end panel rests on the skidway 63, with the attached bottom flaps thereof projecting inwardly. In this position, the space between the bottom end flaps is not less than the length of the platen 20, so that these flaps will not interfere with the upward movement of the platen. In other words, the said bottom end flaps are wholly supported by the leaf 62 and by the skidway 63. To insure proper positioning of the cartons in this position, abutments 71 and 72 are secured to the outer end of the leaf 62 to engage the corresponding end panel of the carton.

With the carton in this position, compressed air is supplied to the bottom of the cylinder 16 by actuating the air valve 52 through the medium of an electrical switch 73 placed at a convenient point on the machine, thereby forcing the piston 47 upward and carrying with it the shaft 13, platen 20, half-platens 23 and 24 and the levers 42 and 43.

To prevent destruction or undue shock, an adjustable breather valve 74 is connected to the upper end of the cylinder 16 in communication with the space above the piston.

As the shaft 13 moves upward, the arms 40 and 41 are forced together by the rollers 44 and 45, resulting, as explained above, in the spreading of the half-platens 23 and 24 within the carton,

as shown in Fig. 3. In this position, the carton is ready to be filled with the bottom layer or layers of material. A bottom sheet 75 of stiff cardboard or other suitable material is first placed on the platens and one or more layers of the material to be placed in the bottom of the carton is placed on the sheet 75. The material is continuously fed to the shelf 76 in front of the operator who removes it from the shelf and places it in layers in the carton.

The platens are then lowered one interval by tripping the solenoid 58 and simultaneously releasing the air pressure on the bottom of the piston 16. Two electrical switches 77 and 78 operated by a single pivoted lever 79 are provided for this purpose. On movement of the lever 79, the lower switch 78 is actuated in advance of the switch 77, thereby moving the slide 53 of the air valve to the release or exhaust position, as explained above, thereby permitting the shaft 13 to drop by gravity until the detent engages the notch 49, thus lowering the platens to and holding them in an intermediate position in the carton for the reception of an intermediate layer or layers of material. The number of intermediate positions to be used in any particular case will depend upon the depth of the carton and the material being loaded in it. For illustrative purposes, two intermediate positions are shown in the drawing, but it is to be understood that additional ones may be provided without departing from the spirit of this invention.

Upon actuation of the lever 79 again, the solenoid is tripped by actuation of the switch 77 whereby shaft 13 is dropped a further interval causing the detent 48 to engage the notch 61. The final layers of material are then placed in the carton. The lever 79 is further actuated to release the detent 48 from the notch 61 and permit the platens to return to their normal lower position. The carton is then moved sideways over the skidway 63 to a collecting station, such as the conveyor belt 66. During this movement of the carton, the bottom side flaps are folded under by the convergent guides 80 and 81. A transverse guide 82 is positioned at the convergent end of the guides 80 and 81 to complete the closing of the side flaps and prevent them from being damaged or hung up by the end frame member 83. Additional guides 84 and 85 may be provided to engage the sides of the cartons and keep them in proper position as they move over the skidway.

To furnish a signal for the placing of the final top layers and thus prevent overloading, when the platens have returned to the position just prior to the normal, a position which cannot be seen by the operator while the cartons are being loaded, an electric light bulb 86 is attached to the machine in front of the operator and it is energized by an electric current controlled by a switch 87. The switch is positioned on the machine so that the actuator 88 thereof is engaged by the finger extension 19 as the shaft drops to the last loading position. A lever 89 connected to a dash pot or shock absorber 90 also engages the finger extension 19 during this movement of the shaft to cushion the movement of the shaft under the load of the layers of material already placed on the platens so as to avoid damage to both the material and to the machine by shock or abruptness in stopping as the shaft comes to rest.

In each of the loading positions, lateral support for the material being placed in the cartons is



furnished by the upstanding upper flaps 91, 92, 93 and 94 of the carton.

Although the embodiment described above is a preferred embodiment, it is to be understood that various changes may be made therein within the scope of the appended claims without departing from the spirit thereof.

Having thus described my invention, I claim:

1. A machine for filling cartons comprising a frame, a shaft mounted for and constrained to vertical reciprocation on said frame, a horizontal platen secured at the top of said shaft, said platen having outwardly extendable portions, means for moving said portions outwardly when said shaft is elevated from a given normal position, means for moving said portions inwardly when said shaft is lowered to said normal position and means for supporting a carton on said frame about and independently of said platen.

2. A machine as defined by claim 1 in which the means for forcing the portions outwardly comprise bell-cranks pivoted to a collar slidable on the shaft, one arm of each bell-crank being linked to one of said end portions, the other arms of the bell-cranks having cam surfaces, and rollers secured to the frame of the machine in engagement with the cam surfaces.

