

Aug. 25, 1959

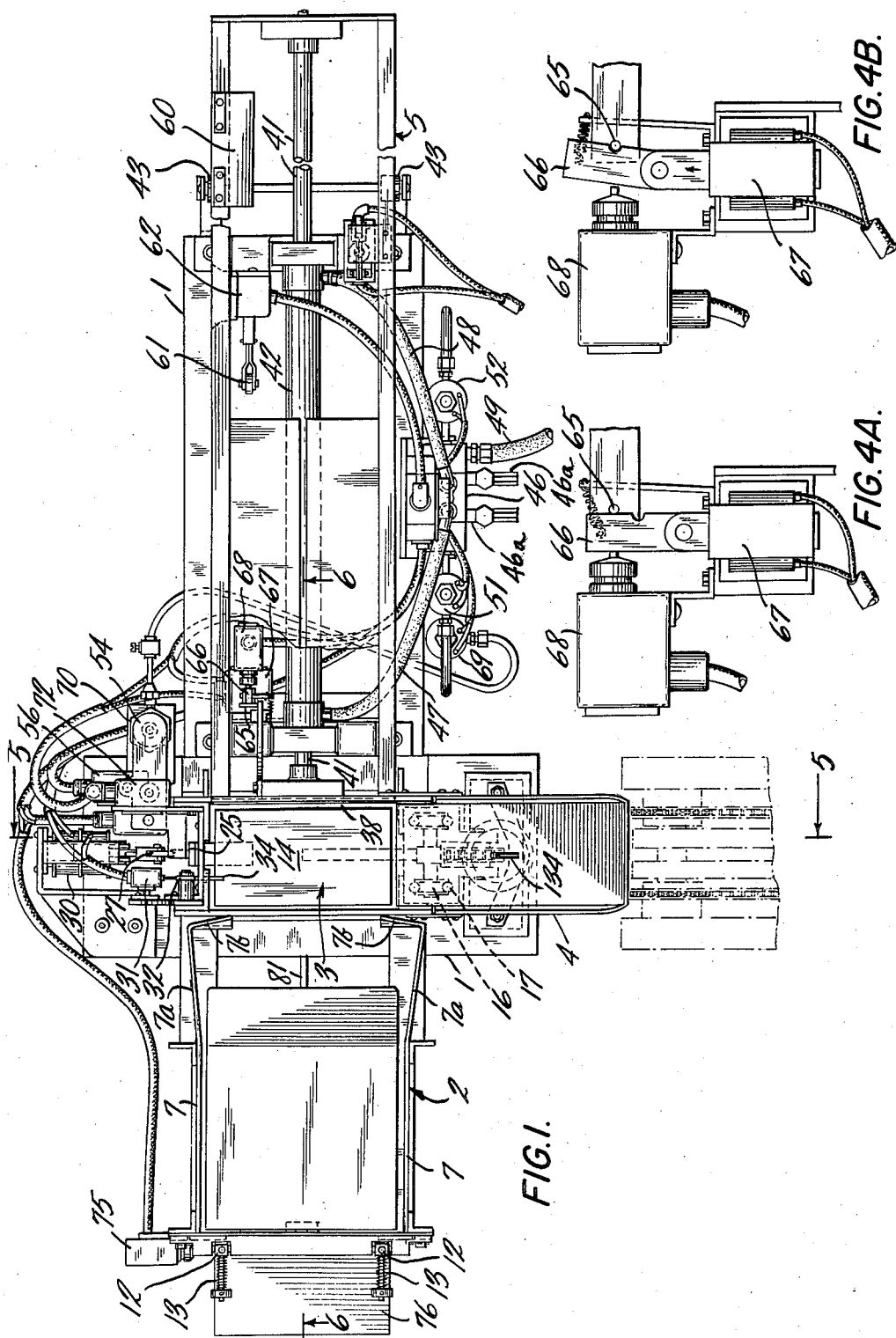
M. B. KOCH

2,900,773

AUTOMATIC CARTON PACKING MACHINE

Filed July 18, 1956

9 Sheets-Sheet 1



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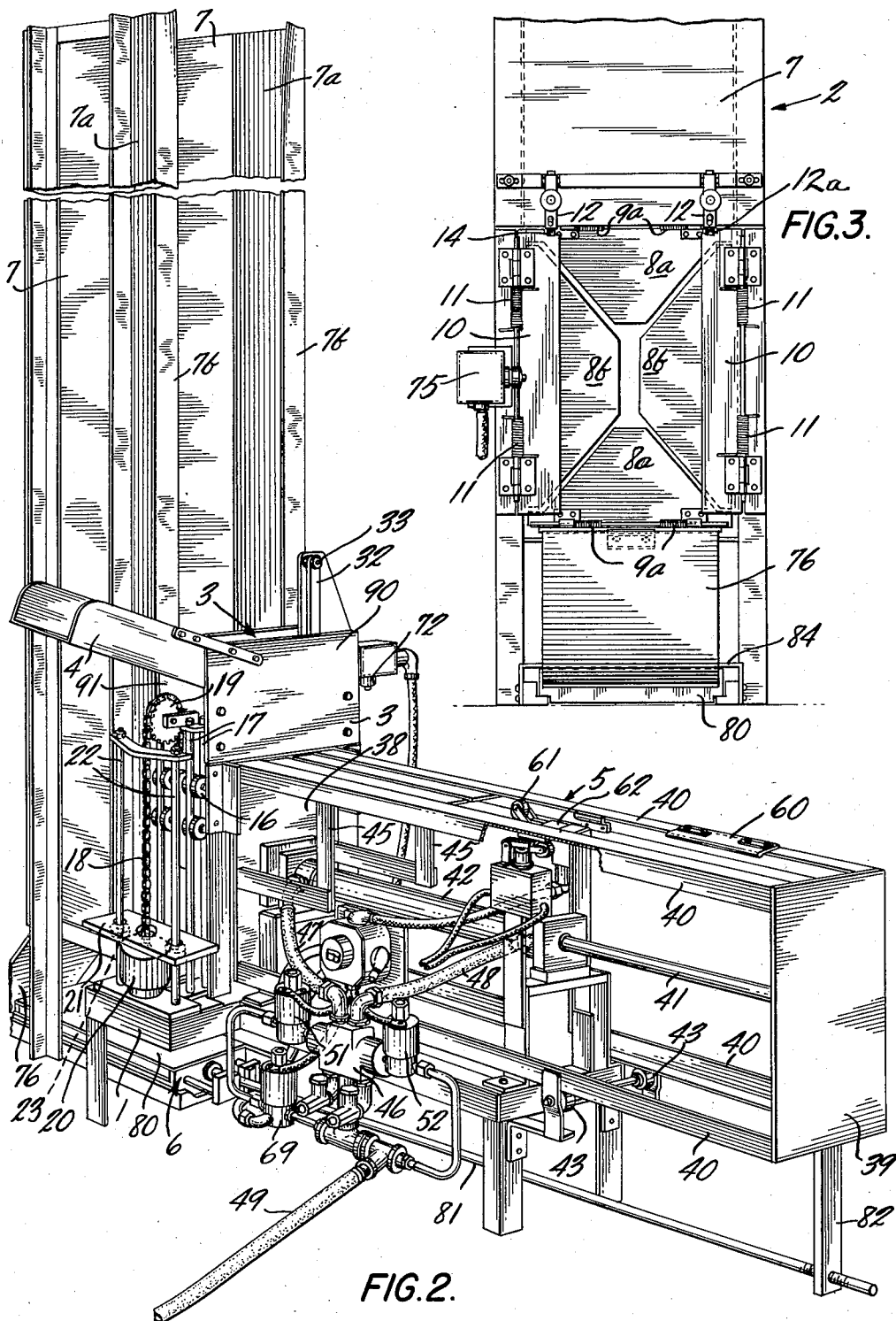
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AUTOMATIC CARTON PACKING MACHINE

