June 1, 1937. J. G. VERGOBBI 2,082,086

CARTON CLOSING MACHINE

Filed April 13, 1935 5 Sheets-Sheet 1

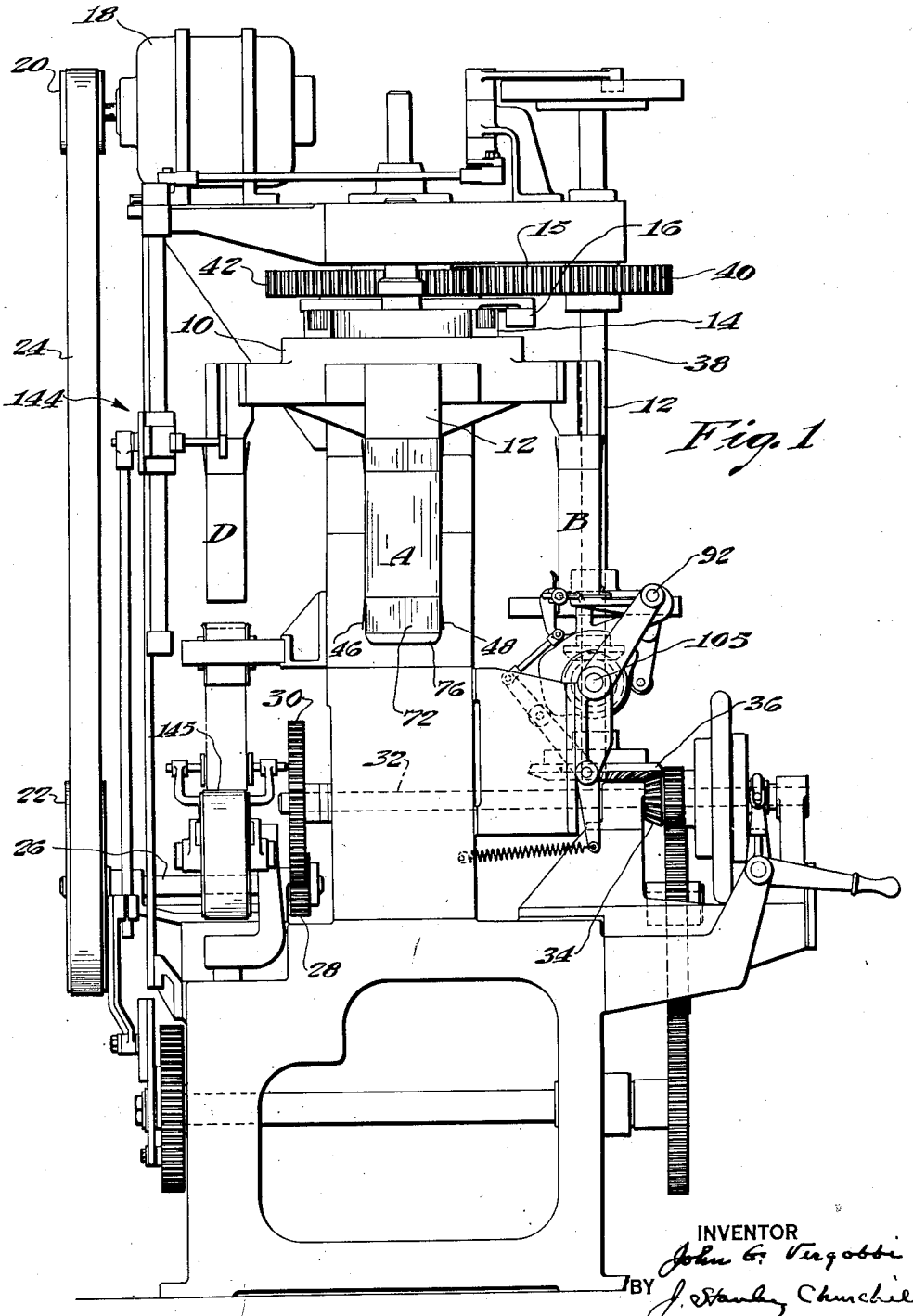


