Jan. 12, 1971 E. F. ROWEKAMP 3,553,932

CASE PACKER HAVING FLOATING GUIDES

Filed Feb. 5, 1969 5 Sheets-Sheet 1

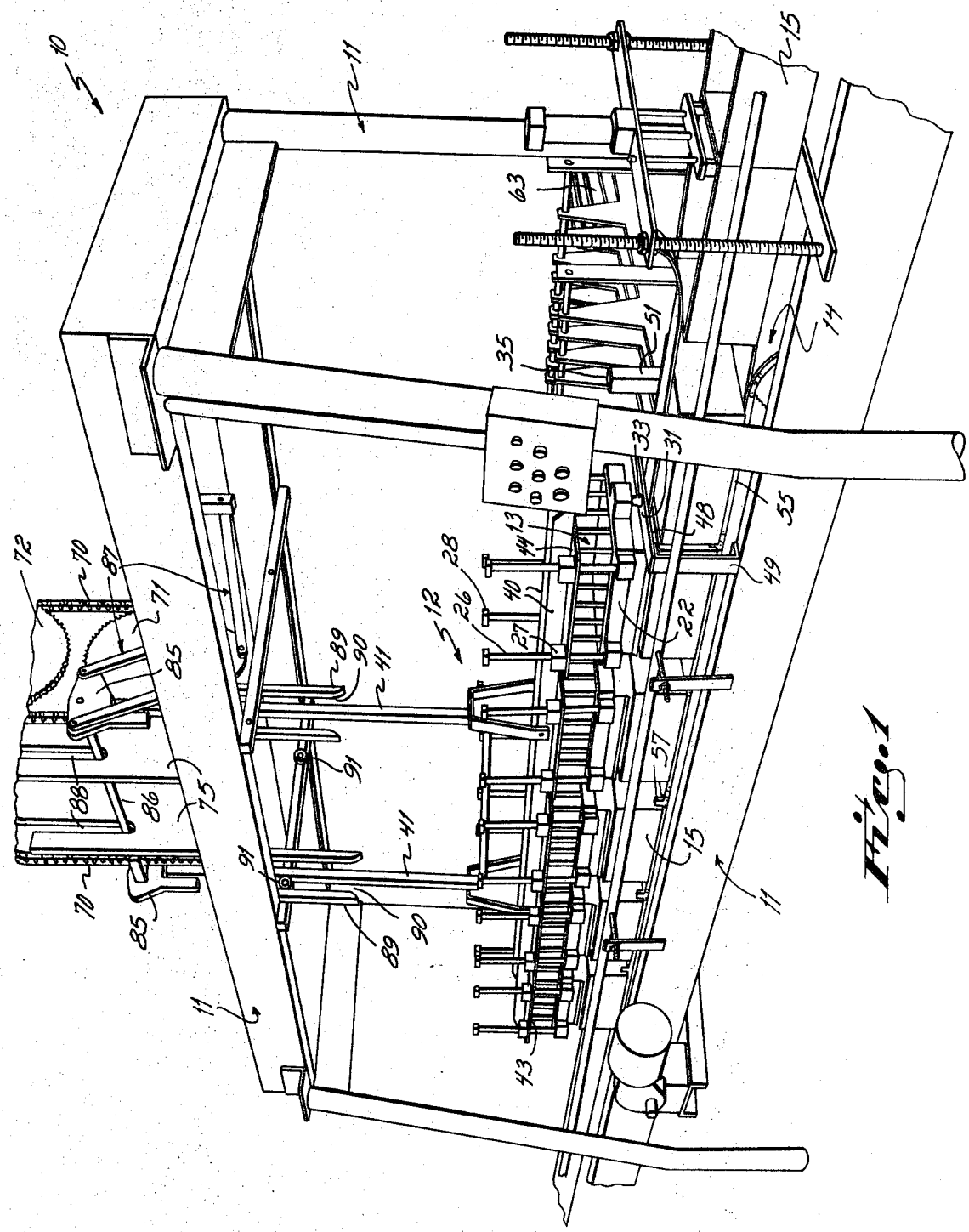

Fig. 1

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CASE PACKER HAVING FLOATING GUIDES

