Sept. 2, 1958 D. G. KINGSLEY 2,849,950

BOX CLOSING MACHINE

Filed Jan. 27, 1954 4 Sheets-Sheet 1

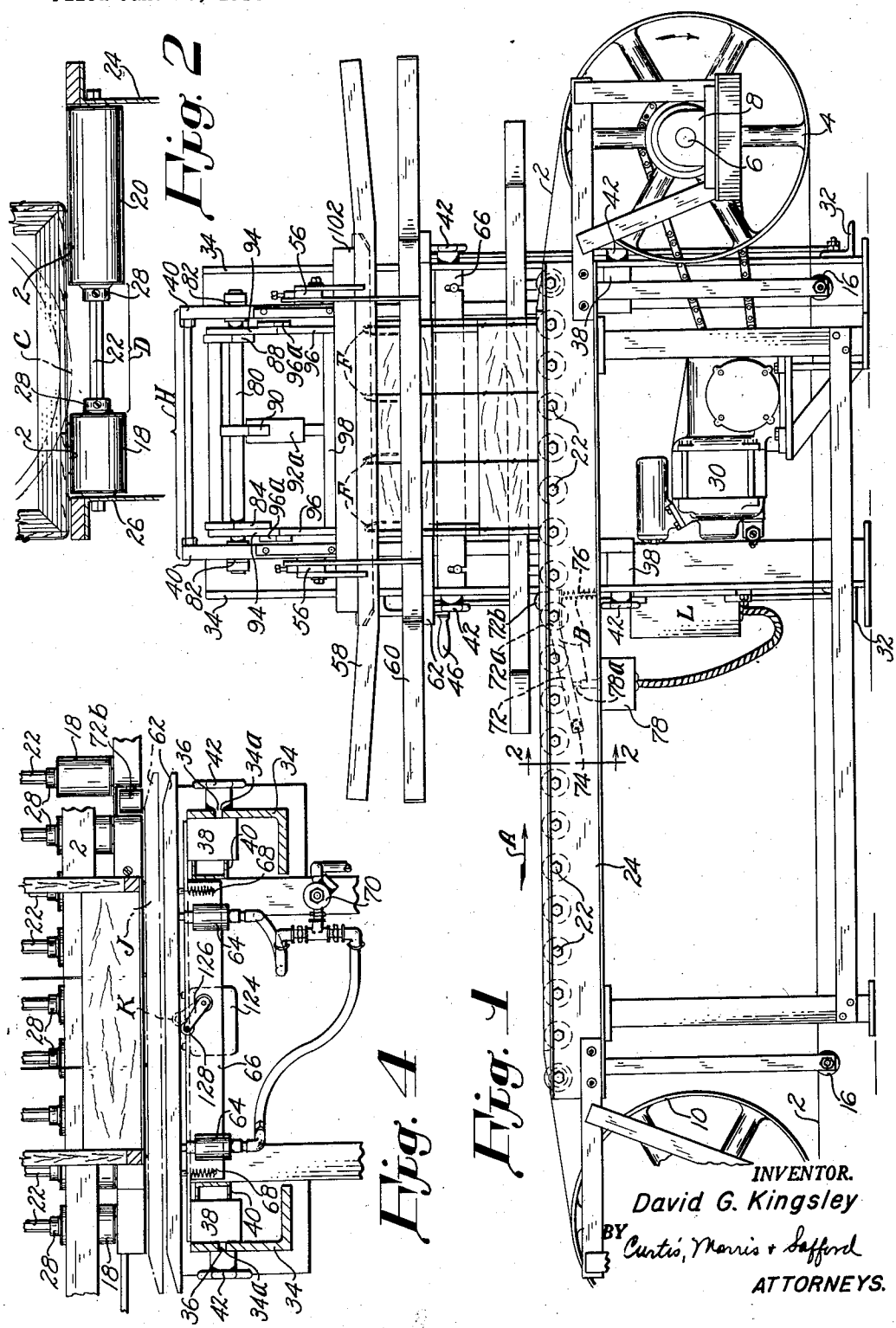

Fig. 2

Fig. 4

Fig. 1

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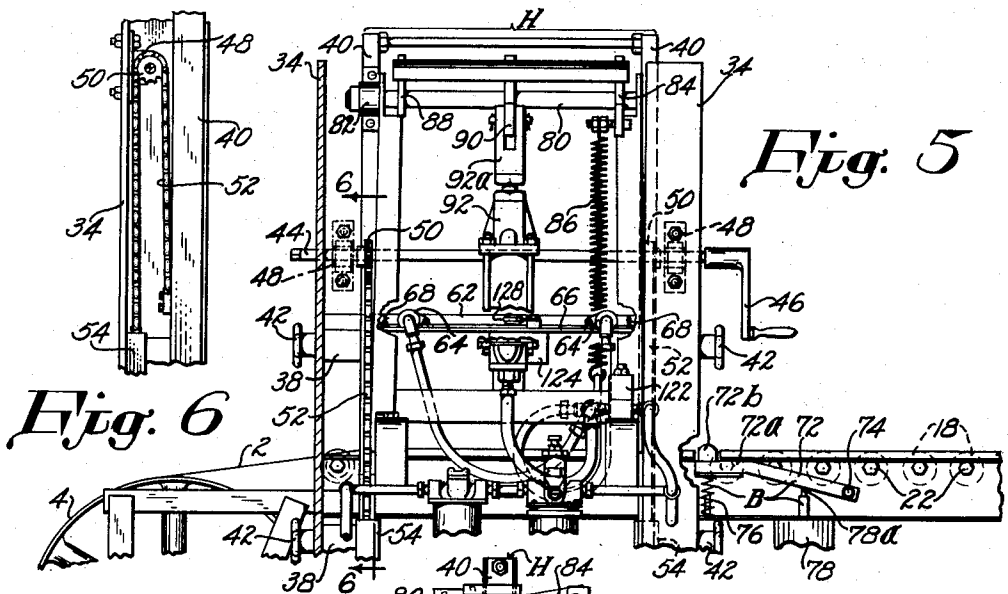

