Aug. 27, 1957 A. R. LUBERSKY 2,803,934

CARTON CLOSING MACHINE

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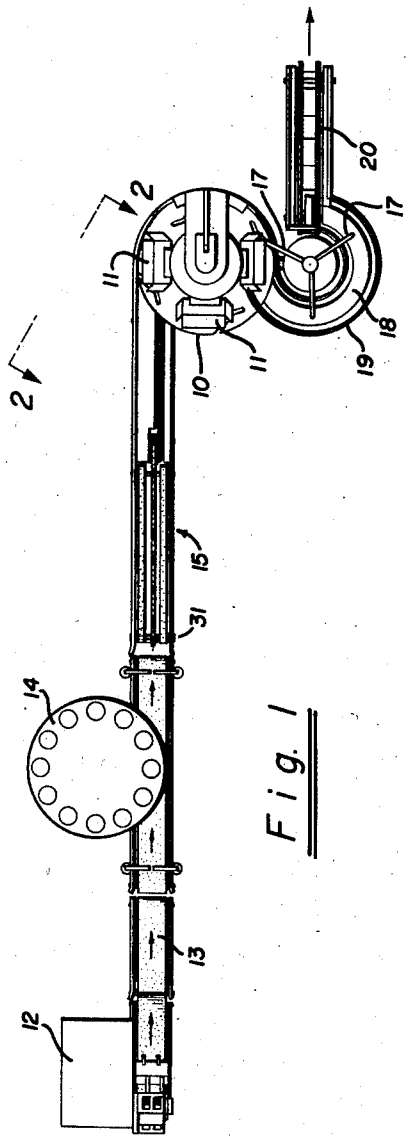


