March 31, 1959 R. L. HILL 2,879,638

MACHINE FOR LOADING CONTAINERS IN A CARTON

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Fig. 5.

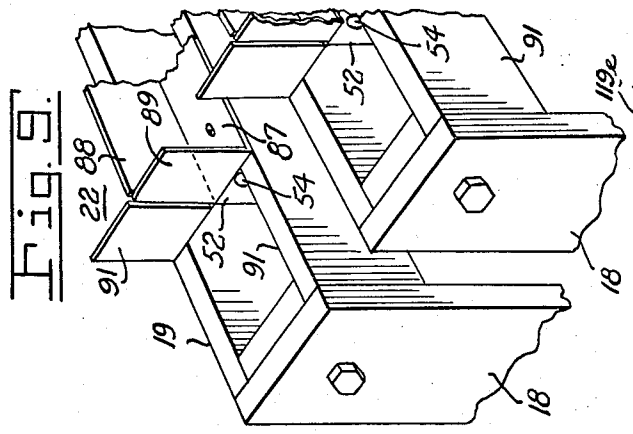


Fig. 10.

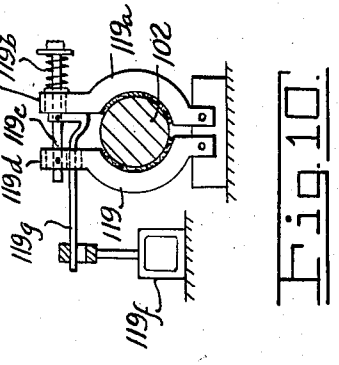
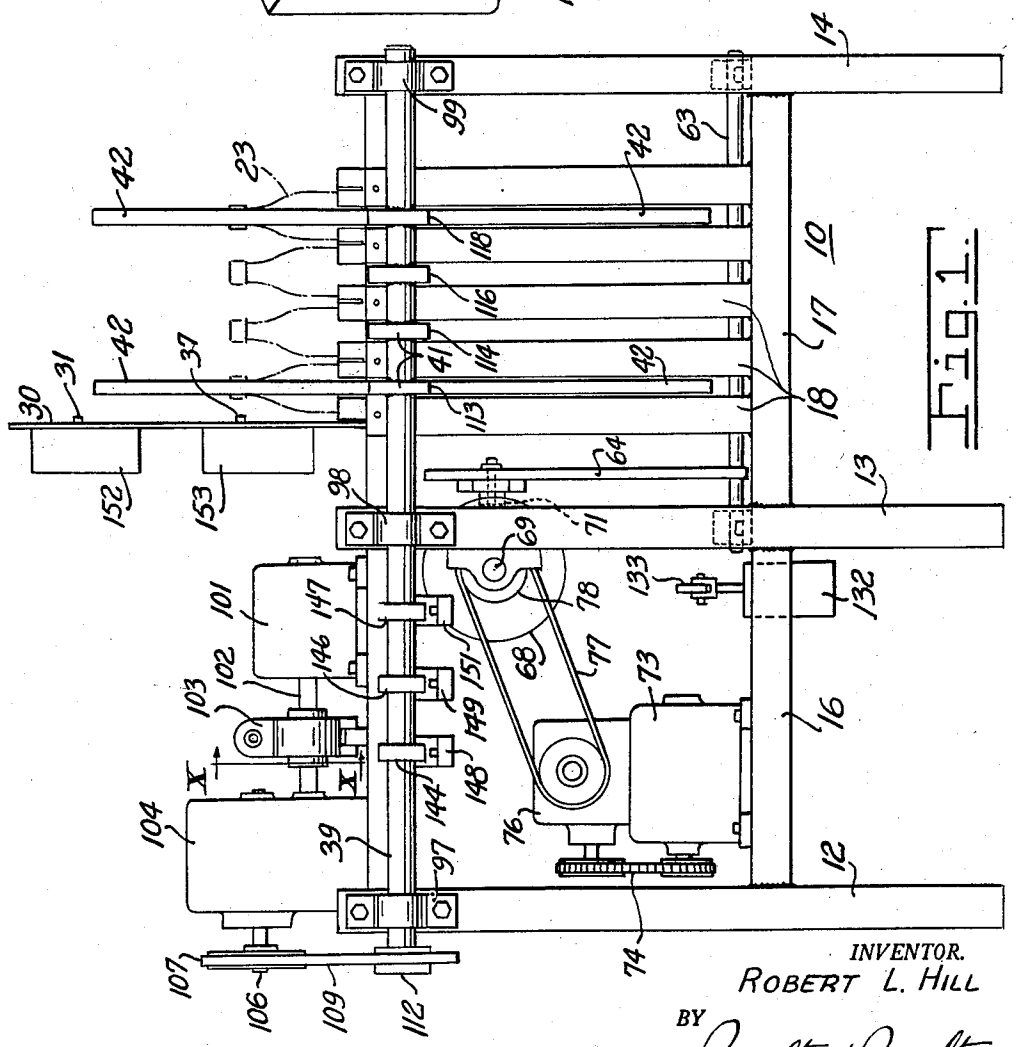


Fig. 1.



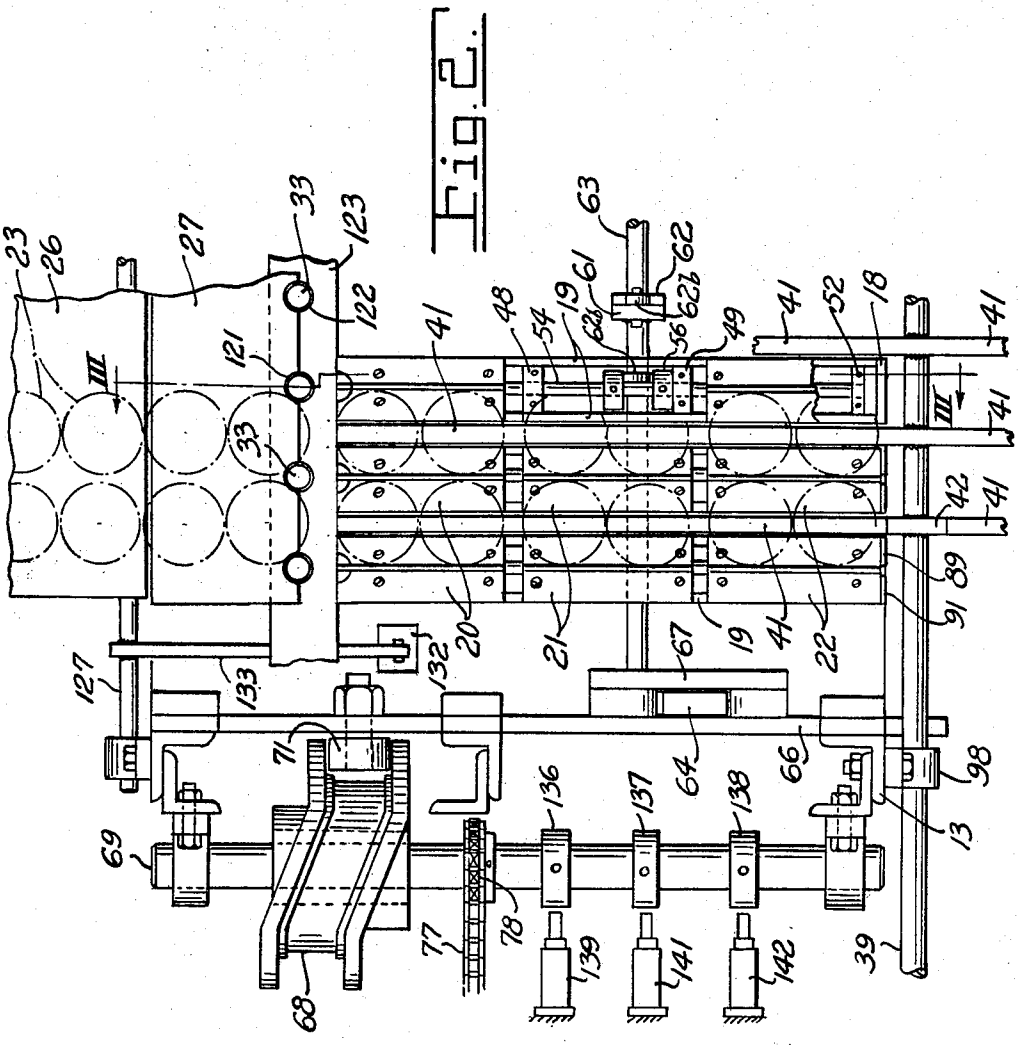
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MACHINE FOR LOADING CONTAINERS IN A CARTON

