May 27, 1952 J. M. SCHMIED 2,598,135

CARTON CLOSING AND FLAP TUCKING MACHINE

Filed Nov. 26, 1949 4 Sheets-Sheet 1

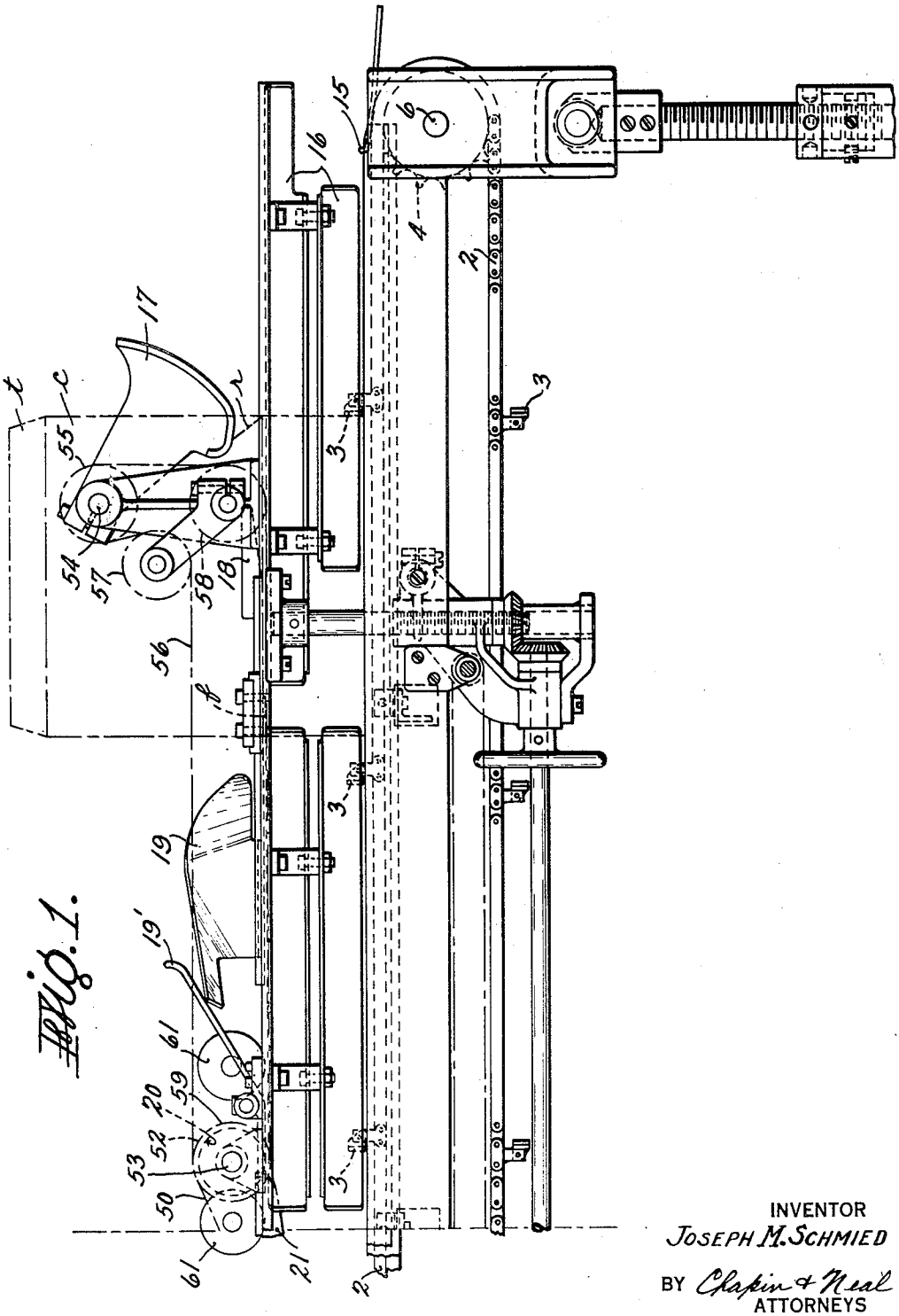


Fig. 1.

