May 8, 1956 R. D. HULL ET AL 2,744,373

CARTON SEALING APPARATUS

Filed Sept. 8, 1952 2 Sheets-Sheet 1

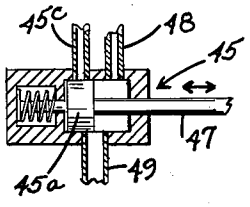


Fig. 5

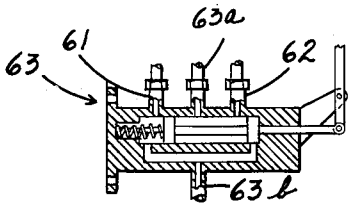


Fig. 6

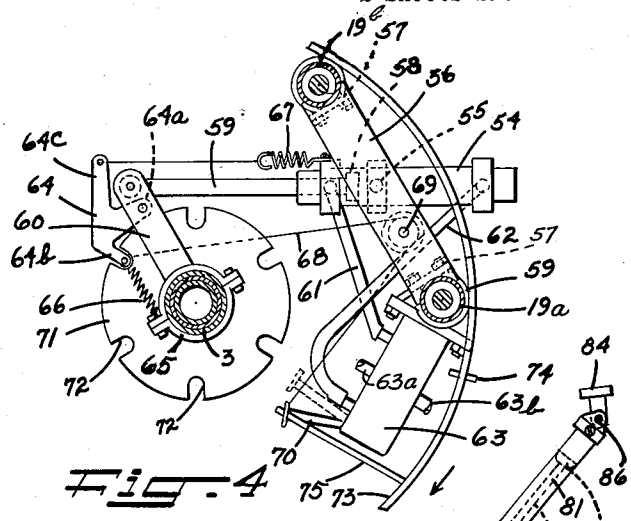


Fig. 4

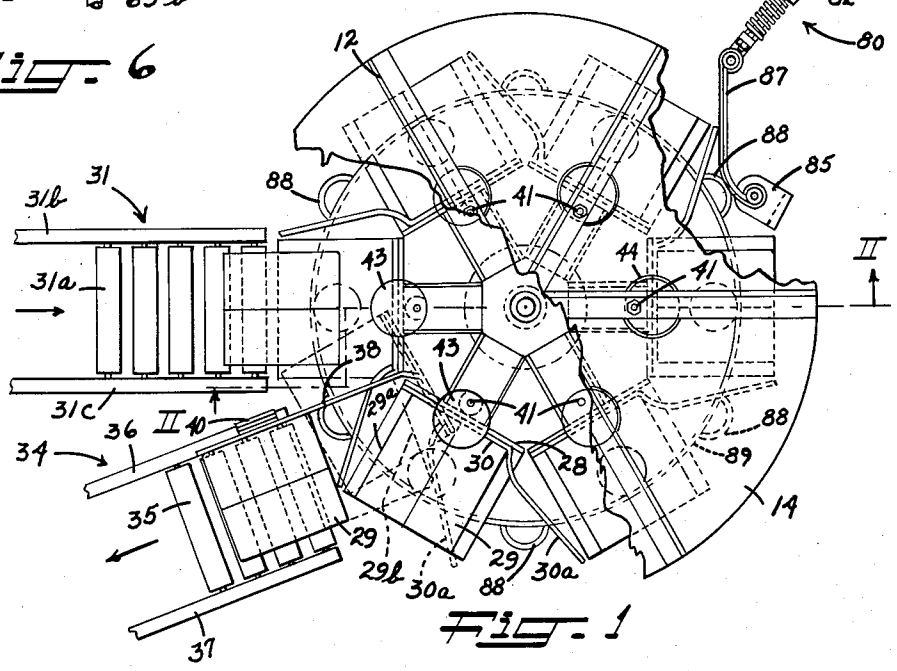


Fig. 1

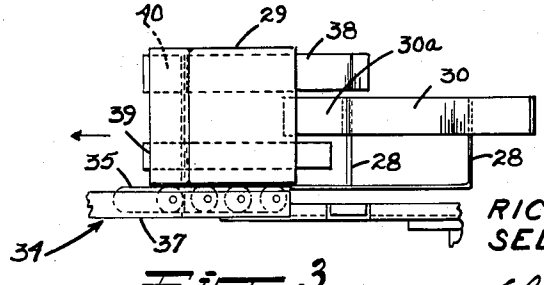


Fig. 3

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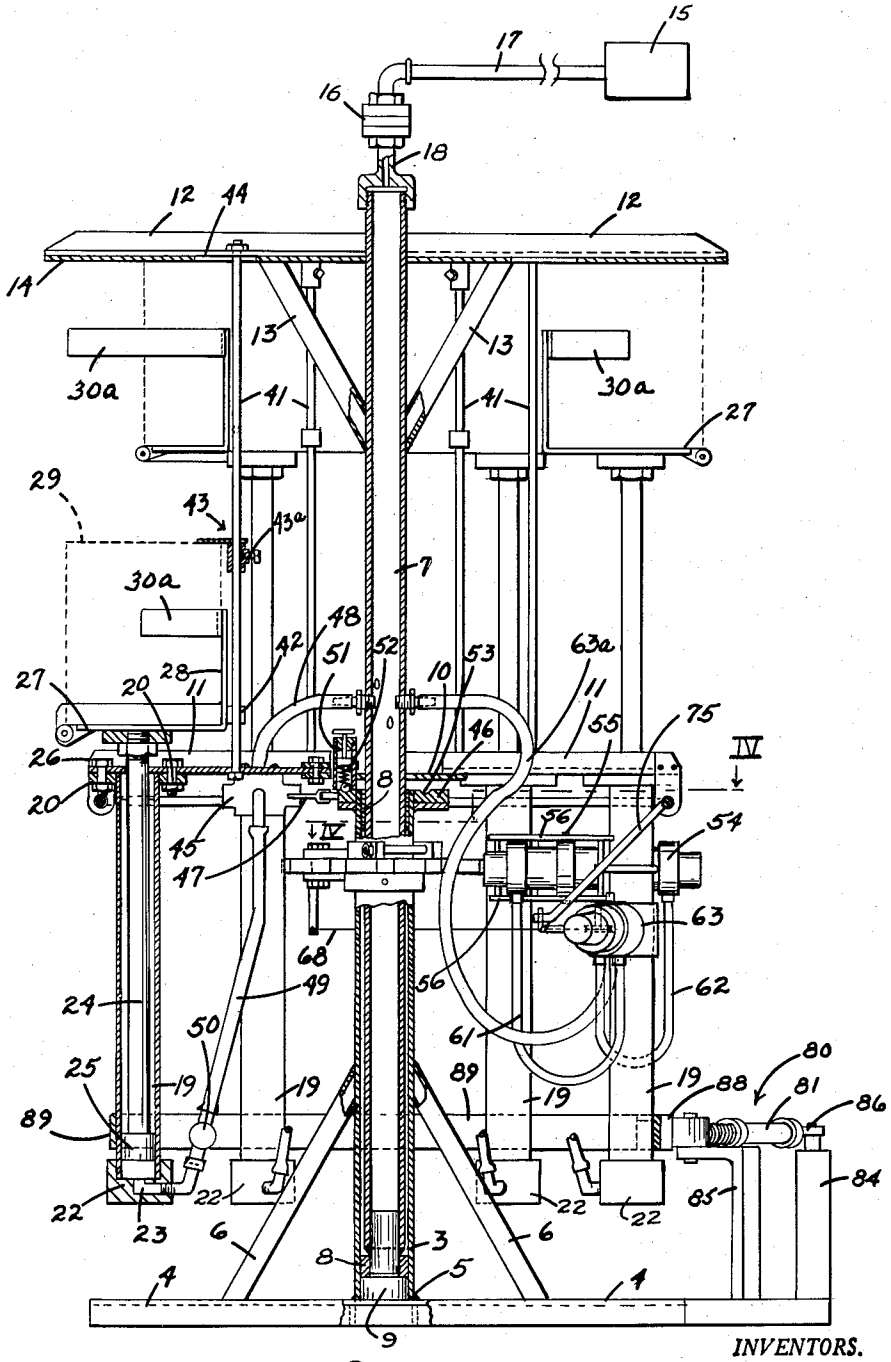


FIG. 2

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CARTON SEALING APPARATUS

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6 Claims. (Cl. 53—374)

The present invention relates to carton sealing apparatus and more particularly to novel and improved apparatus for automatically sealing the flaps of cartons or the like which may vary in size within a given range.

In most present day manufacturing, processing and packaging operations it is customary and expedient to render as many of the same as automatic as is convenient and practical. Thus, for example, in sealing the top and bottom flaps of a conventional carton it is ordinarily desirable to employ suitable automatic or semiautomatic apparatus. Although many types of such apparatus have been employed in the past, considerable difficulty has been experienced in designing them to handle cartons of varied sizes.

