Sept. 21, 1926. 1,600,230

G. I. HOHL

CARTON CLOSING MECHANISM

Filed May 13, 1926 2 Sheets-Sheet 1

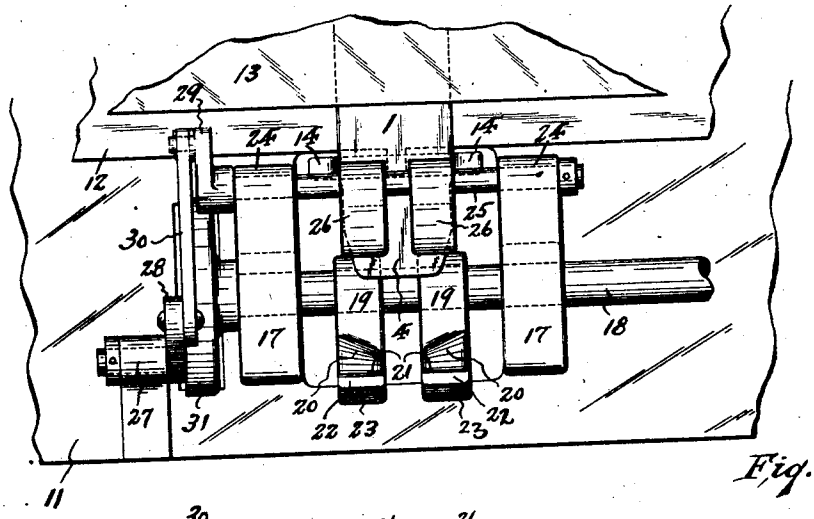


Fig. 1

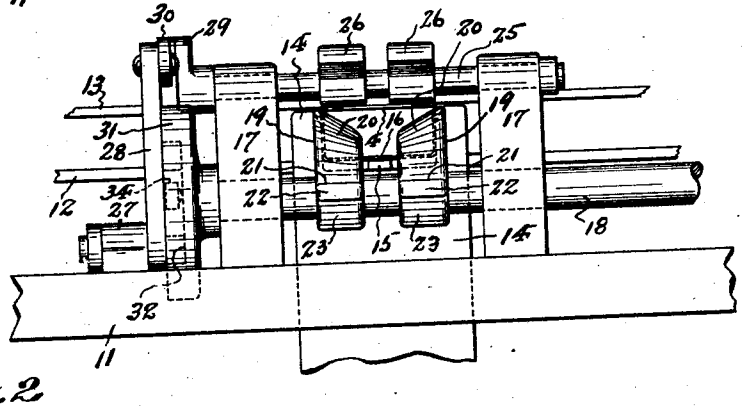


Fig. 2

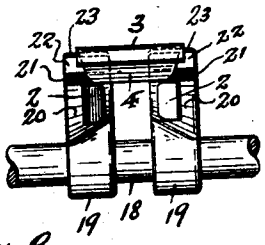


Fig. 9

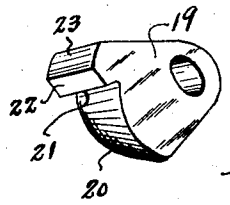


Fig. 10

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Fig. 3

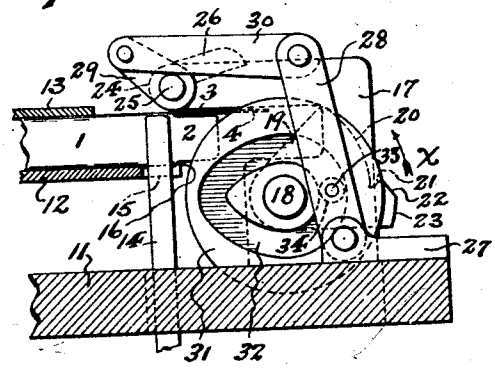


Fig. 4

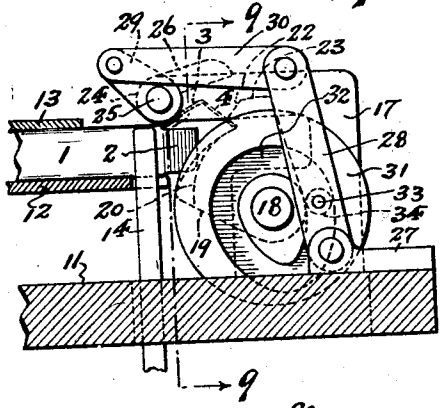


Fig. 5

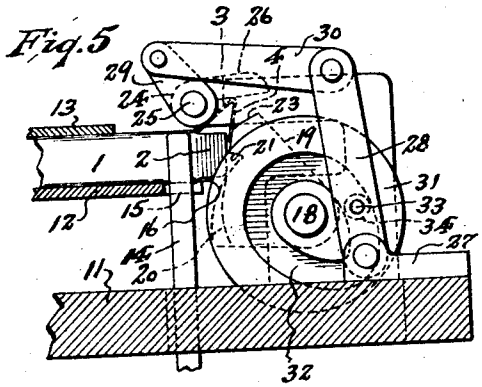
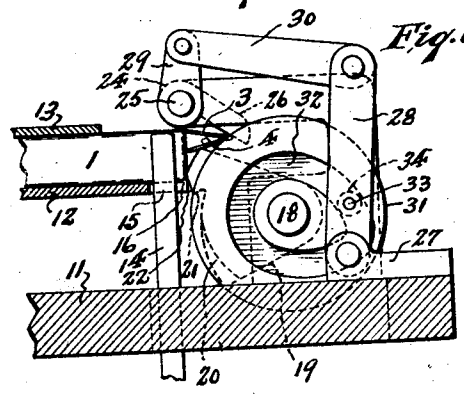


Fig. 6



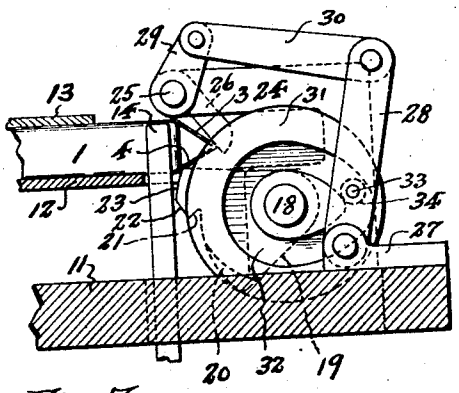


Fig. 7

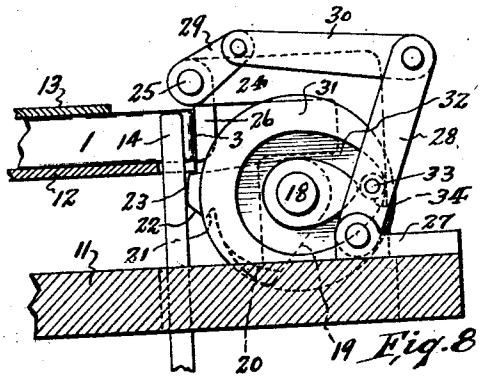


Fig. 8

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UNITED STATES PATENT OFFICE.

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CARTON-CLOSING MECHANISM.

Application filed May 13, 1926. Serial No. 108,747.

This invention relates, generally, to improvements in automatic machines for setting up, filling and closing cartons or boxes formed with side tabs and with end closure flaps having tuck portions which are manipulatable to close the ends of said cartons or boxes; and the invention has reference, more particularly, to improvements in those parts of such machines which function to manipulate the side tabs and closure flaps to automatically move the same into end closing relation to the carton body, and which at the same time operate to insert the tuck-portions of the end closure flaps in operative closed position.