Fig. 6

Fig. 5

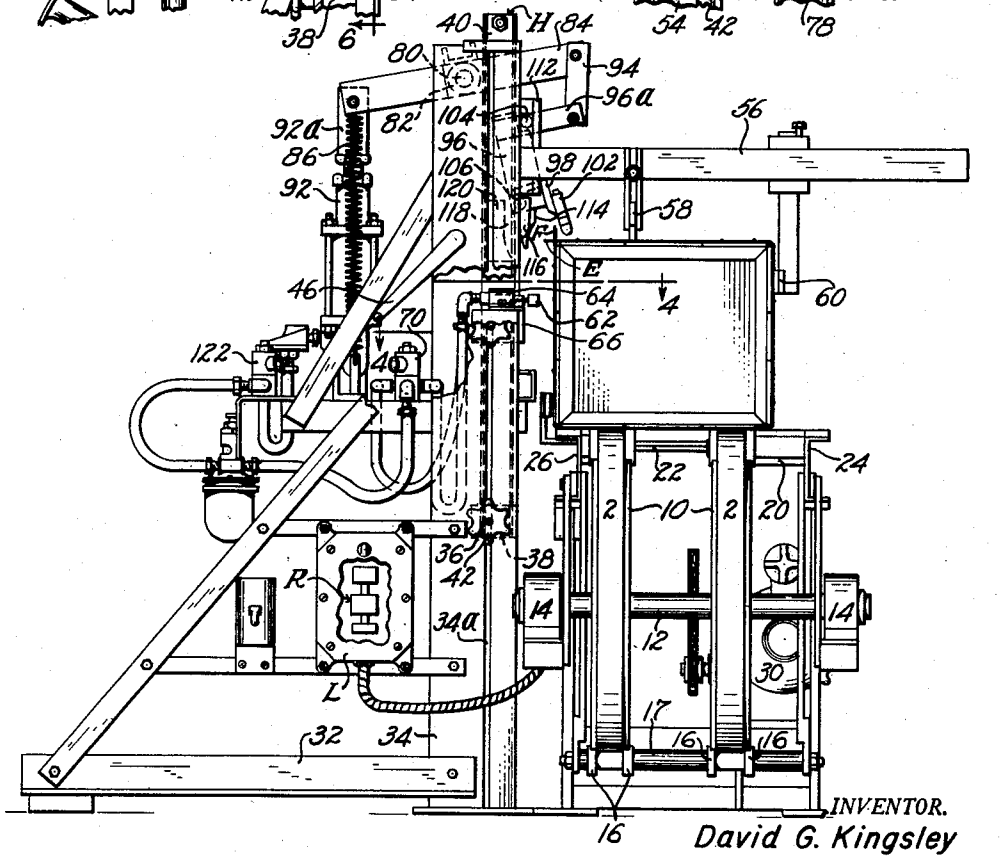

Fig. 3

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BOX CLOSING MACHINE

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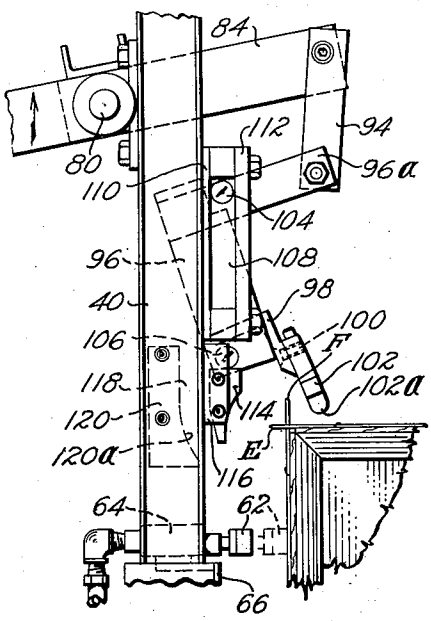