It is a principal object of the present invention to provide novel and improved carton sealing apparatus that operates upon all sizes of cartons within predetermined limits without any necessity for preliminary adjustments.

Other objects and advantages of the invention will be apparent from the following description.

In the drawing which is illustrative of the invention,

Figure 1 is a plan of a preferred embodiment of the present invention with parts thereof omitted and broken away for the sake of greater clarity;

Figure 2 is a sectional view taken along the reference line II—II in Figure 1;

Figure 3 is a detail of a portion of the apparatus shown in Figure 1;

Figure 4 is a sectional detail taken along reference line IV—IV in Figure 2;

Figure 5 is a sectional detail of the 3-way valve shown in Figure 2; and

Figure 6 is a sectional detail of the 4-way valve shown in Figures 2 and 4.

In general the improved container or carton sealing apparatus of the present invention comprises a rotatable member or turret with a plurality of carton receiving means secured to and spaced about its periphery, means positioned adjacent one point of the rotary path of the turret for depositing cartons or the like on the carton receiving means, means positioned adjacent another point on the rotary path of the turret for discharging the cartons from the carton receiving means, and means for applying pressure upon the upper and lower surfaces of the cartons as they progress with the turret between the said points on its rotary path.

A preferred embodiment of the present invention is shown in detail in the various figures of the drawing. As illustrated therein the tubular post member or pipe **3** is preferably supported in a vertical manner by the radially disposed channel members **4** which are secured to the foot or base of the post member in any suitable manner such as by the welding shown at **5**. The brace members **6** which extend angularly as shown between the channel and post members are preferably provided to add rigidity to the structure. The tubular shaft or the like **7** is positioned in the post **3** where its rotation is facilitated therein by the sleeve bearing **8, 8** and the thrust bearing **9**. The plate **10** is secured to the periphery of the tubular shaft **7** adjacent the point where it emerges from the post **3** and provides a means of support for the radially disposed arms **11, 11** which are preferably bolted thereto.

The radially disposed upper arms **12, 12**, channels and braces **13, 13** are secured near the top of shaft **7** and provide a supporting framework for the upper carton compression plate **14**.

The top of hollow shaft **7** is connected to any suitable fluid pressure source **15** shown diagrammatically, through a swivel joint **16** and conduits **17, 18**.

The upper flanged portions of the fluid cylinders **19** are secured to the radially disposed arms **11** adjacent the outer extremities thereof in any suitable manner such as by the bolts **20**. The lower extremities of the cylinders are provided with caps **22**, through which fluid under pressure is introduced to the cylinder bores by means of the L-shaped passages **23, 23**.

Each piston rod **24**, which is connected to the piston **25** positioned within each of the cylinders **19**, extends upwardly through its respective arm **11** and is secured to the underside of each carton supporting platform **27**.

The inner edge of each platform **27** is provided with an upstanding plate or backstop **28** to properly retain an object such as carton **29** thereon. The sweep guides or "cams" **30** are secured to the backstops **28, 28** and extend in the manner shown in Figure 1 of the drawing, angularly from the inner edge of the backstop toward the periphery of its rotary path about the axis of the shaft **7**. The angle between the trailing edge of the platform and the projection of the portion of the associated sweep guide is formed so that removal of the cartons **29** may be easily and readily effected.

A conveyor **31** having a plurality of rollers **31***a*, **31***a* extending between conveyor frame members **31***b* and **31***c*, is positioned to deliver cartons **29** onto platforms **27, 27**.

In a similar manner the discharge conveyor **34** having a plurality of rollers **35, 35** extending between the conveyor frame members **36** and **37** is positioned horizontally or inclined downwardly slightly so that the cartons **29** are automatically discharged from the platforms **27** in a manner which will be more fully described hereinafter.

The horizontally disposed barriers **38** and **39** are preferably secured to the upstanding support plate **40** and are adapted to cooperate with the sweep guides **30** to discharge the cartons **29** automatically onto the conveyor **34**.

As shown in Figure 2 of the drawing, the vertically disposed guide rods **41** extend between the aligned upper and lower channel members **11** and **12**. Each of the platforms **27** is preferably provided with the bored lug or guide **42** which is secured thereto and which is adapted to slide on its associated guide rod **41**. A flap holder device **43** also slides on each of the guide rods **41** and maintains the flaps of the carton in their closed position by means of a spring pressed snubber **43***a*. The apertures **44** in the upper compression plate member **14** prevent the detents **43***a* from contacting the plate member during the carton compression and sealing operation.