The invention has for its principal object to provide a novel carton closing mechanism which is of very simple construction, the number of parts in which have been reduced to a minimum, and one which possesses a novel mode of operation adapting the same to high speed service, without danger of mutilating or otherwise injuring the cartons; and to this end the mechanism consists of rotating means for accurately folding the tabs and flaps on their predetermined scored lines of bend, while moving the same to closed position, with the tuck portions of the end closure flaps accurately presented and directed for insertion into the carton bodies, together with timed means for finally thrusting said tuck portions into the carton bodies.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

The invention is clearly illustrated in the accompanying drawings, in which:—

Figure 1 is a plan view of the novel carton closing mechanism made according to and embodying the principles of this invention; Figure 2 is an end elevation of the same; Figures 3 to 8 inclusive are respectively side elevations illustrating various stages of the operation of the mechanism, when functioning to close the side tabs and end closure flap and tucking the tuck portion of the latter relative to the end of a carton; Figure 9 is a fragmentary transverse section, taken on line 9—9 in Figure 4; and Figure 10 is a detail perspective view of one of the rotary folding elements of the mechanism.

Similar characters of reference are employed in all of the hereinabove described views, to indicate corresponding parts.

The novel carton closing mechanism, which is the subject of this invention, is adapted to manipulate that type of commercial carton or container comprising a rectangular hollow body 1 having open opposite ends, at which are provided inwardly foldable side tabs 2 and a foldable closure flap 3 having a tuck-portion 4 at its free end. Cartons of this type are generally made of light card-board and furnished by the manufacturer to the user in collapsed or flat form, with the side tabs 2 and closure flaps 3 projecting in unfolded condition from the respective ends of the carton body 1. The operation of raising the body 1 of the carton from initial flat or collapsed condition to properly set up or opened condition is frequently spoken of by users as "squaring" the carton, and is an operation which must be performed before the side tabs and closure flaps can be closed at one end prior to filling the carton, and also closed at the opposite end after filling the carton. In automatic machines for setting up, filling and closing such cartons, devices are provided for delivering the flat cartons from a stacked supply thereof and then "squaring" the same preparatory to closing one end thereof, whereupon the squared carton is positioned relative to a tab and flap closing and tucking mechanism. The instant invention, therefore, may be incorporated in an automatic machine of the kind mentioned, and stationed to operate first upon one end of the squared carton preparatory to filling the same, and also stationed, if desired, to operate upon the opposite or remaining end of the carton after the same is filled.

Referring now to the accompanying drawings, the reference character 11 indicates the deck plate of a machine from which is suitably supported a carton supporting plate 12, upon which the collapsed cartons are deliv-

ered and squared, and along which the same are moved to a succeeding station of the machine. Cooperating with said carton supporting plate 12, and spaced above the same, is a keeper plate 13 for retaining the squared cartons against upward displacement from said supporting plate. After a collapsed carton has been delivered upon said supporting plate 12, upwardly moving squaring members, indicated at 14, operate to open or square the collapsed carton, and thereupon serve to hold the same against lateral displacement subject to the operation of the carton closing mechanism. When the carton is squared, suitable mechanism (not shown) registers the end thereof which is presented to the carton closing mechanism, against a positioning stop 15 having a chamfered nosing 16 to engage the end edge of the bottom side of said carton.

When the squared carton is positioned as above described, the carton closing mechanism, which is actuated by power transmission in such manner that its operations are properly synchronized or timed in relation to the carton delivery and squaring operations, functions to close the end of the carton presented thereto.

The novel carton closing mechanism, comprises the following construction:—

Mounted on the deck-plate 12 are a pair of spaced up-standing bearing members 17 in which is journaled a rotary shaft 18 adapted to be driven by any suitable form of power transmission mechanism. Fixed on said shaft 18 are a pair of rotating folders 19. These folders 19 are preferably of a segmental shape provided with a peculiar conformation at their outer peripheral portions or faces, to form at the forward portions, helical cam faces 20 progressively changing in plane from an initial inwardly and transversely inclined angular plane to a plane parallel to the axis of rotation, whereby the folders in rotating initially engage the outwardly projecting side tabs 2 of the carton 1, whereupon the helical cam faces 20, as they move against the same, gradually turn them inwardly and across the open end of the carton. Rearwardly of said helical cam faces 20, the folders 19 are provided with undercut outwardly projecting shoulders 21, from the free edges of which extend rearwardly tuck-flap bending faces 22, which terminate in folder faces 23, the latter being disposed at the rearward portions and being preferably concentric to the axis of rotation of the folders 19.

