United States Patent [19]

Armbruster et al.

[11] **3,893,282**

[45] **July 8, 1975**

[54] **ARTICLE PACKER APPARATUS**

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[52] U.S. Cl. **53/252;** 53/164

[51] **Int. Cl.** **B65b 35/44**

[58] **Field of Search** 53/164, 249, 250, 251, 53/252

[56] **References Cited**

UNITED STATES PATENTS

2,909,016	10/1959	Sherrill	53/250 X
3,846,959	11/1974	Good	53/252 X

Primary Examiner—Travis S. McGehee

Attorney, Agent, or Firm—Wegner, Stellman, McCord, Wiles & Wood

[57] **ABSTRACT**

An article packer apparatus for arranging groups of articles in series including a conveyor for moving articles to a packing station, a locator for successively segregating the articles and simultaneously transferring the articles to the packing station, a conveyor at the packing station for conveying receivers such as cans, boxes and the like into article receiving position, means for retaining the receivers in preselected patterns at the packing station in position for receiving the articles, transfer means for transferring the articles successively to the receivers at the station and means for moving the locator means at a speed faster than that of the article conveyor to clear the conveyor successively of articles adjacent to the packing station and thereby provide space for the next group of articles.

11 Claims, 7 Drawing Figures

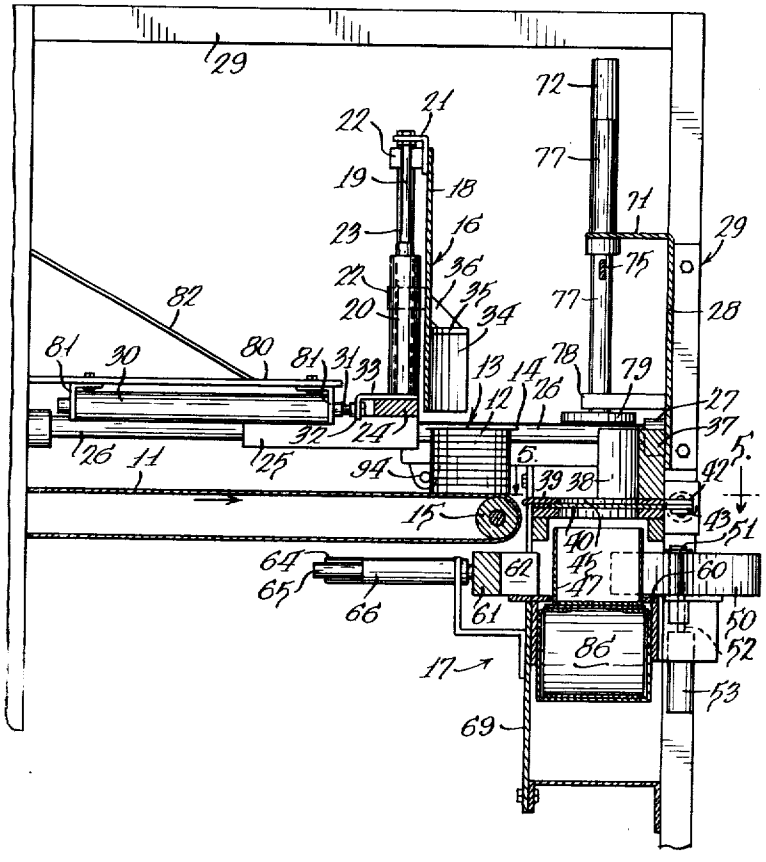


Fig. 1.