Fig. 1

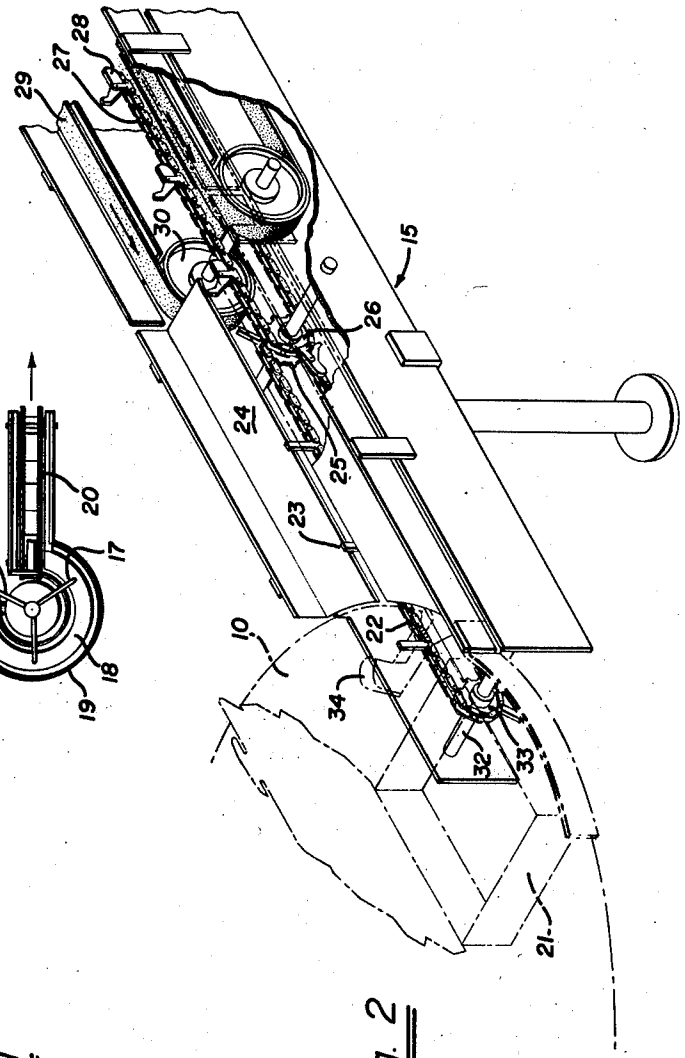


Fig. 2

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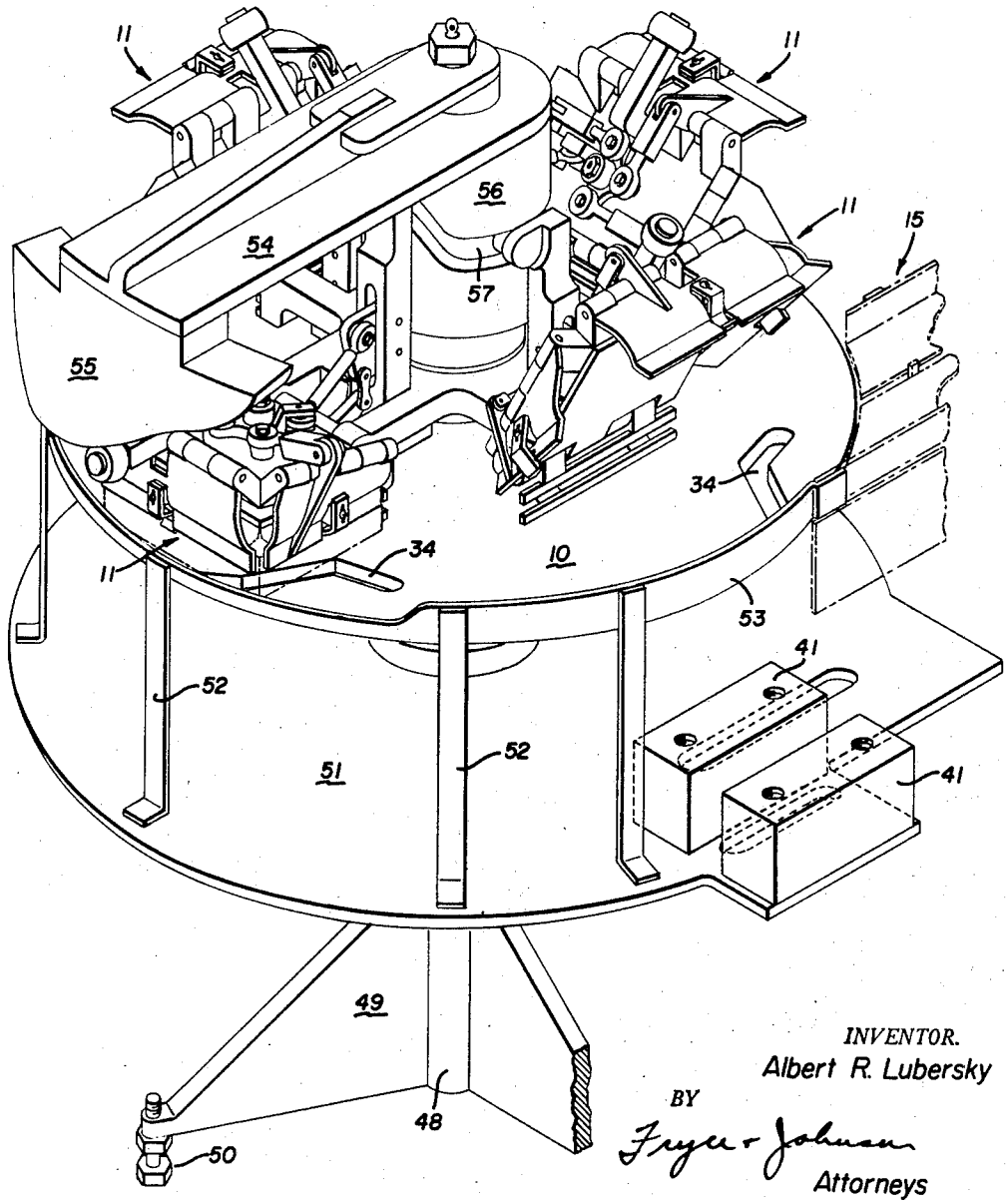
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Fig. 3