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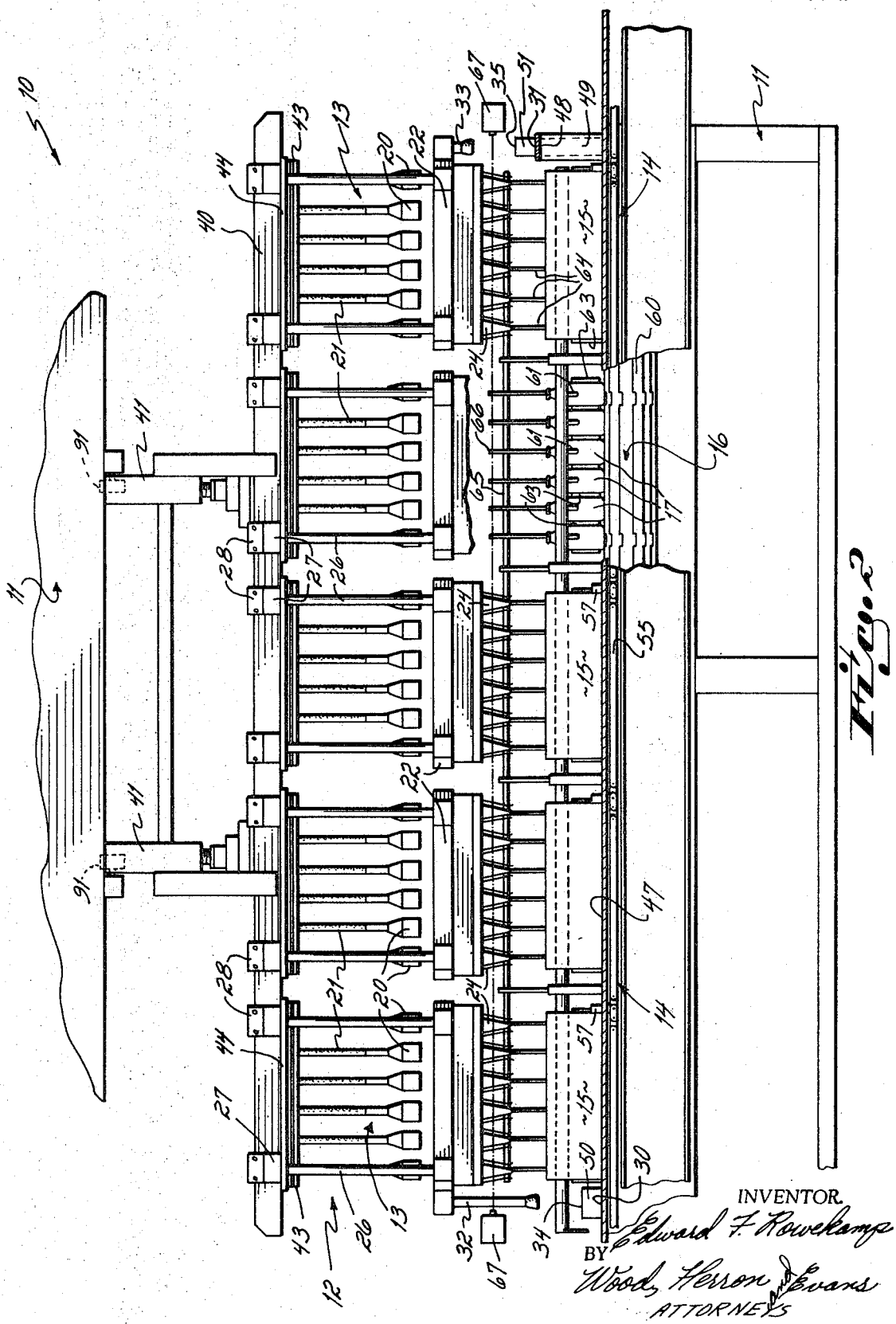

Fig. 2

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CASE PACKER HAVING FLOATING GUIDES