3. A machine as defined by claim 1 having a piston connected to the shaft, a fluid system for moving said piston upwardly, and electrical means for controlling said system.

4. A machine for filling cartons comprising a frame, a shaft mounted for and constrained to vertical reciprocation on said frame, means for moving said shaft to and holding it in different vertical positions, a horizontal platen secured at the top of said shaft, said platen having outwardly extendable portions, means for moving said portions outwardly when said shaft is elevated from a given normal position, means for moving said portions inwardly when said shaft is lowered to said normal position, and means for supporting an open carton on said frame about and independently of said platen.

5. A machine for filling cartons comprising a frame, a shaft mounted for and constrained to vertical reciprocation on said frame, means for moving said shaft to and holding it in different vertical positions, a horizontal platen secured to the top of said shaft, said platen having outwardly extendable portions, means actuated by the upward movement of the shaft for moving said portions outwardly from a given normal position, means for moving said portions inwardly when said shaft is lowered to said normal position, and means for supporting an open carton on said frame about and independently of said platen.

6. A machine for filling cartons comprising a frame, a shaft vertically movable on said frame, means for moving said shaft to and holding it in different vertical positions, a horizontal platen secured at the top of said shaft, said platen having outwardly extendable portions, yieldable means urging said portions to their retracted positions, means for forcing said portions outwardly against said yieldable means when said shaft is elevated from a given normal position to an upper position, and means for supporting an open carton on said frame about and independently of said platen.

7. A machine for filling cartons comprising a frame, a shaft vertically movable on said frame between a given normal position and a position above the normal position, means for moving said

shaft to and holding it in said positions and in positions intermediate thereto, a horizontal platen secured at the top of said shaft, said platen having outwardly extendable portions, a horizontal skidway adjacent the platen in its normal position, means for moving said portions outwardly when said shaft is elevated from its normal position, means for moving said portions inwardly when said shaft is lowered to said normal position, and means for supporting an open carton on said frame about and independently of said platen.

8. A machine for filling cartons of the type having side and end panels and closure flaps depending therefrom, comprising a frame, a vertically movable horizontal platen on said frame, said platen having outwardly extendable end portions, means for moving said portions outwardly when said platen is elevated from a given normal position, means for moving said portions inwardly when said platen is lowered to said normal position, a pair of members having stationary horizontal supporting surfaces adjacent the outer ends of said portions, said supporting surfaces being substantially level with said portions in their normal positions, said surfaces being adapted to support the bottom edge of the end panels of a carton to be filled, whereby the movable platen with its extendable end portions may be moved in different vertical positions within the carton and facilitate the filling of the carton with consecutive layers of material.

9. A machine for filling cartons of the type having side and end panels and closure flaps depending therefrom, comprising a frame, a vertically movable horizontal platen on said frame, said platen having outwardly extendable end portions, yieldable means urging said end portions to their retracted positions on said platen, means for forcing said portions outwardly against said yieldable means when said platen is elevated from its normal lowermost position, a pair of stationary members having horizontal supporting surfaces adjacent the outer ends of said portions, said supporting surfaces being substantially level with said portions in their normal lowermost position, said surfaces being adapted to support the bottom edge of the end panels of a carton to be filled, whereby the movable platen with its extendable end portions may be moved in different vertical positions within the carton and facilitate the filling of the carton with consecutive layers of material.



10. A machine for filling cartons comprising a frame, a shaft mounted for vertical movement on the frame, a horizontal lower platen fixed to the top of the shaft, a pair of upper half-platens slidably mounted on top of said lower platen, a pair of curved levers having cam surfaces, each of said levers being pivoted at one end to one of said half-platens, a sleeve on said shaft, said levers being fulcrumed to said sleeve, rollers mounted on said frame in contact with the cam surfaces of said levers, means for yieldably urging said half-platens inwardly on said lower platen, and means for supporting an open carton on said frame about and independently of said platens.

11. A machine for filling cartons comprising a frame, a shaft mounted for vertical movement on said frame, a horizontal lower platen fixed to the top of said shaft, a pair of upper half-platens slidably mounted on said lower platen, a bracket secured to the bottom of each of said half platens, said lower platen having slots therein to receive and slidably engage said brackets, a pair of curved levers, each of said levers being pivoted at one end to one of said brackets and depending downwardly and outwardly below the lower platen so that their concave surfaces face outwardly, rollers engaging said concave curvatures, a sleeve carried by said shaft, said levers being fulcrumed to said sleeve, and means for supporting a carton on said frame about and independently of said platens.

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**References Cited** in the file of this patent

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,592,793 | Webster | July 13, 1926 |
| 2,143,847 | Gordon | Jan. 17, 1939 |