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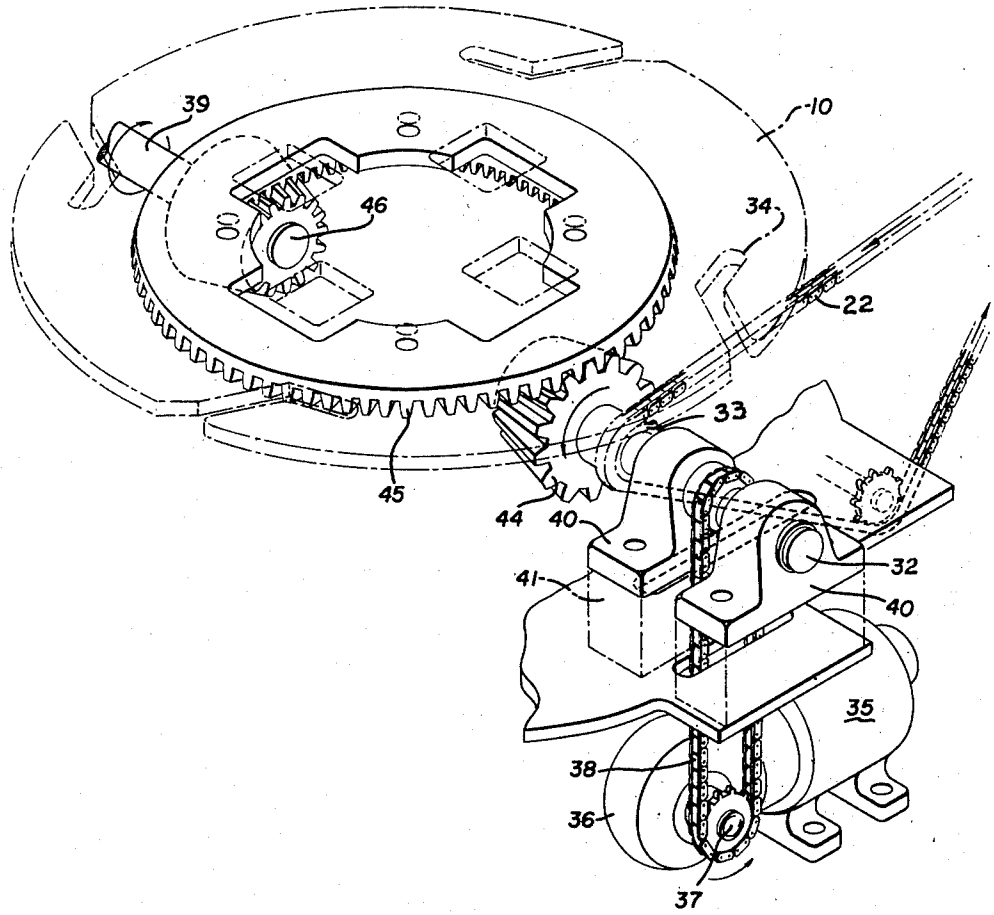
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Fig. 4



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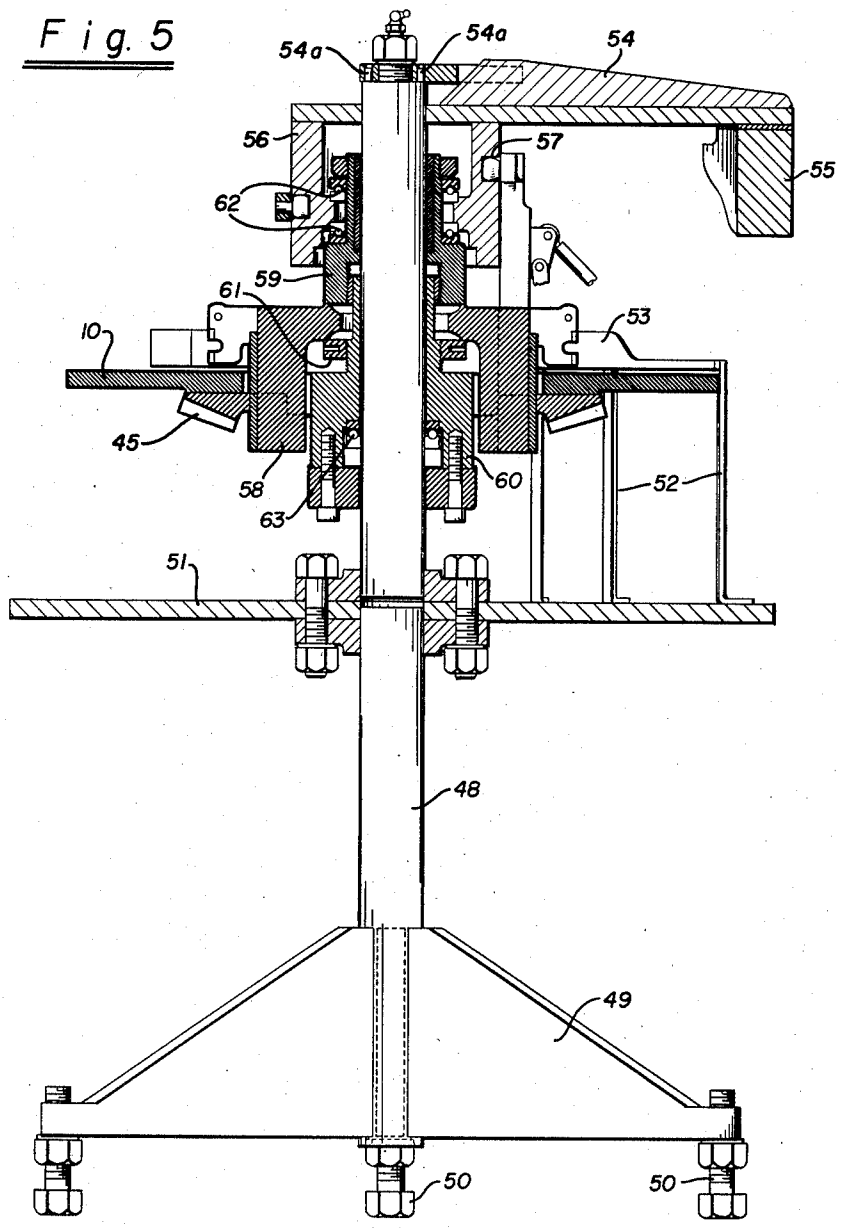
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Fig. 5