Filed Feb. 5, 1969 5 Sheets-Sheet 3

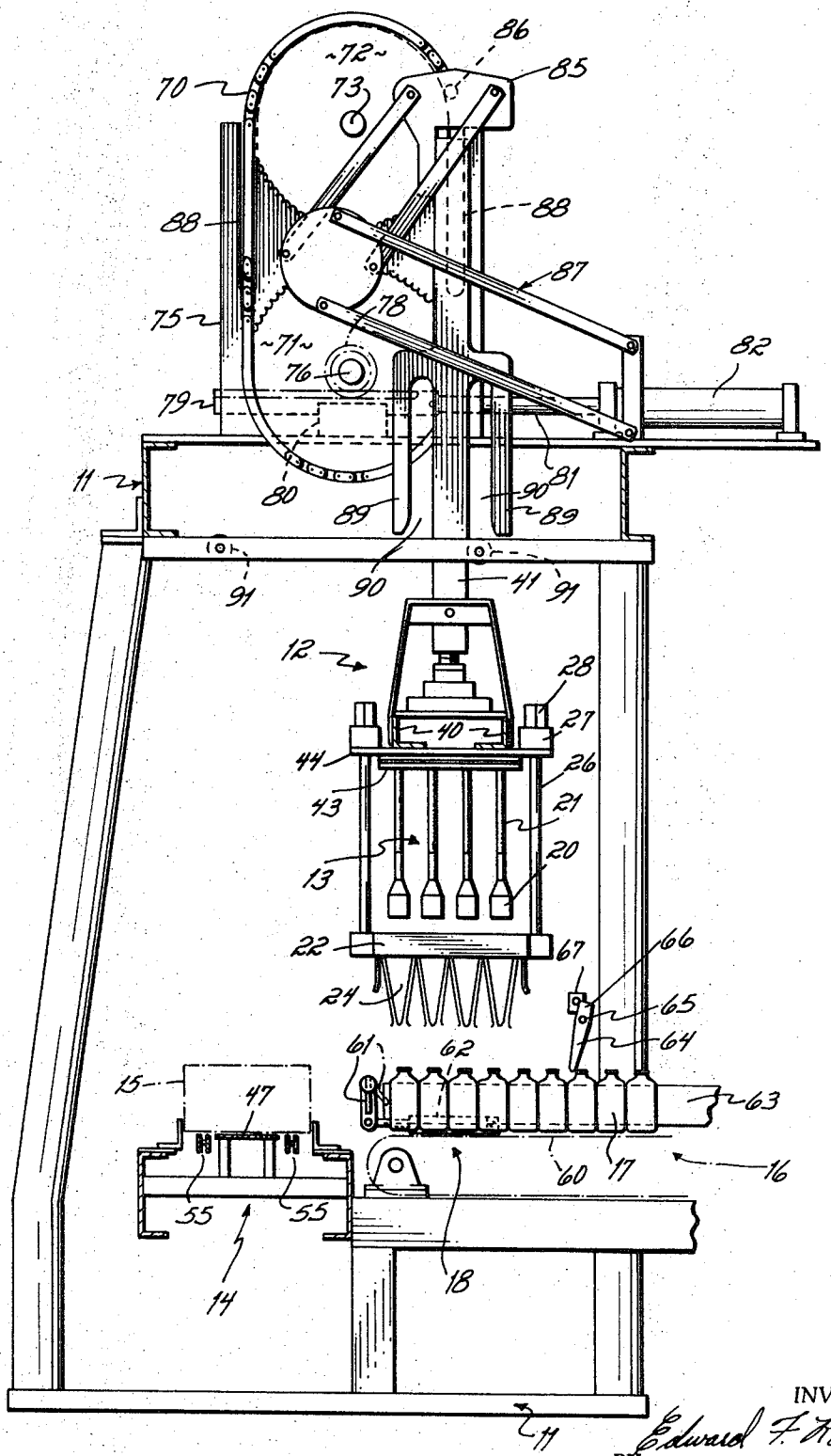

Fig. 3

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CASE PACKER HAVING FLOATING GUIDES