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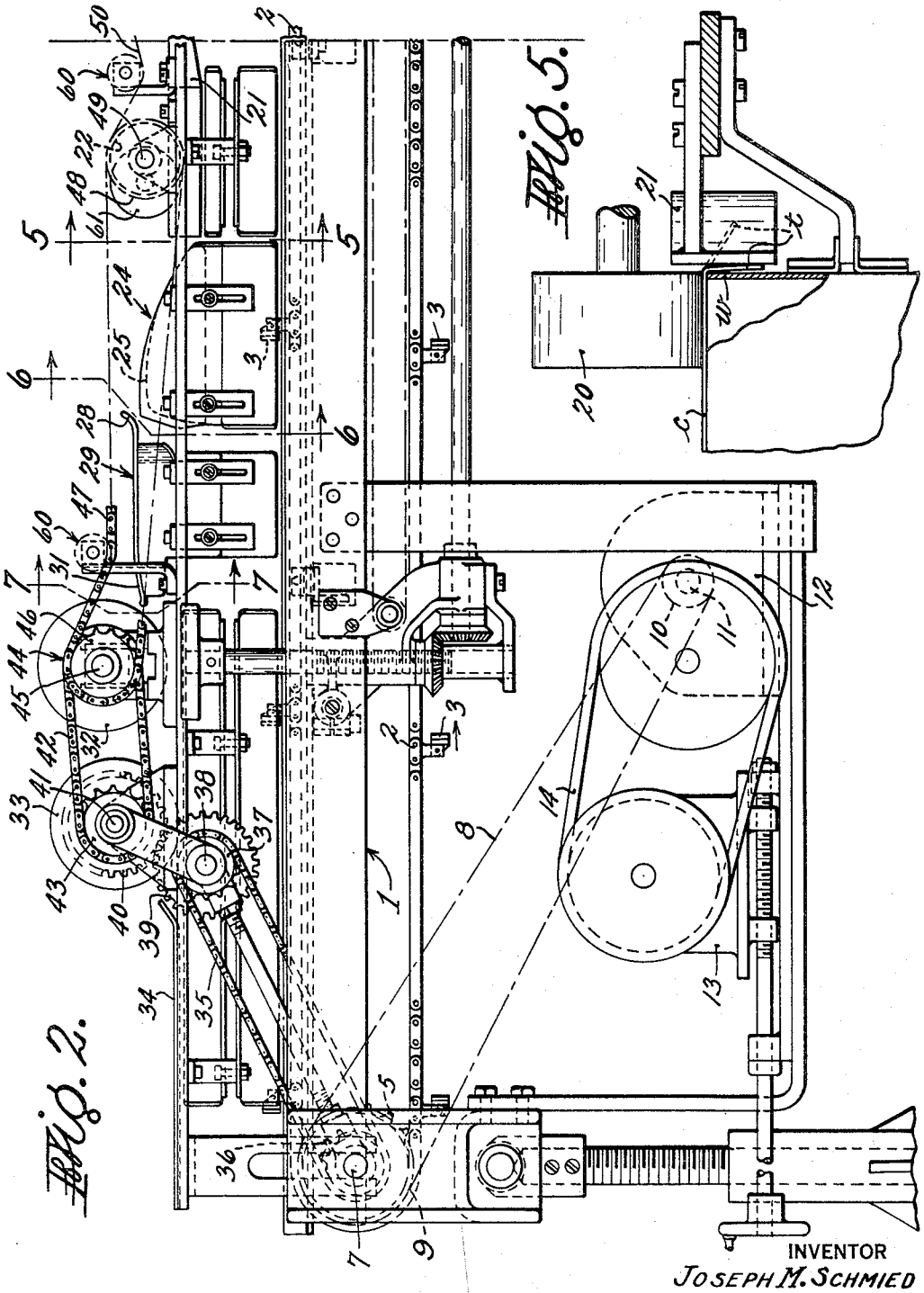


Fig. 2.

Fig. 5.