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Fig. 2.



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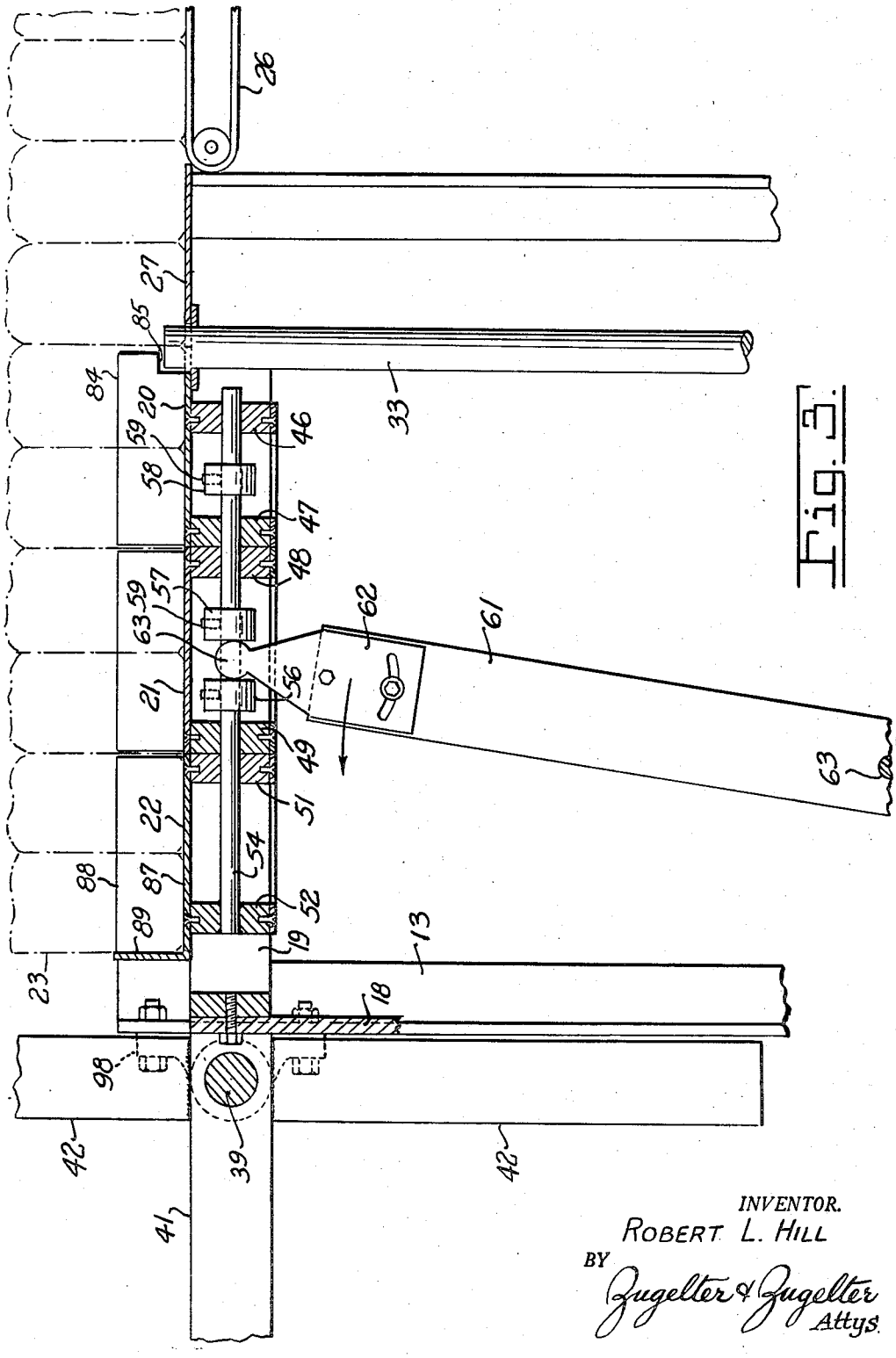


Fig. 3.

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MACHINE FOR LOADING CONTAINERS IN A CARTON

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Fig. 4.

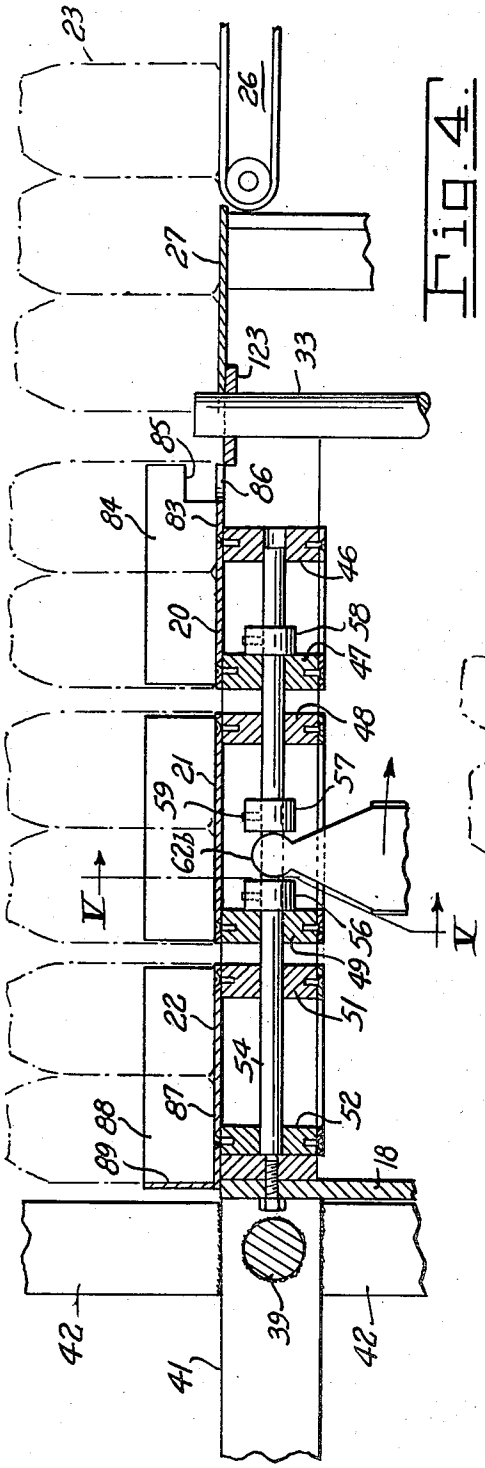
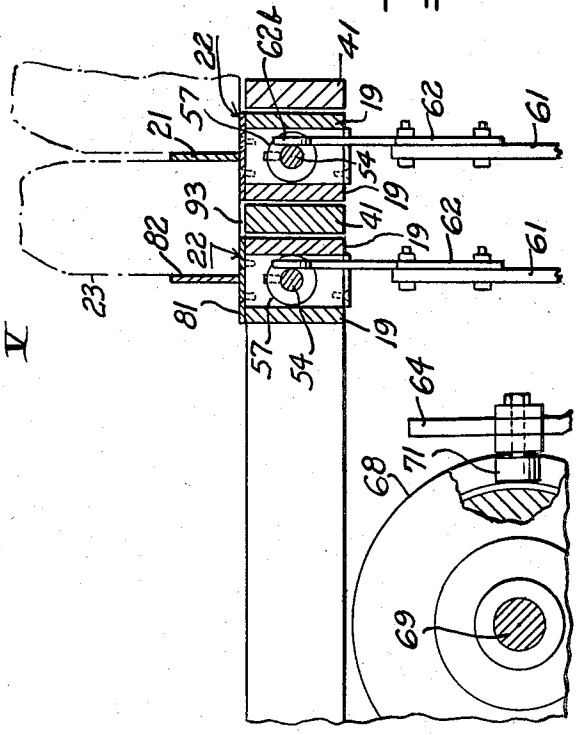