Filed Feb. 5, 1969 5 Sheets-Sheet 4

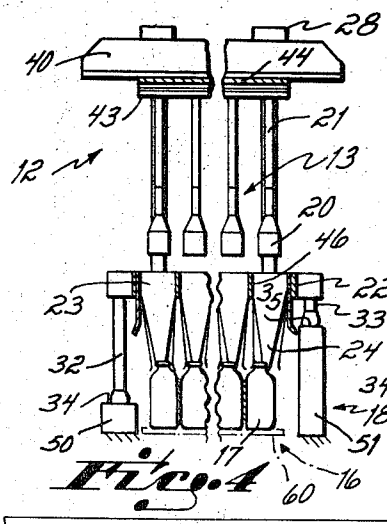

Fig. 4

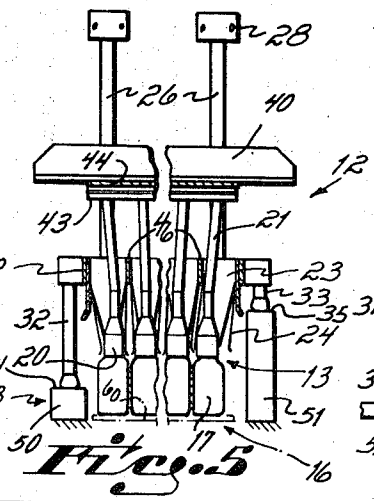

Fig. 5

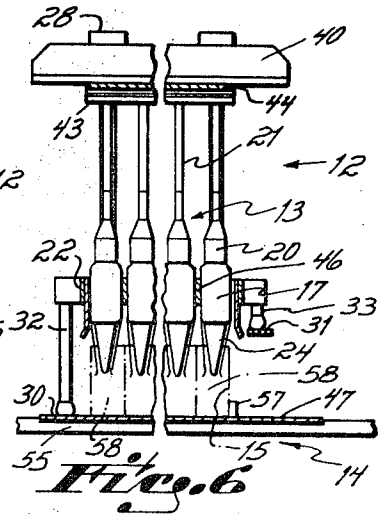

Fig. 6

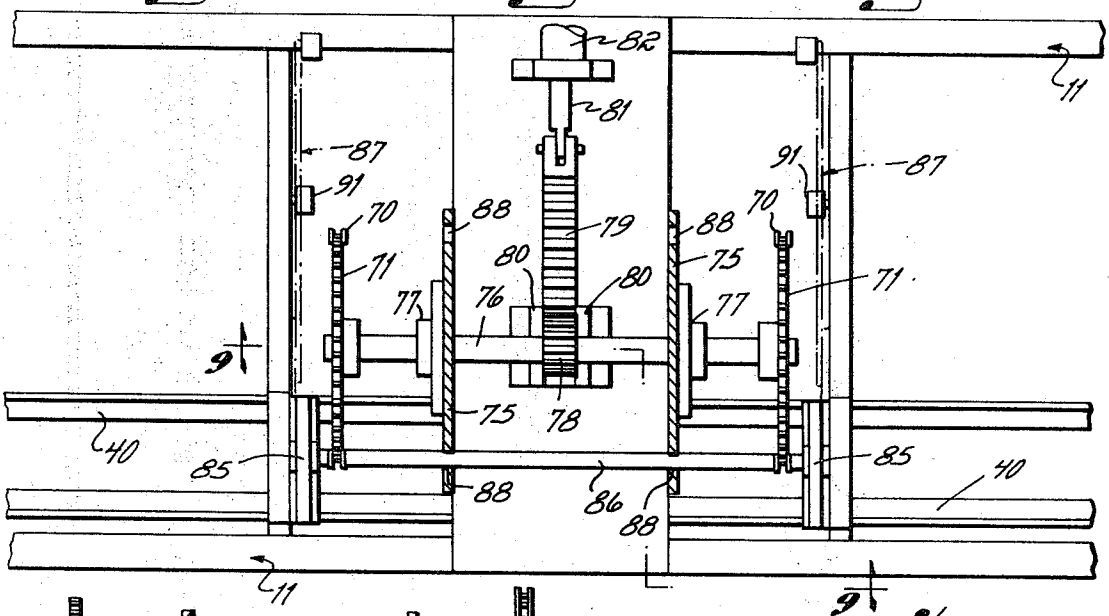

Fig. 8

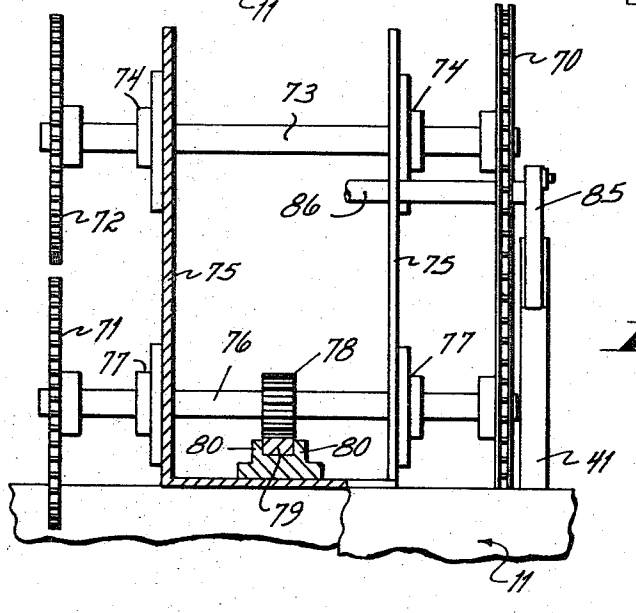

Fig. 9

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CASE PACKER HAVING FLOATING GUIDES

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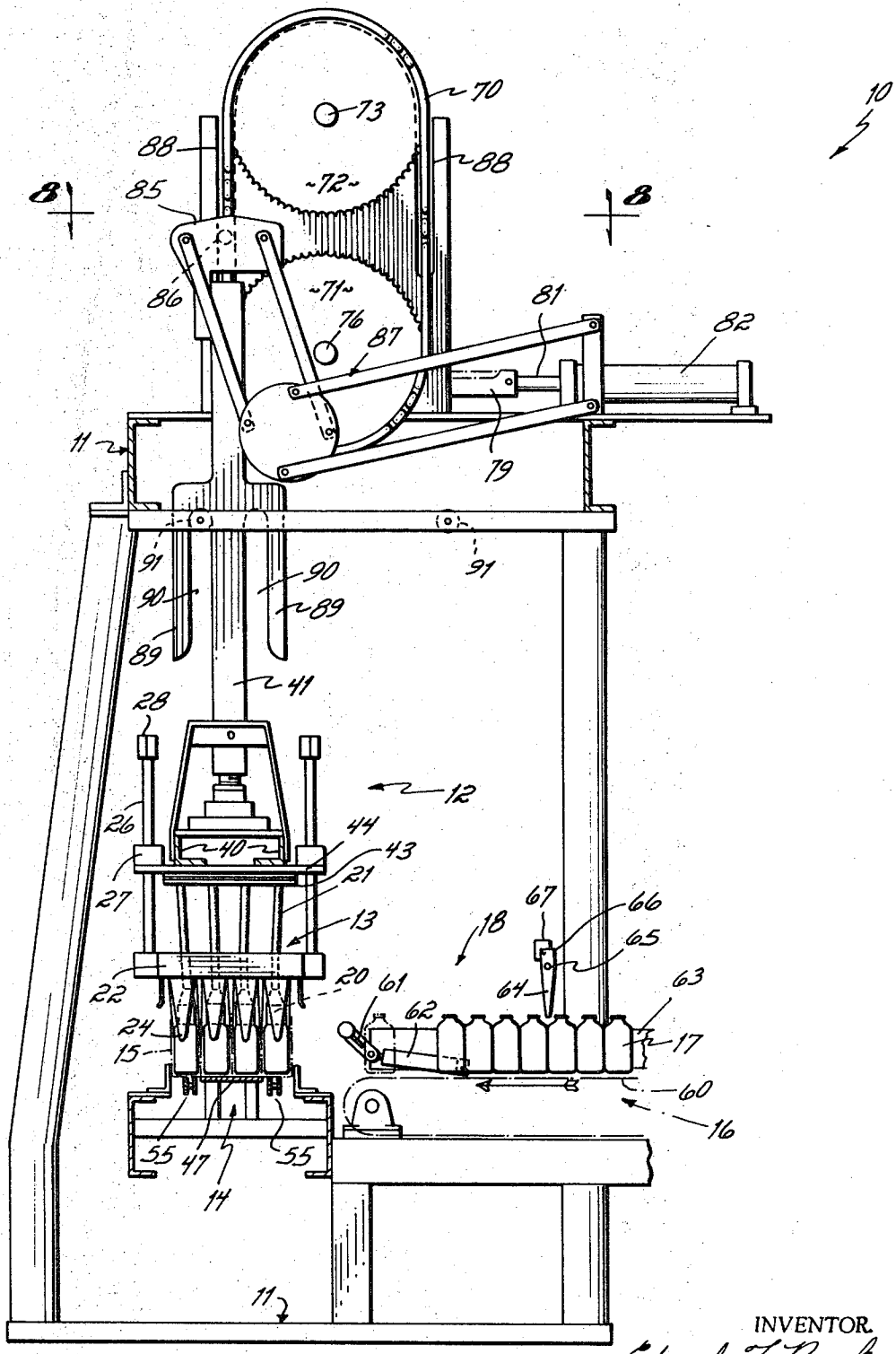