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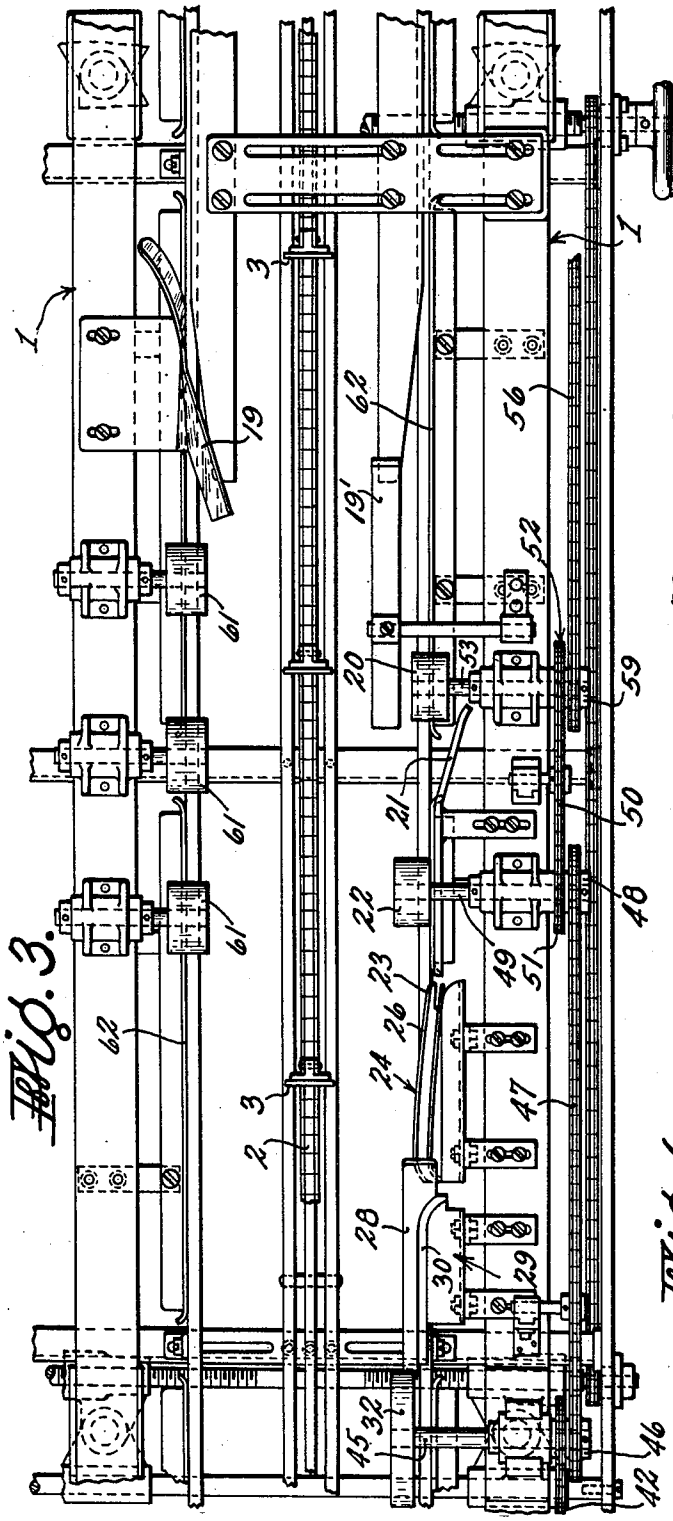


Fig. 3.

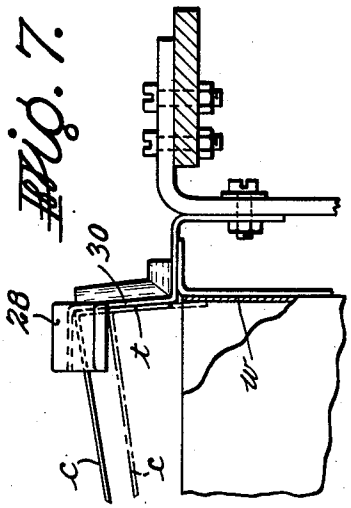


Fig. 7.

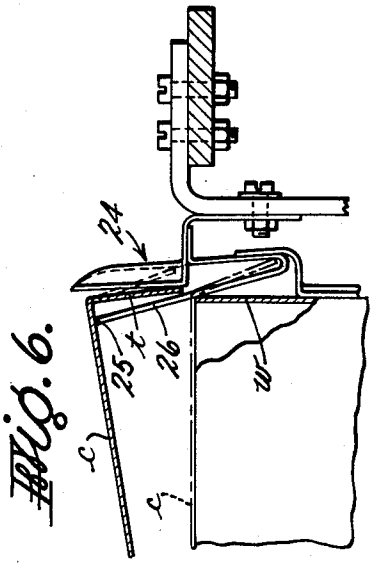


Fig. 6.