Fig. 1

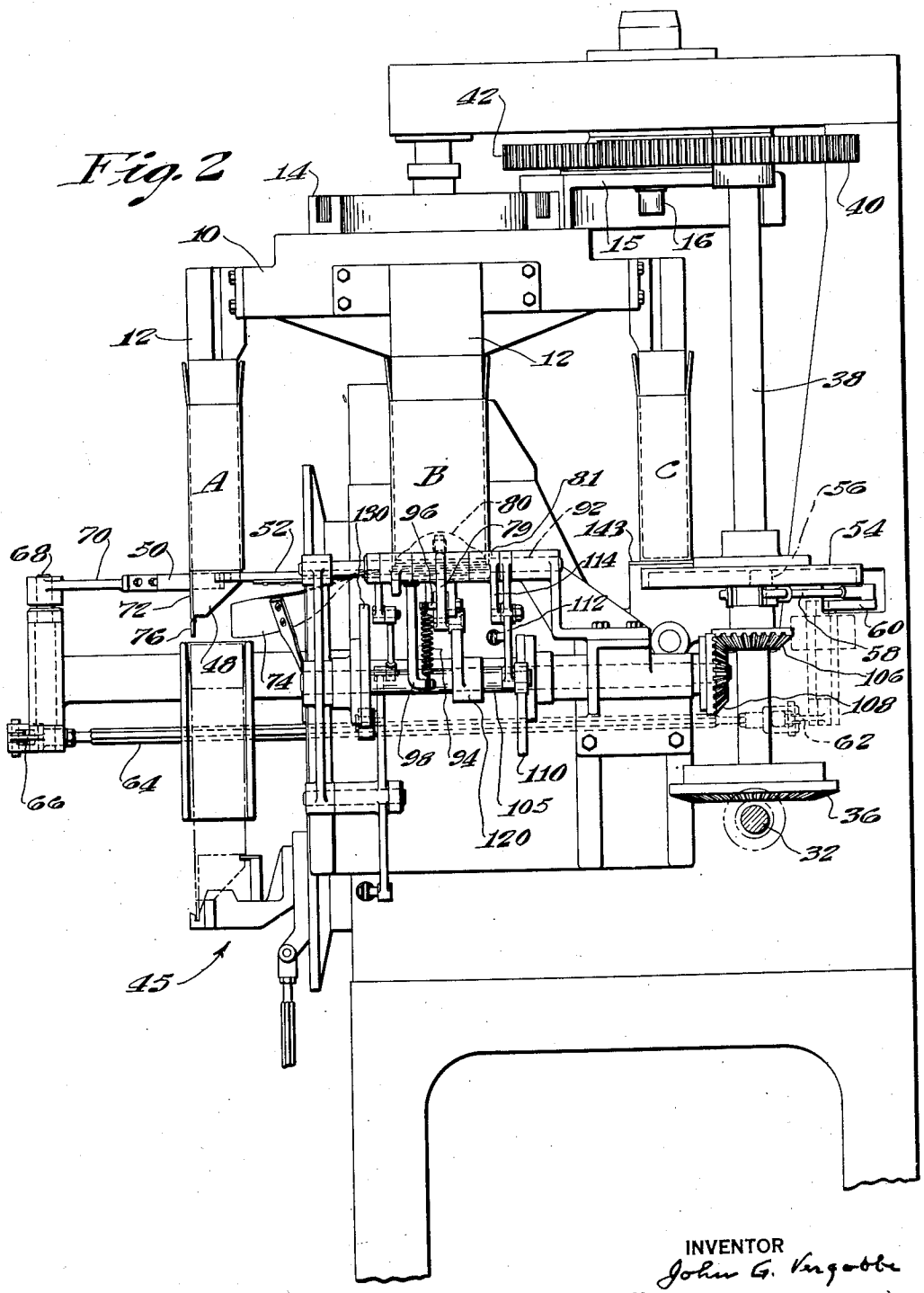
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Fig. 2