Said bearing members 17 are each provided with inwardly extending secondary bearing arms 24 which overhang the end of the carton 1 when in position to be acted upon by the carton closing mechanism. Journaled in said secondary bearing arms 24 is a rock-shaft 25 upon which are fixed oscillatable push-fingers 26, which, at proper times, function to cooperate with the end closure flap 3 and its bent and inwardly directed tuck-portion 4, to fold down the former across the end of the carton while at the same time thrusting the latter into the carton body.

The means for producing properly timed oscillations of said push-fingers 26 comprises the following devices. Pivoted by its lower end in connection with a fulcrum block 27, which is suitably located and affixed to said deck-plate 12, is a lever member 28. Fixed on an end of said rock-shaft 25 is a crank-arm 29, and interconnecting the upper free end of said lever member 28 with said crank-arm 29 is a link 30. Fixed on the end of said shaft 18, so as to be positioned adjacent to said lever member 28, is a cam-member 31 provided in its outer face with a suitably shaped cam race-way 32. Secured to the side and intermediate the ends of said lever member 28 is a stud 33 which projects into said cam race-way 32, said stud 33 carrying an anti-friction roller 34. Said cam race-way 32 is so shaped that it will transmit, through the stud and roller entered therein, to the lever member 28 an oscillatory movement, properly timed relative to the operative movements of said folders 19, which is in turn transmitted, through the link 30, crank-arm 29 and rock-shaft 25, to the push-fingers 26, to thereby cause the latter to function in timed relation to said folders 19.

In operation, the above described carton closing mechanism functions as follows:—

By the time the squared carton 1 is positioned ready for the end closing operations, the rotating shaft 18 has turned the folders 19 to the position shown in Figure 3, the direction of movement being that indicated by the arrow x in said Figure 3, so that the continued rotation of the shaft and folders turns and moves the operative portions of the latter toward and into folding engagement with the projecting side tabs 2 and closure flap 3; and during such stage in the movement of said folders 19, the concentric portion of the cam race-way 32 is in engagement with the lever member 28, to hold the same in normal inactive position operative to position and retain the push-fingers 26 in normal initial raised position, as is also shown in Figure 3 of the drawings. As the folders 19 move into operative relation to the side tabs 2, the helical cam faces 20 will engage and begin to swing the same inwardly and toward each other, while the end of the tuck-portion 4 of the end closure flap 3 will be engaged by the shoulders 21 of the folders, whereby the closure flap 3 is first bent upwardly along the line of its juncture with the main body of the carton, thus breaking the grain of the paper at the line

of bend to assure a sharp angular fold when said closure flap 3 is swung down to closed position, and at the same time the bending of said tuck-portion 4 downwardly and out of the plane of said closure flap 3 is initiated; all of which is shown in Figure 4 of the drawings. As the folders 19 continue to rotate, the closure flap 3 is bent back and upwardly until it is brought into abutting engagement with the normally raised push-fingers 26, and in the meantime the underfolding of said tuck-portion 4 continues, as the free end of the same springs out of engagement with the shoulder 21 and into engagement with the bending faces 22 of the folders, all as shown in Figure 5 of the drawings. Attention may here be called to two very desirable results, which are obtained by the above described novel mode of operation of the folders, and which contribute to the production of a perfect end closing of the carton. First, the operations produce an initial back-bending on the scored line marking the junction of the closure flap 3 with the main body of the carton, which, as above mentioned, breaks or loosens the grain or fiber of the paper at the line of bend or fold so that all tension at such point is relieved, whereby when the flap is swung back and downwardly into closed position, not only will a neat and sharp angular bend be produced, but, the tension at the line of bend being relieved, all tendency of the flap 3 to spring outwardly from desired closed relation to the carton end, once it is so closed, is eliminated.