Fig. 7

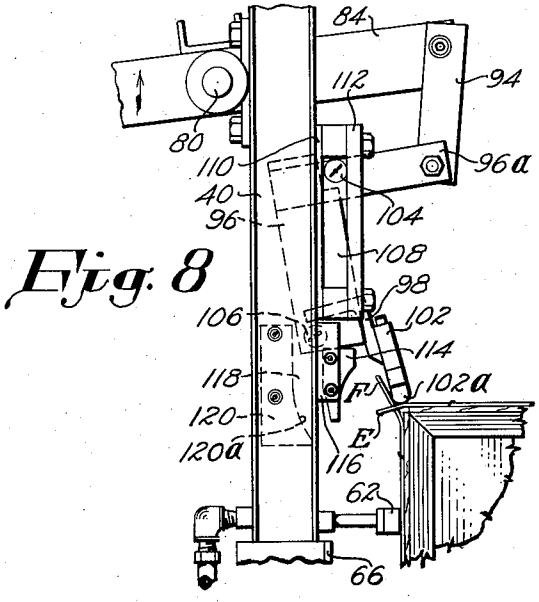

Fig. 8

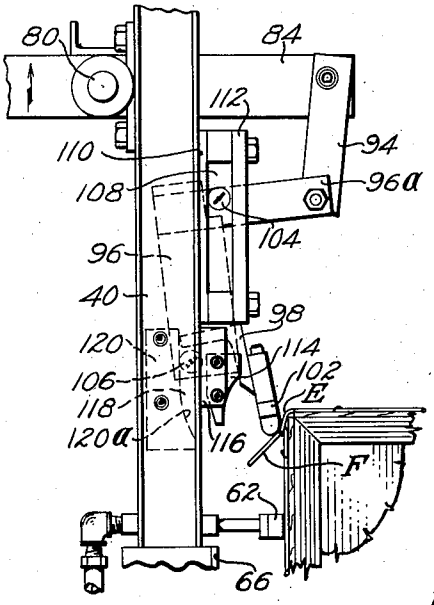

Fig. 9

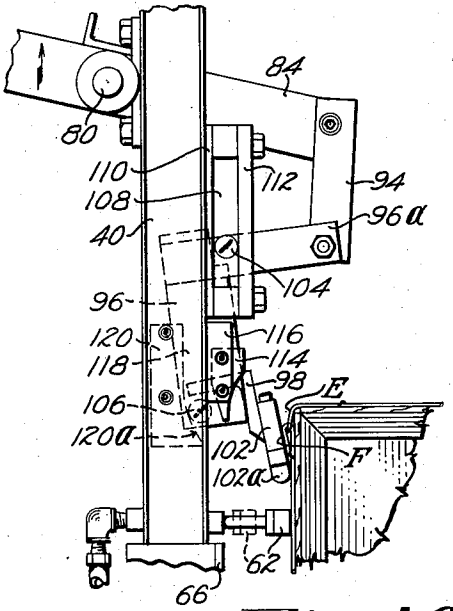

Fig. 10

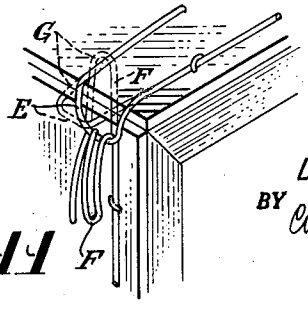

Fig. 11

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BOX CLOSING MACHINE

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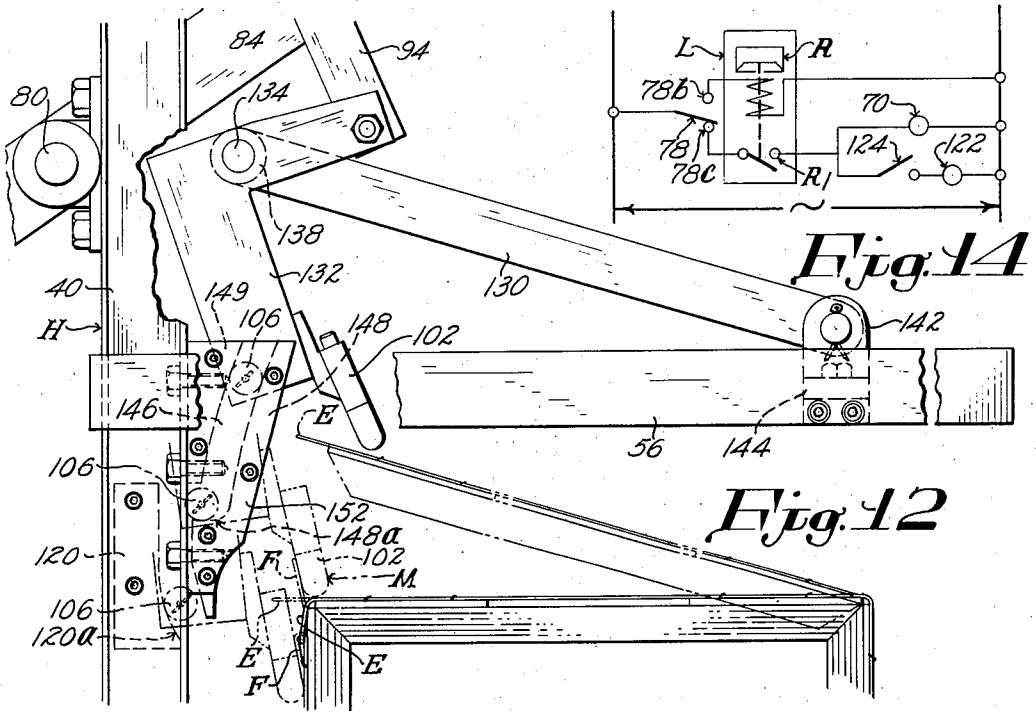