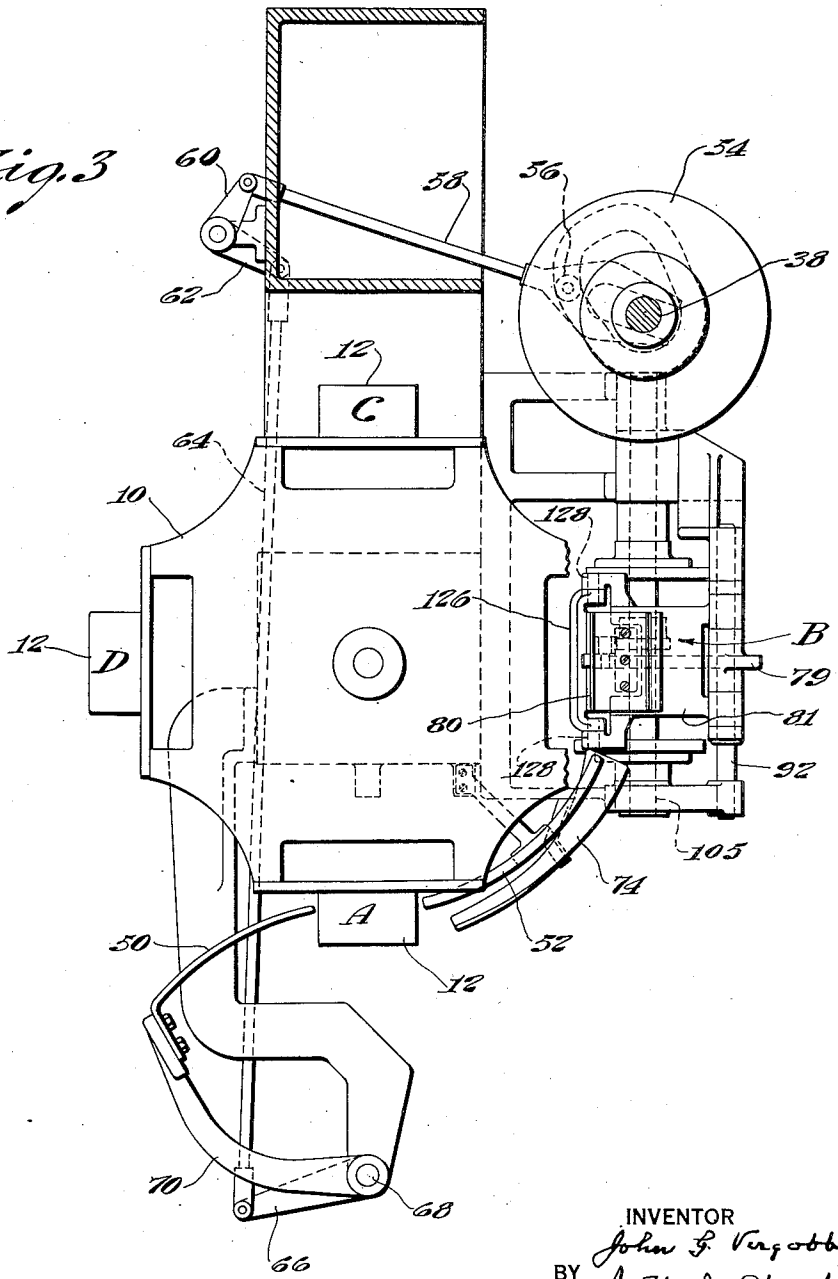
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Fig. 3



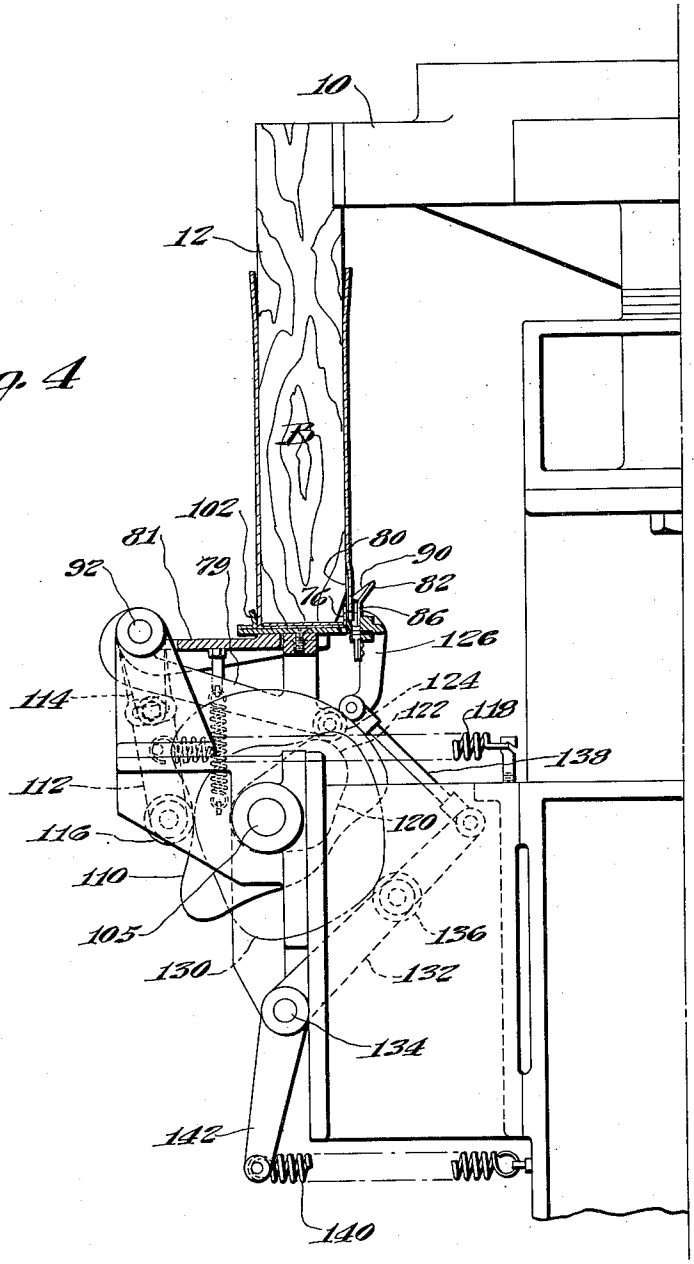
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Fig. 4