Fig. 5.



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MACHINE FOR LOADING CONTAINERS IN A CARTON

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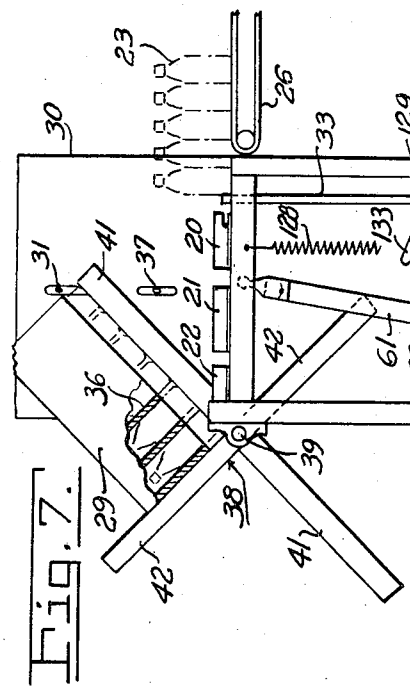


Fig. 7.

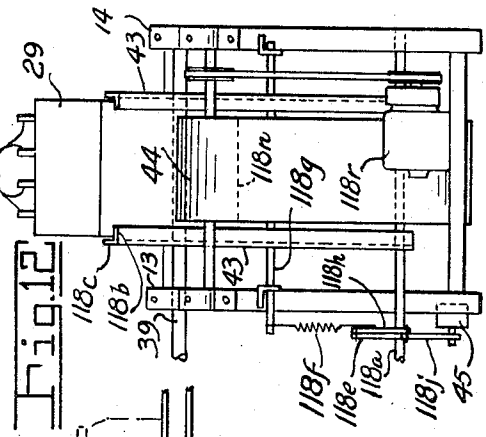


Fig. 12

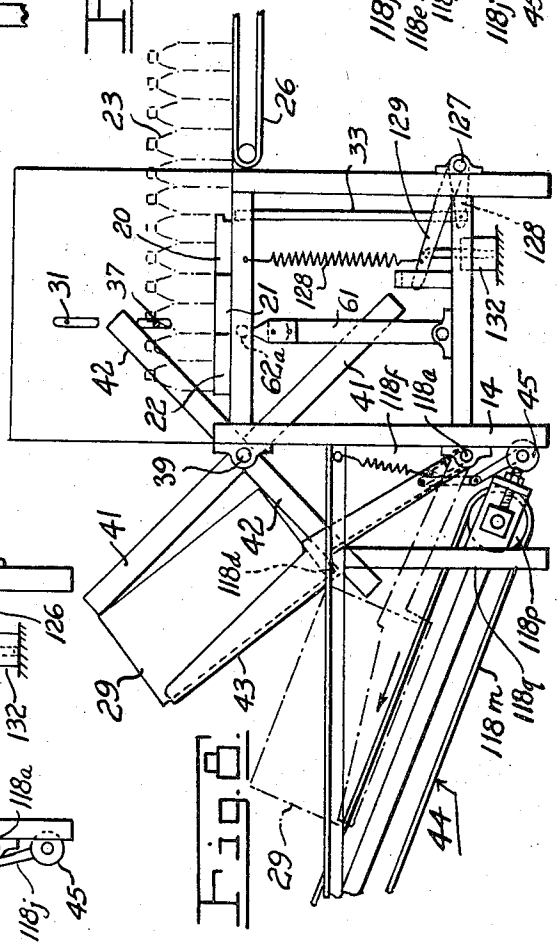


Fig. 8.

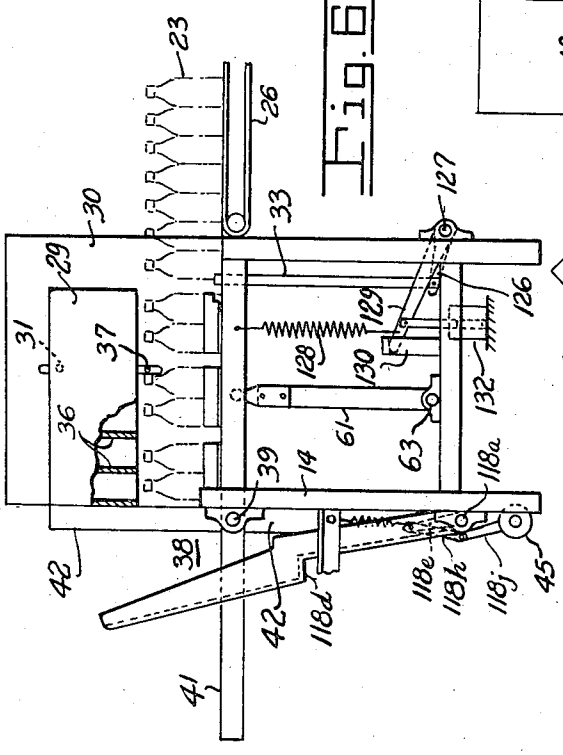


Fig. 6.