Fig. 12

Fig. 14

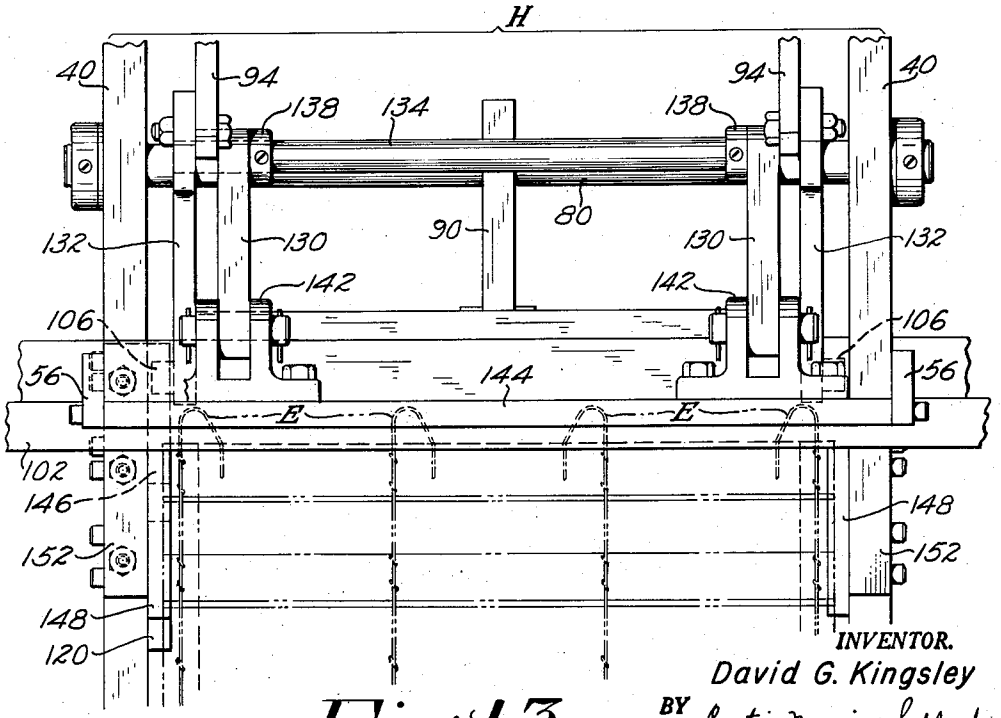

Fig. 13

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2,849,950

BOX CLOSING MACHINE

David G. Kingsley, Mountain Lakes, N. J., assignor to Stapling Machines Co., Rockaway, N. J., a corporation of Delaware

Application January 27, 1954, Serial No. 406,506

5 Claims. (Cl. 100—56)

This invention relates to a machine for closing wire-bound boxes (including crates) of the general type shown, for example, in United States Patent No. 1,933,030. Such boxes are provided with encircling binding wires which have formed at their opposite ends loops which come into opposition with each other at the closing corner of the box and one of such loops, being somewhat narrower than the other, may be inserted through the latter and bent down to secure the box closed.

Heretofore such boxes have been closed entirely by hand operations. In packing plants where large numbers of boxes are packed daily, the labor of closing the boxes is a substantial item of expense. By supplementing and partially supplanting this hand labor, the closing machine provided by the present invention enables an appreciable reduction in production costs. Moreover, by accomplishing uniformly good box closures, the machine reduces the possibility of accidental opening of the boxes in transit.

This machine, in general, includes a conveyor for moving the filled boxes into and out of the closing machine, guide rails for aligning and laterally positioning the box and, if desired, for pressing the hingedly connected top of the box into snugly closing position, movable clamp members for gripping the box and stopping its movement when it reaches the proper position to be operated upon, and movable closing members for engaging and bending the loops. The clamp members and the closing members are actuated by pneumatic cylinders, or other suitable means, controlled either directly or indirectly by sensing means responsive to the position of the box.

In the drawings:

Figure 1 is a front elevation of a box closing machine embodying features of the present invention.

Figure 2 is a fragmentary sectional view of the machine taken on the line 2—2 of Figure 1, showing the conveyor bands and their supporting rollers.

Figure 3 is a side elevation of the closing machine as viewed from side appearing at the left in Figure 1, showing a wirebound box arriving in proper position to be operated upon.

Figure 4 is a fragmentary sectional view taken on the line 4—4 of Figure 3, showing the means for properly positioning and clamping the box for a closing operation.

Figure 5 is a fragmentary elevational view of the rear upper portion of the closing machine with some parts shown broken away to reveal more clearly the means for raising or lowering the loop fastener-bending mechanism to accommodate boxes of different height.

Figure 6 is a fragmentary sectional view taken on the line 6—6 of Figure 5, showing one of these adjusting mechanisms.

Figures 7, 8, 9 and 10 are fragmentary elevational views of the upper portion of the closing machine, with certain parts omitted, to show progressively the movement of the loop fastener-bending mechanism when performing a box closure.

Figure 11 is a fragmentary isometric view of a portion

of a box closing corner showing in broken lines the position of a pair of interengaged loop fasteners and in full lines their position after closure.

Figure 12 is a fragmentary end elevational view of the upper portion of the closing machine, with some parts removed, showing an alternative arrangement of elements which are designed to press the top or cover of the box down into closing position as well as bend the loop fasteners to secure the box closed.

Figure 13 is a side elevational view of the portion of the machine shown in Figure 12 as viewed from the side appearing at the right in Figure 12.

Figure 14 is a schematic diagram of the electrical circuit for controlling the air operated elements.

