Jan. 19, 1971 E. F. ROWEKAMP 3,555,770

CASE PACKER

Filed Jan. 28, 1969 5 Sheets-Sheet 1

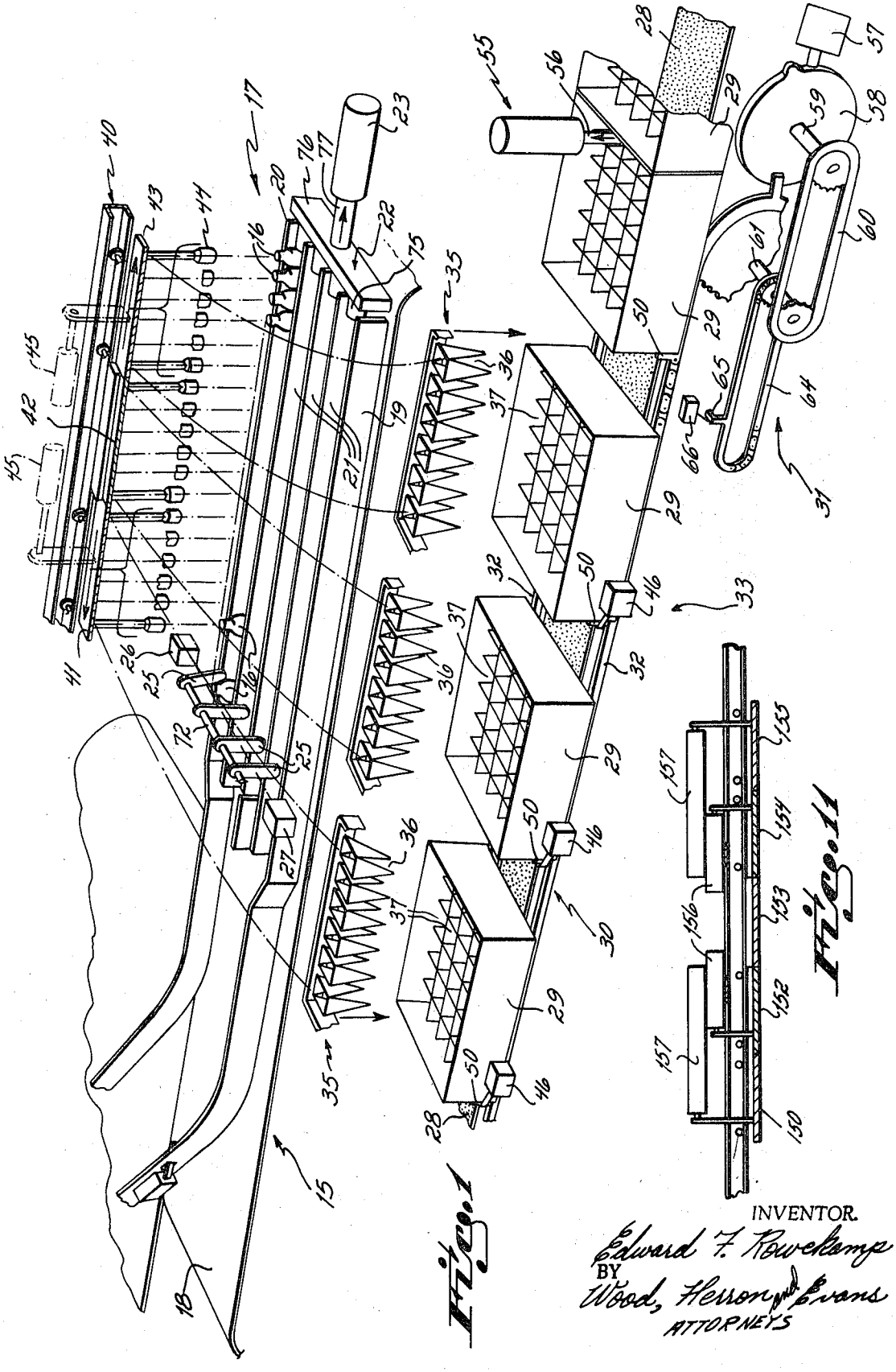

Fig. 1

Fig. 11

INVENTOR.
Edward F. Rowekamp
BY
Wood, Herron & Evans
ATTORNEYS

Jan. 19, 1971 E. F. ROWEKAMP 3,555,770

CASE PACKER

Filed Jan. 28, 1969 5 Sheets-Sheet 2

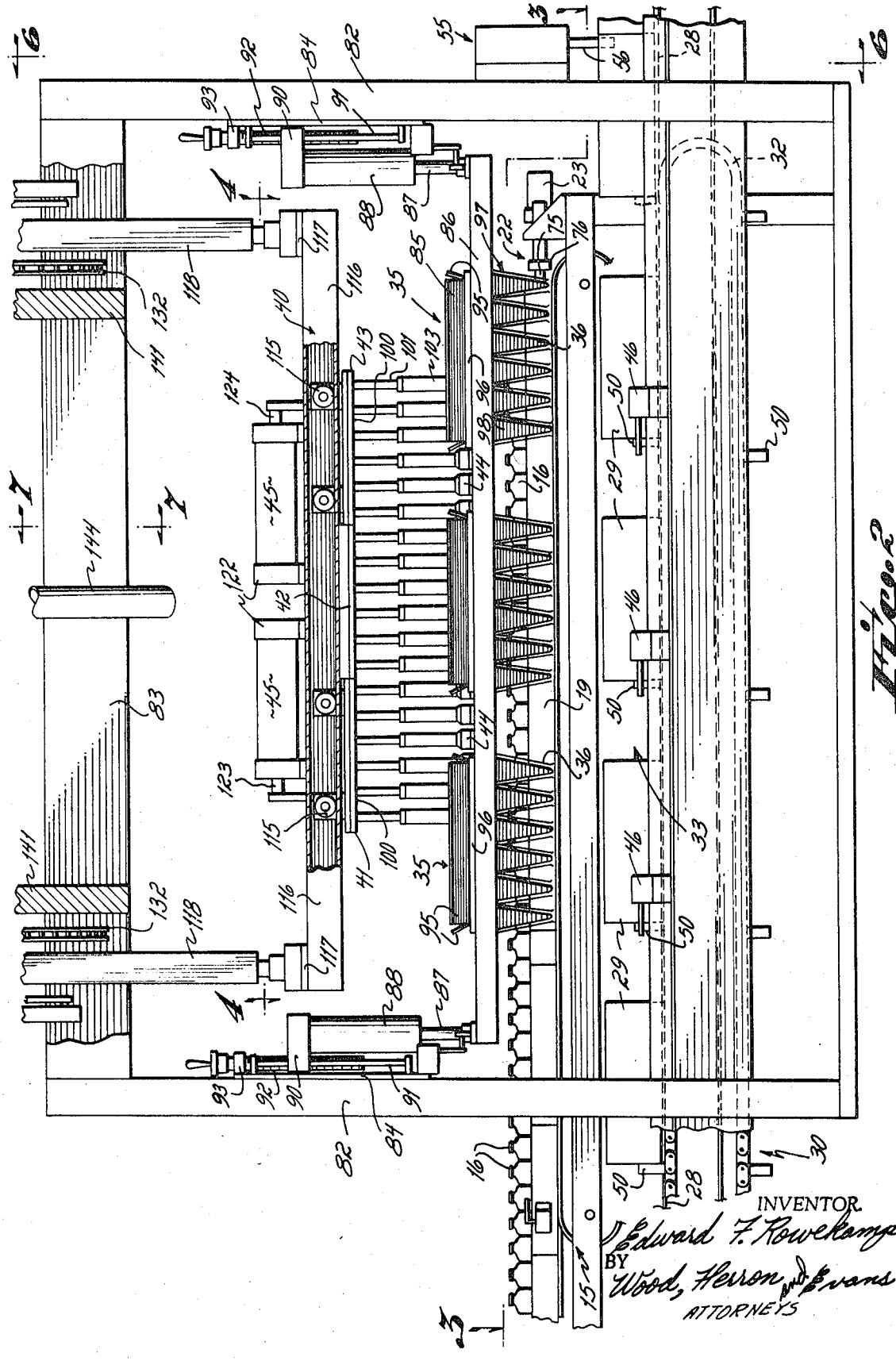

Fig. 2

INVENTOR.
Edward F. Rowekamp
BY
Wood, Herron & Evans
ATTORNEYS

Jan. 19, 1971 E. F. ROWEKAMP 3,555,770

CASE PACKER

Filed Jan. 28, 1969 5 Sheets-Sheet 3