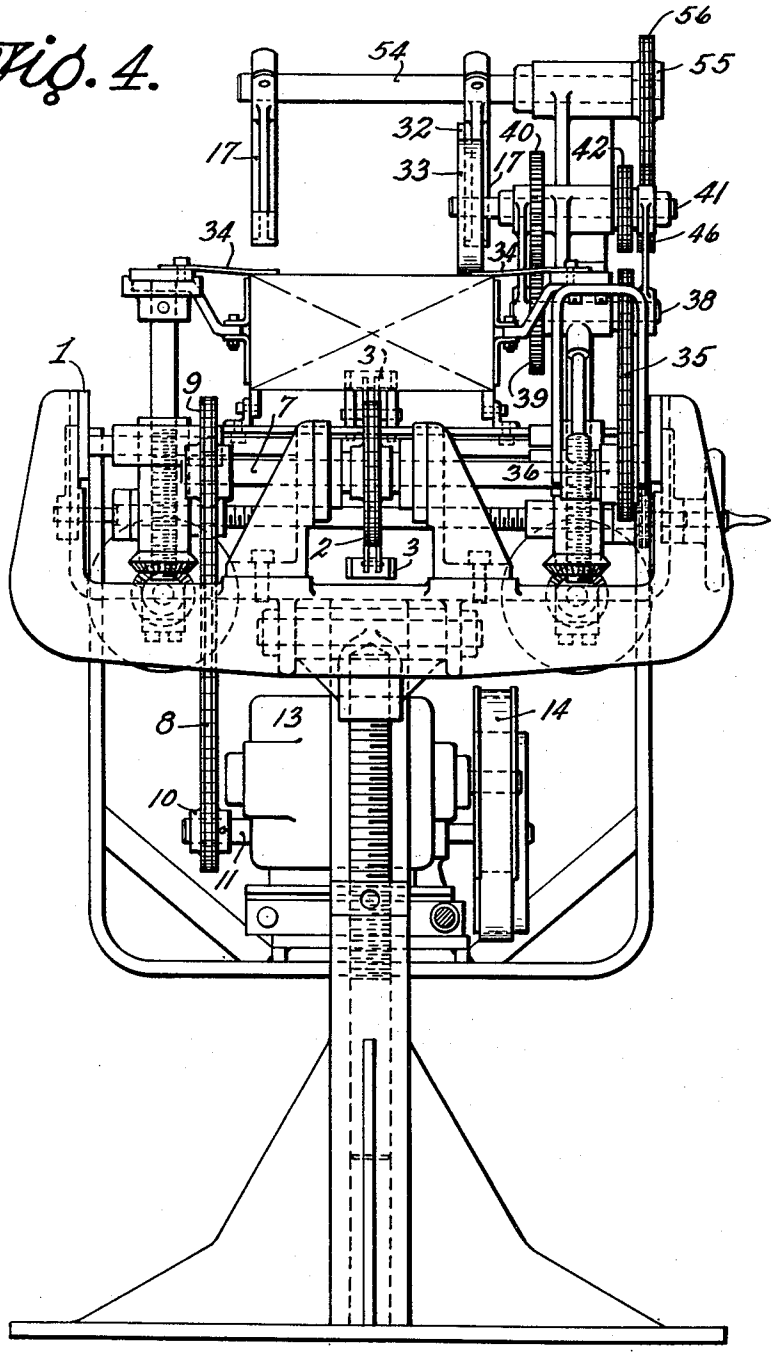
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Fig. 4.



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CARTON CLOSING AND FLAP TUCKING MACHINE

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Application November 26, 1949, Serial No. 129,615

6 Claims. (Cl. 53—147)

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This invention relates to a machine for closing cartons having a closure hinged along one longitudinal edge and provided along its opposite edge with a tuck-in flap. The tuck-in flap, when the carton is closed, is positioned between the front wall of the carton and the carton contents.

More particularly the present invention relates to the means by which the positioning of the tuck-in flap between the front wall of the carton and the carton contents is accomplished.