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Fig. 6

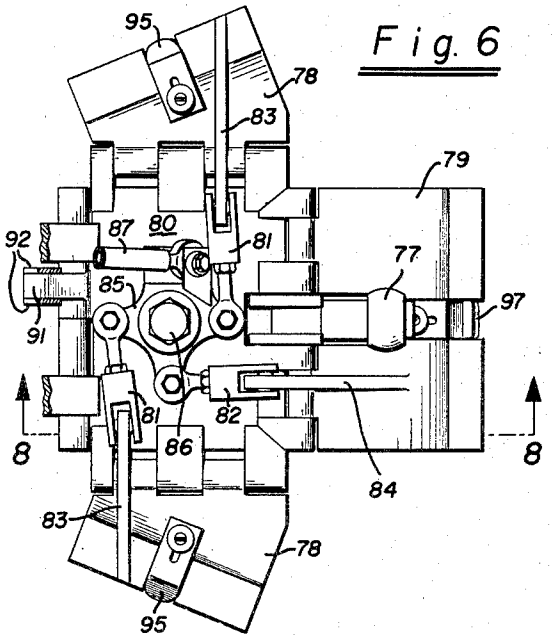
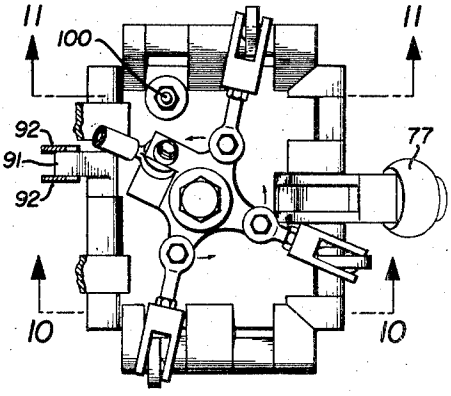