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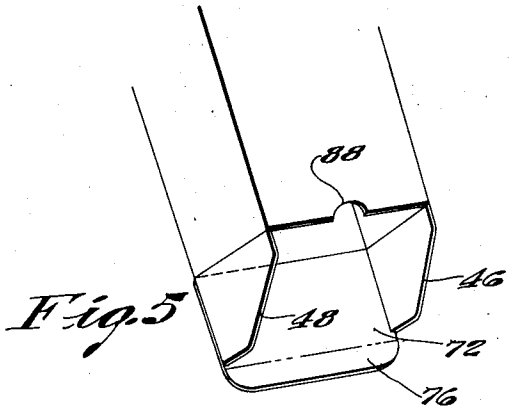


Fig. 5

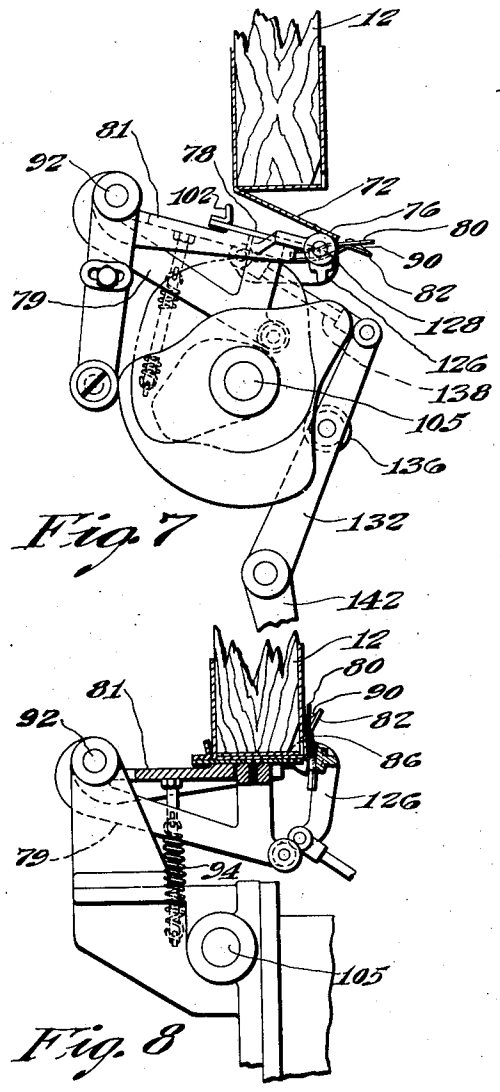


Fig. 7

Fig. 8

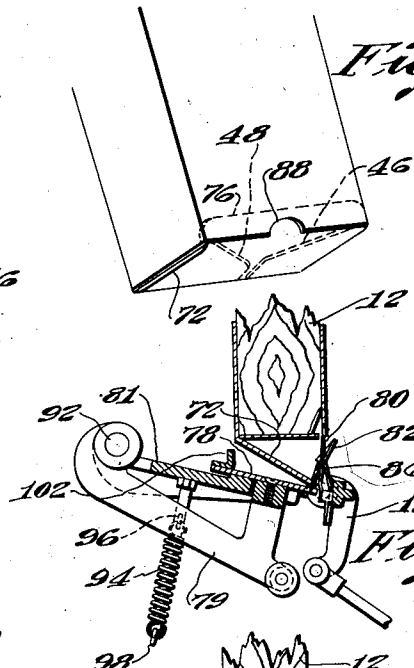


Fig. 6

Fig. 9

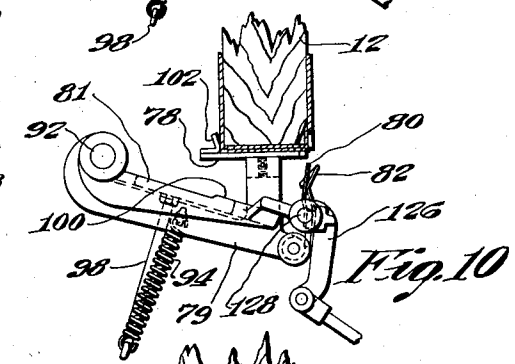


Fig. 10

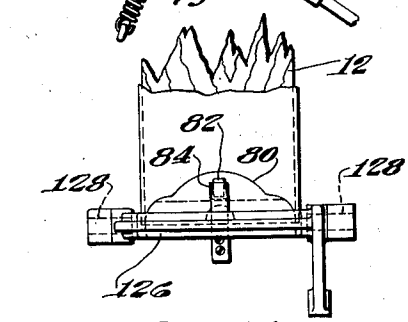


Fig. 11

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UNITED STATES PATENT OFFICE

2,082,086

CARTON CLOSING MACHINE

John G. Vergobbi, Quincy, Mass., assignor to Pneumatic Scale Corporation, Limited, Quincy, Mass., a corporation of Massachusetts

Application April 13, 1935, Serial No. 16,184

11 Claims. (Cl. 93—44.1)

This invention relates to a carton closing machine and more particularly to a machine for closing the bottom flaps of a carton, for tucking one of the flaps into the interior of the carton.

The invention has for an object to provide a novel and improved carton closing machine by which cartons of the type having the bottom flaps at least one of which is provided with a tucking flap, may be closed in a novel, efficient, and rapid manner.

A further object of the invention is to provide novel apparatus for tucking flaps of a carton in an efficient and practical manner.

With these general objects in view and such others as may hereinafter appear, the invention consists in the carton closing machine and in the various structures, arrangements and combination of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 illustrates in side elevation a sufficient portion of the present carton closing machine to enable the different features of the invention to be understood; Fig. 2 is a front elevation of the same; Fig. 3 is a plan view of the portion of the machine shown in Fig. 1; Fig. 4 is an enlarged side elevation of the flap tucking mechanism, some of the parts being shown in section; Figs. 5 and 6 are perspective views of a portion of a carton with its bottom flaps in open and closed positions respectively; Figs. 7, 8, 9, and 10 are detailed views in side elevation with some of the parts in section and with the preferred form of flap tucking mechanism illustrated in different positions of operation, and Fig. 11 is a rear elevation viewed from the right of Fig. 8 illustrating the tucker blade and associated parts.