The principal object of the invention is to provide a carton closing device of the above character which is relatively simple in construction and operation. A further object is to provide means for positioning the tuck-in flap of the closure within the carton without interrupting movement of the carton through the machine.

Other and further objects residing in the details of construction will be made apparent in the following specification and claims.

In the accompanying drawings:

Fig. 1 is a side elevational view of the initial half of a machine embodying the invention;

Fig. 2 is a similar view of the other half of such machine, Figs. 1 and 2 together constituting a side elevational view of full length;

Fig. 3 is a plan view of the central portion of the machine showing the instrumentalities by which the positioning of the tuck-in flap within the carton is accomplished;

Fig. 4 is an end elevational view looking from the left of Fig. 2; and

Figs. 5, 6 and 7 are diagrammatic sectional views substantially on lines 5—5, 6—6 and 7—7 of Fig. 2.

Referring to the drawings, 1 indicates an elongated table by which the various instrumentalities are supported. Extending longitudinally of the table is a conveyor chain 2 carrying spaced pusher members 3 which propel the cartons to be closed through the machine. Conveyor chain 2 passes around end sprockets 4 and 5 respectively carried by shafts 6 and 7. The conveyor chain is driven in any suitable manner as by sprocket chain 8 passing around a sprocket 9 secured to shaft 7 and around a sprocket 10 secured to a shaft 11 of a gear reduction unit, generally indicated at 12, and driven from a suitable motor 13 by a belt 14. The boxes to be closed are presented to the machine in any suitable manner to be brought to rest against a conventional package lock 15 by which they are released to the pushers 3.

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The packages are initially carried by the pushers between side guides 16 and beneath a pair of transversely spaced, rotatable end flap closing members 17 which are timed to overtake the rear end flap *r* of the carton and swing it into horizontal position. The forward end flap *f* has previously been engaged by the plate 18 to be folded thereby into horizontal position, and the rear flap *r* is retained under the control of folder 17 until it too has passed beneath the plate 18. Further advance brings the top closure *c*, which has hitherto been positioned substantially in a vertical position, into engagement with a stationary folder 19 which is transversely curved to bend the top closure along its hinged line into a position short of engagement with the top of the carton. The portion of the top closure adjacent the tuck-in flap portion *t* is brought by folder 19 beneath inclined folding bar 19' which carries the top closure *c* into fully closed position. As the closure *c* moves to the latter position it engages beneath a roll 20 (see Figs. 3 and 5). While the main closure is held in position by roll 20, the outwardly extending tuck-in flap *t* is engaged by fixed folding member 21 which folds the flap against the outside of the front wall *w* of the carton, as best shown in Fig. 5, the carton top at this latter point being held in position by a second roll 22. Preferably, the flap *t* has been scored along the line of its attachment to the closure *c* and the effect of folder 21 is to sharply bend and crease the tuck-in flap along such score line.

The effect of the mechanism so far described has been to accomplish what may be termed a false closing of the carton with the tuck-in flap folded against the outside front wall of the carton, as shown in Fig. 5, this "false closing" has however brought the parts into positions relative to each other which are very close to those desired in the properly closed carton.

As the carton advances past roll 22 the tip portion 23 of generally V-shaped manipulating member 24 engages between the flap *t* and the forward wall *w* of the box, and the forward motion of the carton causes the rising edge 25 of the inner plate 26 of the manipulating member to engage the underside of the cover, as best shown in Fig. 6, and raise the cover to a heighth to which the lower edge of the flap *t* clears the top of the front wall *w*. With the parts in the position shown in Fig. 6, the further advance of the box carries it under the forwardly extending end of portion 28 of a closure member generally indicated at 29. As the cover *c* and flap

t pass beneath the portion 28 their leading portions are freed of the restraint of member 24 and the flap portion t is engaged and moved inwardly by a slightly inclined and inwardly offset plate portion 30 by which the transversely extending member 28 is supported. As best shown in Fig. 7, member 30 forces the flap t inwardly to a position in which the outer face of the said flap is in general alignment with an inner face of the front wall w of the carton, or slightly inwardly of such position, the upper edge of wall w engaging beneath and being guided by the shoulder formed by the lower edge of member 30. At the same time, that edge of the cover c to which flap t is joined is engaged by the portion 28 so that a compressive force is applied, by the upper portion of member 30, in substantially the plane of the cover, along which plane is the greatest resistance to deformation. The result is that the cover c and its flap t are very precisely controlled and maintained in the general relationship shown in Fig. 7. This control is maintained as the box is advanced beneath the downwardly portion 31 of the member 28 to insert the forward end portion of the flap t into the box as indicated in dotted line in Fig. 7.