Referring first to Figures 1, 2 and 3, the box closing machine includes a power-driven conveyor having a pair of endless flexible conveyor bands 2. As may be seen in Figure 3, the conveyor bands 2 are spaced apart so as to support the boxes near their opposite bottom corners, and, as may be seen in Figure 1, are trained about drive wheels 4 keyed to a drive shaft 6 whose ends are journaled in bearings 8. As appears at the opposite side of Figure 1, the conveyor bands 2 are also trained about idler wheels 10 rotatably mounted on a fixed shaft 12 whose ends are supported by brackets 14 (Figure 3).

The lower run of the conveyor bands 2 is supported and guided by means of collars 16 (Figures 1 and 3) which are rotatably supported on fixed shafts 17 extending across the lower portion of the machine near either end thereof and suitably supported.

The upper run of the conveyor bands 2 is supported by a series of spaced rollers 18 and 20 which in Figure 2 may be seen to be of unequal length, and which rotate freely on stationary rods 22 the ends of which are secured to channel-shaped side rails 24 and 26. The rollers 18 and 20 are maintained in spaced relationship endwise by collars 28 secured to the rods 22 by set screws. The space D between the inner ends of the rollers 18 and 20 serves a very useful purpose in accommodating boxes which are heavily packed with fruit or vegetables so that the bottom of the box is caused to bulge downwardly under the forces applied to the top or cover of the box when performing a closing operation. This space is also found useful for handling crates carrying, for example, generally cylindrical cans or drums which project through the openings between the slats at each side of the crate, as indicated by broken lines C in Figure 2.

The drive shaft 6 and the drive wheels 4 keyed thereto are driven in a clockwise direction, as viewed in Figure 1, by a gear motor 30 which appears at the lower right in Figure 1 and which has a suitable driving connection with shaft 6. The conveyor bands 2 are thereby continuously driven in the direction indicated by the arrow A.

Referring to Figures 1 and 3, and particularly to Figure 3, the reverse L-shaped main framework of the closing machine includes base members 32 and upstanding side members 34, suitably braced. The side members 34 are provided along a major portion of their length with vertical slots 34*a* (Figure 3) through which studs 36 anchored in spacer blocks 38 (Figure 1) project and are guided vertically. The spacer blocks 38 are secured to the outer face of the flanges of vertically extending channels 40 at either side of an auxiliary framework H, and serve to space the auxiliary framework from the inner faces of the main framework side members 34. Threaded on the outwardly projecting ends of the aforementioned studs 36 are clamp members 42 which may be tightened against the outer faces of the side members 34 to lock the auxiliary framework H in the desired vertical position with respect to the main framework.

When the clamp members 42 are loosened, auxiliary framework H may be raised or lowered to accommodate

varying heights of box. The mechanism for accomplishing this function is shown in Figures 5 and 6 and includes an adjusting shaft **44** whose ends extend through openings in the upper portion of the main framework side members **34** a sufficient amount to receive thereon a removable crank **46** (shown at the right in Figure 5) for rotating said shaft. Rotatably supporting the adjusting shaft **44** are a pair of bearings **48** mounted on the inner side of the rear flange of side members **34**. Keyed to adjusting shaft **44** adjacent the inner faces of bearings **48** are sprockets **50** which have trained thereabout chains **52**. One end of each of the chains **52** is anchored to the rear face of one of the channels **40** of auxiliary framework H while its other end is attached to a counterweight **54**. This counterweight **54** balances the weight of auxiliary framework H and reduces the effort which need be applied to crank **46** to move auxilitary framework H to the desired height.

As shown in Figures 1 and 3, the auxilitary framework H integrally supports on the front face of its channels **40** a pair of overhanging arms **56** which have adjustably attached thereto a downwardly projecting presser bar **58** which maintains the top or cover of the box in closed position as the box moves into position. Also adjustably attached to said arms is a backing-bar **60** which engages the rear face of the box to cooperate with clamp bar **62** in securing the box in a fixed position during a closing operation.

Clamp bar **62** is supported and actuated by air-clamps or cylinders **64** mounted on a cross member **66** of auxiliary framework H.

As each box reaches proper box-closing position, air under pressure is supplied to the air clamps **64** to move the clamp bar **62** outwardly against the resistance of tension spring **68** (Figure 4) to a box-clamping position, indicated in Figure 4 by broken lines J, and after a suitable interval during which the box closure will have been completed, the supply of compressed air is removed and the tension springs **68** are allowed to return the clamp bar **62** to its withdrawn position, shown by full lines in Figure 4. The air supply to the air clamps **64** is controlled by a solenoid valve **70** which is controlled in turn by the sensing mechanism generally designated B and appearing in the central portion of Figure 1 and at the right in Figure 5.

The actuating member of this sensing mechanism B is a lever **72** having one of its ends pivotally fastened at **74** to the outer face of side rail **26** and its opposite free end **72***a* bent at such an angle that its uppersurface lies flat against the under surface of the upper flange of side rail **26**. Integrally formed on the upper surface of the free end **72***a* of lever **72** is a trip block **72***b* of sufficient height to extend upwardly through a suitable opening of the previously mentioned flange to lie in the path of travel of a box being conveyed into the closing machine.

The trip block **72***b* is urged upwardly by a coil spring **76** interposed between the undersurface of the free end **72***a* of lever **72** and the uppersurface of the lower flange of side rail **26**. To cooperate with lever **72** there is attached to the undersurface of the lower flange of side rail **26** an electric start switch **78** whose actuating plunger **78***a* extends upwardly through an opening in said flange a sufficient distance to engage the undersurface of lever **72**. As each box nears the proper box closing position, it depresses the trip block **72***b* and lever **72** and trips the switch **78** and this, through an electrical circuit to be described hereinafter, results in actuating the solenoid valve **70** to supply compressed air to the air clamps **64**, causing them to move clamp bar **62** out to box clamping position and stop the box for the box closing operation.