In general, the present invention contemplates a carton closing machine which is adapted to efficiently close those cartons having bottom flaps at least one of which is provided with a tucking flap adapted to be tucked into the interior of the carton in order to effect the closure of the bottom of the carton, and accordingly the invention contemplates the provision of bottom flap folding means associated with, and cooperating with, tucking mechanism for tucking the tucking flap into the carton, and provision is made for automatically presenting successive cartons into a position to be operated upon by said bottom flap folding and tucking mechanism. The successive cartons to be operated upon may and preferably will be automatically delivered to movable carton supporting means, and the latter may take the form of a plurality of blocks upon which the cartons are mounted with their bottom flaps projecting downwardly beyond the lower ends of the blocks. Provision may be made for intermittently moving the blocks through successive stations, and during the movement of the blocks and while the carton is being supported thereon, provision is made for folding the bottom flaps of the carton and for tucking in the tucking flap, as will be described.

Referring now to the drawings, the different features of the invention are illustrated in a carton closing machine which may, except as to details of construction to be hereinafter pointed out, comprise any of the usual forms of bottom sealing machines now upon the market. Reference is made to the patent of W. S. Scales, No. 767,445, dated August 16, 1904, as disclosing the general details of construction and mode of operation of such prior art of bottom sealing machines.

As is generally known, and as illustrated in the Scales Patent No. 767,445 above referred to, these prior art bottom sealing machines have included four forming blocks upon which cartons are successively placed by suitable mechanism, with the bottom flaps of the cartons projecting below the lower ends of the blocks. Successive cartons are placed upon successive blocks, as each block is moved into a definite station, and thereafter a particular block with its carton is intermittently revolved through successive steps of 90° each to permit the different operations of folding and closing the bottom flaps of the carton to be performed.