Further advance of the carton brings the forward end of the cover c adjacent the flap into position where it is engaged by a narrow roll 32 (Figs. 2 and 3), which roll carries the cover c further in the direction of closed position and forces the flap t further into the carton. Still further advance of the carton brings the flap bearing edge of the cover beneath a second roll 33 which moves the cover to final closed position and moves flap t to its full depth within the carton.

The resistance of the material of the cover and flap causes the latter to tend to hug the inside surface of the front wall w as it is moved to final position. From the roll 33 the closed carton passes beneath cantilever plates 34 (Figs. 2 and 4) which extend to the terminal end of the machine and from beneath which the closed cartons are discharged by the conveyor.

The various rotating members previously described are driven from the shaft 7 by a sprocket chain 35 passing around a sprocket 36 on shaft 7 and a sprocket 37, Fig. 2, on a short transverse shaft 38 to which is fixed a gear 39.

Gear 39 meshes with a gear 40 secured on shaft 41 to which is fixed roll 33.

Roll 32 is driven from shaft 41 by means of a sprocket chain 42 trained around a sprocket 43 fixed to shaft 41 and a sprocket 44 fixed to shaft 45 to which roll 32 is secured. Shaft 45 carries a second sprocket 46 (Fig. 3) connected by a sprocket chain 47 to a sprocket 48 secured to shaft 49 to which roll 22 is secured.

Roll 20 is driven from shaft 49 by sprocket chain 50 trained around a sprocket 51 secured to shaft 49, and a sprocket 52 secured to shaft 53 to which roll 20 is secured.

The rotatable folding members 17 are secured to a shaft 54 carrying a sprocket 55 driven by a chain 56 engaging idle sprockets 57 and 58 and passing around a sprocket 59 secured to shaft 53.

It will be understood that the various chain drives may be maintained at proper tautness by suitable adjustable tightening sprockets two of which are indicated at 60 in Fig. 2. Also, as shown in Fig. 3, freely rotatable guide rolls such as shown at 61 and side guide plates 62 are positioned along the path of the cartons to maintain

them in proper alignment with the several folding mechanisms.

The rolls such as 20, 22, 32 and 33 which participate in the closing operation may if desired, or as found necessary, be driven at a slightly increased surface speed than that imparted to the carton by the conveyor to compensate for the drag of the stationary members.

As is common in carton closing machines the frame members which support the various instrumentalities are preferably made adjustable relative to each other so as to accommodate various sizes of boxes. The means for such adjustment as shown in the drawings are not however essential to the present invention and therefore are not specifically described.

What is claimed is:

1. In a carton closing device, means for advancing a carton having a closure hinged at one side thereof, means in the path of the carton for folding said closure to carton closing position with a tuck-in flap forming portion extending beyond the front wall of the carton, means to bend said flap portion downwardly into substantial parallelism with the front wall of the carton and outwardly thereof, means positioned to enter between the so-positioned front wall and flap as the carton is advanced by the conveyor, said means having an upwardly inclined edge portion engaging the under side of the closure to raise the latter to a position in which the lower edge of the depending flap clears the upper edge of the front wall of the carton, means engaging the outer face of the flap to bend it to a position inwardly of the inner face of the front wall of the carton, and means engaging the upper surface of the closure adjacent its flap carrying edge to force the flap into the carton as the latter is advanced beneath said last-named means by the conveyor.