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MACHINE FOR LOADING CONTAINERS IN A CARTON

Filed May 14, 1956

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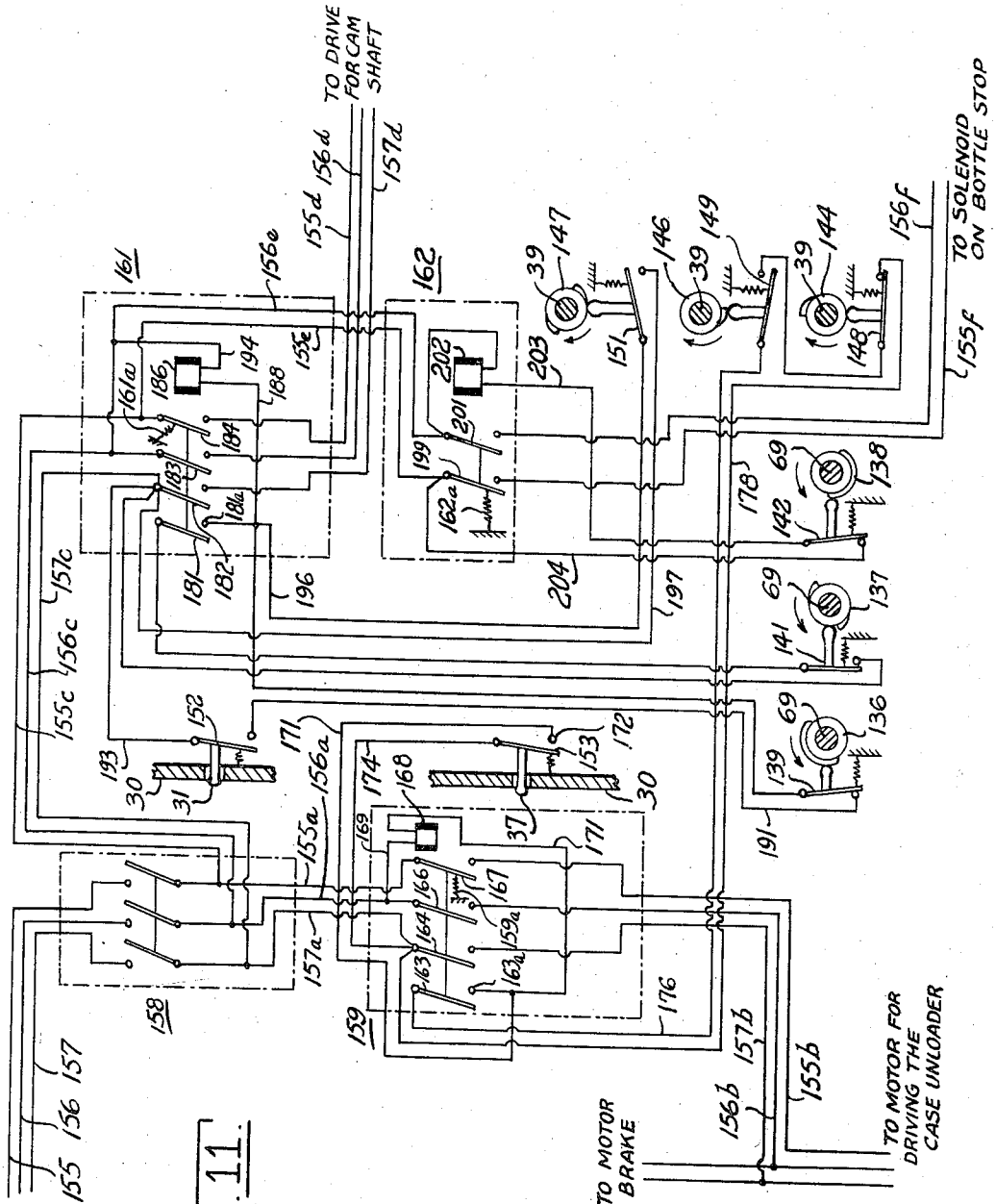


Fig. 11.

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United States Patent Office 2,879,638 Patented Mar. 31, 1959

2,879,638

MACHINE FOR LOADING CONTAINERS IN A CARTON

Robert L. Hill, Austin, Ind., assignor to Morgan Packing Company, Inc., Austin, Ind., a corporation of Indiana

Application May 14, 1956, Serial No. 584,729

10 Claims. (Cl. 53—166)

This invention relates to a machine for loading containers in a carton.

An object of the invention is to provide a machine on which an empty carton is brought down over the tops of containers to load the containers into the carton.

A further object of this invention is to provide a carton-loading machine which positions containers on a container-supporting structure and spaces the containers so that a carton having separators or spacers therein can be brought down over the containers.

A further object of this invention is to provide a machine of this type in which containers on a feed conveyor are held back by stops while the containers on the container-supporting structure are separated and the carton is brought down over the containers.

A further object of this invention is to provide a machine of this type which turns the carton with the containers therein to an upright position after the carton has been brought down over the containers so that the carton is discharged from the machine with the open end up.

A further object of this invention is to provide a machine of this type in which container-engaging members are swung through slots in the container-supporting structure and engage the containers to hold the containers inside the carton while the carton is being turned.

A further object of this invention is to provide a machine of this type in which mechanism is provided for automatically feeding the containers onto the container-supporting structure when a carton is placed in a position above the containers preparatory to lowering the carton onto the containers.

The above and other objects and features of the invention will be apparent to those of ordinary skill in the art to which this invention pertains from the following detailed description and the drawings, in which:

Figure 1 is a view in end elevation of a carton-loading machine constructed in accordance with an embodiment of this invention with a discharge conveyor and carton-lowering mechanism removed to show construction details.

Figure 2 is a fragmentary view partly in plan and partly in section of the machine, parts of the machine being removed or broken away to show details of construction.

Fig. 3 is a view in section of the machine taken on line III—III in Fig. 2, showing the slides of the machine in retracted position.

Fig. 4 is a view in section taken on the same line as Fig. 3, but showing the slides of the machine in extended position.

Fig. 5 is a fragmentary view in section taken on the line V—V in Fig. 4.

Fig. 6 is a schematic view in side elevation showing the machine with carton disposed above bottles and ready to be lowered onto the bottles, the carton being partly broken away and in section to reveal details of construction, the discharge conveyor being removed.

Fig. 7 is a schematic view in side elevation showing the machine after the carton has been placed over the bottles and the carton has been partly discharged from the machine, the discharge conveyor and carton-lowering mechanism being removed.

Fig. 8 is a schematic view in side elevation showing the machine with the carton discharged therefrom, the carton catching arms and carton being shown in full lines in partly lowered position and in dot-dash lines in fully lowered position.

Fig. 9 is a fragmentary, perspective view showing details of construction of the slides.

Fig. 10 is a view in section taken on a line X—X in Fig. 1.

Fig. 11 is a schematic wiring diagram of the machine.

Fig. 12 is a schematic view in end elevation of the machine.

In the following detailed description, and the drawings, like reference characters indicate like parts.

As shown in Figs. 1 and 2, the machine includes a frame **10** which includes upright posts **12**, **13**, and **14** and transverse frame members **16** and **17**. The frame member **17** supports upright frames **18** on which are mounted horizontal, stationary slide-supporting members or bars **19** (see Figs. 2 and 5). On top of the members **19** are mounted rows of slide or cradle members **20**, **21** and **22** which are shown most clearly in Figs. 3 and 4. As shown in Fig. 1, there are five rows of slide or cradle members which receive four rows of bottles **23**. The slide or cradle members move between a retracted position illustrated in Fig. 3 and an extended position shown in Fig. 4. Each of the slide or cradle members is provided with a flange which underlies a portion of the underside of one of the bottles. Each bottle is supported by the flanges of two slides with a space or slot being provided under the center of each bottle as shown in Fig. 5.