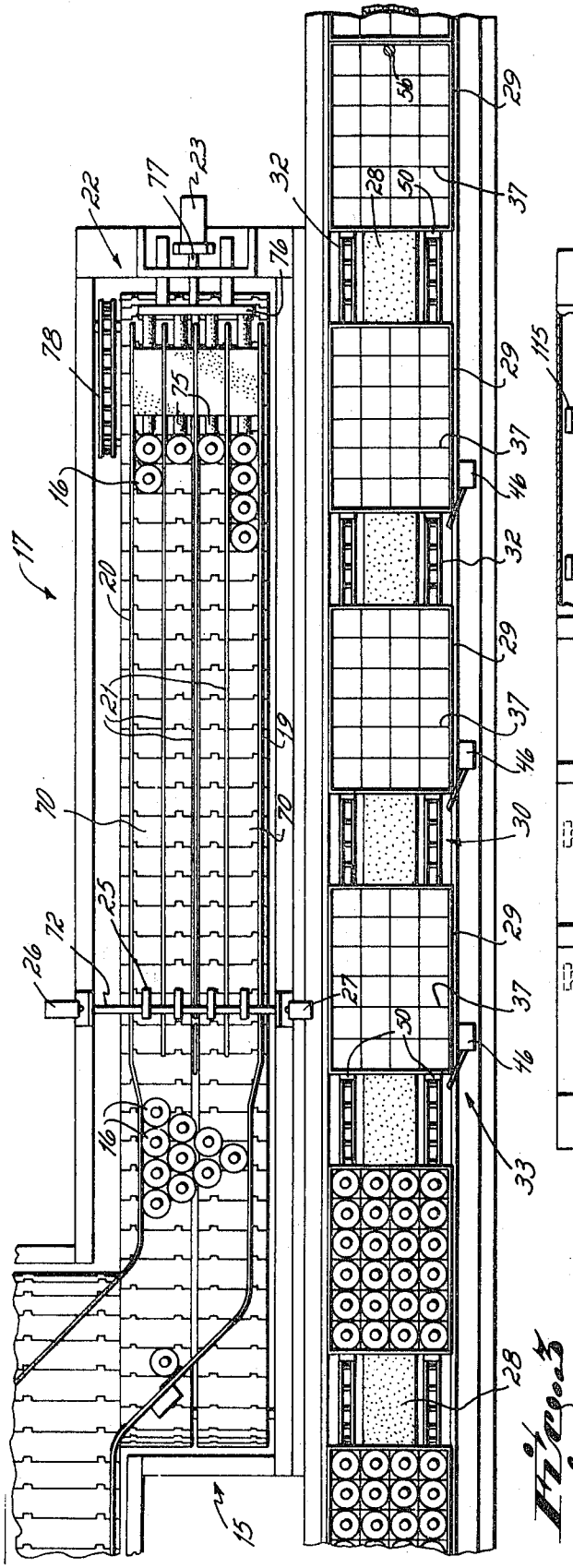

Fig. 3

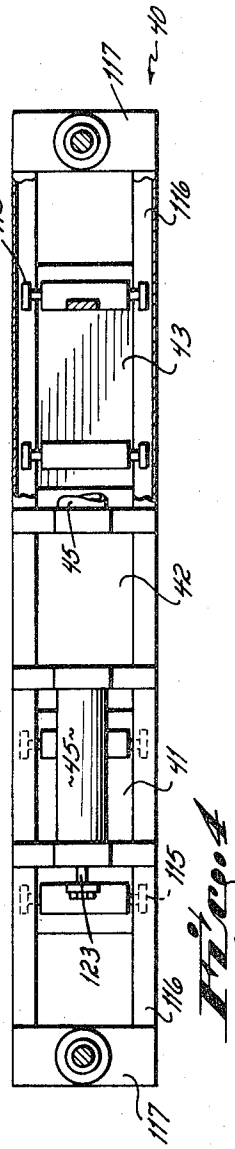

Fig. 4

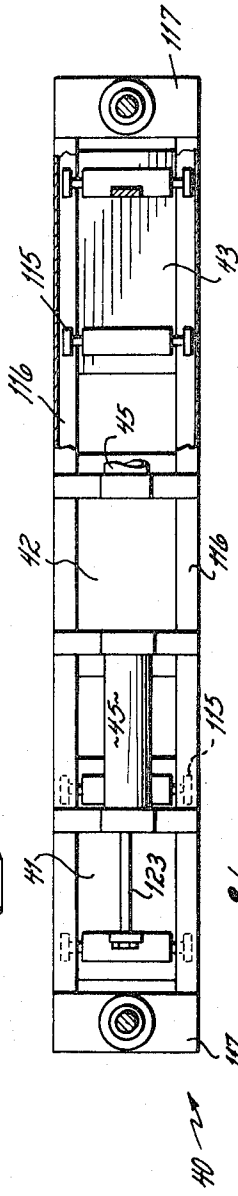

Fig. 5

INVENTOR.
Edward F. Rowekamp
BY
Wood, Herron and Evans
ATTORNEYS

Jan. 19, 1971 E. F. ROWEKAMP 3,555,770

CASE PACKER

Filed Jan. 28, 1969 5 Sheets-Sheet 4

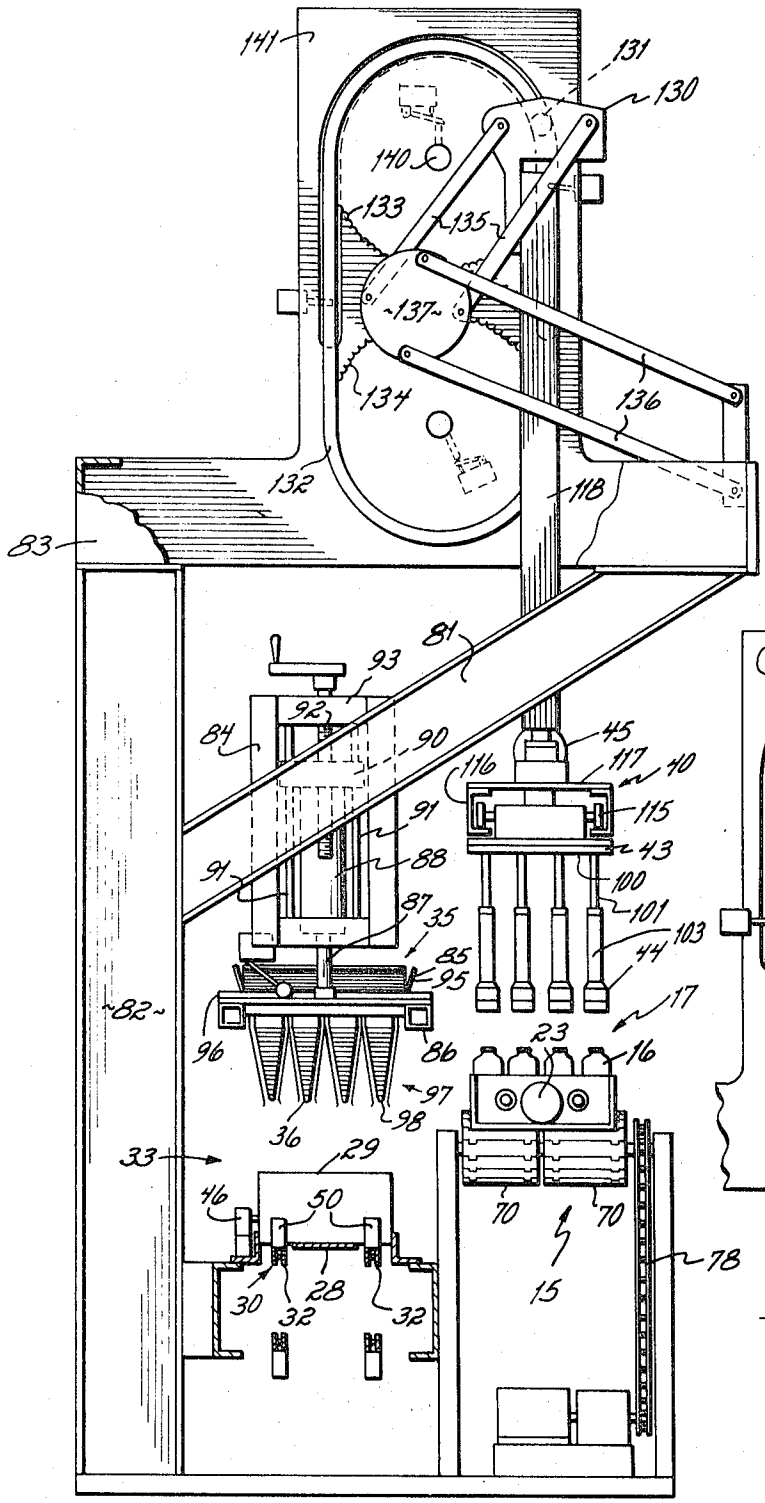

Fig. 6

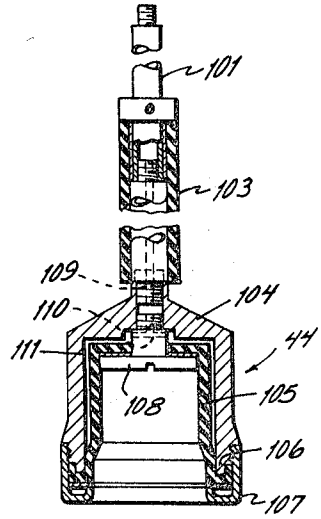

Fig. 8

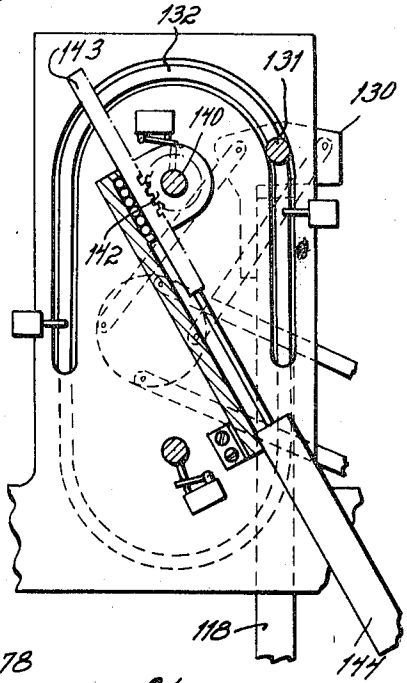

Fig. 7

INVENTOR.
Edward F. Rowekamp
BY
Wood, Herron and Evans
ATTORNEYS

Jan. 19, 1971 E. F. ROWEKAMP 3,555,770