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9 Sheets-Sheet 2



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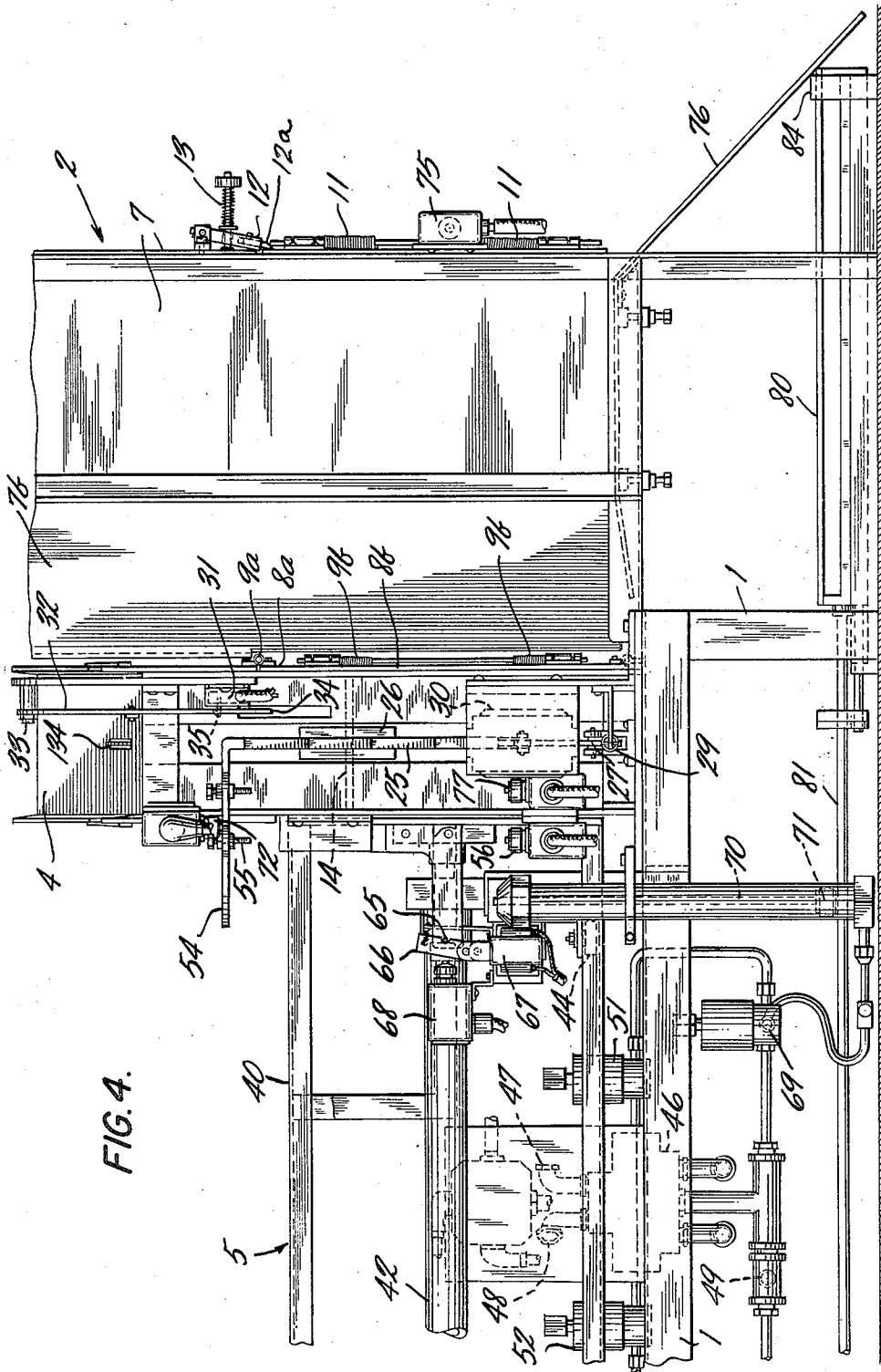
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AUTOMATIC CARTON PACKING MACHINE

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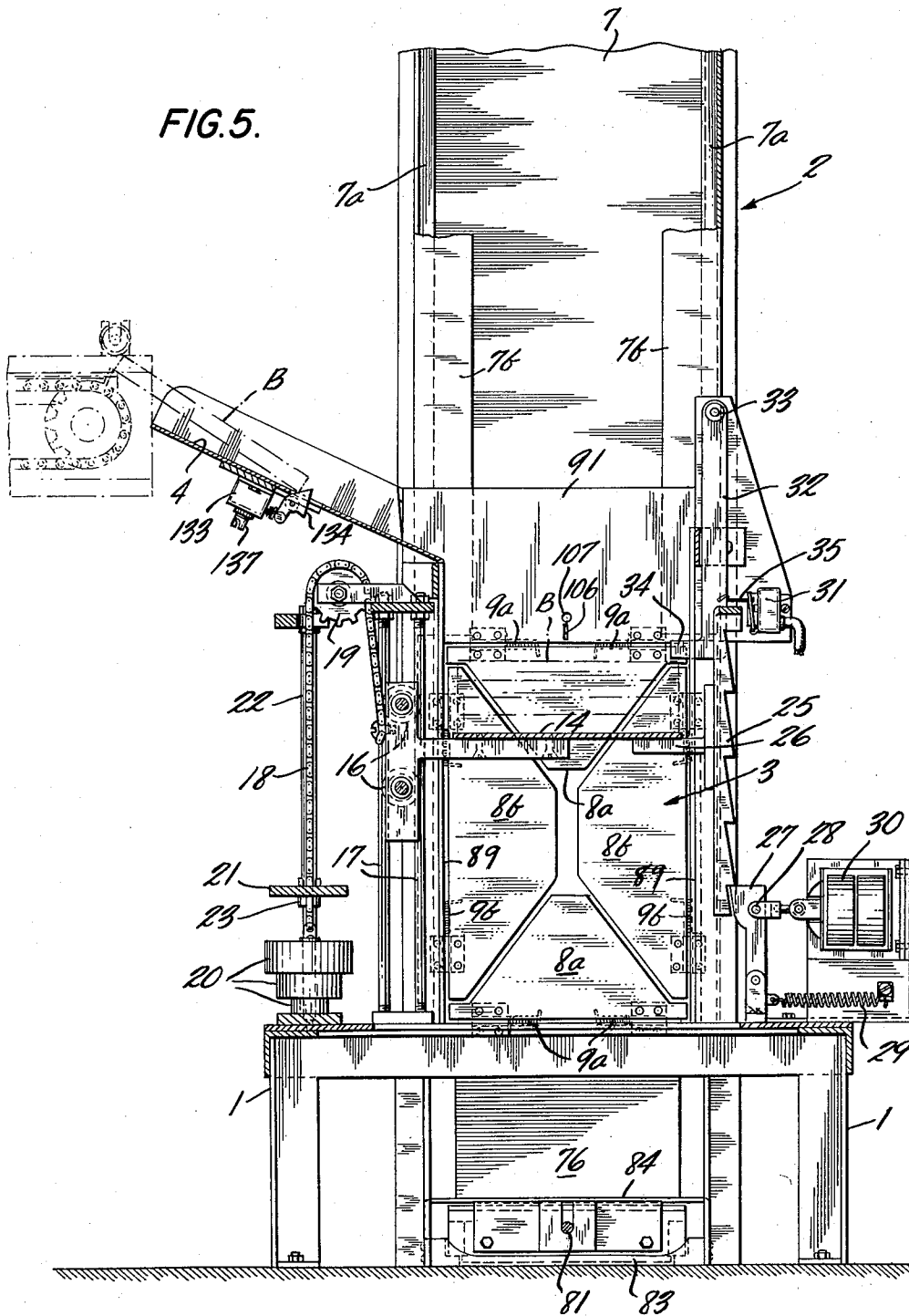
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AUTOMATIC CARTON PACKING MACHINE