As shown in Figures 2 and 5 of the drawing, a conventional 3-way valve **45** is secured to each of the arms **11** between the associated fluid cylinder **19** and the plate **10**. The valves **45, 45** are controlled by a cam **46** secured to the stationary post **3** and which acts through the cam follower **47** of the valve to properly position the control element **45***a* in the valve **45**. The cam follower **47** follows the contour of the cam **46** to supply the various cylinders **19** with the pressurized fluid from the tubular shaft **7** through the hoses **48** and **49** or vented through the vent **45***c*. The control valve **50** in each of the hoses **48** permits adjustment and control of the speed of the carton compressing operations.

A spring-pressed ball detent 51 cooperates with a plurality of recesses 53 in the upper surface of cam 46 to intermittently align the delivery and discharge conveyors 31 and 34 with each of the platforms 27 as the turret turns.

The turret brake 80 comprises an air cylinder 81 (Figures 1 and 2) having a piston rod 82 connected to a piston 83, all of which are supported on posts 84 and 85. More specifically the cylinder 81 is pivotally secured at one extremity to the post 84 as at 86 while the exposed extremity of the piston rod is connected by means of leather faced metal strap 87 to the other post 85. The leather face of the outwardly biased strap 87 frictionally engages the circumferentially spaced bosses 88 on a ring 89 secured to cylinders 19, 19. The brake assembly 80, together with detent 51, assures accurate alignment of the various radially disposed platforms 27 with the carton delivery and discharge conveyors 31 and 34.

The mechanism for causing periodic rotation of the shaft 7 and the guide supporting platforms which are secured to and spaced about the periphery thereof is best shown in Figures 2 and 4 of the drawing. As illustrated therein a fluid cylinder 54 is pivotally mounted as at 55 in the yoke assembly 56 which is secured by the clamps 57, 57 to a pair of adjoining cylinders 19*a*, 19*b*. A piston 58 in cylinder 54 actuates piston rod 59 connected to the lever arm 60. Fluid under pressure alternately delivered to the cylinder 54 through conduits 61 and 62 causes the piston to reciprocate in the cylinder, and this motion is imparted to the turret. The 4-way spool valve 63, which is supported in any suitable manner on the turret such as by being clamped to one of the cylinders 19*a*, is preferably a conventional type used in hydraulic or pneumatic systems for alternately directing a fluid to and exhausting it from opposite ends of a cylinder. Thus, the valve 63 delivers the pressurized fluid received from shaft 7 and conduit 63*a* alternately to opposite ends of cylinder 54 through the conduits 61 and 62. Moreover, while each end of the cylinder 54 is being supplied with the pressurized fluid from the shaft 7, the other end of the cylinder is being vented through its associated conduit 61 or 62 and the vent 63*b*.

As is best illustrated in Figure 4 of the drawing the piston rod 59 is pivotally connected to the extremity of the lever arm 60 which is rotatably secured by the collar bearing member 65 to the stationary post 3. The pawl 64 is pivoted preferably as at 64*a* to the lever arm 60 between its connection with post 3 and the piston rod 59. Opposite extremities 64*b* and 64*c* of the pawl 64 are biased by the springs or the like 66 and 67 respectively toward the fixed collar member 65 and the extremity of the cylinder 54. The cable 68 extends from the pawl extremity 64*b* about the pulley 69 which is secured in the yoke 56 to the 4-way valve control lever 70. A ratchet 71 which is secured to the stationary post 3 is provided with a suitable number of notches 72 with which the engaging end of the pawl 64*b* cooperates. The control ring 73 which is slidably positioned in the stationary guide lugs 74 and which encircles the stationary post 3 is connected by an extension arm 75 to the 4-way valve control lever 70.

In operation each of the cartons or the like 29 which is delivered to the carton sealing apparatus of the present invention is moved along conveyor 31 manually, gravitationally, automatically or otherwise toward one of the platforms 27 which has been properly aligned with an extremity thereof. After the carton has been properly disposed on the aligned platform and the flap holding device 43 has been moved downwardly to engage the upper flaps of the carton to preliminarily hold the same in their closed position, the operator moves the control ring 73 in a clockwise direction shown by the arrow in Figure 4 of the drawing and thereby causes the valve control lever 70 to assume the solid line position shown