CASE PACKER

Filed Jan. 28, 1969 5 Sheets-Sheet 5

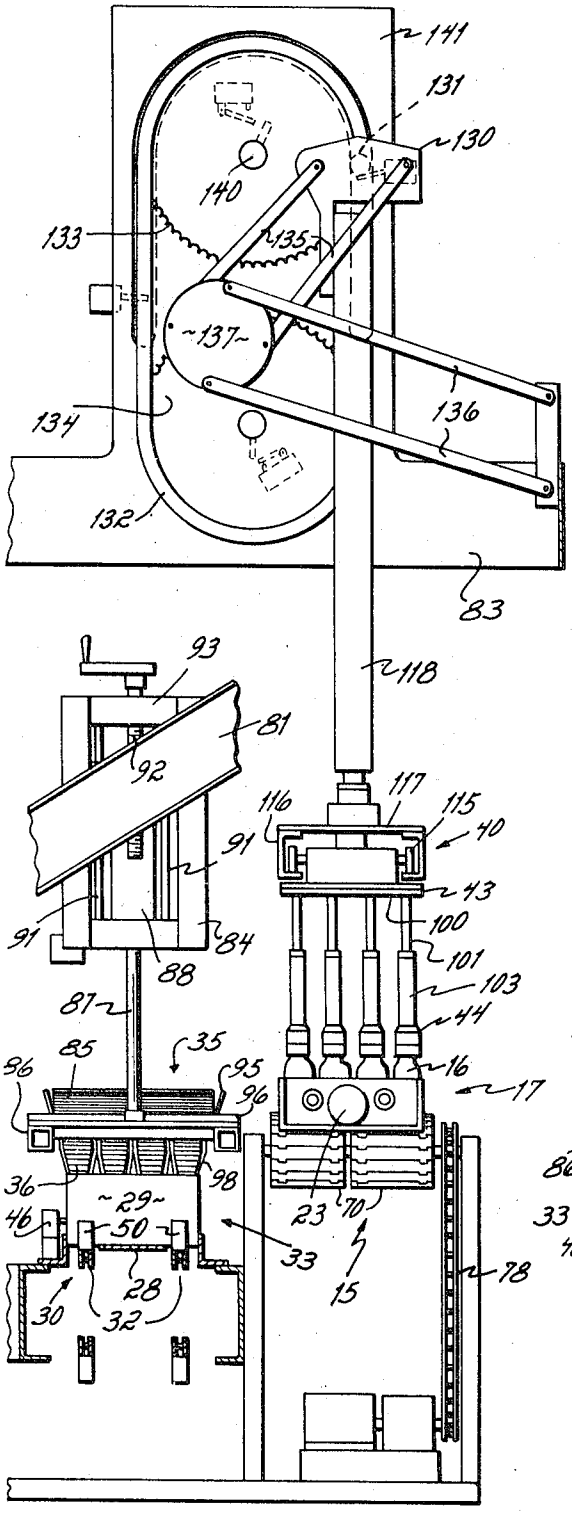

Fig. 9

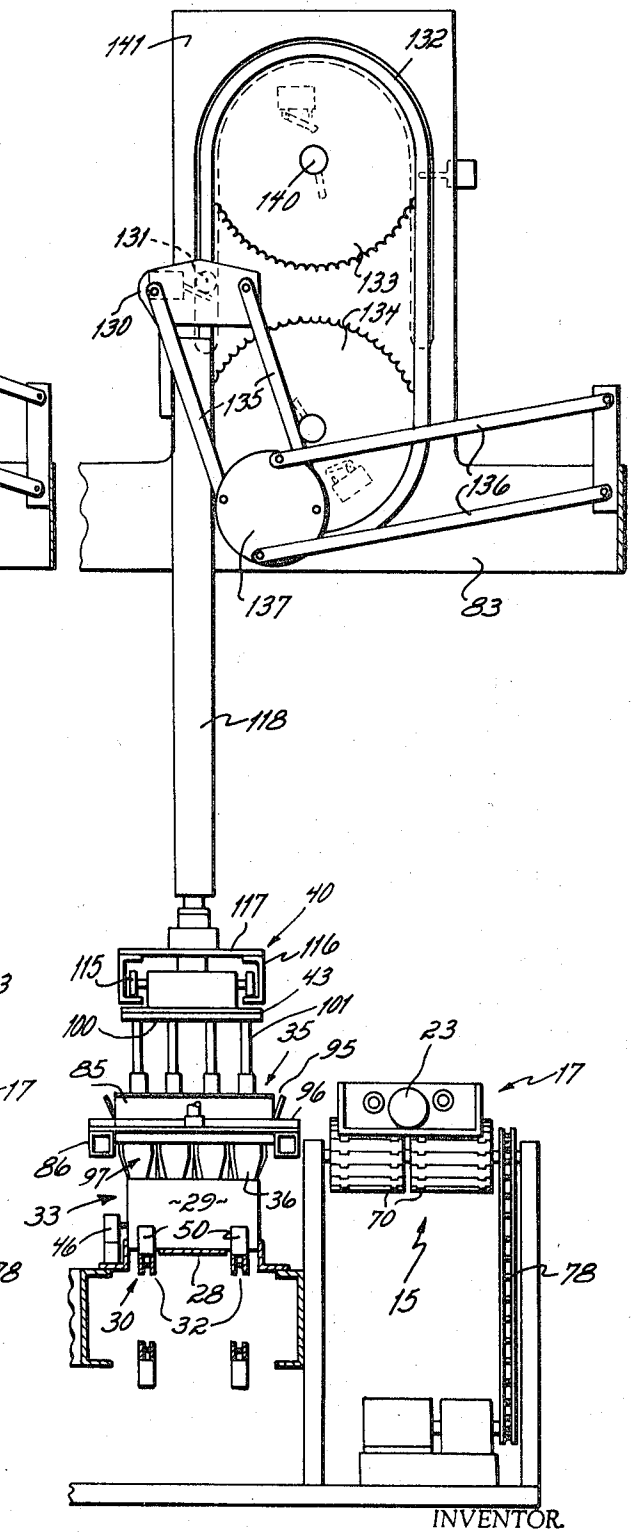

Fig. 10

INVENTOR.
Edward F. Rowekamp
BY
Wood, Herron & Evans
ATTORNEYS

United States Patent Office 3,555,770 Patented Jan. 19, 1971

3,555,770

CASE PACKER

Edward F. Rowekamp, Cincinnati, Ohio, assignor to The Lodge & Shipley Company, Cincinnati, Ohio, a corporation of Ohio

Filed Jan. 28, 1969, Ser. No. 794,610
Int. Cl. B65b 57/10, 21/20
U.S. Cl. 53—61 7 Claims

ABSTRACT OF THE DISCLOSURE

A case packer in which files of abutting articles are conveyed parallel to a conveyor carrying spaced-apart cases, the cases and articles are stopped, and a plurality of lifting heads, one for each case, are moved transversely between the articles and the cases to lift the articles and deposit them in the cases. The lifting heads are moved longitudinally with respect to each other to vary the spacing of the lifting heads between the article pick-up position and the case deposit position.