The bottles **23** reach the slide members from a feed conveyor **26** and are driven across an entry table portion **27** onto the slides **20**, **21** and **22** as indicated in Fig. 8. When the slides are filled, a carton **29** is placed against an upright guide plate **30** in the position shown in Fig. 6 with the open end thereof down. The carton engages a switch operator **31** (Fig. 8), which initiates operation of the machine. When the switch operator **31** is engaged, stop members **33** are raised to halt the advance of bottles on the conveyor, and the slides are moved to the extended position illustrated in Figs. 4 and 6. When the slides have been moved to the extended position, the carton may be lowered over the bottles to allow carton separators **36** to enter between the bottles. When the carton has been lowered over the bottles, a switch actuator **37** (Fig. 7) is engaged by the carton, and the carton and bottles are discharged by the operation of a discharge or unloader mechanism **38** illustrated in Figs. 6, 7 and 8. The unloader mechanism includes a shaft **39** on which are mounted unloader arms **41** and **42**. As shown in Figs. 6–8 inclusive, the unloader arms **42** engage one side of the carton while the unloader arms **41** underlie the rows of bottles in the carton to hold the bottles in place inside the carton as the carton is turned to unright position and unloaded from the machine. The unloader arms swing 180 degrees with their shaft from the position shown in Fig. 6 through the position shown in Fig. 7 and the position shown in Fig. 8. When the unloader reaches the position shown in Fig. 8, the carton is caught by carton lowering arms **43** which lower the carton onto a discharge conveyor **44** which removes the loaded carton from the machine. A shock absorber **45** restrains the carton lowering arms so that the carton is lowered easily onto

the discharge conveyor. As the carton is being unloaded, the bottle slides return to the retracted position and the bottle stop members are drawn down out of the way of the bottles so that the slides can fill up ready for the next carton.

The machine is shown in use for loading bottles in a carton, but the machine can be used for loading other types of containers, such as tin cans or the like.

The machine which has been described in general terms to this point will now be discussed in greater detail.

The bottle slides

As shown in Fig. 2, there are three sliding members or slides in each row of slides, the slide nearest the feed conveyor **26** being numbered **20**, the intermediate slide being numbered **21** and the slide nearest the unloader mechanism being numbered **22**. The slides are mounted in and reciprocate back and forth on top of the slide supporting bars **19**. Since the slides of each row are similar in construction, only the slides in one row will be described in detail.

The operation of the slides is best shown in Figs. 3 and 4. As shown, slide **20** is attached to blocks **46** and **47**. Slide **21** is attached to blocks **48** and **49**, and slide **22** is attached to blocks **51** and **52**. As shown in Fig. 2, the blocks slide between the slide-supporting bars **19**, and the slides are wider than the blocks and rest on the members **19**. A rod **54** extends through the blocks, as shown in Figs. 3 and 4, and actuates the slides. One end of the rod **54** is welded to block **52**. The rest of the blocks are slidably mounted on the rod **54**. Collars or rings **56**, **57**, and **58** are mounted on the rod **54** and held in place thereon by set screws **59**.

The rod **54** is reciprocated by an elongated crank **61**. The crank carries a head member **62** which is adjustably attached to the upper end thereof. A rounded upper or tip portion **62***a* of the head member is received between collars **56** and **57**. When the crank **61** is swung from the position shown in Fig. 3 to the position shown in Fig. 4, the slides are moved to extended position. Slide **22** moves with the rod **54**. Collar **56** engages block **49** to move the slide **21** a shorter distance than slide **22**. Collar **58** engages block **47** to move slide **20** a still shorter distance, so that the slides are separated and bottles on each slide are separated from the bottles on the other sides and from the bottles on the entry table. When the crank **61** is returned to the position shown in Fig. 3, slide **22** moves to the right with the rod **54** and pushes the other slides to the right to the retracted position shown in Fig. 3.

As shown in Figs. 2 and 5, a crank **61** is provided for each row of slides. The cranks **61** are attached to a shaft **63** which is pivotally mounted on the framework of the machine. The shaft **63** is swung by a main crank **64** which is also attached to the shaft **63**. The main crank **64** is actuated by a reciprocating bar **66**. A yoke **67** (Fig. 2) attached to the bar **66** connects the main crank **64** to the bar **66** so that, when the bar **66** is reciprocated, the main crank **64**, the shaft **63**, and the cranks **61** are swung therewith. The reciprocating bar **66** is rocked back and forth by a cam **68**. The cam **68** is mounted on and turns with a cam shaft **69**. The cam engages a cam follower **71** which is attached to the bar **66** and is actuated by the cam **68** so that, when the cam is turned, the bar **66** is reciprocated.

The cam shaft is driven by a motor **73** (Fig. 1). The motor **73** drives a chain **74**. The chain **74**, in turn, drives reduction gearing (not shown in detail) in a gear box **76**. The reduction gearing in the box **76** drives a second chain **77** which drives a sprocket gear **78** mounted on the cam shaft.

As shown in Fig. 5, each of the intermediate slides **21** is of generally inverted T-shape and includes a horizontal plate portion **81** and an upright portion **82**. As shown in Fig. 4, each of the slides **20** similarly includes a horizontal plate portion **83** and an upright portion **84**. One end of the upright portion is cut away to form a slot **85** which can ride over the upper end of stop **33** when the slides are in retracted position, as shown in Fig. 3. The plate portion **83** is provided with a half circular slot **86** which fits around out of the stops. Each of the slides **22** (Fig. 4) includes a horizontal plate portion **87**, an upright portion **88**, and bottle-arresting flanges **89** and **91** (Figs. 2 and 9). The flanges **89** and **91** may be integral with the plate portion **87** and, as shown in Figs. 1 and 9, are spaced from the upright portion so that, if desired, the flanges can be bent toward or away from the bottles to adjust the position at which the bottles rest on the slides.

When the slides are in retracted position, as shown in Fig. 3, the flat, horizontal plate portions of the slides are aligned with the entry table **27**, and, when the stops **33** are drawn down, as shown in Fig. 8, the bottles can advance onto the slides. As shown in Fig. 1, each bottle is supported on parts of the horizontal plate portions of two adjacent rows of slides, and there is a space or slot **93** (Fig. 5) below the central portion of each bottle.

The carton unloading mechanism

When the bottles are moved onto the slides and the slides have been moved to extended position, the carton **29** (Fig. 6) is brought down over the tops of the bottles. Then the case and bottles are inverted, as indicated in Figs. 6, 7, and 8, by means of the unloading mechanism **38**.

The unloading mechanism **38** includes the shaft **39** which is rotatably mounted on the framework of the machine in bearings **97**, **98**, and **99** (Fig. 1). The shaft is driven by an electric motor **101**. The motor **101** drives a shaft **102** which extends through a brake **103** to a gear box **104**. The gear box **104** contains appropriate reduction gearing (not shown in detail) which drives a shaft **106**. A sprocket wheel **107** on shaft **106** drives a chain **109**. Chain **109** drives a sprocket wheel **112** mounted on the unloader shaft **39**.

The unloading mechanism further includes the unloader arms **41** and **42**, which are mounted on the shaft **39** as already pointed out and as shown in Fig. 7, arms **41** are adapted to underlie the bottles in the carton, and arms **42** are adapted to engage one side of the carton. As shown in Fig. 1, arm units **113**, **114**, **116**, and **118** are mounted on the shaft **39**. There is one arm unit for each row of bottles. The arm units swing with the shaft **39** through the slots between the rows of slides. Arm units **114** and **116** each include two arms **41**, which extend in opposite directions from the shaft. Arm units **113** and **118** each consist of two arms **41** and two arms **42**. The arms of the arm units **113** and **118** are disposed at 90 degree angles to each other. As shown in Fig. 5, the arms **41** are adapted to underlie the bottles on the slides. The arms **42** engage one side of the carton **29** to support the carton as it is turned as shown in Figs. 6–8 inclusive. The arms **41** engage the bottoms of the bottles as the unloader mechanism swings counter-clockwise, as shown in Figs. 6–8 inclusive.