This permits the pressurized fluid from the tubular shaft 7 to enter the cylinder 54 through the hose connection or conduit 62 and react upon the piston 58 moving it outwardly toward and beyond the position shown in Figure 4 of the drawing. As the outermost position of the piston is attained, the bias exerted by the spring 67 increases and finally exceeds the opposed biasing tendency of spring 66 thereby causing the pawl 64 to be withdrawn from the notch 72 in the ratchet 71. Rotation of the pawl 64 about its pivot causes the taut cable 68 to return the valve control lever 70 to its dotted line position such that the supply of pressurized fluid from shaft 7 is then delivered to the opposite end of the cylinder 54 through the conduit or hose 61 while simultaneously the first-mentioned end thereof is vented to the atmosphere, As the piston rod then moves inwardly, the bias of spring 67 once again becomes smaller than that of spring 66 so that the pawl as it rotates in a counterclockwise direction about its pivot 64*a* is adapted to engage the next notch 72. Thus, when the operator manually moves the control ring 73 in a clockwise direction to cause the pressurized fluid to move the piston rod 59 outwardly once again, the cylinder 54, its mounting structure and the rest of the apparatus secured to the rotatable shaft 7 is caused to revolve a predetermined distance about the stationary post 3 and its attached ratchet 71. To explain the operation of Figure 4 more fully, the position of the parts, as shown, is at the end of the turning increment of the turret. However, since the valve lever 70 is still open to admit air to cylinder 54 through conduit 62, piston 58 overtravels or continues to move to the left. This action does not turn the turret but lifts the pawl from the notch in the disc 71. Simultaneously with the lifting of the pawl from engagement with the disc, the spring 67 pivots the pawl on lever 60 to assist in disengaging the nose 64*b* of the pawl from the disc notch. When the pawl 64 has pivoted sufficiently far to effect complete disengagement with the notch in the disc, the valve is shifted through cable 68 which throws lever 70 to the dotted line position. This reverses the travel of piston 58 in the cylinder by venting conduit 62 and admitting fluid under pressure to conduit 61. As the piston rod 59 retracts, the pawl eventually becomes engaged in the next successive notch in the disc, whereupon the cycle is repeated when the operator moves ring 73.

As the shaft 7 and its associated attached equipment rotate about the post 3, the cam 46 controls the 3-way valves 45 through their associated cam followers 47 such that the pressurized fluid from the source 15 is delivered to each of the cylinders 19 to properly elevate each of the platforms 27 between the delivery and discharge conveyors 31 and 34. In this way the upper and lower surfaces of each carton are uniformly compressed regardless of its size between the associated platform 27 and the plate 12 so that its flaps are properly held in a closed position for a suitable period of time during the sealing operation as they progress toward the discharge conveyor 34. The cartons are pressed against the upper plate 12 until sufficiently sealed. This sealing occurs during approximately ¾ of a turn of the turret. As the raised platforms approach the discharge conveyor 34, cam 46 releases valve rod 47 to vent the cylinders 19, thus lowering the platforms to a position on a level with the discharge conveyor.

As the platform 27 and the carton or the like 29 carried thereon approach and become aligned with the discharge conveyor 34 by means of the braking device 80 and the detent 51, the barriers 38 and 39 engage the lateral surface 29*a* of the carton and restrain its further movement about the axis of the shaft. As the platform, however, continues to rotate and move past the discharge conveyor, the properly extended portion 30*a* of the associated sweep guide 30 engages the opposite and inner lateral surface 29*b* of the carton and urges the

same outwardly onto the rollers 35 of the discharge conveyor. Thereafter the carton is conveyed manually, gravitationally, automatically or otherwise to any other suitable location. As best shown in Figure 3 of the drawing during the continued rotation of the turret the sweep guide 30 passes between the suitably spaced barriers 38 and 39 and the empty platform 27 is then ready to receive another carton or the like 29 from the conveyor 30 and conduct the same through a similar processing cycle.

It is to be understood that although the conveyor device of the present invention as shown and described herein is adapted to accommodate six cartons, any greater or lesser number of the same should be accommodated without departing from the spirit or scope of the present invention.

While preferred embodiments of the invention have been disclosed, the description is intended to be illustrative only and it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. Carton sealing apparatus comprising a fixed support; a member rotatably mounted on the fixed support; a source of a pressurized fluid connected to the member; a plurality of fluid cylinders radially positioned about and extending downwardly from the member; a piston positioned in each of the fluid cylinders; a piston rod which is secured to each piston and which extends upwardly through the member; a carton supporting platform secured to an upper portion of each piston rod; means positioned adjacent one point on the rotary path of the member for conveying cartons to the plaforms; means positioned adjacent another point on the rotary path of the member for discharging the cartons from the platforms; a plate secured to the member above and substantially parallel to each of the platforms; a valve associated with each of the fluid cylinders; means including the valve for conducting the fluid from the source to each fluid cylinder adjacent a lower portion thereof; and means dependent upon the angular position of the member on its fixed support for controlling the delivery of fluid to each of the fluid cylinders.