It has been deemed sufficient to illustrate only those portions of the bottom closing machine as will enable the present invention to be understood, and as herein shown, see Figs. 1 and 2, 10 represents the usual rotatable spider upon which the four forming blocks 12 are mounted to revolve therewith. The spider is arranged to be intermittently rotated by the usual form of Geneva drive including the Geneva wheel 14, driver 15, and roll 16, the latter being driven from an electric motor 18 through connections including a motor pulley 20 which is belted to a driving pulley 22 by a belt 24. The driving pulley 22 is fixed on one end of a shaft 26, suitably mounted in the machine frame, and the other end of the shaft is provided with a gear 28 fixed thereon. The gear 28 meshes with a gear 30 fixed on a shaft 32 and the second end of the shaft 32 is provided with a bevel gear 34 cooper-

ating with a bevel gear 36 fixed on the lower end of a vertical shaft 38. A gear 40 fixed to the upper end of the vertical shaft 38 meshes with and drives a gear 42 which is attached to the Geneva driver 15.

The cartons are placed upon the blocks when each block is brought into station A, see Figs. 2 and 3, by the usual carton lifting mechanism, generally indicated at 45. After a carton has been placed upon a block at station A, provision is made for folding the two narrower flaps 46, 48 of the carton upon the bottom of the block and these folding operations are performed by an oscillatory folding member 50 and a fixed folding member 52. The arm 50 is arranged to be operated from a cam 54 mounted on the shaft 38 through connections including a cam roller 56 mounted upon a link 58, through connecting arms 60, 62, through a link 64 and arm 66. The arm 66 is fast to a shaft 68 to which is secured an arm 70 carrying the folding member 50. When the arm 50 is oscillated, it engages one of the narrower flaps 46, folding it under the bottom of the carton, and the second narrower flap 48 is folded during the movement of the carton from station A to station B by the fixed folding member 52. The folding arm 50 is arranged to be withdrawn after the fixed folding guide 52 has engaged both flaps. During the movement of the block and carton from station A to station B the wider flap 72 is bent inwardly by a fixed, curved guide 74 and in arriving at station B the carton and block come to rest in a position such as indicated in Fig. 7. In the illustrated carton, the wider flap 72 is provided with a tucking flap 76 as shown in Fig. 5. After the block and carton have arrived at station B, provision is made for folding the flap 72 up against the bottom of the block and for tucking the extended flap 76 up into the interior of the carton. As herein shown, the flap 72 is first bent up against the bottom of the block by a folding plate 78 mounted on an arm 79 and while the flap is held in this position a tucking blade 80 mounted to rock on an arm 81 is caused to bend the tucking flap 76 up at right angles to the flap 72 against the outside of the carton as shown in Fig. 8. At the same time, a hook member 82 mounted on a flat spring directly in back of the tucking blade, engages the top edge of the tucking flap so that when the folding plate 78 and the hook member 82 are rocked down away from the block, the hook member 82 carries the flap down with it to a position, as illustrated in Fig. 9.

The parts are now disposed in readiness for the next step in the series of operations for tucking the flap 76 into the interior of the carton. From the position shown in Fig. 9, the folding plate 78 is again rocked up against the bottom of the block and at the same time the tucking blade 80 is caused to enter the inside edge of the carton and as the folding plate advances toward the block, the tucking blade 80 guides the flap 76 up into the carton and the different parts of the mechanism will then be disposed, as illustrated in Fig. 4. It will be observed that the corner of the block is cut away in order to provide a clearance for the tucking flap to enter. It will also be seen that as the tucking blade 80 advances into the carton, the hook member 82 is disengaged from the top edge of the flap and rides up over the outside edge of the carton. As herein shown, the tucking blade 80 and hook member 82 operate together as a unit and normally the hook member extends through a cut out portion 84 in the blade, as shown in Fig. 11. As previously stated, the hook member is mounted on a flat spring 86 to provide the necessary yielding action. In order to assist in the separation of the hook 82 from the blade 80, a thumb hole 88 is provided in the carton in the side where the tucking flap enters and it will be seen that when the blade 80 and hook 82 advance toward the carton, the parts are operated so that the angular surface 90 of the hook will come in contact with the top edge of the thumb hole and consequently the hook will be separated from the blade.