As the case unloading mechanism approaches the position shown in Fig. 8, the carton is transferred from the unloader arms **41** and **42** to the carton lowering arms **43**. As shown in Figs. 6, 8, and 12, the carton lowering arms are mounted on a shaft **118***a* which is pivotally mounted on the frame of the machine near the bottom thereof and extend upwardly on opposite sides of the unloader arms **41** and **42**. As shown in Fig. 12, the upper portion of each of the carton lowering arms **43** is of angle shape and includes a flange **118***b* for underlying the carton and a flange **118***c* for engaging one side of the carton. The upper portion of each of the carton lowering arms **43** terminates in a shoulder **118***d* which extends at right angles to the flanges of the upper portion and can engage another side of the carton, as shown

in Fig. 8. A lever arm **118***e* is also mounted on the shaft **118***a*. A tension spring **118***f* is connected to the lever arm **118***e* and urges the carton lowering arms **43** to the raised position shown in Fig. 6 where the arms **43** engage stops **118***g*.

As shown in Fig. 8, the lever arm **118***e* is linked by a link **118***h* to a crank **118***j*. The crank **118***j* is attached to the shock absorber **45**, which may be an hydraulic shock absorber and restrains the descent of the carton lowering arms and the carton so that the carton is deposited on the conveyor **44** with a minimum shock.

When the case unloading mechanism reaches the position shown in full lines in Fig. 8, the case unloader arms **43** receive the carton and lower the carton to the position shown in dot-dash lines in which the arms **43** are on opposite sides of a conveyor belt **118***m*.

As shown in Fig. 8, the conveyor belt **118***m* carries the case upwardly and to the left away from the machine until the carton is removed from the arms **43**, whereupon, the spring **118***f* restores the arms **43** to the raised position of Fig. 6.

The conveyor belt **118***m* runs on rollers **118***n* and **118***p*, which are mounted on a conveyor framework **118***q*. An appropriate motor **118***r* drives the discharge conveyor. The discharge carriage may be operated continuously to draw discharged cartons upwardly and away from the machine.

As the carton is discharged, the bottle slides are returned to the right as shown in Fig. 8, ready to be loaded again.

The unloader swings 180 degrees to discharge one case. When the unloader has swung 180 degrees, the shaft **102** is engaged by the brake **103** to limit swinging of the unloader. As shown in Fig. 10, the brake includes brake shoes **119** and **119***a* which can grip the shaft **102**. A compression spring **119***b* urges the brake shoes into gripping position. As shown, the spring **119***b* is mounted on a rod **119***c* which is attached to a flange **119***d*, on the brake shoe **119**. The rod **119***c* extends through an opening in a flange **119***e* attached to the brake shoe **119***a*. The brake is released by action of a solenoid **119***f*. The solenoid **119***f* operates a crank or lever **119***g* which is pivotally attached to the rod **119***c*. When the solenoid is actuated, the lever **119***g* is swung counter-clockwise to separate the brake shoes and release the brake.

The bottle stops

During separation of the slides and during a portion of the unloading cycle of the machine, the bottles on the feed conveyor **26** and the entry table **27** are held back by the stop members **33**. As shown in Fig. 2, the upper ends of the stop members **33** extend through slots **121** in the entry table and openings **122** in a plate **123** attached to the underside of the entry table.

The stop members are elongated substantially vertical rods. Lower ends of the stop members are pivotally connected to actuating cranks **126** (Fig. 6). The cranks **126** are attached to a shaft **127**, which is pivotally mounted on the framework of the machine. A tension spring **128** attached to the framework of the machine and to a crank **129** urges the stop members to raised position. When the stops are raised to the proper height, the crank **129** may engage a hold-down member **130** which limits the height to which the bottle stop members can be raised by the spring **128**. The bottle stop members are drawn down by a solenoid **132**. The solenoid is connected to a crank **133** (Fig. 1) which is attached to the shaft **127**. When the solenoid **132** is energized, the stops are drawn downwardly to permit bottles to advance onto the slides.

Electrical connections

As shown in Fig. 2, the cam shaft **69** carries switch operating cams **136**, **137**, and **138**. These cams operate switches **138**, **141**, and **142**, respectively. As shown in Fig. 1, the unloader shaft **39** carries switch operating cams **144**, **146** and **147**. These cams operate switches **148**, **149**, and **151**, respectively. These switches and carton operated switches **152** and **153** control operation of the motors which drive the machine. Electrical connections are shown in detail in Fig. 11. In the drawing, the cam surfaces of the cams are exaggerated for clarity of disclosure. The cams may be held in place by appropriate set screws, or the like (not shown).

Power is supplied through power lines **155**, **156**, and **157**. Power supply may be a three-phase power supply, and the motors may be three-phase motors. Power from the power lines passes through a main switch **158** to magnetic switches **159**, **161**, and **162**. The switch **159** controls the case unloader and the brake **103**. The switch **161** controls the motor on the cam shaft. The switch **162** controls the solenoid **132** which actuates the bottlestop.

The switch **159** includes four movable switch elements **163**, **164**, **166**, and **167**, which open and close together. A spring **159***a* urges the switch elements to open position. Closing of elements **164**, **166** and **167** connects power leads **155***a*, **156***a*, and **157***a* to leads **155***b*, **156***b*, and **157***b*, respectively, which supply power to the case unloader motor and to the motor brake. The contacts of the switch **159** are closed by operation of an electro magnet **168**. One side of the magnet coil is connected to power lead **156***a* by a lead **169**. The other side of the magnet coil is connected to a lead **171**. Lead **171** is connected to a switch contact **163***a*. In addition, lead **171** is connected to one contact **172** of a normally open micro switch **153**. The other contact of switch **153** is connected by means of a lead **174** to the power lead **157***a*. The micro switch **153** is actuated by the switch actuator **37**, and when switch actuator **37** is engaged by a carton (see Fig. 7) the switch **153** is closed and magnet **168** is energized to close contacts of magnetic switch **159** and start the case unloader motor and release the motor brake.

During operation of the case unloader motor, the contacts of the magnetic switch **159** remain closed and are held closed by magnet **168**. Once the contacts of the switch **159** have closed, power is supplied to magnet **168** by a circuit from power lead **156***a* through lead **169**, magnet coil **168**, lead **171**, contacts **163***a* and **163**, a lead **176**, the contacts of normally closed switch **149**, the contacts of normally closed switch **148**, and a lead **178** to power line **157***a*. When the shaft **39** of the case unloader has turned 180 degrees, either cam **146** opens switch **149**, or cam **144** opens switch **148** to open the circuit to magnet **168** permitting the contacts of switch **159** to open, whereupon the case unloader motor is stopped and the motor brake is released to engage the drive shaft **102** (Fig. 1) and stop the turning of the case unloader. Cams **144** and **146** are separately mounted on shaft **39** and can be individually adjusted to assure stopping of the case unloader at the proper positions.