2. Carton sealing apparatus comprising a fixed support; a turret journaled on the fixed support; a plurality of carton receiving platforms spaced about the turret; a compression plate which is secured to the turret in a substantially parallel and spaced relation with respect to each of the platforms; means for imparting relative movement between the compression plate and each of the platforms comprising a ratchet secured to the fixed support; a pawl positioned to cooperate with the ratchet; a normally contracted expandable means connecting the pawl and the turret; means for normally causing the pawl to engage the ratchet; manually controlled means for expanding the said connecting means to cause a predetermined amount of rotation of the turret about the fixed support; and means for automatically withdrawing the pawl from its engagement with the ratchet and for restoring the connecting means to its normally contracted condition following each increment of turret rotation.

3. Carton sealing apparatus comprising a fixed support; a turret journaled on the fixed support; a plurality of carton receiving platforms spaced about the turret; a compression plate which is secured to the turret in a substantially parallel and spaced relation with respect to each of the platforms; fluid actuated means for imparting relative movement between the compression plate and each of the platforms comprising a source of a pressurized fluid; a fluid cylinder which is secured to the rotatable apparatus; a piston positioned in the cylinder; means including a valve with a control lever for conducting the fluid from the source to the cylinder; a piston rod secured to the piston; a lever, pivotally secured at one end

to the fixed support and at the other end to the piston rod; ratchet means secured to the fixed support; a pawl mounted on the lever for cooperating with the ratchet means; first biasing means urging the pawl into engagement with the ratchet means; second biasing means urging the pawl out of engagement with the ratchet means, the second mentioned biasing means being normally weaker than the first mentioned biasing means but overcoming the first as the piston nears its outermost position in the cylinder; and means connecting the control lever of the valve with the pawl to throw a valve control when the piston reaches its maximum extended position to reverse the direction of piston travel.

4. A carton handling turret assembly rotatably mounted on a fixed support; means for producing predetermined angular displacements of the said apparatus comprising a ratchet member secured to the fixed support; a pawl positioned to cooperate with the ratchet member; a normally contracted expandable means connecting the pawl and the turret means for normally causing the pawl to engage the ratchet member; manually controlled means for expanding the said connecting means to cause predetermined increment of rotation of the turret about the fixed support; and means for automatically withdrawing the pawl from engagement with the ratchet and for restoring the connecting means to its normally contracted condition following each increment of rotation of the turret.

5. A carton handling turret assembly rotatably mounted on a fixed support; means for producing predetermined angular displacements of the turret comprising a source of a pressurized fluid; a fluid cylinder secured to the turret; a piston positioned in the cylinder; means including a valve with a control lever for conducting the fluid from the source to the cylinder; a piston rod secured to the piston, a lever, pivotally secured to one end to the fixed support and at the other end to the piston rod; ratchet means secured to the fixed support; a pawl mounted on the lever to cooperate with the ratchet means; first biasing means urging the pawl into engagement with the ratchet means; second biasing means urging the pawl out of engagement with the ratchet means, the second mentioned biasing means being normally weaker than the first mentioned biasing means but overcoming the first as the piston reaches its outermost position in the cylinder; and means connecting the control lever of the valve with the pawl to throw a valve control when the piston reaches its maximum extended position to reverse the direction of piston travel.

6. In carton sealing apparatus wherein a turret having a plurality of radially positioned elements is mounted on a fixed support; means for compressing opposite surfaces of a plurality of cartons that are supported on the turret comprising a source of pressurized fluid connected to the turret; a fluid cylinder secured to and extending downwardly from an outer portion of each of the radially positioned elements of the turret; a piston positioned in each of the fluid cylinders; a piston rod secured to each piston and extending upwardly through an aperture in the associated radial element; a carton supporting platform secured to the upper extremity of each piston rod; a valve positioned on each of the radial elements; conduit means between the source of pressurized fluid, each valve, and each cylinder; a plate secured to the turret above and substantially parallel to the radial elements; and means dependent upon the angular position of the turret on its fixed support for controlling the delivery of fluid to each of the fluid cylinders.

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