Fig. 7



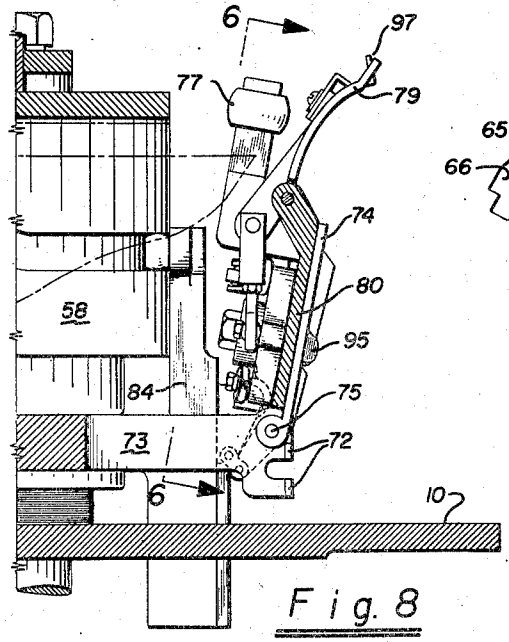


Fig. 8

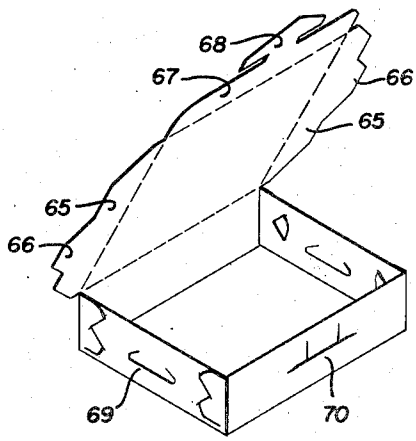


Fig. 12

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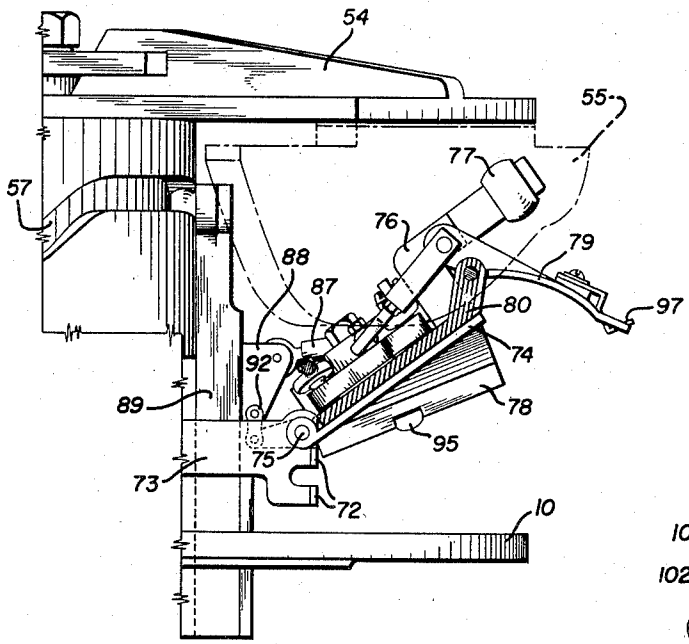
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Fig. 9



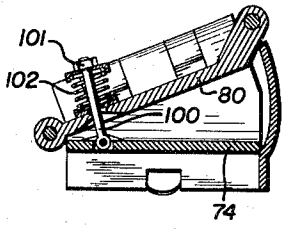
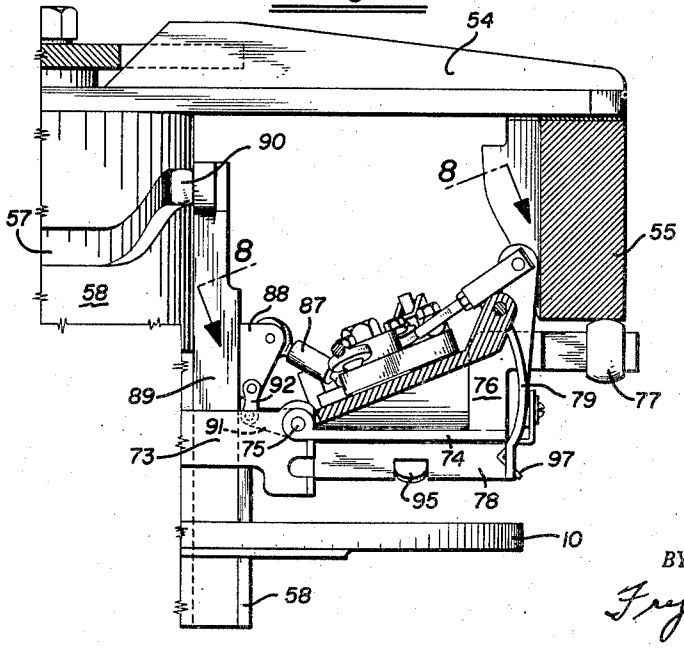


Fig. 11

Fig. 10



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United States Patent Office 2,803,934
Patented Aug. 27, 1957

2,803,934

CARTON CLOSING MACHINE

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Application July 30, 1956, Serial No. 600,803

8 Claims. (Cl. 53—376)

This invention relates to machines for closing cartons and particularly cartons of the kind used for frozen food products or the like which are of rectangular form and have a hinged cover with side flaps and tabs to enter slits in the carton sides for holding the cover closed.

It is an object of the invention to provide a carton closing unit which will act automatically upon a filled carton delivered to it to swing the cover toward a closed position and at the same time swing two side flaps and a front flap on the cover inwardly exerting pressure on the tabs to insure their insertion into slots formed in the carton walls.

Another object is to exert pressure on all six sides of the carton to shape or square it up just prior to its delivery from the closing unit thus eliminating bulges which might occur were the contents not slightly compressed.

A still further object of the invention is to provide a support for a plurality of such carton closing units to move and actuate them in synchronism with conveyors leading to and away from them and to effect rapid and continuous operation.

Further and more specific objects and advantages of the invention and the manner in which it is carried into practice are made apparent from the following specification wherein reference is made to the accompanying drawings for a detailed disclosure of the invention and the manner in which it operates.

In the drawings:

Fig. 1 is a schematic view in plan illustrating the manner in which cartons are delivered to and from the carton closing machine.

Fig. 2 is a perspective fragmentary view as seen from the plane 2—2 of Fig. 1 illustrating a portion of the mechanism for delivering cartons to the machine.

Fig. 3 is a perspective view illustrating the carton closing units and the table upon which they are mounted, but with the drive mechanism removed.

Fig. 4 is a perspective view of the drive mechanism which rotates the table and synchronizes the delivery and discharge mechanism therewith.

Fig. 5 is a view in elevation of the table which supports the carton closing units with the units removed and with parts shown in section.