2. In a carton closing device, means for advancing a carton having a closure hinged at one side thereof, means in the path of the carton for folding said closure to carton closing position with a tuck-in flap forming portion extending beyond the front wall of the carton, means to bend said flap portion downwardly into substantial parallelism with the front wall of the carton and outwardly thereof, means positioned to enter between the so-positioned front wall and flap as the carton is advanced by the conveyor, said means having an upwardly inclined edge portion engaging the under side of the closure to raise the latter to a position in which the lower edge of the depending flap clears the upper edge of the front wall of the carton, a plate member engaging the outer face of the flap to bend it to a position inwardly of the face of the front wall of the carton, the lower edge of said plate providing a guide shoulder engaging the upper edge of the front wall of the carton, and means engaging the upper surface of the closure adjacent its flap carrying edge to force the flap into the carton as the latter is advanced under said last-named means by the conveyor.

3. In a carton closing device, means for advancing a carton having a closure hinged at one side thereof, means in the path of the carton for folding said closure to carton closing position with a tuck-in flap forming portion extending beyond the front wall of the carton, means to bend said flap portion downwardly into substantial parallelism with the front wall of the carton and outwardly thereof, a plate member extending in the direction of travel of the car-

ton and having an end portion positioned to enter between the advancing ends of the so-positioned front wall and flap, the upper edge of said plate member being inclined upwardly to engage the under side of the closure and raise the latter to a position in which the lower edge of the depending flap clears the upper edge of the front wall of the carton, means engaging the outer face of the flap to bend it to a position inwardly of the inner face of the front wall of the carton, and means engaging the upper surface of the closure adjacent its flap carrying edge to force the flap into the carbon as the latter is advanced beneath said last-named means by the conveyor.

4. In a carton closing device, means for advancing a carton having a closure hinged at one side thereof, means in the path of the carton for folding said closure to carton closing position with a tuck-in flap forming portion extending beyond the front wall of the carton, means to bend said flap portion downwardly into substantial parallelism with the front wall of the carton and outwardly thereof, a plate member extending in the direction of travel of the carton and having an end portion positioned to enter between the advancing ends of the so-positioned front wall and flap, the upper edge of said plate member being inclined upwardly to engage the under side of the closure and raise the latter to a position in which the lower edge of the depending flap clears the upper edge of the front wall of the carton, a second plate member engaging the outer face of the flap to bend it to a position inwardly of the face of the front wall of the carton, the lower edge of said second plate member providing a guide shoulder engaging the upper edge of the front wall of the carton, and means engaging the upper surface of the closure adjacent its flap carrying edge to force the flap into the carton as the latter is advanced under said last-named means by the conveyor, said second plate member forming a guide for the initial portion of the movement of the flap into the carton.

5. In a carton closing device, means for advancing a carton having a closure hinged at one side thereof, means in the path of the carton for folding said closure to carton closing position with a tuck-in flap forming portion extending beyond the front wall of the carton, means to bend said flap portion downwardly into substantial parallelism with the front wall of the carton and outwardly thereof, means positioned to enter between the so-positioned front wall and flap as the carton is advanced by the conveyor, said means having an upwardly inclined edge portion engaging the under side of the closure to raise the latter to a position in which the

lower edge of the depending flap clears the upper edge of the front wall of the carton, and a plate member engaging the outer face of the flap to bend it to a position inwardly of the face of the front wall of the carton, the lower edge of said plate providing a guide shoulder engaging the upper edge of the front wall of the carton, the upper portion of said plate member extending transversely over the adjacent edge portion of the closure, said transversely extending portion being curved downwardly in the direction of travel of the carton to force the underlying portion of the flap into the carton.

6. In a carton closing device, means for advancing a carton having a closure hinged at one side thereof, means in the path of the carton for folding said closure to carton closing position with a tuck-in flap forming portion extending beyond the front wall of the carton, means to bend said flap portion downwardly into substantial parallelism with the front wall of the carton and outwardly thereof, means positioned to enter between the so-positioned front wall and flap as the carton is advanced by the conveyor, said means having an upwardly inclined edge portion engaging the outer side of the closure to raise the latter to a position in which the lower edge of the depending flap clears the upper edge of the front wall of the carton, a plate member engaging the outer face of the flap to bend it to a position inwardly of the face of the front wall of the carton, the lower edge of said plate providing a guide shoulder engaging the upper edge of the front wall of the carton, the upper portion of said plate member extending transversely over the adjacent edge portion of the closure, said transversely extending portion being curved downwardly in the direction of travel of the carton to force the underlying portion of the flap part way into the carton, and a pair of rolls successively engaging the edge closure to complete the insertion of the flap in the carton.

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