Fig. 1

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United States Patent Office 3,553,932
Patented Jan. 12, 1971

3,553,932

CASE PACKER HAVING FLOATING GUIDES

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Filed Feb. 5, 1969, Ser. No. 796,703
Int. Cl. B65b 21/02
U.S. Cl. 53—166 4 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus having a bottle conveyor, a case conveyor, and means for transporting bottles between the bottle conveyor and the case conveyor, the means including a lifting head having pickup cups depending therefrom and a bottle guide carried by said lifting head for holding said bottles from swinging and banging into each other during transport between said bottle conveyor and said case conveyor and for assisting the guiding of said bottles into said case.

This invention relates to case packers and, more particularly, the invention is directed to apparatus for lifting articles from a marshaling station and depositing them in a case located adjacent the marshaling station. While the invention will be described with particular reference to the packing of glass bottles, it should be understood that it is useful in the packing of any articles but is particularly useful where those articles are breakable.

The case packer which is in common use today is of the type described in Rowekamp Pat. No. 3,307,328. In that apparatus, bottles are marshaled above a grid which forms a bottle guide and a case is located below the grid. The case is raised as close as possible to the grid and the bottles are released so as to pass through the grid and to be guided into the case by fingers which project from the grid into the cells of the case. While this apparatus performs very satisfactorily, there are a number of factors which limit the speed with which the cases can be packed, and at best it is possible to pack only approximately twenty-five cases per minute.

Another bottle-handling mechanism presently in use is the uncaser shown in the Meierjohan Pat. No. 2,695,190 and McHugh Pat. No. 2,873,996, for example. That apparatus is especially adapted to unpack as many as five cases at a time. It employs a lifting head for each case, the lifting head having lifting devices which preferably are of the inflatable cup type shown in the Meierjohan and McHugh patents. The lifting heads are moved over the cases packed with empty bottles and the lifting cups engage the bottles and lift them out and carry them over to a conveyor table on which they are carried away for further processing. The uncaser is a comparatively simple and reliable mechanism which is capable of comparatively high speeds which permit the uncasing of up to fifty cases per minute with a five head uncaser.

In the copending application of Henry Tiews, Ser. No. 710,102, filed Mar. 4, 1968, and now Pat. No. 3,505,787 there is disclosed an apparatus for lifting marshaled bottles and depositing them into cases. One of the problems for which that invention provides a solution is that the high speed movement of the bottles from one position to another in a cluster causes the bottles to bang together. Where the bottles are filled as in the case of bottled beverages, any frequent instances of breakage during transport cannot be tolerated. The problem is particularly acute in bottle-handling mechanisms of the type described wherein the lifting cups are suspended by tubes which permit a necessary lateral movement of the cups to conform to the spacing of the bottles.

In solving that problem, the Tiews invention provides a bottle guide which is carried below the lifting head, the bottle guide serving to guide the bottles into the case during release, and, perhaps more importantly, to hold the bottles separate from each other within the pockets of the guide as the lifting head is moved from the marshaling station to the case.

As disclosed in the Tiews application, the bottle guide is caused to move up and down with respect to the lifting head by pistons and cylinders. The operation generally is that the guide is first carried above the lifting devices, such as the cups, until the marshaled bottles are grasped, then the pistons and cylinders cause relative movement of the guide and lifting head to draw the bottles up into the guide. In this relation, the bottles are transported to the cases and the assembly is lowered into the cases. Thereafter, the pistons and the cylinders move the lifting head downwardly relative to the guide to deposit the bottles into the cases.