Fig. 6 is a plan view of a single carton closing unit in its raised or open position, taken on the line 6—6 of Fig. 8.

Fig. 7 is a plan view of the same unit in its closed position taken on the line 7—7 of Fig. 10.

Fig. 8 is a sectional view taken on the line 8—8 of Fig. 6.

Fig. 9 is a similar sectional view illustrating the unit in a partially closed position.

Figs. 10 is a similar section illustrating the unit in its fully closed position, the section being taken on the line 10—10 of Fig. 7.

Fig. 11 is a detail in section illustrating the resilient support of a top presser plate; and

Fig. 12 is a perspective view of a carton which is typical of the kind that is closed by the machine of this invention.

Referring first to Fig. 1 of the drawings for an illustration of the environment in which the carton closing machine is used, a rotatable table is shown at 10 as having a plurality of carton closing units schematically illustrated at 11 supported upon it. The table is illustrated as having four such units upon it, but more or less may be employed if desired. A carton setting up machine which folds flat blanks into carton form is schematically illustrated at 12, and the folded cartons with their covers open are delivered by a conveyor 13 to a filling machine indicated at 14 which may be of any conventional type. The filled cartons pass directly to a feed conveyor generally indicated at 15 by which they are directed into one of the carton closing units 11 on the table 10. This unit acts upon rotation of the table to close and compress the carton until it is ready for discharge, where it is engaged by one of three arms 17 of a rotary impeller which sweeps the filled and closed carton over an arcuate track 18 upon which it is confined by a rail 19 until it is deposited onto a discharge conveyor 20 of conventional type. The empty carton closing unit then returns by rotation of the table 10 to its position opposite the feed conveyor for reception of another filled carton to be closed.

In Fig. 2 of the drawings a portion of the table 10 is illustrated in broken lines as having a carton 21 thereon just received from the feed conveyor 15, a portion of which is illustrated. The terminal end of the feed conveyor comprises a drive chain 22 with spaced drive lugs 23 thereon for advancing cartons in spaced relation over a track 24 which is centrally slotted as illustrated so that the lugs 23 can extend upwardly through it. The drive chain is trained over suitable sprockets as illustrated and its sprocket 25 is connected against rotation to a sprocket 26 which drives a similar chain 27 with carton advancing lugs 28. Conveyor belts 29 are arranged on opposite sides of the drive chain 27 and trained over sheaves 30, two of which are carried by a common shaft illustrated at 31 in Fig. 1. Since the common shaft also supports a sprocket for the chain 27, the chain and belts are driven at the same speed. The driving power for both of the chains 22 and 27 as well as belts 29 is derived from a shaft 32 with a sprocket 33 thereon by drive mechanism illustrated in Fig. 4.

The table 10 as illustrated in Figs. 2, 3 and 4 has spaced slots 34 extending through it and extending outwardly through the edge of the table. These slots are spaced for synchronism with the driving lugs 23 carried by the chain 22 and are of angular configuration so that upon advancing of the chain 22 and rotation of the table 10, the driving lugs register with the slot instead of striking the table as they approach it, and until they move downwardly out of the plane of the table as they pass over the sprocket 33.

The drive for the entire mechanism is derived from a motor illustrated at 35 in Fig. 4 with a reduction gear in a housing 36 imparting rotation to a sprocket 37 which drives a chain 38. The chain rotates shaft 32 journaled in bearings 40 supported on bearing blocks 41 shown in broken lines and illustrated in full lines in Fig. 3. The shaft 32 also carries the sprocket 33 driving the chain 22 which imparts driving motion to the conveyor 15. The end of the shaft 32 carries a spur gear 44 which meshes with and drives a bevel pinion 45 fixed to the bottom of the rotating table 10 for imparting rotation to it. Diametrically opposite the gear 44 is a second spur gear 46 which is mounted on a shaft 39. A conventional drive, not shown, connects the shaft 39 with the discharge conveyor 20 for driving the latter.

The general arrangement and support of the table 10 is illustrated in Figs. 3 and 5 where it is shown as rotat-

able about a vertical post 48 with radially extending legs 49 and adjustable feet 50 thereon. A stationary table 51 is clamped to the post at a position beneath the rotating table 10 and supports vertical brackets 52 for a rail 53 extending around a portion of the rotating table. The blocks 41, shown in Fig. 3, are also supported on the table 51. Also fixed to the post 48 adjacent its upper end is a radially extending cam supporting arm 54 with a cam 55 at its outer end and a cylindrical box cam 56 surrounding and concentric to the post and having a cam groove 57 therein for a purpose later to be described. The cam arm 54 is held against rotation by pins 54a and a nut threaded to the upper end of post 48 as shown. The table 10 has a hub portion 58 which rotates with it and is clamped between adjustable bearing supports 59 and 60. The bearing support 59 is threaded to an upper extension of the bearing support 60, and the latter carries a threaded nut 61. Suitable bearings 62 adjacent the upper end and 63 adjacent the lower end are disposed between the rotating and stationary parts to permit rotation of the table.