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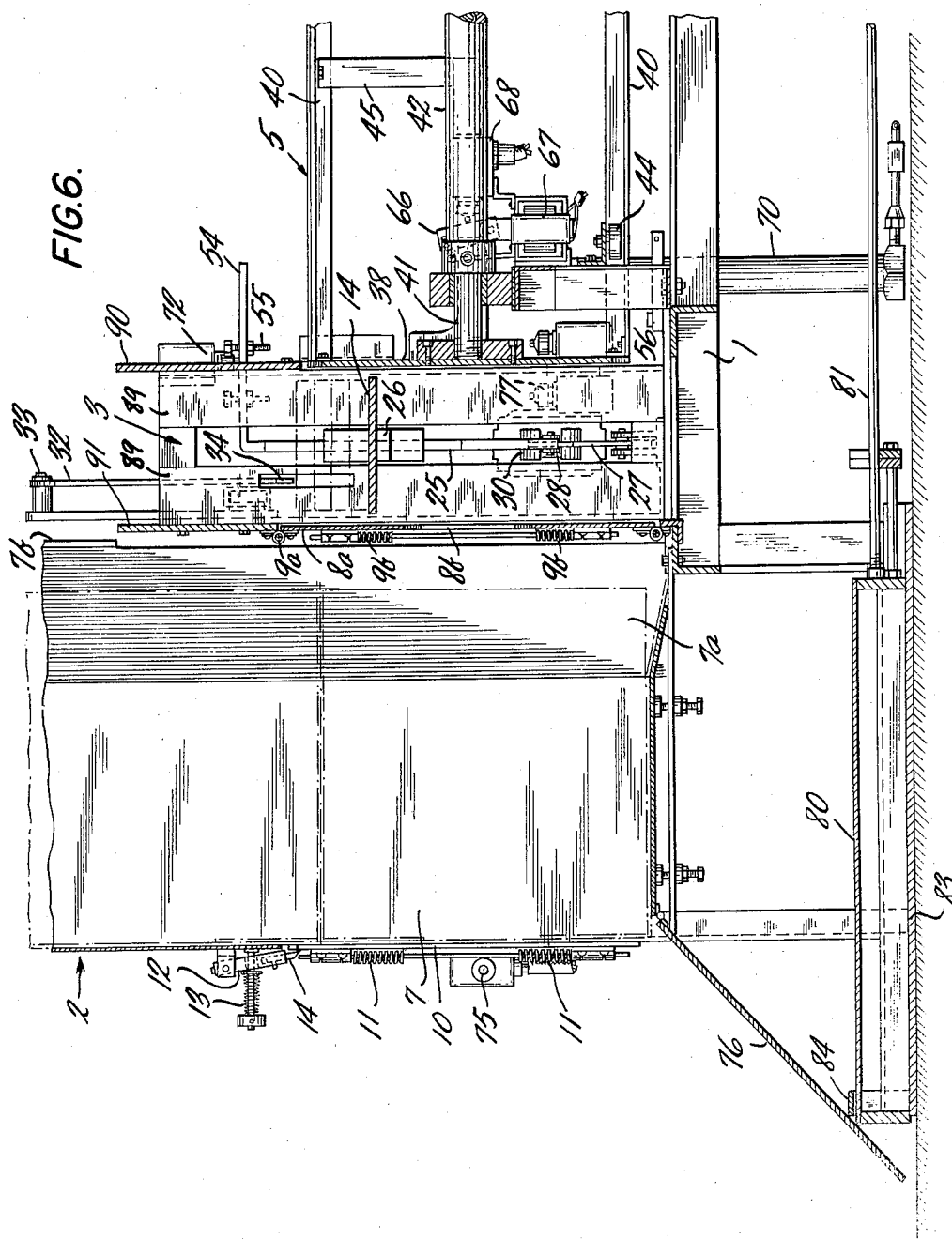
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AUTOMATIC CARTON PACKING MACHINE

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9 Sheets-Sheet 5



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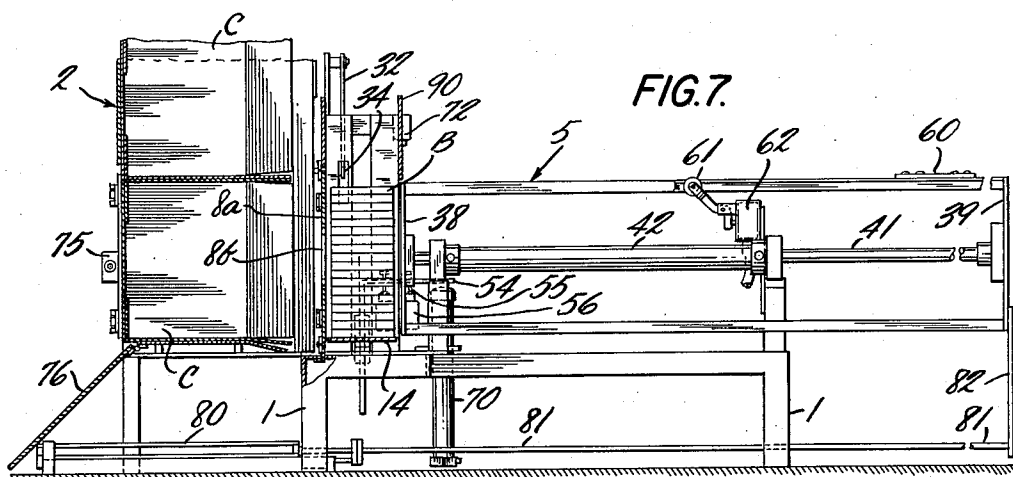
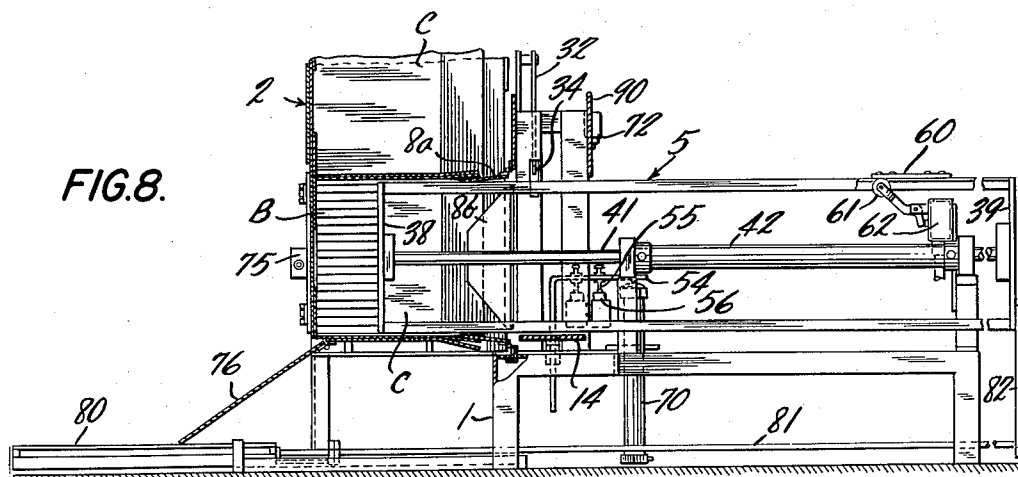
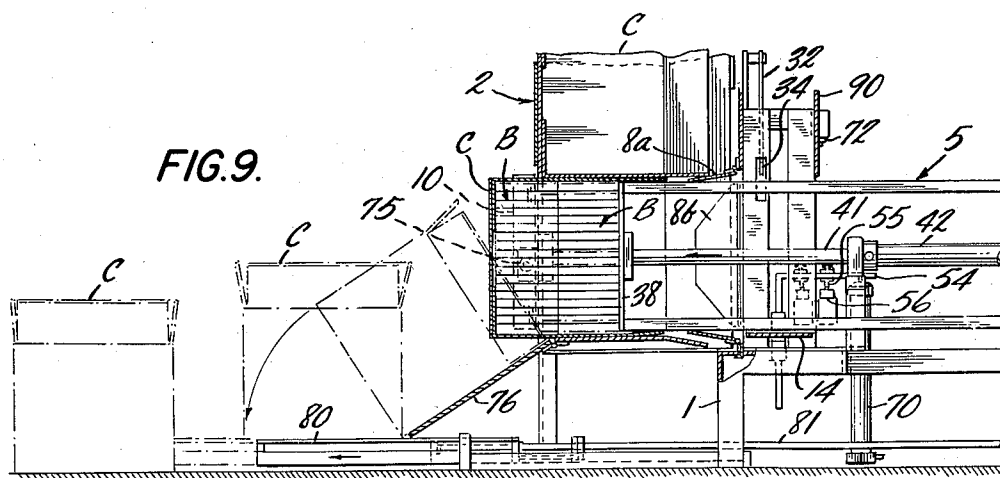
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AUTOMATIC CARTON PACKING MACHINE