This invention relates to case packers and more particularly the invention relates to apparatus which improves the handling of bottles, jars and like articles to increase the speed of packing cases, to improve the economy of the apparatus, and to minimize bottle and label damage. While the invention has obvious application to the packing of a variety of articles, it will be described with particular reference to the packing of bottles into celled cases.

Other than the manual packing of bottles into cases, there are basically two types of packers. In the first type, the drop packer, bottles are conveyed in an elevated position and stopped in a pattern corresponding to the pattern which they are to assume in the case into which they are to be deposited. A case, in the meantime, is conveyed to a position underneath the bottle marshaling station. When both bottles and case are in position, a type of trap door is operated to drop the bottles into the case below. While the drop packer has enjoyed considerable success in the market place, it has its disadvantages. Because the articles must drop a substantial distance, the problem of breakage is always present and is particularly acute in the handling of the non-returnable bottles.

Another type of packer utilizes the bottle handling apparatus of the Meierjohan Pat. No. 2,695,190. In that apparatus, cases are moved in a longitudinal direction and the bottles are marshaled in a transverse direction perpendicular to the movement of the cases. The cases and articles are stopped and lifting heads, each having a plurality of lifting cups, grip the bottles and convey them over to the cases depositing them into the cases. This apparatus, which satisfactorily transfers the bottles from the marshaling station to the cases, nevertheless requires a marshaling table of substantial size which projects transversely from the line of movement of the cases and requires diverting or spreading bottles from an incoming column, which is, perhaps, six bottles across, to a marshaled group of which may be thirty files of bottles. Further, the incoming bottles normally are moving parallel to the movement of the cases and must be turned through an angle of 90° to move them into the marshaling position. This requirement of moving bottles from a longitudinal direction to a transverse direction causes considerable bottle rubbing and abrasion, if not destruction of the bottle labels.

An objective of the present invention has been to provide apparatus for conveying cases and articles parallel to each other, stopping the cases and articles and then transversely shifting the bottles to the cases. This packer improves upon the packer previously described in minimizing the complexity of the problems in conveying the articles to the marshaling station and in minimizing label damage.

The apparatus of the type described is not without its problems however. The cases into which the articles are to be deposited cannot be brought to the packing station in end-to-end abutment. Rather, the cases must be individually indexed and brought to the packing station in spaced apart relation primarily to accommodate the case flaps. Even half cases or shells which have no flaps should be spaced apart for their dimensions vary so widely that to bring them into the packing station in end-to-end abutment would give rise to a cumulative error which would make virtually impossible the deposit of the articles into the cases.

Still further, the articles themselves are subject to dimensional imperfections. For example, bottles will be out of round and will have varying wall thicknesses. These cause cumulative errors, particularly when long files of up to thirty or even more bottles are brought into the marshaling station in abutting relation.

An objective of the present invention has been to provide apparatus of the type described, the apparatus being adapted to accommodate the problems of bottle and case tolerances and case flaps. To this end the invention provides for a conveyor to bring cases to a packing station in spaced-apart relation and a conveyor to bring bottles to a marshaling station in files parallel to the line of cases, the articles in the files being in abutting relation. A carriage supporting a plurality of lifting heads is provided for the respective cases, the carriage being adapted to move the lifting heads transversely between the marshaled bottles and the indexed cases. Associated with the carriage for the lifting heads are means for adjusting the longitudinal spacing of the lifting heads so that they can pick up bottles in abutting relation and, during transfer, can spread apart to deposit into cases which are in spaced relation.

Another objective of the invention has been to provide, in apparatus of the type described, means for stopping the incoming articles once they have achieved a marshaled condition and thereafter to relieve the pressure on the marshaled articles of the incoming articles so that they may be conveniently lifted from the marshaling station by the lifting heads.

Another objective of the invention has been to employ lifting cups for the lifting heads which are generally of the type shown in the Meierjohan Pat. No. 2,695,190 wherein each lifting cup is permitted, by a flexible mounting, considerable lateral movement. Thus, articles which are brought into the marshaling station in abutting relation can be deposited into cases in slightly spaced relation as determined by the case cells.

The several features of the invention will become more readily apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a diagrammatic perspective view of the apparatus of the invention,

FIG. 2 is a front elevational view thereof,

FIG. 3 is a plan view partly in section taken along lines 3—3 of FIG. 2,

FIGS. 4 and 5 are plan views partly in section taken along lines 4—4 of FIG. 2 indicating the head shifting mechanism,

FIG. 6 is a side elevational view partly in section taken along lines 6—6 of FIG. 2,

FIG. 7 is a side elevational view partly in section taken along lines 7—7 of FIG. 2 illustrating the drive for the transverse conveyor,

FIG. 8 is a cross-sectional view of a lifting cup,

FIGS. 9 and 10 are diagrammatic side elevational views illustrating the operation of the invention,

FIG. 11 is a diagrammatical view of alternative embodiment of the lifting head carriage.

GENERAL ORGANIZATION AND OPERATION

The general organization and operation of the invention is illustrated generally in FIG. 1. As shown there, the invention provides a conveyor **15** for conveying bottles **16** to a marshaling station indicated generally at **17**. The conveyor includes an endless belt **18** over which side guides **19** and **20** and center guides **21** are mounted. The guides **19** thru **21** channel the bottles **16** into longitudinally extending files of abutting bottles. An adjustable stop **22** is mounted at the downstream end of the conveyor **15**, the stop being connected to a double acting piston and cylinder **23** which pulls the stop **22** out of the way of the bottles when they are in marshaled position in order to relieve the pressure on the bottles.

At the upstream end of the conveyor **15** are four pivotally mounted detector fingers **25**, each corresponding to a respective file of bottles. An electric eye **26** and lamp **27** are located on opposite sides of the conveyor **15** with the lamp **27** directing a beam toward the electric eye **26** on a path normally occupied by the four fingers **25**. When all four fingers are held out of the way by the incoming bottles for a sufficient length of time, the electric eye initiates the cycling of the bottle pick up and transfer.