As the folders 19 continue their rotation, their bending and folder faces 22 and 23 will continue to press against the side tabs 2, so that the same are brought into finally closed position across the open end of the carton 1; while the rear edges of the folders 19 will pass beneath and support the inwardly bent and directed tuck-portion 4 of the closure flap 3. As these operations proceed, the cam race-way 32 becomes operative upon the lever-member 28, so that the same continues in outward swing and, through the provided intermediate connections, turns the rock-shaft 25 to cause the push-fingers 26 to swing downward the closure flap 3 (see Figure 6). As these movements continue, the tuck-portion 4 will follow down after the folders 19, and will thus be supported in such position as to readily enter the carton interior, as the push-fingers 26 continue to turn down the closure flap 3 (see Figure 7), until finally the push-fingers 26 reach the end of their downward swinging stroke, which operates to complete the inward thrusting of said tuck-portion 4 and the closing of the flap 3 (see Figure 8), whereupon the cycle of operations is complete. Now the folders continue their rotation, and the cam race-way operates to return the lever-member and, through the interconnections, the push-fingers 26 to normal initial positions, during which movements the closed carton is removed and a new carton to be closed is brought into operative relation to the closing mechanism.

It will be apparent that the novel construction and novel mode of operation involved in the described carton closing mechanism is calculated to perform its carton closing functions with ease, accuracy and rapidity. Since the folders 19 are arranged for continuous operation, a smooth, high speed service is easily attained with a minimum of wear, and consequently with little likelihood of disarrangement of parts or interruptions of service from similar causes.

While I have stated that my novel carton closing mechanism is especially adapted for incorporation in automatic machines for setting up, filling and closing cartons, it will be understood that it may also be used in connection with machines of more limited service, and may even be used as an independent unit for closing cartons otherwise handled by hand or in independent machines.

It will be also understood that various changes may be made in the general construction and arrangement of parts, as well as in the details thereof, without departing from the principles of this invention within the scope of the claims here following, and consequently I do not limit myself to the exact combinations and arrangements of the various devices and parts as described in the foregoing specification, nor do I confine myself to the exact details of construction as shown in the accompanying drawings.

I claim:—

1. In a carton closing mechanism, the combination with means to support a carton having open side tabs and an end closure flap provided with a tuck-portion, of rotary folder means adapted while in passing engagement therewith to turn inwardly and laterally said side tabs, bend back said closure flap, and turn inwardly and under the latter its tuck-portion to support and direct the same for entrance into the carton; and means synchronized with the movement of said folders adapted to swing downward said closure flap into closed position and simultaneously thrust its tuck-portion into said carton.

2. In a carton closing mechanism, the combination with means to support a carton having open side tabs and an end closure flap provided with a tuck-portion, of rotary folder means adapted while in passing engagement therewith to turn inwardly and laterally said side tabs, bend back said closure flap, and turn inwardly and under the latter its tuck-portion to support and direct the same for entrance into the carton; pivoted push-finger means adapted to swing down-

ward said closure flap into closed position and simultaneously thrust the tuck-portion into said carton, cam means rotatable with said rotary folders, and means operated by said cam means for actuating said push-finger means in timed relation to said rotary folders.

3. In a carton closing mechanism, the combination with means to support a carton having open side tabs and an end closure flap provided with a tuck portion, of rotary folders, a driven shaft upon which said folders are mounted, said folders having helical cam faces at their peripheries to operatively engage and turn said side tabs, outwardly projecting shoulders at the rearward end of said cam faces adapted to operatively engage said closure flap and its tuck-portion, and bending and folding faces rearward of said shoulder; and means synchronized with the movement of said folders adapted to swing downward said closure flap into closed position and simultaneously thrust its tuck-portion into said carton.