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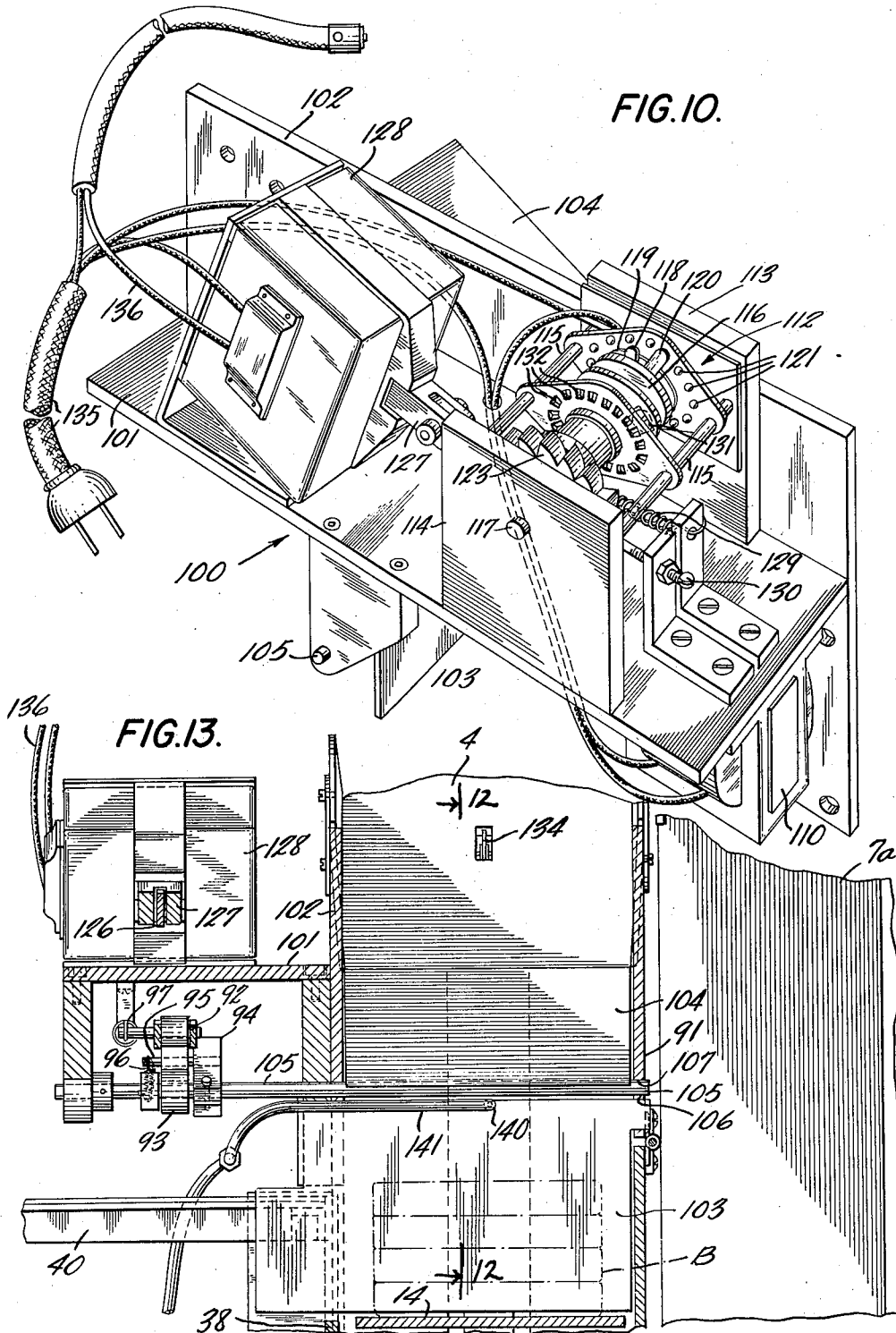
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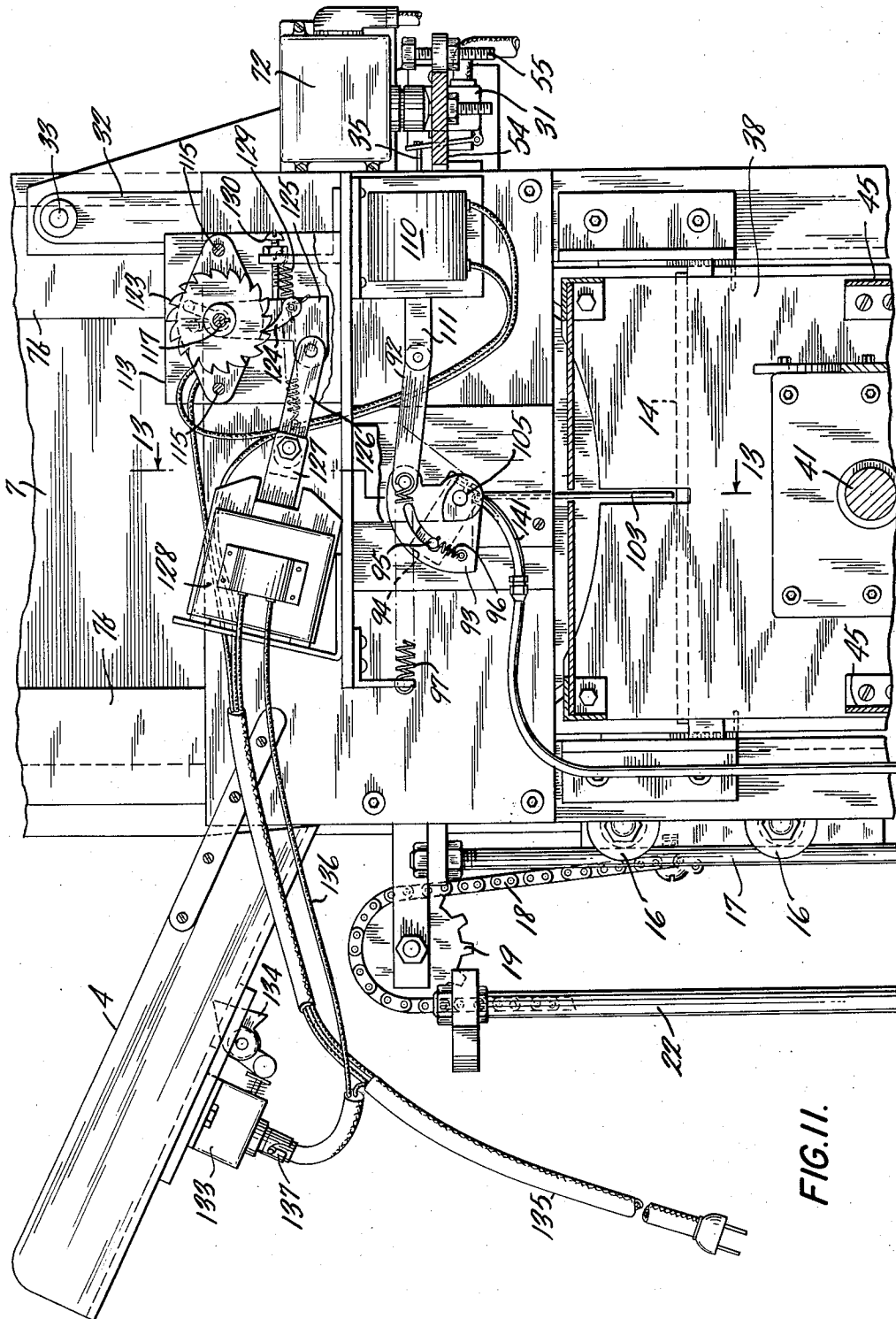


FIG. 11.