The switch **161** controls the motor **73** which drives the cam shaft **69**. Switch **161** includes four movable switch elements **181**, **182**, **183**, and **184**, which open and close together. A spring **161***a* urges the switch elements to open position. Closing of switch elements **182**, **183** and **184** connects power leads **155***c*, **156***c*, and **157***c* to leads **155***d*, **156***d*, and **157***d*, respectively, which supply power to the motor that drives the cam shaft. The switch **161** is actuated by an electromagnet **186**. One side of the coil of the magnet **186** is connected to power lead **156***c*. The other side of the coil of magnet **186** is connected to a lead **188**. The lead **188** is connected to one contact of the normally open switch **139**. The other contact of switch **139** is connected by lead **191** to one contact of normally open micro switch **152**. The other contact of switch **152** is connected to power lead **157***c* through a lead **193**. The micro switch **152** is actuated by switch actuator **31**. When a carton is brought against

switch actuator **31** to close switch **152**, while switch **139** is closed, the magnet **186** is energized to close the contacts of magnetic switch **161** and start the cam motor to draw the slides to extended position.

During operation of the motor which drives the cam shaft, the contacts of magnetic switch **161** remain closed and are held closed by magnet **186**. Once the contacts of the switch **161** have closed, power is supplied to the magnet **186** by a circuit from power lead **156***c* through a lead **194**, magnet coil **186**, lead **188**, the contacts of **181***a* and **181**, and the contacts of normally closed switch **141** to the power lead **157***c*. When the cam shaft has turned 180 degrees to open the slides fully, one of the raised surfaces of the cam **137** opens the switch **141** to de-energize the magnet **186** and allow the contacts of the switch **161** to open and stop the cam motor.

By the time the slides reach fully open position, the carton may have been brought down over the bottles or may have reached the position shown in Fig. 7 in which switch actuator **31** is no longer engaged. However, the switch **152**, which is actuated by actuator **31**, is connected in series with the contacts of switch **139**, as already pointed out, and the cam **136**, associated with switch **139**, permits the switch **139** to open just before the cam **137** opens switch **141** so that, even if switch **152** is held closed, the cam operating motor is stopped when the slides are fully open by operation of cam **137** and switch **141**.

When the case unloader has swung approximately 45 degrees from its initial position to that shown in Fig. 7, the slides start moving back toward the right or retracted position. When the case unloader reaches the position shown in Fig. 7, switch **151** is closed by cam **147**. When the switch **151** is closed, the magnet **186** is energized by a circuit from power lead **156***c* through the lead **194**, the magnet coil **186**, lead **188**, a lead **196**, the contacts of switch **151**, and a lead **197**, to power lead **157***c*. The motor which drives the cam shaft operates until the slides are returned to retracted position, whereupon one of the raised portons of cam **137** opens switch **141** to stop the cam driving motor.

The switch **162** controls the solenoid which operates the bottle stop. The switch **162** includes two movable switch elements **199** and **201** which open and close together. A spring **162***a* urges the switch elements to open position. Closing of the switch elements **199** and **201** connects power leads **155***e* and **156***e* to leads **155***f* and **156***f*, respectively, which supply power to the solenoid which operates the bottle stops. The switch **162** is actuated by an electromagnet **202**. One side of the coil of magnet **202** is connected to the power lead **156***e*. The other side of the coil of the magnet **202** is connected to a lead **203**. Lead **203** is connected to one contact of a normally open switch **142**. The other contact of the switch **142** is connected through a lead **204** to the power lead **155***e*. The cam **138** is arranged to permit the switch **142** to open when the cam motor is started to move the slides from retracted to extend position, and permit the bottle stops to remain raised to hold back bottles on the feed conveyor until the carton has been partly unloaded. Then, as the bottle slides return toward retracted position, the switch **142** is closed again so that the bottle stops are drawn down out of the way of the bottles and the bottle slides can fill up again.

Operation

The overall operation of the machine is as follows: When a carton **29** is placed above bottles on the slides in the position shown in Fig. 6, the switch operator **31** is engaged to close the contacts of switch **152** (Fig. 11) and to energize the magnet **186** of the magnetic switch **161** to start operation of the drive for the cam shaft **69**. Turning of the cam shaft **69** (Fig. 11) causes opening of the contacts of switch **142**, which de-energizes the magnet **202** of switch **162** to de-energize the solenoid of the bottle stop so that the stop members **33** rise from the Fig. 8 position to the Fig. 6 position. The cam shaft is turned sufficiently to move the slides **20**, **21** and **22** from the position shown in Fig. 8 in which the bottles are close together to that shown in Fig. 6 in which the bottles on the slides are spaced. Then the carton **29** is lowered over the bottles and engages the switch actuator **37**. The switch actuator **37** closes the contacts of switch **153** (Fig. 11) to energize the magnet **168** and close the contacts of the switch **159** to start the case unloader motor and release the motor brake. The unloader arms **41** and **42** swing from the position shown in Fig. 6 through the position shown in Figs. 7 and 8, to invert the carton and the bottles therein. The carton lowering arms **43** catch the carton and lower it onto the discharge conveyor **44** which removes the loaded carton. When the case unloading shaft **39** has swung approximately 45° from its initial position to that shown in Fig. 7, switch **151** (Fig. 11) is closed by cam **147** to energize the magnet **186** again and start operation of the cam shaft to return the slides from the Fig. 7 position to the Fig. 8 position. When the slides have returned to their Fig. 8 position, the switch **142** (Fig. 11) is closed to energize the magnet **202** of the magnetic switch **162** and energize the solenoid of the bottle stop so that the bottle stop members **33** (Fig. 8) are lowered to permit bottles to move onto the slides ready for the next operation.

Conclusion

The machine of this invention has been illustrated in use for loading bottles of the type used for tomato catchup, or the like, in a carton. However, the machine may readily be modified to handle bottles of other sizes or shapes or other types of containers, such as tin cans, or the like.

The machine separates the containers from each other and from containers on the feed conveyor, so that there is ample room between the containers for receiving the separators of the carton. Then the loaded carton is inverted and discharged from the machine in upright position.

The machine illustrated in the drawings and described above is subject to structural modification without departing from the spirit and scope of the appended claims.

Having described my invention, what I claim as new, and desire to secure by Letters Patent is:

1. A machine for loading containers in a carton having partitions for insertion between containers which comprises a feed conveyor, a plurality of horizontally reciprocating cradles aligned with the feed conveyor and arranged to receive containers from the feed conveyor, switch means above the cradles and engageable by a carton disposed above the containers on the cradles, stop means for arresting advance of containers on the feed conveyor, means controlled by said switch means for disposing the stop means in container-stopping position when the carton engages said switch means, means controlled by said switch means for moving the cradles away from the stop means to space the containers sufficiently to permit the partitions of the carton to pass between the containers when the carton is lowered over the containers on the cradles, a second switch means engageable by the carton when the carton is lowered over the containers, means for engaging the undersides of the containers, and means controlled by the second switch means for advancing the container engaging means in a direction to engage the containers and invert the carton while the containers are held thereon.

2. A machine for loading containers in a carton having partitions for insertion between containers which comprises a feed conveyor, a plurality of reciprocating cradles aligned with the feed conveyor, an entry table between the feed conveyor and the cradles, the containers passing from the feed conveyor over the entry table onto the cradles, switch means above the cradles and engage-

able by a carton disposed above containers on the cradles, stops mounted in the entry table for reciprocating between a lowered released position in which the stops are flush with the entry table and a raised operative position in which the stops are raised above the entry table and arrest the advance of the containers on the feed conveyor, means controlled by the switch means for disposing the stops in operative position, when the carton engages said switch means, means controlled by said switch means for advancing the cradles in a direction away from the feed conveyor to space the containers sufficiently to permit the partitions of the carton to pass between the containers when the carton is brought down over the containers, and means for engaging the undersides of the containers when the carton has been brought down over the containers to hold the containers in the carton and for inverting the carton while the containers are held therein.