The auxiliary framework H supports in its upper portion a transversely extending rocker shaft **80** whose ends are journaled in bearings **82** secured to the rear faces of channels **40** (Figures 3 and 5). Supported at one end of the rocker shaft **80** (the right-hand end as viewed in Figure 1) adjacent the inner faces of one of the channels **40** is a rocker arm **84** which as may be seen in Figure 3, projects both forwardly and rearwardly of the auxiliary framework. At the rearward end of the rocker arm **84** is fastened the upper end of a tension spring **86** the lower end of which is fastened to the lower part of the auxiliary framework H. This spring **86** urges the rocker arm **84** and rocker shaft **80** in a counterclockwise direction, as viewed in Figure 3.

At the opposite end of the rocker shaft **80** from the rocker arm **84** is another rocker arm **88** (see Figure 1) which projects only forwardly of the rocker shaft and is of the same proportions as the similar projecting portion of rocker arm **84**. Midway between the arms **84** and **88**, rocker shaft **80** has fixed on it a main rocker lever **90** which projects rearwardly and is pivotally connected to the piston rod **92***a* of an air cylinder **92** (Figures 3 and 5) which is secured to the lower portion of the auxiliary framework.

Pivotally fastened to the rocker arms **84** and **88** adjacent their forward ends are a pair of connecting links **94** (see particularly Figure 3) the lower ends of which are pivotally fastened to the forwardly extending arms **96***a* of crank members **96** (Figure 3). As shown particularly in Figure 7, the crank members **96** are joined at their lower ends by an angle cross brace **98** (see particularly Figure 7), which has demountably secured to its front face by bolts **100** a closure bar **102** with a rounded bottom face **102***a*. As may be seen in Figure 1, the closure bar **102** extends the full width of the main framework and even beyond it at either side so as to engage all of the loop fasteners along the closing corner of the box.

Figures 3 and 7 show the position of the box closing elements in their initial position prior to a loop fastener bending operation. As may be seen in these figures the closure bar **102** is normally positioned to the outer side of the upwardly projecting loop fasteners F of the front side of the box, thereby eliminating any interference with these loop fasteners as the box is fed into position for the box closing operation.

To impart the closure bar **102** the complex movement required for properly bending the interengaged loop fasteners in securing the closing corner of the box, the supporting framework of the closure bar **102** has rotatably mounted at its outer faces upper guide rollers **104** and lower guide rollers **106**. The upper guide rollers **104** are received in guideways **108** formed by plates **110** and **112** fastened to the front face of the channels **40** at either side of the auxiliary framework H, while the lower guide rollers **106** rest upon the upper surfaces of support plates **114** secured to the inner faces of plate members **116** which are mounted on the front faces of channels **40** (Figure 7). At the rear of the support plates **114** are guideways **118** formed by the rear faces of support plates **114** and the adjacent faces of cam plates **120** fastened to the inner faces of channels **40**.

Figures 8 through 10 show the successive positions through which these box closing elements pass during a box closing operation. This movement is imparted by rocking the rocker shaft **80** in a clockwise direction. In the first stage, as shown in Figure 8, this causes the crank members **96** to pivot in a clockwise direction about the axis of the upper guide rollers **104**, moving the lower guide rollers **106** rearwardly until they strike the forward surfaces of the cam plates **120**. The rollers **106** will then be clear of the upper surfaces of the support plates **114** and in line with the upper ends of the guideways **118**. During this first phase of movement, the closure bar **102** will sweep arcuately over the closing corner of the box, engaging the upstanding loops F and bending them outwardly in position to be bent back down along the front of the box.

Continued clockwise movement of the rocker shaft **80**, as shown in Figure 9, causes the crank members **96** to move translationally downward, with the upper and lower guide rollers **104** and **106** moving in their respective guide-

ways 108 and 118. The resulting downward movement of the closure bar 102 bends the loops E down against the front side of the box and bends the loops F around the loops E.

As shown in Figure 10, the continued clockwise movement of the rocker arm 84 moves the crank members 96 translationally further downward to the point where the lower guide rollers 106 engage the forwardly curved lower portions 120*a* of the surfaces of the cam plates 120. These curved surfaces 120*a* force the lower guide rollers 106 forwardly, causing the crank members 96 as they move downwardly to pivot in a counterclockwise direction about the upper guide rollers 104. This causes the closure bar 102 to press the loops F downwardly and inwardly against the front sides of the box to complete the box closure.

Clockwise movement of the rocker shaft 80 to move the closure bar 102 for the closure of a box in the manner described is accomplished by supplying air under pressure to the air cylinder 92 (Figures 3 and 5), while this mechanism returned to its starting position prior to the next box closing operation by cutting off the supply of compressed air to the air cylinder and allowing the spring 86 to move the rocker shaft 80 in a counterclockwise direction.