The objective of the present invention has been to improve upon the mechanism for providing relative movement between the guide and the lifting head. To this end, the invention provides a transversely moving carriage supporting a lifting head having downwardly depending lifting devices. A bottle guide is slidably mounted for vertical movement on the lifting head, the lifting head having lower stops defining the position of the guide during the transporting of the bottles and the apparatus having abutments adjacent the bottle and case conveyors which are engaged by the guide to determine the relative position of the guide with respect to the lifting head during pickup and release of the bottles. With this apparatus, at the bottle marshaling station, the guide comes to rest on its abutments and the lifting devices, such as the cups, are projected through the guide to pick up the bottles and thereafter draw them up into the guide by the upward movement of the transverse carriage. The transverse carriage continues to move upwardly and over to the case conveyor. It then descends and the guide engages the abutments associated with the case conveyor to limit the extent of the downward movement and the bottles continue to move downwardly until they are deposited gently in the bottom of the case.

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 perspective view of the apparatus of the invention,

FIG. 2 is a front elevational view of the apparatus,

FIG. 3 is a side elevational view, partly in section, of the apparatus,

FIGS. 4, 5 and 6 are diagrammatic fragmentary cross-sectional views looking toward the front of the apparatus illustrating the sequence of operations,

FIG. 7 is a side elevational view similar to FIG. 3 illustrating the deposit of the bottles into their cases,

FIG. 8 is a cross-sectional view along lines **8—8** of FIG. 7,

FIG. 9 is a cross-sectional view along lines **9—9** of FIG. 8.

GENERAL ORGANIZATION AND OPERATION

Referring to FIGS. 1 and 2, the packing apparatus is indicated generally at **10** and includes a frame **11** which supports a transverse carriage **12** for a lifting head **13**. A case conveyor **14** passes within the frame **11** for conveying cases **15**. An article or bottle conveyor **16** carries bottles **17** up to a marshaling station **18** and marshals them into patterns adapted to be picked up by the head **13**.

The head **13** carries cups **20** on flexible stems or tubes **21**. While the cups of the type shown in the Meierjohan

and McHugh patents are preferred, it should be understood that the lifting devices **20** can also be of the type providing internal or external gripping fingers or can be suction devices.

A bottle guide or grid **22** having pockets **23** (FIGS. 4, 5 and 6) and guide fingers **24** depending from the pockets is supported below the lifting head. While the invention will be described in relation to a bottle guide having pockets and guide fingers, it should be understood that the mechanism of the invention which determines the relative movement of the guide with respect to the lifting head is not dependent upon a guide having pockets and guide fingers and is equally applicable to a guide which is simply a rectangular ring surrounding the pattern of bottles to be deposited into a particular case. Preferably, the guide has vertical rods **26** slidably received in bushings **27** mounted on the transverse carriage **12** so as to permit the guide to move vertically relative to the lifting cups. Stops **28** fixed on the upper ends of rods **26** limit the downward extent of the movement of the guide **22**.

The frame **11** supports stops or abutments **30** and **31** adjacent the case conveyor **14**. The abutments **30** and **31** are engageable by depending legs **32** and **33** respectively to limit the downward extent of movement of the guide **22** over the case conveyor **14**. At the marshaling station **18**, similar abutments **34** and **35** are provided, these abutments being engageable by the legs **32** and **33** to limit the downward extent of the movement of the guide **22** over the marshaling station.

In the general operation, the transverse carriage **12** carries the lifting head **13** over the marshaled bottles and then moves straight down carrying the guide fingers **24** over the bottles **17** as shown in FIG. 3. As the legs **32** and **33** of the guide engage the abutments **34** and **35** the guide stops and the cups continue to move downwardly to engage the bottles (FIGS. 4 and 5). After the cups engage the bottles, they are inflated to grip the bottles and then lift the bottles up within the guide **22**. The carriage **12** carries the lifting heads with the bottles captured within the guide over the cases and then moves straight downwardly into the cases. As can be seen from FIG. 6, the guide fingers first move into the case cells and then the guide is blocked from further downward movement by the engagement of legs **32** and **33** with the abutments **30** and **31**. As the cups continue to move downwardly, they carry the bottles almost to the bottom of the case, at which point the inflating pressure is released to permit the bottles to drop within the case (FIG. 7).

THE LIFTING AND GUIDE ASSEMBLY

It is contemplated that from one to five lifting heads would be provided in a case packing machine, five being illustrated in FIG. 2 The lifting heads are supported from a beam structure **40** as best shown in FIGS. 1 and 2. The beam structure is carried by vertical supports **41** which are mounted on the carriage **12** to be described in detail below.

Each lifting head is preferably the same in all material respects as those described in the Meierjohan and McHugh patents and includes a manifold **43** from which flexible tubes **21** are supported. The cups **20** are carried on the lower ends of the flexible tubes **21**, the tubes and cups being arranged in a pattern corresponding to that of the case cells, as, for example, four rows of six cups each. Suitable hose connections are made to the manifold in order to supply fluid, as, for example, air, under pressure to the cups and to effect the application of that air pressure.