During the operations thus far described, the arm 79 on which the folding plate 78 is mounted, and the arm 81 in which the tucking blade and hook are mounted, move together as a unit. The arm 81 is fixed to a rock shaft 92 and the arm 79 is mounted free on the shaft 92. As herein shown, a spring 94 is hooked at one end to a spring stud 96 secured to the arm 79 and at the other end to a spring stud 98 secured to the arm 81. The spring yieldingly urges the underside of the plate 78 against the flat surface 100 of the arms 81. Accordingly as the shaft 92 is rocked to move the arm 81, the arm 79 will follow along with it.

During the withdrawal of the tucking blade into the position shown in Fig. 10, the plate 78 is caused to remain in engagement with the bottom of the carton on the block to hold the tucked flap in its closed position and prevent the flap from being withdrawn with the tucking blade. It will be observed that the top edge of the tucking flap 76 has been tucked up beyond the thumb hole so that when the tucking blade and the hook are withdrawn, the hook will slide over the flap and return into engagement with the tucking blade, as shown in Fig. 10.

After the tucking blade 80 has been withdrawn, provision is made for lowering the folding plate 78 into engagement with the arm 81 and the parts are thus returned to their normal position at the start of another cycle of operation, as shown in Fig. 7. The folding plate 78 is provided with an angular member 102 which serves to hold and support the outer edge of the carton on the block when the plate is raised to the end that the flap will not be displaced laterally when being manipulated by the flap tucking members.

The above described motions of the flap tucking device are imparted through connections from a cam shaft 105. The cam shaft 105 is driven from the vertical shaft 38 through cooperating bevel gears 106, 108. The rock shaft 92 on which the arm 81 is fixed, is rocked by a cam 110 fixed on the shaft 105, through a lever 112 adjustably secured to an arm 114 extending from the hub of the arm 81, and through the cam roller 116 mounted on the lever 112. The roller 116 is held against the cam 110 by a spring 118. The arm 79, which as previously described normally moves with the arm 81, is held in a raised position, as shown in Fig. 10, by a cam 120 fixed on the shaft 105. This cam 120 is so placed on the shaft that the raised portion 122 comes in contact with a roll 124 in the arm 79 at the same time the tucking blade 80 is withdrawn and thereafter the roll 124 follows the cam 120 until the arms 79 and 81 are again in contacting relation as described.

The tucking blade 80 and hook member 82 are mounted in a rocking lever 126 which is pivoted on studs 128 carried in the end of the arm 81. The lever 126 is rocked by a cam 130 fixed to the shaft 105 through connections including a

lever 132, pivoted on a stud 134, cam roll 136 and link 138. A spring 140 connected at one end to a second arm 142 and at the other end to the machine frame holds the roll 136 against the cam 130. During the operation of the machine, the lever 126 may be rocked at the same time the lever 81 is rocked and the combined rocking action controls the movement of the tucking blade 80 and the hook member 82, as described.

After the flap has been tucked into the carton at station B, the block with its carton is advanced to station C where the bottom of the carton is subjected to pressure, of any usual or preferred mechanism, including a pressure pad generally indicated at 143, to further set the tucked flap into the bottom of the carton.

The carton is then advanced to station D where the carton is removed from the block by any usual or preferred stripping device generally indicated at 144, and deposited on a conveyor belt 145 to be carried away from the machine.

While the tucking mechanism is preferably embodied in a machine for closing and tucking the bottom flaps of cartons, it is not desired to limit the invention thereto.

While the preferred embodiment of the invention has been illustrated and described, it will be understood that the invention may be embodied in other forms of machines within the scope of the following claims.

Having thus described the invention, what is claimed is:—

1. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, carton supporting means, means for folding the inner bottom flaps, means for folding the outer bottom flaps, means for imparting a preliminary fold to the tucking flap to cause it to assume an angular position with relation to the bottom flap, means for laterally supporting the lower corner of the carton to which the outer bottom flap is connected, and tucking means insertible into the carton for tucking the tucking flap into the carton.

2. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, folding means for folding the inner bottom flaps, folding means for folding the outer bottom flap, independent means insertible into the carton for guiding the tucking flap to within the carton, means for laterally supporting the lower corner of the carton to which the outer bottom flap is connected during the flap tucking operation, and means for withdrawing said guiding means while permitting the folding means to hold the bottom flap in carton closing position.

3. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, means for folding the outer bottom flap into carton closing position with the tucking flap folded against the exterior of the carton, means for withdrawing the bottom flap from the position into which it has thus been folded, said means comprising a latch member adapted to engage the end of the tucking flap, a guide member movable with said latch and insertible into the carton, said latching member being constructed and arranged whereby engagement of the lower edge of the wall of the carton therewith effects the disengagement of the latch from the tucking flap.

4. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, means for folding the outer bottom flap into carton closing position with the tucking flap folded against the exterior of the carton, means for withdrawing the bottom flap from the position into which it has thus been folded, said means comprising a latch member adapted to engage the end of the tucking flap, a guide member movable with said latch and insertible into the carton, said latching member being constructed and arranged whereby engagement of the lower edge of the wall of the carton therewith effects the disengagement of the latch from the tucking flap, and means for withdrawing said guide member from the carton prior to the withdrawal of the flap folding means whereby to hold the bottom flap in carton closing position.

5. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, means for folding the outer bottom flap into carton closing position, means for folding the tucking flap against the outer surface of the carton including a latch member adapted to engage the end of the tucking flap, and a guide member, mechanism for effecting the downward movement of said bottom flap folding means and said tucking flap folding means, mechanism for effecting the insertion of said guide member into the interior of the carton and of the engagement of the latch member with the lower edge of the wall of the carton whereby to disengage the latch from the tucking flap, said mechanism being operative to fold the bottom flap into carton closing position.

6. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, means for folding the outer bottom flap into carton closing position, means for folding the tucking flap against the outer surface of the carton including a latch member adapted to engage the end of the tucking flap, and a guide member, mechanism for effecting the downward movement of said bottom flap folding means and said tucking flap folding means, mechanism for effecting the insertion of said guide member into the interior of the carton and of the engagement of the latch member with the lower edge of the wall of the carton whereby to disengage the latch from the tucking flap, said mechanism being operative to fold the bottom flap into carton closing position, and means for withdrawing said guide member from the carton prior to the withdrawal of the flap folding means whereby to hold the bottom flap in carton closing position.

7. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, means for folding the outer bottom flap into carton closing position, said means being provided with a member for laterally supporting the lower corner of the carton to which the bottom flap is connected, means for withdrawing the bottom flap from the position into which it has thus been folded, said means comprising a latch member adapted to engage the end of the tucking flap, a guide member movable with said latch and insertible into the carton, said latching member being con-

structed and arranged whereby engagement of the lower edge of the wall of the carton therewith effects the disengagement of the latch from the tucking flap.

8. In a machine for closing the bottom flaps of a carton of the type having an outer bottom flap provided with a tucking flap and having inner bottom flaps, in combination, means for folding the outer bottom flap into carton closing position, means for laterally supporting the lower corner of the carton to which the bottom flap is connected, means for withdrawing the bottom flap from the position into which it has thus been folded, said means comprising a latch member adapted to engage the end of the tucking flap, a guide member movable with said latch and insertible into the carton, said latching member being constructed and arranged whereby engagement of the lower edge of the wall of the carton therewith effects the disengagement of the latch from the tucking flap.

9. In a machine for closing the flaps of a carton of the type having an outer flap provided with a tucking flap and having inner flaps, in combination, carton supporting means, means for folding the inner flaps, means for folding the outer flaps, means for imparting a preliminary fold to the tucking flap to cause it to assume an angular position with relation to the flap, means for laterally supporting the lower corner of the carton to which the outer flap is connected, and tucking means insertible into the carton for tucking the tucking flap into the carton.

10. In a machine for closing the flaps of a carton of the type having an outer flap provided with a tucking flap and having inner flaps, in combination, folding means for folding the inner flaps, folding means for folding the outer flap, independent means insertible into the carton for guiding the tucking flap to within the carton, means for laterally supporting the lower corner of the carton to which the outer flap is connected during the flap tucking operation, and means for withdrawing said guiding means while permitting the folding means to hold the flap in carton closing position.

11. In a machine for closing the flaps of a carton of the type having an outer flap provided with a tucking flap and having inner flaps, in combination, means for folding the outer flap into carton closing position with the tucking flap folded against the exterior of the carton, means for withdrawing the flap from the position into which it has thus been folded, said means comprising a latch member adapted to engage the end of the tucking flap, a guide member movable with said latch and insertible into the carton, said latching member being constructed and arranged whereby engagement of the lower edge of the wall of the carton therewith effects the disengagement of the latch from the tucking flap.

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