The supply of air to the cylinder 92 is controlled by means of a solenoid valve 122 (appearing at the left in Figure 3), which in turn is controlled by means of an electric switch 124, best shown at the center of Figure 4. This switch 124 is secured to the underside of the lower cross member 66 of the auxiliary framework at a point between the two air clamps 64. The actuating shaft of this switch extends through an opening provided in cross member 66 and has adjustably mounted thereon a lever 126 bearing a roller 128 positioned to engage the rear face of clamp bar 62 in the withdrawn position of the clamp bar. Outward movement of the clamp bar 62 toward its box-clamping position (broken lines J), permits lever 126 to be urged by the mechanism of switch 124 to move in a clockwise direction, as viewed in Figure 4, from its initial position shown in full lines to the position indicated by broken lines K. This outward movement of lever 126 actuates the switch 124 so as to open the solenoid valve 122 and supply compressed air to cylinder 92, thus causing movement of the rocker shaft 80 and its assocated parts for a box closing operation.

The operation of the above-described mechanism is as follows:

Preparatory to feeding or placing boxes onto the conveyor bands 2, the top or cover of the box is brought to a closed position with each pair of loop fasteners E and F threaded one through the other, as indicated by broken lines G in Figure 11. The boxes are placed on the conveyor bands 2 so that the boxes approaching trip block 72*b* on lever 72 are spaced apart a distance slightly greater than the dimension of the trip block as measured in a direction parallel to the direction of movement of the boxes in order to permit lever 72 to move upwardly under the urging of coil spring 76 at least momentarily after each box passes over it. Such a spacing of the boxes can be easily maintained by a single operator who also pushes down the top section of the box and interengages the loop fasteners E and F.

As the box is moved toward a position adjacent the loop fastener bending mechanism of the closing machine, being partially guided by the outwardly flared end of backing bar 60 and having its top or cover further closed and held by presser bar 58, trip block 72*b* is contacted and held depressed for the full length of the box, actuating the start switch 78.

As may be seen in the schematic diagram of Figure 14, this actuation of start switch 78 closes its normally open contacts 78*b*, and energizes the solenoid of a time-delay relay R which, as shown at the lower left in Figure 3, is housed in a box L attached to the main framework of the closing machine. The energization of the relay R closes its normally open contacts R_1 which are connected in series with the normally closed but now open contacts 78*c* of start switch 78. As the trailing end of the box moves beyond trip block 72*b* (Figure 1), lever 72 is moved upwardly to its initial position by coil spring 76, opening contacts 78*b* of start switch 78 to de-energize the solenoid of the time-delay relay R, and closing contacts 78*c* to apply current through the delayed opening relay contacts R_1 to the solenoid valve 70. This actuates the valve 70 to supply compressed air to air clamps 64 (Figure 4) and cause movement of the clamp bar 62 to clamp the box between it and the backing bar 60. The box is thus held in proper position for the box closing operation, with the conveyor bands 2 continuing to run but merely sliding ineffectually under the bottom face of the securely held box.

As the clamp bar 62 moves outwardly to box-clamping position, lever 126 of switch 124 is allowed to move outwardly as indicated in Figure 4 by broken lines K, closing switch 124 and, as may be seen from Figure 14, energizing solenoid valve 122 and supplying compressed air to air cylinder 92 (Figure 3). This causes the piston rod 92*a* of the cylinder to move upwardly and move the rocker shaft 80 and the closure bar 102 to close the loop fasteners on the box. This box closing operation is completed within the time-delay interval before opening of the contacts R_1 of time-delay relay R.

With the completion of the time-delay interval, the contacts R_1 of time-delay relay R open, breaking the circuit to solenoid air valves 70 and 122 which are de-energized to remove air pressure from cylinder 92 and air clamps 64. The relief of air pressure in cylinder 92 permits tension spring 86 to return the loop bending mechanism to its initial position, while the relief of pressure in air clamps 64 allows tension springs 68 to retract clamp bar 62, releasing the closed box, which is immediately moved from the path of the next oncoming box by the continuously moving conveyor bands 2.

A variation of the suspension of closure bar 102 is shown in Figures 12 and 13, wherein said bar performs the function of closing the partially opened covers of the packed boxes in addition to bending the loop fasteners. As may be seen in said figures, the upper guide rollers 104 are dispensed with and the closure bar supporting assembly is pivotally supported on a pair of elongated arms 130 positioned at either side of the closure bar supporting framework adjacent the inner faces of crank members 132 which are connected to rocker arms 84 and 88 by connecting links 94. One end of each of the elongated arms 130 is rotatably mounted on a cross shaft 134 the ends of which are journaled in bearings secured to the inner faces of crank members 132 and maintained in position by stop collars 138. The opposite ends of elongated arms 130 are rotatably mounted on short shafts extending from brackets 142 secured to the upper surfaces of a flat cross member 144 fastened to the inner faces of overhanging arms 56.

The construction of the framework supporting closure bar 102 is similar to that described hereinbefore. The lower guide rollers 106 are received in irregularly shaped guideways 146 formed in cam plates 148 and 149 attached to the inner face of brackets 152 mounted on the outer face of the channels 40 of auxiliary framework H and cam plates 120 attached to the inner face of channels 40.

As shown in full lines in Figure 12, the initial or raised position of closure bar 102 is of sufficient height to permit the partially opened cover of a packed box to pass beneath it as the box is fed into position to be closed. As has already been described, the sequence of operations by the mechanism of the closing machine is initiated by depression and release of trip block 72*b* as the box passes over it. In this latter embodiment of the machine, the path of movement of the closure bar 102 is such that it first contacts the partially opened box cover and, as it moves downward arcuately to the position shown in

broken lines M, presses the box cover into closed position. At this point in the movement of closure bar **102**, the lower guide rollers **106** contact and move rearwardly on a horizontal step **148***a* of cam plate **148**, causing closure bar **102** to move over the edge of the box cover while pressing it tightly closed and then move downwardly to bend the threaded loop fasteners F and E in the manner previously described.