A case conveyor **30** is mounted adjacent the bottle conveyor and conveys cases **29** in a longitudinal direction parallel to the movement of the bottles. An indexing mechanism, indicated at **31**, which includes laterally spaced stop chains **32**, feeds the cases into a position adjacent the marshaled bottles and stops them in that packing station or packing position **33**, where they are adapted to receive the bottles.

A grid structure **35** overlies each case **29** and has guide fingers **36** adapted to seek each cell **37** of a respective case and thus to provide a guide for effecting the deposit of the individual bottles into the case cells. At this point, it should be noted that the grid structure is used principally where many small articles are deposited in individual cells. There are, however, applications of the invention, as for example packing gallon containers, wherein a simple rectangular frame or chute would be substituted for the grid structure.

A lifting head carriage **40** carries three lifting heads **41**, **42** and **43**, the outboard heads **41** and **43** being longitudinally movable. Each lifting head carries a pattern of lifting cups **44** corresponding to the pattern of case cells **37** into which the bottles are to be deposited. The transverse carriage **40** for the liftng heads is adapted to move the lifting heads first into engagement with the bottles to grip the bottles and thereafter to convey the bottles to a position overlying the cases and to lower the bottles into the cases. The two outboard lifting heads **41** and **43** are connected to the center lifting head by respective pistons and cylinders **45**. During the motion of the overhead carriage **40** between the marshaling station and packing station the piston and cylinders are actuated to change the spacing of the lifting heads in order to enable them to accommodate the abutting spacing of the articles and the spaced apart relationship of the cases.

In the operation of the invention, the cases **29** are brought into the packing station **33** to the desired position shown. Limit switches **46** are used to determine that there are three properly located cases in the packing station. Simultaneously, the bottles **16** are being conveyed by the belt **18** into the marshaling station and brought into engagement with the stop **22**. As soon as the detector system determines that the bottles are in position, the cycle of operations is initiated. This cycle includes the stopping of the conveyor belt **18** and the actuation of the piston and cylinder **23** to remove the stop, thereby relieving the pressure on the bottles. The grids move toward the cases to bring the guide fingers into the case cells. The overhead carriage **40** lowers to bring the lifting cups **44** into engagement with the bottles. The lifting cups are actuated to grip the bottles and the movement of the conveyor is reversed to lift the lifting heads and move them into a position overlying the cases **29**. Simultaneously with that movement, the individual cylinders **45** are actuated to spread the lifting heads **41** and **43** away from the center of the head **42** so as to bring each head into alignment with its respective case. Thus aligned, the lifting heads are lowered causing the bottles to pass through the grids and to be guided into the respective case cells. Thereafter, the gripping devices **44** are relieved to release the bottles and the conveyor mechanism is returned to its original position. The grids **35** are lifted out of the way of the conveyed cases and the filled cases are conveyed away while three new cases are indexed into proper position. Simultaneously, a fresh supply of bottles is conveyed by the belt **18** into the marshaling station as described above.

CASE CONVEYOR

The case conveyor is similar to that disclosed in my Pat. No. 3,185,288. Referring to FIGS. 2 and 3 of the present drawings, the case conveyor **30** includes an endless belt **28** and the endless stop chains **32** which are on each side of the belt **28**. The chains **32** carry spaced stop lugs **50** which project above the level of the upper flight of the belt **28**. The chains themselves are disposed slightly below the plane of the belt **28**. The drive mechanism for the belt and chains is not shown but it is to be understood that the belt is driven continuously and preferably at a speed greater than that of the chains. The chains, on the other hand, are driven through a clutch and brake and are adapted to be stopped very precisely for it is the chains and their stop lugs **50** which determine the positioning of the cases in the packing position.

At the packing position **33** the limit switches **46**, one for each case position, are mounted adjacent to the conveyors. The limit switches detect the presence of a case at each of the case positions. If no case is present at one or more of the positions, the limit switches operate to prevent the cycling of the apparatus which would cause bottles to be transferred to the packing station.

An indexing mechanism is indicated generally at **55** and includes a pneumatically operated indexing stop **56** which is raised for an instant to permit a case **29** to be conveyed by the belt **28** under it and then returns to the stop position shown in FIG. 2 where it engages the rear wall of the next succeeding case to block its movement.

The indexing cylinder **56** is a double acting air cylinder which is operated by a valve **57** which is in turn operated by an air cam **58** mounted on a shaft **59**. The shaft **59** is rotated by a chain **60** which is driven by the tailshaft **61** of the stop chain **32**. The transmission ratio between the shaft **61** and the shaft **59** is such that the cam **58** rotates one revolution each time a lug **50** on the stop chain moves through a distance equal to the spacing between adjacent lugs on the stop chain. When the valve **57** is operated by the cam **58**, air is admitted to one side of the cylinder **56** to lift the rod out of the way, thus permitting a case to pass. As soon as the operative surface on the cam passes the valve, the valve position is reversed to admit air to the other side of the cylinder thereby returning the rod to its stop position thereby blocking admission of the next succeeding case.

The tail shaft **61** also drives a timing chain **64** carrying a lug **65**. The lug **65** cooperates with a limit switch **66** through a circuit to declutch and brake the stop chain **32**. The transmission ratio is such that the lug **65** passes the limit switch each time the chain **32** moves a distance corresponding to that required to introduce three cases **29** into the packing station.

ARTICLE CONVEYOR

The article conveyor includes a pair of conveyor tracks **70** which form the endless conveyor **18**. The outside guide rails **19** and **20**, together with the inside guide rails **21**, form four channels each receiving a file of bottles **16**.

The downstream end of the tracks **70** together with the guide rails **19**, **20** and **21** form the marshaling station **17**. The bottles are conveyed into the marshaling station in random orientation by upstream extensions of the guide rails **19** and **20**, but in the marshaling station are guided into files of abutting bottles.

At the upstream end of the marshaling station, the detector fingers **25** are individually loosely mounted on a transverse rod **72** and are normally held by gravity in a vertical orientation. In that vertical orientation, the detector fingers lie in the path of a light beam from the lamp **27** to the electric eye **26**. When the marshaling station is filled, that is when each channel has a complete file of bottles, a bottle in each channel adjacent the detector finger **25** will hold the detector finger at an angle out of the path of the beam of light from the lamp **27**. The impingement of the beam of light on the photocell, operating through a time delay, closes one of the circuits which initiates the operation of the packer. The time delay, of course, is necessary to avoid the inadvertent initiation of the cycling of the apparatus before the marshaling station is filled with bottles. This could occur, for example when four bottles pass by their respective detector fingers at the same time, thereby instantaneously lifting them out of the path of the light beam from the lamp **27**.