Each manifold has laterally projecting flanges **44** which support the bushings **27** through which the rods **26** pass. The lower ends of the rods **26** are fixed to the guide **22**. The stops **28** at the upper ends of the rods **26** are split clamps which are bolted together and whose vertical position on the rods **26** can be adjusted thereby providing an adjustment to determine the lowermost position of the guide with respect to the lifting head.

The grid is formed by a matrix of longitudinal and transverse members **46**. This matrix forms a pattern of pockets **23** immediately underlying and aligned with the pattern of cups **20**. Depending from each pocket are the four guide fingers **24** which are flexible and which seek the respective cell into which a bottle is to be deposited and guide the bottle into the cell. Such guide fingers are commonly used in case packers as shown, for example, in the patent to Rowekamp No. 3,353,331.

It should be understood that the guide of the type illustrated having separate brackets for guide fingers for each bottle is a preferred embodiment of floating or traveling guide for use in packing cases wherein the bottles are to be deposited in individual cells. There are, however, applications wherein cases not having cells are to be packed. In such event, the guide may comprise just the peripheral frame which would surround a pattern of articles. Such a frame could flare downwardly so that when drawn up into the frame by the lifting head, the pattern of articles would be brought close together to avoid collisions during transport. Further, the inside surface of the guide may be lined with a resilient material to minimize further the possibility of article breaking collisions.

The abutment **30** engaged by the long leg **32** of the guide **22** is formed by a dead plate **47** which supports the cases as they pass through the packing station. At the upstream end of the case conveyor, the short leg **33** of the guide **22** is engageable with a plate **48** which forms the abutment **31**. The plate extends across the case conveyor and is supported at each end by posts **49** (FIG. 1).

Similarly, at the marshaling station, the abutment **34** is formed by a block **50** which is mounted on the frame of the apparatus and located to one side of the bottle conveyor **16**. The abutment **35** is formed by a tall block **51** which is located at the other side of the bottle conveyor **16**. It will be observed from viewing FIG. 2 that the abutments at the bottle marshaling station are slightly higher than the abutments at the case packing station so as to raise slightly the downward limit of movement of the guide.

Since all guides are mouned on the elongated beam structure **40** the abutments and the legs engaged by the abutments are required to be located only at the extreme ends of the transverse carriage.

Adjustment of the relative position of the guides with respect to the lifting heads may be made simply by substituting shorter or longer vertical rods **26** to vary their length.

THE BOTTLE AND CASE CONVEYORS

The bottle and case conveyors may be those which are conventionally used in marshaling bottles on the one hand and in conveying cases to the known uncasing apparatus on the other hand. Referring to the case conveyor, it is formed of two chains **55** and the supporting plate **47** between the chains. The chains carry vertical lugs **57** which are adapted to engage the trailing end of a case to push it into position. A timing mechanism, not shown, is used to stop the cases at a precise position underneath the transverse carriage **12** so that case cells shown at **58** (FIG. 6) are aligned with the pattern of guide fingers and cups of the lifting and guide assembly. A slightly alternative form of case conveyor could be that disclosed in the Rowekamp Pat. No. 3,185,288.

The bottle marshaling conveyor includes a broad metallic endless belt **60** which runs transversely to the direction of the case conveyor and which brings files of bottles up to individual stops **61** (FIG. 3). The stops are connected to a piston and cylinder **62** which can be operated to move toward the solid line position as viewed in FIG. 3 to relieve the pressure on the bottles after the conveyor belt has been braked. The bottles are marshaled into their individual files by spaced guides **63**. Upstream

of the stops **61** are a series of detector fingers **64** pivoted at **65** and engageable by the bottles as they pass under the detector fingers toward the stops **61**. When each file is filled with the required number of bottles, the bottles will be blocked from further movement by their engagement with the stop **61** in the respective files and in this position, one of the upstream bottles will hold its respective guide finger in an angulated position. In that position, the upper end of the finger, indicated at **66**, will be held out of the path of a beam of light associated with a photoelectric assembly indicated at **67**. The photoelectric assembly is in a circuit which cycles the operation of the apparatus and after a slight time delay (to avoid inadvertent actuation) initiates the cycling operation which includes the braking of the conveyor **16**, the release of the stop **61** and the movement of the transverse carriage.

TRANSVERSE CARRIAGE FOR THE HEAD ASSEMBLY

Referring to FIGS. 7, 8 and 9, the transverse carriage **12** for the head assembly includes two chains **70** passing around upper and lower sprockets **72** and **71**. The upper sprockets are fixed to a shaft **73** journaled at **74** in a supporting frame including two vertical plates **75**. Similarly, the lower sprockets **71** are fixed to a shaft **76** journaled at **77** in the supporting plates **75**. A pinion gear **78** is fixed to the center of the shaft **76** and meshes with a rack **79** which is slidable in ways **80**. The rack **79** is connected to a piston rod **81** which is driven by a double acting piston and cylinder assembly **82**. Thus, as the piston rod **81** reciprocates, it, through the rack **79**, causes the pinion **78** to rotate. The pinion rotates shaft **76** and in turn the sprocket and chain assembly.