From the foregoing description, it will be apparent that the present invention provides a practical machine for automatically closing wirebound boxes. It will therefore be appreciated that the above mentioned desirable objectives have been achieved. However, it should be emphasized that the particular embodiments of the invention shown and described herein are intended as merely illustrative and not as restrictive of the invention.

I claim:

1. A machine for closing wirebound boxes of the type having interengageable loop fasteners at their closing corners comprising a pair of clamp members for engaging opposite faces of said boxes and holding said boxes stationary in a predetermined position, a movable loop bending member adjacent to and aligned with the positions of a pair of interengageable loops at the closing corner of a box in said predetermined position, a cam member cooperating with said loop bending member for guiding the same in a path extending first obliquely downward against and across the top of the box past its closing corner, then downwardly along and generally parallel to the front of the box and finally inwardly toward the front of the box, and motor means for driving said loop bending member along said path.

2. A machine for closing wirebound boxes of the type having interengageable loop fasteners at their closing corners comprising a conveyor for moving said boxes into and out of said machine, a pair of clamp members for engaging opposite faces of said boxes, at least one of said clamp members being movable from and into engagement with the adjacent face of said boxes to grip said boxes between said clamp members and hold them stationary in a predetermined position, a movable loop bending member adjacent to and aligned with the positions of a pair of the interengageable loops at the closing corner of a box in said predetermined position, a cam member cooperating with said loop bending member for guiding the same in a path extending first obliquely downward against and across the top of the box past its closing corner, then downwardly along and generally parallel to the front of the box and finally inwardly toward the front of the box, motor means for moving said movable clamp into engagement with said boxes and for moving said loop bending member along said path, a sensing element connected to control said motor means and arranged to be actuated by said boxes as they move toward said predetermined position, whereby said boxes will be stopped and held in said predetermined position by said clamp members and the loops on said boxes will be bent into box-closing position by said loop bending member.

3. A machine for closing wirebound boxes of the type having interengageable loop fasteners at their closing corners comprising a conveyor for moving said boxes into and out of said machine, a first motor means for continuously driving said conveyor, a pair of clamp members for engaging opposite faces of said boxes, at least one of said clamp members being movable from and into engagement with the adjacent face of said boxes to grip said boxes between said clamp members and hold them stationary in predetermined position, a second motor means for moving said movable clamp member into engagement with said boxes, a first sensing element connected to control said second motor means and arranged to be actuated by said boxes as they move toward said predetermined position, whereby said sensing element will cause movement of said movable clamp member into engagement with said boxes to hold said boxes in said predetermined position, a movable loop bending member adjacent to and aligned with the positions of a pair of interengageable loops at the closing corner of a box in said predetermined position, a cam member cooperating with said loop bending member for guiding the same in a path extending first obliquely downward against and across the top of the box past its closing corner, then downwardly along and generally parallel to the front of the box and finally inwardly toward the front of the box, a third motor means for driving said loop bending member along said path, a second sensing element connected to control said second motor means and arranged to be actuated in accordance with the position of said movable clamp member whereby movement of said movable clamp member into engagement with said box will initiate movement of said loop bending member to bend said loops.

4. In a machine for closing wirebound boxes of the type having interengageable loop fasteners at their closing corners, mechanism for bending the loop fasteners of boxes held stationary within said machine comprising a supporting shaft mounted for translational movement in a direction generally parallel to the front of the box, a crank assembly pivotally supported on said shaft for arcuate movement about an axis generally parallel to the closing corner of the box, said crank assembly having a first crank arm extending toward said box and a second crank arm extending in a direction generally rearward with relation to said box, a loop engaging portion at the end of the said first crank arm adjacent said box, drive means connected to the rear end of said second arm to urge said crank assembly to move translationally downward and to pivot in an arc swinging said loop engaging portion obliquely downwardly and forwardly relative to said box, and a cam having a cam surface generally parallel to the front of said box for engaging a portion of said crank assembly and limiting its movement in a direction forwardly with relation to said box, whereby such actuation of said drive means causes said loop engaging portion to move arcuately downwardly and forwardly across the closing corner of said box until said crank assembly strikes said cam surface, and then downwardly along the front of said box.

5. In a machine for closing wirebound boxes of the type having interengageable loop fasteners at their closing corners, mechanism for bending the loop fasteners of boxes held stationary within said machine comprising a supporting shaft mounted for translational movement in a direction generally parallel to the front of the box, a crank assembly pivotally supported on said shaft for arcuate movement about an axis generally parallel to the closing corner of the box, said crank assembly having a first crank arm extending toward said box and a second crank arm extending in a direction generally rearward with relation to said box, a loop engaging portion at the end of the said first crank arm adjacent said box, and a cam having a cam surface adapted to engage a portion of said crank assembly and limit its movement forwardly with relation to said box, the upper portion of said cam surface extending generally parallel to the front of said box and the lower portion of said cam surface being inclined inwardly toward the front of said box, whereby such actuation of said drive means causes said loop engaging portion to move arcuately downwardly and forwardly across the closing corner of said box until said crank assembly engages said cam, then to move downwardly along the front of said box and finally inwardly toward the front of said box.

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