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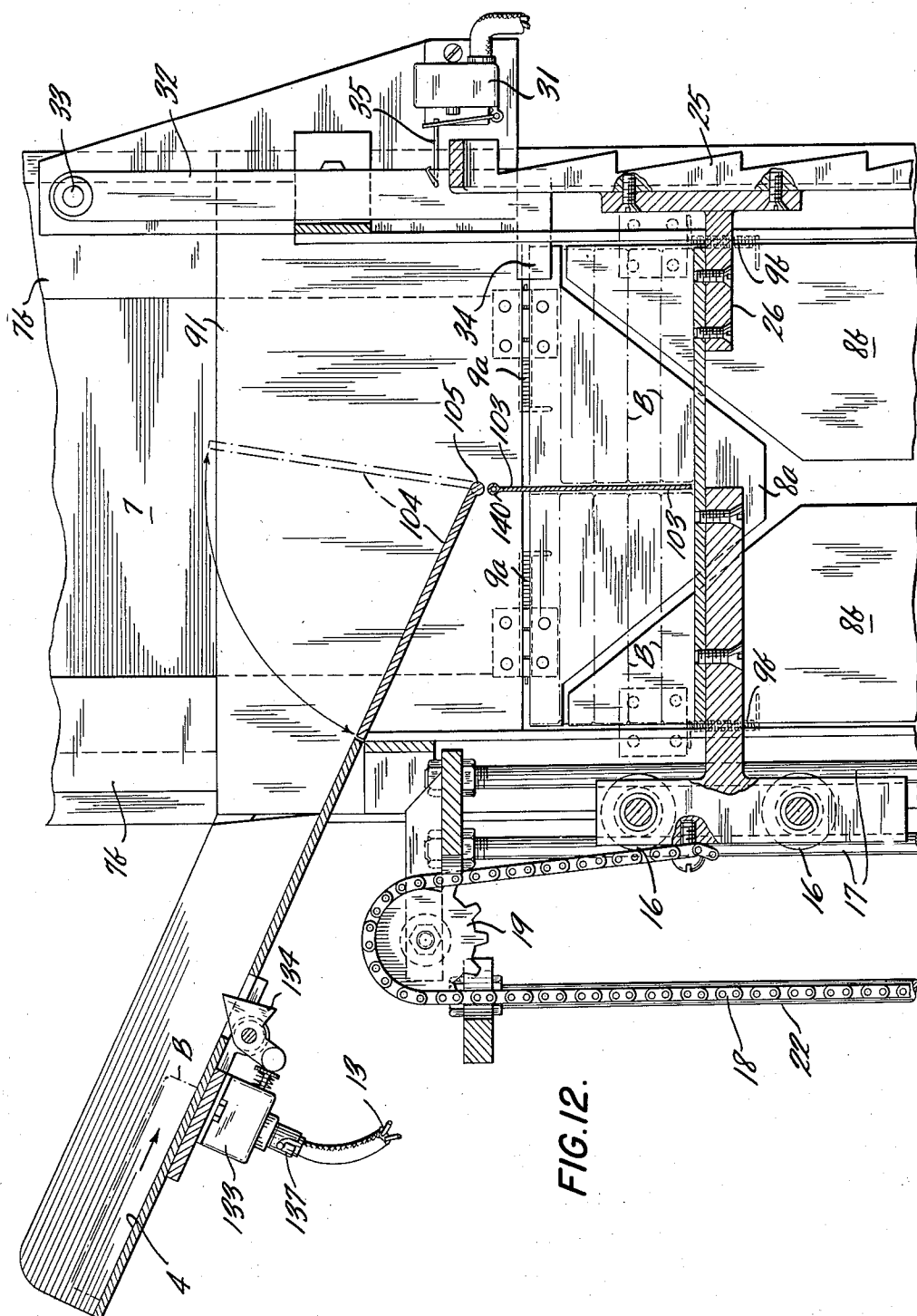
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AUTOMATIC CARTON PACKING MACHINE

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AUTOMATIC CARTON PACKING MACHINE

Melvin B. Koch, Lititz, Pa., assignor to Animal Trap Company of America, Lititz, Pa., a corporation of Pennsylvania

Application July 18, 1956, Serial No. 598,694

12 Claims. (Cl. 53—62)

This invention relates to packing machines and more particularly to an automatic device for packing articles, packages or boxes of selected dimensions and selected quantities into cartons.

Machines have been developed for automatically packing various commodities in individual packages. A number of these packages are then packed into a shipping box or carton for transportation to the point of sale or use. The packing of the individual packages into shipping cartons is to a considerable extent done by hand. While machines have heretofore been developed for packing the shipping cartons they have been too complicated and too expensive to permit wide spread use. Moreover, such machines are ordinarily custom made for a particular size package and a particular size carton and are thus limited in their usefulness.

It is an object of the invention to provide a relatively simple and inexpensive machine for automatically packing articles, packages or boxes into cartons. A further object of the invention is to provide a carton packing machine capable of handling different sizes of packages and cartons.

A feature of the machine in accordance with the invention is that it will automatically pack a plurality of stacks or tiers of packages into a carton and then discharge the filled carton. Still another feature is that the filled cartons are automatically moved to a shipping or storing point in a very simple and positive manner.

Other objects, features and advantages of the invention will be understood from the following description and claims in conjunction with the accompanying drawings which illustrate by way of example preferred embodiments of the invention and in which:

Fig. 1 is a plan view of a complete machine in accordance with the invention.

Fig. 2 is a front perspective view of the machine viewed from the end having the pusher mechanism.

Fig. 3 is a partial left end elevation showing ejection doors for the filled cartons.

Fig. 4 is a partial rear elevation showing the elevator control and operating mechanism.

Fig. 4A is a fragmentary rear elevation showing solenoid actuating mechanism for returning the elevator to its starting position.

Fig. 4B is a fragmentary rear elevation showing the mechanism of Fig. 4A after the elevator has returned to its starting position.

Fig. 5 is a vertical cross-section of the machine taken approximately on the line 5—5 in Fig. 1.

Fig. 6 is a vertical longitudinal section of the machine taken approximately on the line 6—6 in Fig. 1.

Fig. 7 is a section similar to Fig. 6, showing the position of the packages and pusher in readiness to deliver a stack of packages into the carton.

Fig. 8 is a section similar to Fig. 6, showing the pusher mechanism delivering a first stack of packages into the carton.

Fig. 9 is a section similar to Fig. 6, showing the pusher

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delivering a second stack of packages into the carton and subsequently ejecting the filled carton.

Fig. 10 is a front top perspective view of a flip-flop unit adapting the machine in accordance with the invention to insert four stacks of packages into a carton.

Fig. 11 is a partial elevation showing the flip-flop controls and actuating mechanism.

Fig. 12 is an elevation partly in section approximately on the line 12—12 in Fig. 13 showing the gate means of the flip-flop unit.