The general arrangement of the carton closing units 11 on the table 10 is illustrated in Fig. 3 with one of the units directly opposite the end of the feed conveyor 15 and in its raised or open position in readiness to receive a carton therefrom. The next unit in a clockwise direction is disposed beneath the cam 55 and has been closed. The next unit is open to permit discharge of a closed carton onto the discharge conveyor, and the last unit is approaching the carton receiving position.

A carton typical of those to be closed by the present machine is shown in Fig. 12 as having a rectangular body member and a cover formed integrally therewith and scored for hinging to its closed position. The cover has side flaps 65 with tabs 66 thereon and also has a front flap 67 with a tab 68 thereon. The sides of the carton have slits 69 for reception of the tabs 66 and the front of the carton has a slit 70 for reception of the tab 68, which interlocks therewith for holding the cover in its closed position.

Referring now to Figs. 6 through 11, one of the carton closing units carried by the table 10 is illustrated as having a pair of rails 72 (Figs. 8 and 9) supported on brackets 73 which extend outwardly from the hub 58 of the table. This support is engaged by the back wall of the carton when it is placed in position on the table. A top presser plate is shown at 74 as pivotally supported on a pin 75. At its forward or outer end the top presser plate carries an angle bracket 76 with a cam roller 77 thereon. During rotation of the table the roller 77 engages and is depressed by the cam 55 to urge the presser plate downwardly against the top of the carton. A pair of side presser plates 78 and a front presser plate 79 are hinged as best shown in Fig. 6 to a supporting plate 80 also pivoted on the pin 75 for swinging movement in the same general direction as the top presser plate 74. These side presser plates 78 and front presser plate 79 are actuated by adjustable links 81 and 82, respectively, connected to them by ball and socket joints. The opposite ends of the links 81 and 82 are connected also by ball and socket joints to three of the four arms of a lever member 85 mounted for oscillating movement with respect to the supporting plate 80 by means of a cap screw 86. The fourth arm of the same lever is connected by an adjustable link 87, as best illustrated in Figs. 9 and 10, to a bracket 88 carried by a post 89 guided for vertical sliding movement adjacent the hub 58 and having a cam roller 90 at its upper end. This cam roller rides in the box cam groove 57 to impart vertical reciprocation to the post 89 upon rotation of the table 10. Extending rearwardly from the supporting plate 80 is a lever 91 which is connected by links 92 to the bracket 88. Thus vertical reciprocation of the post 89 which carries the bracket 88 produces two results; first, it swings the plate 80 from an uppermost position illustrated in Fig. 8 to a lowermost position illustrated in Fig. 10. At the same time the link 87 imparts oscillating movement to the four-armed lever 85 and through the levers 81 and 82 swings the side presser plates 78 and front presser plate 79 from their upper or open position illustrated in Fig. 6 to their lower position illustrated in Figs. 7 and 10 where they engage the sides and front of the carton.

The side presser plates 78 each carry a resilient finger 95 (see particularly Figs. 6 and 8) secured by a screw as illustrated to the exterior of the plate and projecting inwardly at its lower end beyond the inner surface of the plate for engagement with the carton just above the slits 69 to press the carton inwardly opening the slits in preparation for admission of the tabs 66 on the side flaps of the cover. The front presser plate 79 carries a somewhat similar resilient finger 97 also having a part projecting inwardly of the plate to engage the carton above the slit 70 opening it for reception of the tab 68 which has an interlocking engagement with the slit 70 to hold the box in its closed position. The timing of the cams is such that the presser plates are lowered and engage the carton to open the slits just prior to lowering the top presser plate 74 which occurs when the roller 77 is depressed by engagement with the cam 55.

The fully lowered, or carton closing position of the parts is illustrated in Fig. 10, and when closing has been accomplished the roller 77 leaves the cam 55 permitting the top presser plate 74 to swing upwardly under spring action into the position shown. The spring for accomplishing this is illustrated in Fig. 11 wherein a post 100 is illustrated as extending upwardly from the presser plate 74 through an opening in the support plate 80. The post 100 has a nut 101 threaded to its upper end and providing a seat for a spring 102 which bears against the support plate 80 and is under compression so that it tends to raise the presser plate 74.