The posts **41** which carry the head and guide assembly are fixed at their upper ends to the chains **70**. Specifically, the chains **70** carry blocks **85** to wich a transverse shaft **86** is fixed and the posts **41** are mounted on the blocks **85**. A pantograph linkage **87** is connected to the blocks **85** to assure the proper vertical orientation of the posts **41**. The shaft **86** rides in vertical slots **88** in frame **75** during its vertical descent to provide further assurance of proper alignment in preventing skewing of the posts **41**.

Still further, the posts **41** carry depending spaced arms **89** which form slots **90**. The slots **90** pass over rollers **91** during the descent of the carriage, thereby providing further protection against skewing.

DETAILED DESCRIPTION OF THE OPERATION

A timing mechanism, which is not shown, programs the operation of the carriage **12** by selectively applying fluid pressure to the respective ends of the double-acting cylinder **82** and programs the actuation of the lifting cups by selectively applying and releasing fluid pressure to the lifting cups.

The apparatus, in FIG. 3, is in an intermediate stage in which the empty lifting cups are moving toward the bottles **17** on the conveyor **16**. The movement of the lifting head and guide toward the bottles is caused by the carriage which is in turn operated by the piston **82** driving rack **79** toward the left to rotate the pinion **78**. The pinion in turn rotates shaft **76** to which it is fixed causing the righthand flight of the conveyor chain to move downwardly carrying with it the post **41**. As the posts **41** descend, the legs **32** and **33** of guide **22** engage the abutments **34** and **35** to block further downward movement of the guide as shown in FIG. 4. In this position the guide fingers **24** overlie and are in alignment with a pattern of bottles. Continued downward movement of the support **41** brings the lifting cups **20** into engagement with the necks of the bottles. A lack of precise alignment of the cups with the bottles is compensated for by the flared mouths of the lifting cups coupled with the flexible tubes **21** by which they are supported.

The engagement of the lifting cups with the bottles is illustrated in FIG. 5. In this position, the flexible bladders within the cups are inflated thereby firmly gripping the bottles. When the bottles are firmly gripped, the application of pressure to the cylinder **82** is reversed causing the rack to move toward the right thereby lifting the posts **41** vertically, swinging them over to the case conveyor and lowering them to pack the bottles in the case. During the initial upward movement of the posts **41**, the guide **22** remains fixed upon the abutments **34** and **35** and the lifting cups draw the bottles upwardly within the matrix of transverse and longitudinal members which form the guide. The precise vertical position of the bottles within the guide is not critical but it is important that the bottles be captured or encased within the guide so that they do not bang against one another during transport to the cases.

As the carriage **12** carries the bottles over to the cases on the case conveyor, the guide fingers **24** become aligned with the case cells. During the last portion of the downward movement of the posts **41**, the fingers **24** project slightly into the case cells and thereafter the guide is blocked from further downward movement by the engagement of the legs **32** and **33** with the abutments **30** and **31** (FIG. 6). The lifting head continues moving downwardly to bring the bottles into a position at approximately the bottom of the case whereupon the air pressure to the lifting cups is released (FIG. 7).

The pressure to the conveyor cylinder **82** is reversed causing the posts **41** to move upwardly. As the posts move upwardly, they bring the guide bushings on the lifting heads into engagement with the stops **28** on the rods **26** to carry the guide back to the marshaling position.

Having described my invention, I claim:

1. An apparatus including a case conveyor having means to stop a case in a packing position, and an article conveyor having means to marshal articles in a pattern; a packing mechanism adjacent said conveyors for transferring articles from their conveyor to a case, said mechanism comprising,

a transverse carriage,

means for moving said carriage up, transversely, and down between a pickup position overlying said articles and a release position overlying said case,

a guide carried by said carriage and slidably mounted on said carriage for vertical movement,

a plurality of lifting devices depending from said carriage and aligned with said guide,

an abutment means at said article conveyor engageable by said guide to block its downward movement, thereby permitting said lifting devices to pass through said guide and to pick up articles.

2. Apparatus according to claim **1** further comprising,

a plurality of vertical rods mounted on said guide,

a plurality of bushings mounted on said carriage and slidably receiving said rods,

and stops mounted at the upper ends of said rods whereby as said carriage moves upwardly said bushings slide upwardly with respect to said rods until they engage said stops and thereafter said carriage lifts said guide.

3. Apparatus according to claim **1** further comprising,

abutment means associated with said case conveyor and engageable by said guide to block its downward movement thereby limiting the extent of downward movement of said guide with respect to cases on said case conveyor.

4. Apparatus comprising,

a case conveyor for moving at least one case in a longitudinal direction,

an article conveyor for moving a plurality of bottles in a direction normal to said case conveyor and marshaling them into a pattern,

a carriage movable between said conveyors to lift articles vertically from their conveyor and to deposit them verticaly into a case, said carriage including,

a lifting head having downwardly depending devices for gripping said articles,

a guide supported for vertical movement on said lifting head and aligned with said gripping devices to permit said devices to hold said articles within the confines of said guide,

an abutment means associated with the case conveyor and article conveyor respectively, said abutment means being engageable by said guide to limit the downward extent of its movement while said carriage with its lifting head continues its downwad movement.

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U.S. Cl. X.R.

53—247