4. In a carton closing mechanism, the combination with means to support a carton having open side tabs and an end closure flap provided with a tuck portion, of rotary folders, a driven shaft upon which said folders are mounted, said folders having helical cam faces at their peripheries to operatively engage and turn said side tabs, outwardly projecting shoulders at the rearward end of said cam faces adapted to operatively engage said closure flap and its tuck-portion, and bending and folding faces rearward of said shoulder; pivoted push fingers adapted to swing downward said closure flap into closed position and simultaneously thrust its tuck-portion into said carton, cam means on said driven shaft, and means operated by said cam means for actuating said push fingers in timed relation to said folders.

5. In a carton closing mechanism, the combination with means to support a carton having open side tabs and an end closure flap provided with a tuck portion, of rotary folders, a driven shaft upon which said folders are mounted, said folders having helical cam faces at their peripheries to operatively engage and turn said side tabs, outwardly projecting shoulders at the rearward end of said cam faces adapted to operatively engage said closure flap and its tuck-portion, and bending and folding faces rearward of said shoulder; push fingers adapted to swing downward said closure flap into closed position and simultaneously thrust its tuck-portion into said carton, a rock-shaft on which said push-fingers are mounted, a crank-arm on said rock-shaft, a pivoted lever member, a link interconnecting the free end of said lever member with said crank-arm, a cam provided with a race-way mounted on said driven shaft, and means on said lever member operatively entered in said cam race-way.

6. In a mechanism for closing cartons having side tabs and end closure flaps provided with tuck-portions, a rotary means having peripheral portions shaped to turn the carton side tabs and additional portions adapted to engage the carton closure flap and its tuck portion to initially bend backward said closure flap at its point of junction with the carton body and at the same time fold under the tuck portion thereof to direct the same toward the open end of the carton.

7. In a mechanism for closing cartons having side tabs and end closure flaps provided with tuck-portions, a rotary means having peripheral portions shaped to turn the carton side tabs and additional portions adapted to engage the carton closure flap and its tuck portion to initially bend backward said closure flap at its point of junction with the carton body and at the same time fold under the tuck portion thereof to direct the same toward the open end of the carton; and means synchronized with the operative movement of said rotary means to swing downward said closure flap into closed position and simultaneously thrust its tuck-portion into said carton.

8. In a mechanism for closing cartons having side tabs and end closure flaps provided with tuck portions, a continuously rotating shaft, means rotated by said shaft having peripheral portions shaped to turn the carton side tabs and additional portions adapted to engage the carton closure flap and its tuck-portion to initially bend backward said closure flap at its point of junction with the carton body and at the same time fold under the tuck-portion thereof to direct the same toward the open end of the carton; push fingers adapted to swing downward to closed position said closure flap in following relation to said rotary means and simultaneously thrust said tuck-portion into said carton, actuating means for said push fingers, and cam means on said rotating shaft for operating said actuating means.

9. In a mechanism for closing cartons having side tabs and end closure flaps provided with tuck portions, a continuously rotating shaft, means rotated by said shaft having peripheral portions shaped to turn the carton side tabs and additional portions adapted to engage the carton closure flap and its tuck-portion to initially bend backward said closure flap at its point of junction with the carton body and at the same time fold under the tuck-portion thereof to direct the same toward the open end of the cartons; push fingers adapted to swing downward to closed position said closure

flap in following relation to said rotary means and simultaneously thrust said tuck-portion into said carton, a rock-shaft on which said push fingers are mounted, a crank-arm on said rock-shaft, a pivoted lever member, a link interconnecting said lever member with said crank-arm, a cam provided with a race-way mounted on said rotating shaft, and means on said lever member operatively entered in said cam race-way.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 6th day of May 1926.

GEORGE I. HOHL.