The adjustable stop **22** at the downstream end of the marshaling station includes a comparatively soft plastic (nylon, for example) rod **75** extending horizontally into each channel. Each rod terminates at precisely that position which each bottle is to attain, that position being determined by the position of the outboard four lifting cups of the head **43**. The four bottles which are positioned by the stops determine the positions of the succeeding (seventeen, in the illustrated example) bottles. The stops are mounted on a transverse bar **76** which is fixed to a piston rod **77** of the piston and cylinder **23**. Thus, actuation of the piston and cylinder **23** will cause the bar **76** to be moved to the right as viewed in FIG. 3 thereby pulling the stops away from the bottles and freeing them of the pressure upon them so as to permit them to be lifted easily out of the marshaling station between the lifting heads.

The endless conveyor **18** is driven by a chain **78** which in turn is driven by a motor which could be electric or hydraulic. Suitable clutching and breaking apparatus is provided to effect the starting and stopping of the chain as required with each cycle, the objective being to stop the conveyor when a sufficient number of articles has been marshaled.

ARTICLE GUIDING GRID STRUCTURE

The article guiding grid structure is illustrated as three grids **85** which are mounted on an elongated frame **86** immediately overlying the case conveyor at the packer section. Each end of the frame **86** is supported on a piston rod **87** forming part of a double acting piston and cylinder **88**. The cylinder is mounted on a diagonal brace **81** extending between main vertical columns **82** and overhead frame **83** of the transverse carriage by means of a mounting block **90** which is slideable on rod **91**. The block **90** is threaded into a screw **92** rotatably mounted at **93** in a mounting frame **84** fixed to brace **81**. Rotation of both screws **92** on either side of the grid frame **86** causes a raising or lowering of the piston and cylinder **88** and thus determines the operating height of the guiding grid structure, thereby enabling it to accommodate cases and bottles of different heights.

Each grid **85** has at its upper end an outwardly flaring rim **95** mounted on a grid frame **96**. The grid frame in turn is fixed to the elongated frame **86**. Depending from the grid frame **96** are a plurality of guide channels **97** arranged in a pattern corresponding to the pattern of the case cells which is also the pattern of the lifting devices **44** on the lifting heads **43**. Each guide channel is formed by four flexible fingers **98** which are tapered at their ends and which are angled inwardly so that their maximum dimension at their ends is considerably less than that of each case cell. Thus, each guide channel **97** will seek its respective case cell and compensate for slight misalignments.

In the operation of the guiding grid structure, the piston and cylinder **88** lifts the frame **86** and the respective grids up out of the way of incoming cases. When the cases are brought into position by the case conveyor, the piston and cylinder lowers the guiding grid structure permitting the fingered channels to seek out their respective cells and await a deposit of bottles through the guide channels into the case cells.

TRANSVERSE ARTICLE CARRIAGE

The lifting heads **41–43** are the fundamental components of the transverse article carriage **40**. The article carriage has as few as two and as many as five lifting heads, depending upon the requirements of practice. The size and number of the other cooperating elements, such as the guiding grid structure, bottle and case conveyors, will of course be varied according to the number of heads required. In the illustrated embodiment, three are shown and each includes a manifold **100** from which a plurality of tubes **101** depend, the tubes being arranged on the manifold in a pattern corresponding to that of the grid structure and case cells. The manifold is connected to a source of air pressure not shown and its function is to supply air under pressure to the tubes **101** and to the attached lifting devices. The preferred form of lifting device is illustrated in cross-section in FIG. 8, although it is to be understood that the invention is not restricted to that lifting device, for any lifting device which performs the function of gripping the bottle with sufficient strength to lift it from the marshaled group of bottles and carry it transversely over to the case conveyor will suffice. The lifting device illustrated is of the type shown in McHugh Pat. No. 2,873,996 and includes a flexible tube **103** which is connected to tube **101**. At the lower end of tube **103** is a rigid shell **104** which is cup shaped and whose interior surface is lined with a flexible liner or bladder **105** sealed at its lower end **106** by a collar **107** threaded onto the shell. The upper end of each cup is secured to the upper end of the shell by a threaded screw **108** which has a longitudinal passage **109** in communication with its tube **103** and has lateral passages **110** in communication with the interior of the shell. Channels **111** along side the liner permit air to flow around the bladder to inflate it inwardly and to cause it to grip the neck of an article, such as a bottle, which projects into the device.

As best shown in FIGS. 4, 5 and 6, each lifting head manifold is supported on rollers **115** which engage the horizontal flanges of longitudinally extending channel beams **116**. The channel beams are secured to plates **117** at each end, the plates being supported on two vertical posts **118** located at each side of the carriage.

The piston and cylinders **45** are mounted on each side of the channel beams **116** and supported on cross bars **122** (FIGS. 4 and 5). A piston rod **123** projecting from one piston and cylinder **45** is connected to one of the outboard heads **41** and a piston rod **124** projecting from the opposite piston and cylinder is connected to the other outboard head **43**. Application of air under pressure to the double acting cylinders **45** causes the piston rods **123** and **124** to drive their respective heads **41** and **43** outwardly to a position in which they are aligned, or alignable, with the cells of the spaced cases and the cooperating grids. Application of air to the opposite end of the cylinders returns the pistons and their respective heads to a bottle pick-up position as illustrated in FIG. 2. In that fashion, the pick-up heads are moved longitudinally to accommodate the abutting spacing of the receptacles and the spaced apart relation of the cases.

Each post **118** which supports the lifting heads is carried by a block **130** which is connected by a pin **131** to an

endless chain **132** passing about a drive sprocket **133** and an idler sprocket **134**. The block is maintained in proper orientation by two planographic linkages **135** and **136** interconnected by a circular plate **137**. The drive sprocket **133** is mounted on a shaft **140** which is journaled in supporting plates **141** on each side of the apparatus, the plates being supported on overhead frame **83**. A pinion gear **142** is fixed to the shaft and is driven by a rack **143** which is in turn driven by a double acting hydraulic piston and cylinder **144**. Reciprocation of the rack **143** through the operation of the piston and cylinder **144** causes the drive sprocket **133** to rotate first to a bottle pick-up position and then to reverse itself and to rotate to a bottle drop position. Such rotation of the drive sprocket **133** causes reciprocating movement of the chain **132** carrying the posts and lifting heads up, across, and down to the opposite sides of the apparatus.