Fig. 13 is a vertical section taken approximately on the line 13—13 in Fig. 11.

The embodiment of the invention shown in Figs. 1 to 9 has a main frame or base 1 at one end of which there is a vertically rising carton-holding chute 2. An accumulator 3 fed by a conveyor or feed chute 4 accumulates a stack of articles, packages or boxes that are to be packed in the carton. When the accumulator 3 has been filled to a predetermined height, the boxes are then pushed by pushing mechanism 5 into the lowermost carton in chute 2.

In the present embodiment of the invention two successive tiers or stacks of boxes are pushed into the carton. When the second stack is pushed in the carton, the filled carton is pushed out of the back of the chute and slides down an incline 76 (Fig. 9). When it reaches the floor it automatically tips to an upright position and on a subsequent stroke of the machine it is pushed along by a carton pushing device 80. The empty and open cartons are fed by a chute 2 with an open side facing the pushing mechanism 5. The chute 2 is closed at the back by a panel 6 and at the sides by sheet metal panels 7 having forward portions 7a facing the pusher mechanism flared out slightly and having inturned flanges 7b. At the lower front part of the chute 2 on the side toward the pusher there are provided four spring controlled flaps or doors 8a and 8b. The doors 8a swing about horizontal axis while the doors 8b swing about vertical axis and all are biased to closed position by coil springs 9a and 9b respectively. These doors are used to hold the box flaps opened and line up the boxes or packages with the cartons. At the back of the chute there are provided two hinged flaps 10 biased to closed position by springs 11. Each of the flaps 10 is releasably held in a closed position by an individual spring latch 12. The flaps will not open unintentionally but they must be opened by positively overcoming the action of adjustable springs 13 of the latches 12. Each of the latches has a bevel nose retractable portion 12a permitting the flap to open and return to closed position (Fig. 6).

The accumulator 3 (Figs. 1, 2, 5 and 6) comprises side guide members 89, a removable front cover plate 90, rear plate 91, and a movable elevator or platform 14 carried on a carriage 15 having rollers 16 traveling in tracks 17. The platform is counter-balanced by means of a chain 18 running over a sprocket 19 and carrying at its outer end, a weight 20. A counter-balancing adjusting means, is provided by an additional weight in the form of a plate 21 which is guided for vertical movement by two spaced vertical rods 22. The plate 21 is provided with a hole through which the chain 18 passes. Each of the rods 22 is provided with an adjustably fixed collar 23 which limits the downward movement of the plate 21 so that when the weight 20 is all the way down and the platform 14 is all the way up the plate 21 is held above the weight 20 and the effective counter-balancing weight is hence decreased. As the platform 14 is loaded it moves downwardly and the weights 20 are pulled upwardly by chain 18 and pick up the additional weight 21 so that the total counter-balancing weight is increased.

A ratchet bar 25 is rigidly fixed to the platform 14 by an angular bracket 26 (Fig. 5). The ratchet bar 25 co-

operates with a swingable pawl 27 pivoted on the frame at 28 and biased by spring 29 into position to engage the teeth of the ratchet bar 25. The pawl 27 is retractable by a solenoid 30 controlled by a switch 31 actuated by an arm 32 which is pivoted at 33 and has an inwardly projecting finger 34, the arm being connected with the switch by suitable connections illustrated as a push link 35. Boxes B, which are to be packed in a carton, slide down the chute 4 and pile up on top of one another in the accumulator, being supported by the platform 14. When the boxes have piled high enough to hit the finger 34 of arm 32 (shown in Fig. 5 as four boxes) the switch is closed to energize solenoid 30, withdrawing the pawl 27 and allowing the ratchet bar 25 and affixed platform 14 to move downwardly by gravity. As the platform moves downwardly, the top box clears the switch finger 34 to open switch 31 so that the solenoid is de-energized and the spring pressed pawl 27 engages the next tooth of the ratchet bar 25. This operation is repeated so that the platform moves downwardly by steps corresponding to the teeth on the ratchet bar 25.

Referring to Figs. 2, 6 and 8 the pusher 5 comprises a pusher plate 38 and end plate 39 connected by four longitudinally extending channels 40 and a piston rod 41 which extends between plates 38 and 39 and carries a piston which is slidable inside a cylinder 42 mounted on the frame and the piston rod is connected to the pusher. The pusher is supported and guided by the cylinder and by rollers 43 and guide rollers 44. The front end of the pusher is reinforced by braces 45. Movement of the pusher is effected pneumatically under control of a valve 46 connected to opposite ends of the cylinder 42 by hoses 47 and 48 and to an air supply by hose 49. The valve 46 is actuated by two pilot valves 51 and 52 which are electromagnetically operated. Valve 46 is also provided with two adjustable exhaust valves 46a which permit it to exhaust to atmosphere and to control the back pressure on either side of the piston as it reciprocates in order to control the speed of the pusher movements.

As boxes are fed into the accumulator and the platform 14 moves down step-by-step as described, the boxes are confined between the pusher plate 38 and the spring-loaded doors 8a and 8b of the carton chute.

When the platform 14 has moved down so that the pawl 27 engages the last tooth of the ratchet bar 25, the boxes continue to pile up on the platform until the last box again actuates the switch 31 and energizes solenoid 30 to permit the elevator to drop still further. A laterally extending projection or bracket 54 on the platform 14 carries an adjustable screw 55 which engages a switch 56 (Fig. 4) that is electrically connected with the pilot valve 52. When the switch is closed, the valve 46 is actuated to supply air through hose 48 and thereby move the pusher 5 toward the left as viewed in Fig. 2. As the stack of boxes is pushed into the carton by the pusher 5, the doors 8a and 8b are swung approximately 90° about their pivoted axes to a position in which they hold the lid flaps of the carton open and guide the boxes into the carton. The doors 10 at the back of the carton chute retain the carton in the chute. When the pusher has travelled a distance sufficient to push the stack of boxes into the carton, but not far enough to push the carton out the back of the carton chute, a plate 60 carried by one of the channels 40 of the pusher engages a roller 61 which actuates a switch 62 connected to pilot valve 51 and operates the pilot valve to reverse the valve 46 so that air is supplied through hose 47 and the pusher is returned to its original position.

When the pusher returns to its normal position, a pin 65 (Figs. 4, 4A, 4B) on the pusher engages an arm 66 which is pivotally connected to the plunger of a solenoid 67 and engages a switch 68 which controls an electro-magnetically operated two-way valve 69 for supplying air to a lifter cylinder 70. A plunger 71 in the cylinder 70 is thereby moved upwardly and engages the bracket 54 to lift the

now empty platform 14 to its original upper position. When the platform reaches its upper position, the bracket 54 engages a switch 72 energizing the solenoid plunger 67 which is lifted to bring a notch on the lever 66 into alignment with the pin 65. This permits the arm 66 to swing slightly to the right (Fig. 4B) and thereby releases and opens the switch 68. The plunger 71 and cylinder 70 thereupon return by gravity to their original position as valve 69 is now deenergized and exhausts to atmosphere.

When a second stack of boxes is accumulated on the platform 14, the pusher cycle is repeated in the same manner except that because of the presence of the first stack of boxes in the carton, the carton is pushed out through the back doors 10 of the chute 2 as illustrated in Fig. 9. The opening of the left hand rear door 10 (Fig. 3) operates a switch 75 which actuates the pilot valve 52. The air supplied by the valve 52 counter-balances the air supplied by pilot valve 51 when the switch 62 is actuated and thereby keeps main valve 46 in position to move the pusher toward the left even though plate 60 on the pusher engages roller 61 of switch 62. The pusher hence continues its movement and pushes the filled carton out of the back of the carton chute. The carton slides down a short ramp 76 (Fig. 9) which is swingably attached to the machine just below the doors 10. On reaching the bottom of the ramp, the carton automatically turns a quarter of a turn into upright position as indicated in broken lines. As the carton drops clear, the flaps or doors 10 close, thereby opening switch 75. Switch 62 continues to be closed by the plate 60 (which is long enough for this purpose) and the movement of the pusher is now reversed and it is returned to its initial position as described above. Another switch 77 connected in series with the switch 75 (Fig. 4) and normally open is actuated by an adjustable screw 78 on the bracket 54 carried by the platform 14. This switch nullifies any action by switch 75 except when the platform is in its lowermost position and thereby provides a further safety factor.