With the machine herein described the continuously rotating table 10 receives cartons in the closing units carried by it, closes the cover of each carton, and compresses it into a true rectangular shape and then discharges it onto a conveyor by which it is delivered to any suitable station for further handling. It should be understood, however, that the rotary table form of moving the carton closing units is not to be taken as the only means of receiving and discharging cartons, as one or more carton closing units of the kind herein disclosed could as well be mounted on a stationary table and fed and actuated by hand or by any other suitable driving means.

I claim:

1. A machine for closing cartons with hinged tops which comprises a station with a wall to engage the back of a carton, a top presser plate pivoted to swing from the upper portion of said wall to close the carton top, a support plate pivoted to swing above the presser plate, side and front presser plates pivoted adjacent the side and front edges of the support plate, and means to swing the side and front presser plates downwardly as the support plate is lowered to engage and compress the side and front walls of the carton.

2. A machine for closing cartons having hinged tops with side and front flaps to lie against the sides and front of the carton and in which the flaps have tabs insertable into slits in the sides and front of the carton comprising, a station with a wall to engage the back of a carton, a top presser plate pivoted to swing from the upper portion of said wall to close the carton top, a support plate pivoted to swing above the presser plate, side and front presser plates pivoted adjacent the side and front edges of the support plate, and means to swing the side and front presser plates downwardly as the support plate is lowered to position said flaps against the sides and front of the carton and to compress the side and front walls of the carton while the top presser plate engages the top.

3. A machine for closing cartons having hinged tops with side and front flaps to lie against the sides and front

of the carton and in which the flaps have tabs insertable into slits in the sides and front of the carton comprising, a station with a wall to engage the back of a carton, a top presser plate pivoted to swing from the upper portion of said wall to close the carton top, a support plate pivoted to swing above the presser plate, side and front presser plates pivoted adjacent the side and front edges of the support plate, and means to swing the side and front presser plates downwardly as the support plate is lowered to position said flaps against the sides and front of the carton and to compress the side and front walls of the carton while the top presser plate engages the top, said side and front presser plates having finger members projecting from their carton engaging surfaces to engage the carton adjacent said slits to open them for reception of said tabs.

4. A machine for closing cartons with hinged tops which comprises a station with a wall to engage the back of a carton, a top presser plate pivoted to swing from the upper portion of said wall to close the carton top, a support plate pivoted to swing above the presser plate, side and front presser plates pivoted adjacent the side and front edges of the support plate, and means to swing the side and front presser plates downwardly as the support plate is lowered to engage and compress the side and front walls of the carton, said means comprising a cam for raising and lowering the support plate, and means connecting said cam with the side and front presser plates for simultaneously raising them.

5. A machine for closing cartons with hinged tops which comprises a station with a wall to engage the back of a carton, a top presser plate pivoted to swing from the upper portion of said wall to close the carton top, a support plate pivoted to swing above the presser plate, side and front presser plates pivoted adjacent the side and front edges of the support plate, means to swing the side and front presser plates downwardly as the support plate is lowered to engage and compress the side and front walls of the carton, said means comprising a cam for raising and lowering the support plate, means connecting said cam with the side and front presser plates for simultaneously raising them, another cam for lowering the top presser plate, and resilient means connecting the top presser plate with the support plate to raise the top presser plate when the support plate rises.

6. A machine for closing cartons with hinged tops which comprises a station with a wall to engage the back of a carton, a top presser plate pivoted to swing from the upper portion of said wall to close the carton top, a support plate pivoted to swing above the presser plate, side and front presser plates pivoted adjacent the side and front edges of the support plate, means to swing the side and front presser plates downwardly as the support plate is lowered to engage and compress the side and front walls of the carton, a rotatable table carrying said station, and cam means stationary with respect to the table and operable on rotation thereof to actuate all of said presser plates and said support plate.

7. A machine for closing cartons with hinged tops which comprises a station with a wall to engage the back of a carton, a top presser plate pivoted to swing from the upper portion of said wall to close the carton top, a support plate pivoted to swing above the presser plate, side and front presser plates pivoted adjacent the side and front edges of the support plate, means to swing the side and front presser plates downwardly as the support plate is lowered to engage and compress the side and front walls of the carton, a rotatable table carrying said station, cam means stationary with respect to the table and operable on rotation thereof to actuate all of said presser plates and said support plate, and means to deliver open cartons to said station as the table rotates and to discharge them from the station after they have been closed.

8. In a machine of the character described which includes a device for closing and compressing a carton having a hinged support plate to swing downwardly over a carton carrying hinged presser plates to swing into engagement with the sides and front of the carton, a four armed lever pivoted to the support plate, a connection between each of three arms of said lever and one of the presser plates, and a connection between the fourth arm and actuating means to effect simultaneous actuation of the support plate and the presser plates.

No references cited.