In the foregoing description, the transverse article carriage has been described and illustrated as having three lifting heads. As indicated, the invention is not restricted to a three-head apparatus. Rather, as a practical matter, from two to five heads can be employed. An example, of a five-head carriage is indicated in FIG. 11. There the heads are indicated at **150**, **152**, **153**, **154**, and **155**. The center head **153** is stationary. The heads **152–154** adjacent head **153** are mounted for longitudinal movement in a manner similar to that described in the earier embodiment. They are driven by piston and cylinders **156** in the manner described in the earlier embodiment.

The outboard heads **150** and **155** are connected to piston and cylinders **157**, these devices having twice the stroke as the piston and cylinders **156**. Thus, during transfer, when fluid pressure is applied to piston and cylinders **156** and **157**, the heads **152** and **154** move longitudinally in opposite directions away from the center head **153** a distance approximately equal to the spacing of the cases in the packer station. Simultaneously the outboard heads **150** and **155** move in opposite directions twice that distance.

Instead of mounting the cylinders of the piston and cylinders **156**, **157** as shown, they could be movably mounted and themselves driven outwardly by the piston of the piston and cylinders **152**, **154**. With this structure, the stroke of the outboard piston and cylinder would be the same as that of the inboard piston and cylinders **156**.

OPERATION

In the operation of the invention, the bottle conveyor **15** conveys bottles into the marshaling station so that the bottles are aligned in abutment with each other in four files. The number of files and rows, of course, depends upon the pattern of the cases to be packed. The bottles abut the stops **22** at the downstream end of the conveyor. The electric eye **26** detects the condition of the marshaling station and permits the pick up of the bottles to begin when the marshaling station is filled.

Simultaneously, the case indexer has been feeding the cases into the packing section in the spaced apart relation shown in the figures. The cases engage respective limit switches which, when all three are operated, permit the pick up of the bottles to begin.

At the start of a pick-up cycle, the conveyor **15** is braked and then the stop actuating piston and cylinder **23** withdraws the stops **22** to relieve the pressure on the bottles.

On the transfer carriage, the operation of rack **143** causes rotation of drive sprocket **133** to move the head carriage downwardly to permit the pick-up cups to engage the bottles in the marshaling station. When the bottles are engaged, the liners of the pick-up cups are inflated to grasp the necks of the bottles and the direction of the rack **143** is reversed. The reversal of the direction of the rack causes the lifting heads to be lifted upwardly and over to a position overlying the packing station. Simultaneously, the piston and cylinders **45** associated with the heads are actuated to move the outboard heads longitudinally away from the center head **42** until the heads are aligned with the bottle guiding grids. Substantially simultaneously with these operations, the grid structure is lowered by its piston and cylinders **88** with the guide fingers seeking the respective cells of the underlying cases.

The lifting head carriage continues downwardly moving the bottles, suspended individually by each lifting device, until the bottles rest upon the bottom of the cases whereupon the air pressure to the lifting cups is relieved thereby effecting the release of the bottles.

After the bottles are released, the rack **143** reverses its direction and causes the lifting head carriage to reverse its direction to move over to a position in which it can pick up another group of marshaled bottles. During the period that the lifting head was moving toward the case packing section, a new group of bottles is moved into the marshaling section, with the stops being returned to their initial position.

As the carrriage continues to move toward a position in which it can pick up the bottles, the lifting heads are caused by their piston and cylinders to move close together to pick up the fresh supply of bottles. After the carriage has moved out of the way of the grid structure, it is raised and a new supply of cases is brought into the packing section while the filled cases are removed. When fresh cases and bottles are brought into the machine, the apparatus is ready for a new cycle of operations.

I claim:

1. Apparatus for loading articles into cases comprising,
an article conveyor for conveying four longitudinally extending files of abutting articles,
means for stopping said articles at a marshaling station, the articles in each file being in abutting relation,
a case conveyor generally parallel to and adjacent to said article conveyor for conveying longitudinally spaced cases to a packing station adjacent said marshaling station,
means for stopping said cases at said marshaling station, said cases being in spaced relation,
a lifting head carriage movable transversely between said marshaling station and said packing position,
a plurality of lifting heads mounted on said carriage, each head being adapted to pick up a pattern of articles, means for shifting said heads longitudinally relatively to each other to accommodate the spacing of the articles at the marshaling station and the spacing of the cases at the packing station.

2. Apparatus according to claim **1** in which said carriage includes,
an elongated support,
at least one of said lifting heads being mounted on said support for longitudinal movement with respect to said support,
a piston and cylinder mounted on said support and connected to said movable lifting head to move said lifting head longitudinally.

3. Apparatus according to claim **1** in which said carriage includes,
an elongated support,
a fixed lifting head in the center of said support,
two outboard lifting heads mounted adjacent opposite sides of said center head for longitudinal movement with respect to said support,
two pistons and cylinders mounted on said support, each connected to a respective head to move said head longitudinally.

4. Apparatus according to claim **1** further comprising,
a guiding grid structure mounted over said packing station, said guiding grid structure having a grid for each said lifting head, said grids being spaced from each other a distance corresponding to the spacing

of said cases and adapted to be aligned with said cases when said cases are stopped in the packing station.

5. Apparatus according to claim 4 further comprising, means for lifting said grid structure out of the path of incoming cases and thereafter lowering said grid structure to a position wherein it is adapted to guide articles into cases.

6. Apparatus according to claim 2 wherein said elongated support comprises two spaced parallel channel members, each having horizontal flanges

each movable head having rollers riding on said horizontal flanges,

said piston and cylinder being mounted on said channel members.

7. Apparatus according to claim 1 in which said means for stopping articles comprises

a stop at the downstream end of said conveyor and engageable with each file of incoming articles,

means for detecting that all files are filled with articles, and means for stopping said article conveyor and moving said stops out of the way of said articles when said files are filled with articles.

References Cited

UNITED STATES PATENTS

2,666,562	1/1954	Birch	53—247
2,838,896	6/1958	Currivan et al.	53—166
2,904,944	9/1959	Notredame et al.	53—61
3,209,823	10/1965	Bargel et al.	53—166X

TRAVIS S. McGEHEE, Primary Examiner

U.S. Cl. X.R.

53—166, 247, 248, 251