A carton pusher 80 connected by a push rod 81 to a downwardly projecting arm 82 (Fig. 8) on the pusher 5 slides underneath the swingable ramp 76 as illustrated in Fig. 9 and engages a previously discharged filled carton to push the carton along the floor or other supporting surface. A line of cartons can thus be "conveyed" to a shipping point or elsewhere. The carton pusher 80 slides on a base plate 83 and is guided by a strap 84 (Fig. 6). The hinged mounting of the ramp permits the ramp to swing up so that the pusher 80 can pass under it.

In order to package half size boxes, the front cover plate 90 (Fig. 2) of the accumulator is removed and a "flip-flop" unit 100 shown in Fig. 10 is fitted into place and held by the same four bolts that normally hold the cover plate. The unit comprises a frame 101 (Fig. 10) including a vertical plate 102 that replaces the cover plate 90. On one side of the plate 102 (the inside), there is a fixed vertical dividing plate 103 and a hinged gate 104 that is swingable between a lower position in which it forms a continuation of the bottom of feed chute 4 to an upper position (dotted lines in Fig. 12) in which it is approximately vertical. A projecting tab on the rear edge of the dividing plate 103 and the pivot shaft 105 of the gate 104 fit respectively into a slot 106 and hole 107 provided in the back plate 91 of the accumulator (Fig. 5). On the other side of the vertical plate 102 (the outside), there is provided a mechanism for alternately swinging the gate up and down so that one package will go on the left hand side of the divider 103 and the next package will go on the right hand side (Fig. 12). The operating mechanism comprises a solenoid 110 having a plunger 111 (Fig. 11) connected by a link 92 to a sector 93 which is freely rotatable on an extension of the shaft 105 of the gate 104. An arm 94 fixed on the shaft 105 has a pin 95 that projects through an arcuate slot in the sector 93 and is connected to one end of a tension spring 96, the other end of which is anchored on the sector 93.

The arm 94 normally swings with the sector 113 but the spring connection permits the gate to be raised manually and also prevents jamming in the event that a package should accidentally be caught between the gate 104 and the lower end of the feed chute 4. When the solenoid 110 is energized, the gate is swung to its raised position. A spring 97 returns the gate to its lower position when the solenoid is de-energized.

The solenoid 110 is controlled by a rotary switch 112 (Fig. 10 and 11) comprising parallel stationary plates 113 and 114 supported by rods 115 and a rotor 116 formed of insulating material and mounted on a rotor shaft 117 (Fig. 10). The rotor carries a contact finger 118 engaging a slip ring 119 on the plate 113 which is formed of insulating material and a second contact finger 120 engageable with a circular series of electrical contacts 121 on the plate 113. Alternate ones of the contacts 121 are connected with the solenoid 110 while the slip ring 119 is connected with a source of current and the arms or contact fingers 118 and 120 are electrically connected with one another. Hence, when the contact finger 120 is in engagement with one of the alternate contacts the solenoid 110 is energized to swing the gate 104 to its raised position. The intervening contacts are blank.

The rotor 116 is rotated step-wise by means of a ratchet wheel 123 fixed to the shaft 117 and engaged by a pawl 124 carried by an arm 125 swingable about the shaft 117. The arm 125 is pivotally connected to one end of a link 126, the opposite end of which is pivotally connected to the armature 127 of a solenoid 128. When the solenoid 128 is energized, the arm 125 is swung in a clockwise direction as viewed in Fig. 11 so that the pawl 124 moves the ratchet 123 one step forward. When the solenoid is deenergized, a spring 129 moves the link 126 and arm 125 in the opposite direction a distance adjustable by a stop screw 120. A spring finger 131 on the rotor 116 engages in spaced recesses 132 in the stationary plate 114 to hold the rotor in the position to which it has been advanced and to assure that it stops in a position in which the contact finger 120 engages one of the contacts 121.

The solenoid 128 is energized momentarily each time a box comes down the feed chute 4. The solenoid is controlled by a sensitive switch 133 mounted below the feed chute and actuated by a pivoted trigger 134 which projects up through a slot in the bottom of the chute. One side of the switch 133 is connected to a power supply cord 135 while the opposite side is connected by a lead 136 to the solenoid 128. Connections with the switch 133 are preferably made by a quick disconnect fitting 137 so that the entire "flip-flop" unit can be quickly and easily disconnected and removed while leaving the switch 133 in place. Each time a box or package passes over the trigger 134, the solenoid 128 is energized to advance the rotor 116 of the rotary switch 112. Every second step the finger 120 on the rotor 116 engages a contact 121 which is connected with the solenoid 110. When the solenoid 110 is thus energized, the gate 104 is swung to its upper position. On the intervening steps when the finger 120 is in engagement with blank contacts, the solenoid 110 is not energized and the gate is in its lower position forming a continuation of the feed chute 4 as shown in solid lines in Fig. 12 to direct the package to the far side of the accumulator. When the gate is raised the package drops into the near side of the accumulator. The packages are thus fed alternately, first to one side and then the other, so that two stacks of packages are built up simultaneously.

It has been found that occasionally a box dropping onto the near side of the platform 14 will stand on end and lean against the partition 103 instead of dropping flat on the elevator. To avoid this, there is provided an air jet indicated at 140 (Figs. 12, 13) provided by one or more holes in a tube 141 at the top of the partition 103.

Compressed air is supplied to the tube 141 either continuously or intermittently by suitable connections and controls.

The "flip-flop" unit shown in Figs. 10 to 13 thus permit packing different sized packages in the cartons. Aside from the operation of the "flip-flop" unit, the machine operates in the same manner as described above in conjunction with Figs. 1 to 9. By changing the size of the pusher 5 and adjusting the travel of the platform 14 it is possible to vary the number of packages in the carton and the length of the cartons. Cartons of different cross sectional size can be accommodated by varying the size of the caron feed chute 2 and, if need be, by adjusting the stroke of the pusher 5. Thus great flexibility and adaptability are made possible while using the same basic mechanism.

While a preferred embodiment of the invention has been illustrated and described, it will be understood that the invention is in no way limited to this embodiment and that many changes may be made within the spirit and scope of the invention as defined by the following claims.

What I claim and desire to secure by Letters Patent is:

1. An automatic carton packing machine comprising:

25 carton receiving means to receive a plurality of cartons to be filled, a package accumulator connected to said carton receiving means to cyclically receive and accumulate in selected quantities packages of selected sizes to be packed into said cartons, means to selectively fill and position packages in said package accumulator to form a vertical stack of horizontal packages, means for tipping over any vertical package so as to properly position the package, a reciprocating pusher mechanism connected to said accumulator and adapted to take strokes of selected lengths and cooperating with said package accumulator to deliver said selected quantities of accumulated packages into the cartons so as to fill each of the cartons in sequence, control means and fluid means connected to said package accumulator and said pusher mechanism to control and cyclically actuate said pusher so that it operates only when said selected quantities of packages have been accumulated and being adapted to selectively control the increase of the stroke length of said pusher mechanism whereby the filled cartons are ejected out of said carton receiving means when they are full.

2. A packing machine in accordance with claim 1 in which said means for tipping over a vertical package to position said packages horizontally comprises a selectively positioned air jet.