3. A machine for loading containers in a carton having partitions for insertion between containers which comprises a feed conveyor, a plurality of reciprocating cradles aligned with the feed conveyor and arranged to receive containers from the feed conveyor, the cradles being arranged in a pair of rows, there being a space between the rows, each of said cradles having a substantially horizontal flange for underlying a portion of a container disposed between the rows, switch means above the cradles and engageable by a carton disposed above the containers on the cradles, means controlled by said switch means for arresting advance of the containers on the feed conveyor when the carton engages said switch means, means controlled by said switch means for advancing the cradles in a direction away from the feed conveyor to space the containers sufficiently to permit the partitions of the carton to pass between the containers when the carton is brought down over the containers, and means for engaging the undersides of the containers when the carton has been brought down over the containers to hold the containers in the carton and for inverting the carton while the containers are held therein.

4. A machine for loading containers in a carton having partitions for insertion between containers which comprises a feed conveyor, a plurality of horizontally reciprocating cradles aligned with the feed conveyor and arranged to receive containers from the feed conveyor, switch means above the cradles and engageable by a carton disposed above the containers on the cradles, stop means for arresting advance of containers on the feed conveyor, means controlled by said switch means for disposing the stop means in container-stopping position when the carton engages said switch means, means controlled by said switch means for moving the cradles away from the stop means to space the containers sufficiently to permit the partitions of the carton to pass between the containers when the carton is lowered over the containers on the cradles, and means for engaging the undersides of the containers when the carton has been brought down over the containers to hold the containers in the carton and for inverting the carton while the containers are held therein.

5. In a machine for loading containers in a carton, a device for unloading the carton from the machine which comprises a rotatably mounted shaft, an arm member mounted on said shaft to turn therewith, said arm member being adapted to engage the undersides of containers in the carton with the carton thereover to raise and turn the containers and the carton, means mounted on the shaft for engaging one side of the carton as the carton is raised and turned to hold the carton with the containers on the arm, a pair of pivotally mounted carton-catching arms mounted on opposite sides of the container-engaging arm and arranged to engage the carton when the carton has been turned 90 degrees, and a discharge conveyor adjacent and below said carton-catching arms, the carton-catching arms lowering the carton onto the discharge conveyor.

6. In a machine for loading containers in a carton, a device for unloading the carton from the machine which comprises a rotatably mounted shaft, arm members mounted on said shaft to turn therewith, one of the arm members being adapted to engage the undersides of containers in the carton to raise and turn the containers and carton, another of the arms being adapted to engage one side of the carton as the carton is raised and turned to hold the carton with the containers on the first mentioned arm, a pair of carton-catching arms pivotally mounted on opposite sides of the arm members and arranged to engage the carton when the carton has been turned 90 degrees and starts to descend, a conveyor adjacent and between said carton-catching arms, and shock absorber means for restraining the descent of the carton-catching arms and the carton, the carton-catching arms lowering the carton onto the conveyor.

7. In a machine for loading containers in a carton, a device for unloading the carton from the machine which comprises a rotatably mounted shaft, arm members mounted on said shaft to turn therewith, one of the arm members being adapted to engage the undersides of containers in the carton with the carton thereover to raise and turn the carton to upright position, another arm member being adapted to engage one side of the carton as the carton is raised and turned to hold the carton with the containers on the first mentioned arm, a pair of pivotally mounted carton-catching arms mounted on opposite sides of the arm members and arranged to receive and engage the carton when the carton has been turned 90 degrees, resilient means for urging the carton-catching arms to a position adjacent the shaft, a conveyor adjacent and between the carton-catching arms and below the shaft, the carton-catching arms lowering the carton onto the conveyor, the conveyor withdrawing the carton from the carton-catching arms, the resilient means restoring the carton-catching arms to the position adjacent the shaft when the carton has been withdrawn therefrom by the conveyor.

8. A machine for loading containers in a carton having partitions for insertion between containers which comprises a feed conveyor, a framework, a plurality of reciprocating cradles mounted on the framework and aligned with the feed conveyor and arranged to receive containers from the feed conveyor, the cradles being arranged in two spaced rows, each of said cradles having a flange adapted to underlie a portion of the underside of a container between the rows of cradles, means for arresting advance of the containers on the feed conveyor, means for advancing the cradles in a direction away from the feed conveyor to space the containers sufficiently to permit the partitions to pass between the containers when the carton is brought down over the containers, a shaft rotatably mounted on the framework remote from the feed conveyor, an arm member mounted on said shaft and arranged to swing upwardly through the space between the rows of cradles to engage the containers on the cradle to raise and turn the carton and the containers therein, means mounted on the shaft for engaging one side of the carton as the carton is raised and turned to hold the carton with the containers on the arm member, a pair of carton-catching arms pivotally mounted on the framework on opposite sides of the arm member and arranged to receive and engage the carton when the carton has been turned 90 degrees, and a discharge conveyor adjacent and between the carton-catching arms and below the shaft, the carton-catching arms lowering the carton onto the discharge conveyor.

9. A machine for loading containers in a carton having partitions for insertion between containers which comprises a feed conveyor, a plurality of reciprocating cradles aligned with the feed conveyor and arranged to receive conveyors from the feed conveyor, switch means above

the cradles and engageable by a carton disposed above containers on the cradles, stop means for arresting advance of containers on the feed conveyor, means controlled by said switch means for disposing the stop means in container-stopping position when the carton engages said switch means, means controlled by said switch means for moving the cradles away from the stop means to space the containers sufficiently to permit the partitions of the carton to pass between the containers when the carton is lowered over the containers on the cradles, a second switch means engageable by the carton when the carton is lowered, a shaft rotatably mounted adjacent the cradles, means controlled by said second switch means for turning the shaft substantially 180 degrees when the carton is lowered, an arm member mounted on said shaft to turn therewith, said arm member being adapted to engage the undersides of containers in the carton to raise the containers from the cradles and turn the carton and the containers, means on the shaft for engaging one side of the carton to hold the carton with the containers on said arm member, a pair of carton-catching arms pivotally mounted below the shaft on opposite sides of the arm member, said carton-catching arms being arranged to engage the carton when the carton has been turned 90 degrees, a discharge conveyor adjacent and between said carton-catching arms and below the shaft, and means restraining descent of the carton-catching arms, the carton-catching arms lowering the carton onto the discharge conveyor.

10. A machine for loading containers in a carton having partitions for insertion between containers which comprises a feed conveyor, container separating means for receiving containers from the feed conveyor, switch means adjacent the container separating means and engageable by a carton disposed opposite the containers on the container separating means, stop means for arresting advance of containers on the feed conveyor, means controlled by said switch means for disposing the stop means in container stopping position when the carton engages said switch means, means controlled by said switch means for causing the container separating means to space the containers sufficiently to permit the partitions of the carton to pass between the containers when the carton is advanced over the containers on the container separating means, a second switch means engageable by a carton when the carton is advanced over the containers, means for engaging the undersides of the containers, and means controlled by the second switch means for advancing the container engaging means in a direction to engage the containers and invert the carton while the containers are held thereon.

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