3. An automatic carton packing machine comprising: carton receiving means to receive a plurality of cartons to be filled, a package accumulator connected to said carton receiving means to cyclically receive and accumulate in selective quantities packages of selected sizes to be packed into said cartons, a reciprocating pusher mechanism connected to said accumulator and including a first pusher carried by a piston having a cylinder housing at one end, said pusher mechanism being adapted to take strokes of selected lengths and cooperating with said package accumulator to deliver said selected quantities of accumulated packages into the cartons so as to fill each of the cartons in sequence, control means and fluid means connected to said package accumulator and said pusher mechanism to control and cyclically actuate said pusher so that it operates only when said selected quantity of packages has accumulated in said accumulating means and being adapted to selectively control the increase of the stroke length of said pusher mechanism whereby the filled cartons are ejected out of said carton receiving means when they are full, said reciprocating pusher mechanism further including a second pusher adapted to move along with said first pusher whereby, when said first pusher ejects a filled carton said second pusher engages a previously ejected carton and moves it along a selected path.

4. In a packing machine having a frame, a package accumulator comprising a vertically movable elevator adapted to receive and hold a selected quantity of packages, means counterbalancing said elevator, said counterbalancing means exerting an upward force on said elevator less than the weight of the elevator and packages accumulated thereon so that said elevator is movable downwardly by gravity, means comprising interengaging pawl and ratchet means releasably holding said elevator against downward movement, means responsive to the accumulation of packages on said elevator to disengage said pawl from said ratchet to permit step-by-step downward movement of said elevator from an upper starting position to a lower discharge position as packages are accumulated on said elevator, downward movement of said elevator being effected by gravity and controlled solely by said counterweight and said pawl and ratchet means, elevator to discharge accumulated packages from said elevator into a carton when said elevator is in discharge position, a first fluid motor for moving said pusher, means for supplying fluid to said motor, means controlling said fluid supplying means including valve means actuated by movement of said elevator to discharge position to supply fluid to said motor to initiate movement of said pusher to discharge said packages, a second fluid motor for raising said elevator from discharge position to starting position, means for supplying fluid to said second motor including a control valve actuated by movement of said pusher after discharge of said packages.

5. A packing machine according to claim 4, in which said second fluid motor comprises a member movable upwardly from a rest position to engage said elevator and raise said elevator from discharge position to starting position and thereafter retractable to said rest position while the elevator remains in raised position.

6. In a packing machine, a package accumulator comprising a movable elevator adapted to receive and hold selected quantities of packages, means to cyclically position said elevator in starting position, a counter-weight system for releasably holding said elevator in starting position, means to progressively permit said elevator to move downwardly by gravity in controlled step-wise movements as said elevator is progressively filled, and means to control said step-wise control means by a selected number of incoming packages until a selected total quantity has been accumulated, said counter-weight system including a plurality of suspended counter-weights connected to said elevator and means to automatically add weights as said elevator is progressively filled, the counterweights being lighter than the elevator and packages accumulated thereon so that the elevator is moved downwardly by gravity.

7. In a packing machine having a frame, a package accumulator comprising a vertically movable elevator adapted to receive and hold a selected quantity of packages, said elevator being movable downwardly by gravity means for cyclically positioning said elevator in an upper starting position, a ratchet-bar fixed to said elevator and having spaced teeth a pawl pivotally mounted on the frame of the machine and swingable into and out of engagement with teeth on said bar, said pawl being biased into engagement with said bar to hold said elevator against downward movement, solenoid means for withdrawing said pawl out of engagement with said bar to release said elevator for downward movement by gravity and means controlling the energizing of said solenoid means comprising a switch, a pivotally mounted arm actuating said switch, a finger on said arm projecting into the space above said elevator at a selected height so that when packages are accumulated on said elevator to a predetermined height a package engages said finger to move said arm outwardly to actuate said switch and thereby withdraw said pawl and permit said elevator to move downwardly by gravity thereby disengaging said package from said finger to deenergize said solenoid means

and release said pawl to engage the next tooth on said bar to hold said elevator against further downward movement until said finger is again engaged by a package.

8. An automatic carton packing machine comprising a vertical chute receiving a plurality of empty cartons opening laterally, a package accumulator adjacent the lower end of said chute on the side toward which said cartons open, a horizontally reciprocating pusher associated with said accumulated packages from said accumulator into the lowermost carton in said chute, spring biased front doors opening from said accumulator into the lower portion of said chute and swingable into said lowermost carton to guide said packages into said carton, at least one spring biased rear door at the side of the chute opposite said front door, latch means releasably holding said rear door closed to retain said lowermost carton in said chute while said packages are being pushed into said carton by said pusher and means for thereafter releasing said latch means to permit said rear door to open and said lowermost carton to be discharged therethrough by further movement of said pusher.

9. A packing machine according to claim 8, in which a short ramp is inclined downwardly at a steep angle from said rear door to a horizontal supporting surface whereby a filled carton discharged from said rear door slides down said ramp and tips to upright position upon striking said supporting surface.

10. An automatic carton packing machine comprising carton receiving means to receive a plurality of cartons to be filled, a package accumulator connected to said carton receiving means to receive and accumulate a selected quantity of packages to be packed in said cartons, a reciprocating pusher mechanism including a movable carriage, a fixed cylinder, a piston reciprocable in said cylinder and means connecting said piston to said carriage, control means for selectively controlling the timing and length of stroke of said piston and carriage, said control means including a main valve having fluid connection means to said cylinder at either end and adapted to selectively provide fluid to either end of the cylinder so as to displace the piston, at least two adjustable exhaust valves to permit selective regulation of the speed of movement of the piston in each direction, and means for actuating said main valve comprising at least two solenoid-operated pilot valves, a first switch operated by said accumulator when full and connected to one of said pilot valves whereby when the accumulator is full the pilot valve actuates the main valve to supply fluid to one end of the cylinder so as to move said piston and carriage forwardly and push the packages into the carton, a second switch connected to the other of said pilot valves, means on said carriage to actuate said second switch whereby fluid is applied to the other end of the cylinder to return the piston, and said means to control the length of the stroke of the piston.

11. An automatic carton packing machine comprising: carton receiving means to receive a plurality of cartons to be filled, a package accumulator connected to said carton receiving means to cyclically receive and accumulate in selected quantities packages of selected sizes to be packed into said cartons, means to selectively fill and position packages in said package accumulator, a reciprocating pusher mechanism connected to said accumulator and including a first pusher carried by a piston having a cylinder housing at one end, said pusher mechanism being adapted to take strokes of selected length and cooperating with said package accumulator to deliver said selected quantities of accumulated packages into the carton so as to fill each of the cartons in sequence, control means and fluid means connected to said package accumulator and said pusher mechanism to control and cyclically actuate said pusher so that its operates only when said selected quantities of packages have been accumulated and being adapted to selectively control the increase of the stroke length of said pusher mechanism whereby the

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filled cartons are ejected out of said carton receiving means when they are full, said means to selectively fill and position packages in said package accumulator comprising a gate control assembly including means to divide said accumulator into at least two compartments, a gate swingably mounted on said dividing means, and means to selectively actuate said gate whereby packages are selectively permitted to enter one compartment or the other.

12. In an automatic carton packing machine a package accumulator to receive and accumulate a selected quantity of packages to be packed in a carton, means for feeding packages sequentially to said accumulator, partition means dividing said accumulator into at least two compartments, a gate swingably mounted to move from a first position in which it directs a package from said feeding means to one of said compartments and a second position in which it directs a package from said feeding means to another of said compartments, electrically operated means for moving said gate from one position to another and control means associated with said feed means and activated by the feed of said packages to energize said moving means to move said gate alternatively from one position to another, said control means comprising a rotary switch and means for moving said switch one step forward each time a package is fed to said accumulator, said switch having alternate contacts connected with said

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moving means to energize said moving means to swing said gate to one said position and intervening contacts connected with said moving means to energize said moving means to swing said gate to said other position to direct alternate packages to one compartment and intervening packages to the other of said compartments.

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