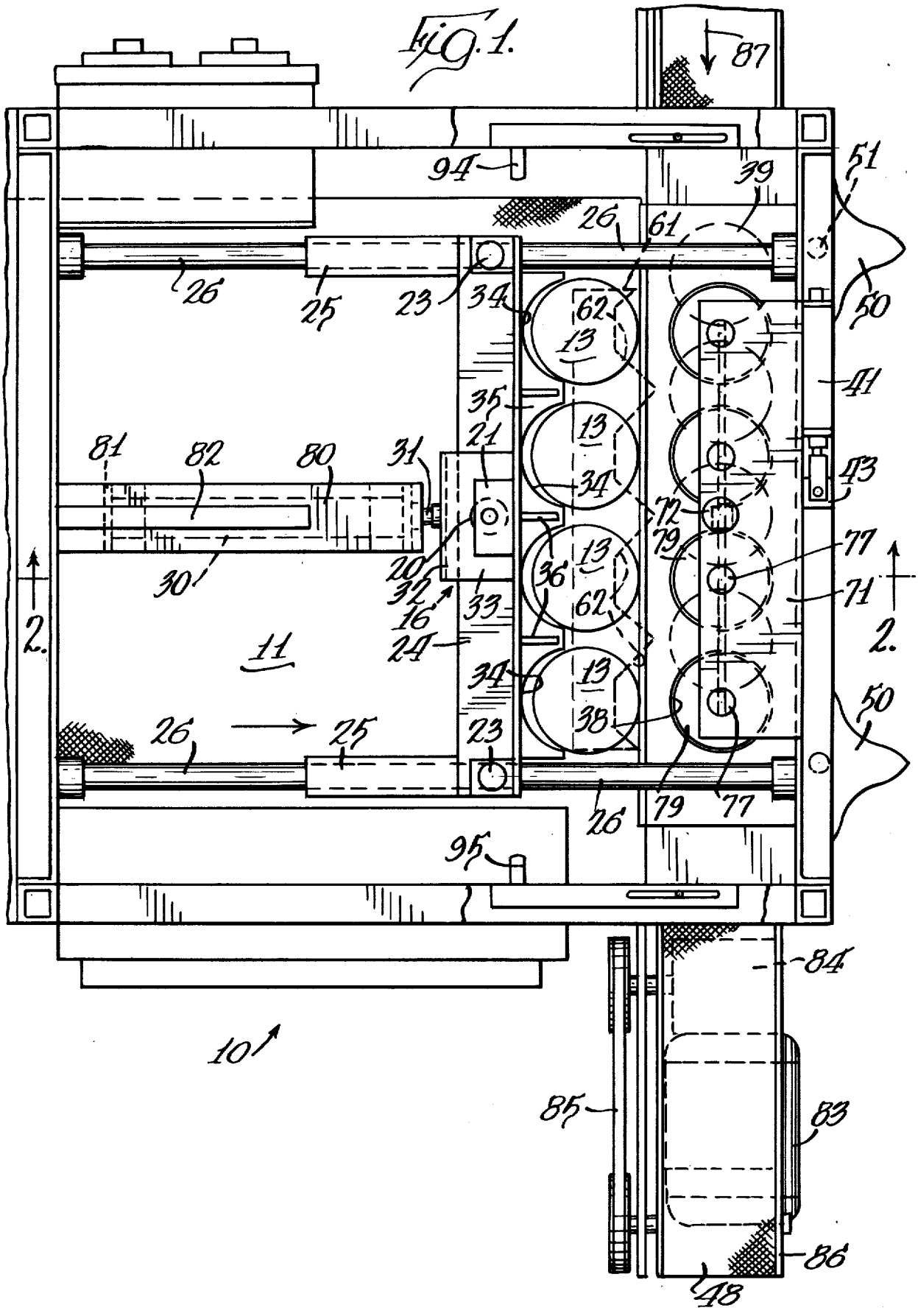

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Fig. 2.

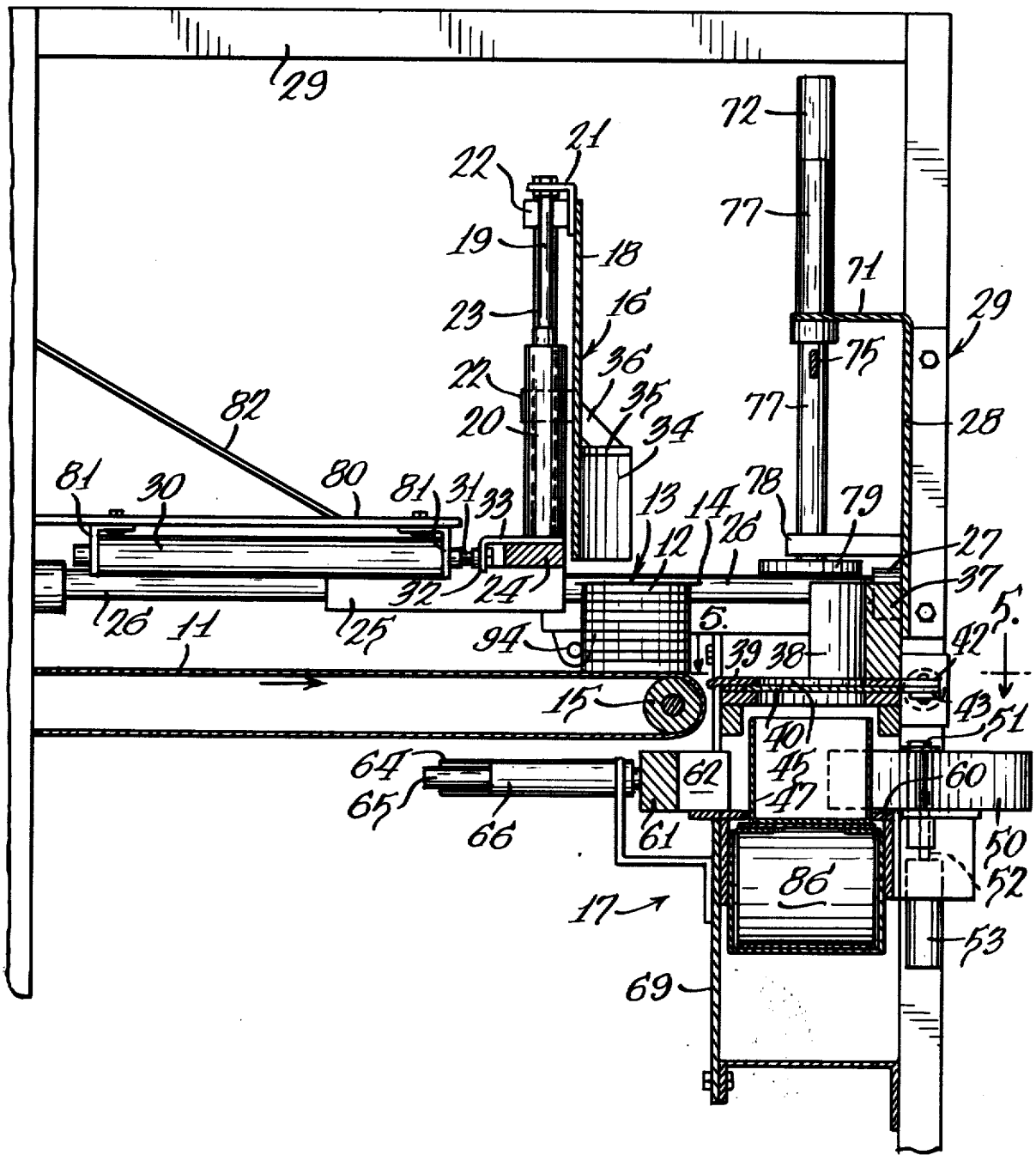

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Fig. 3.

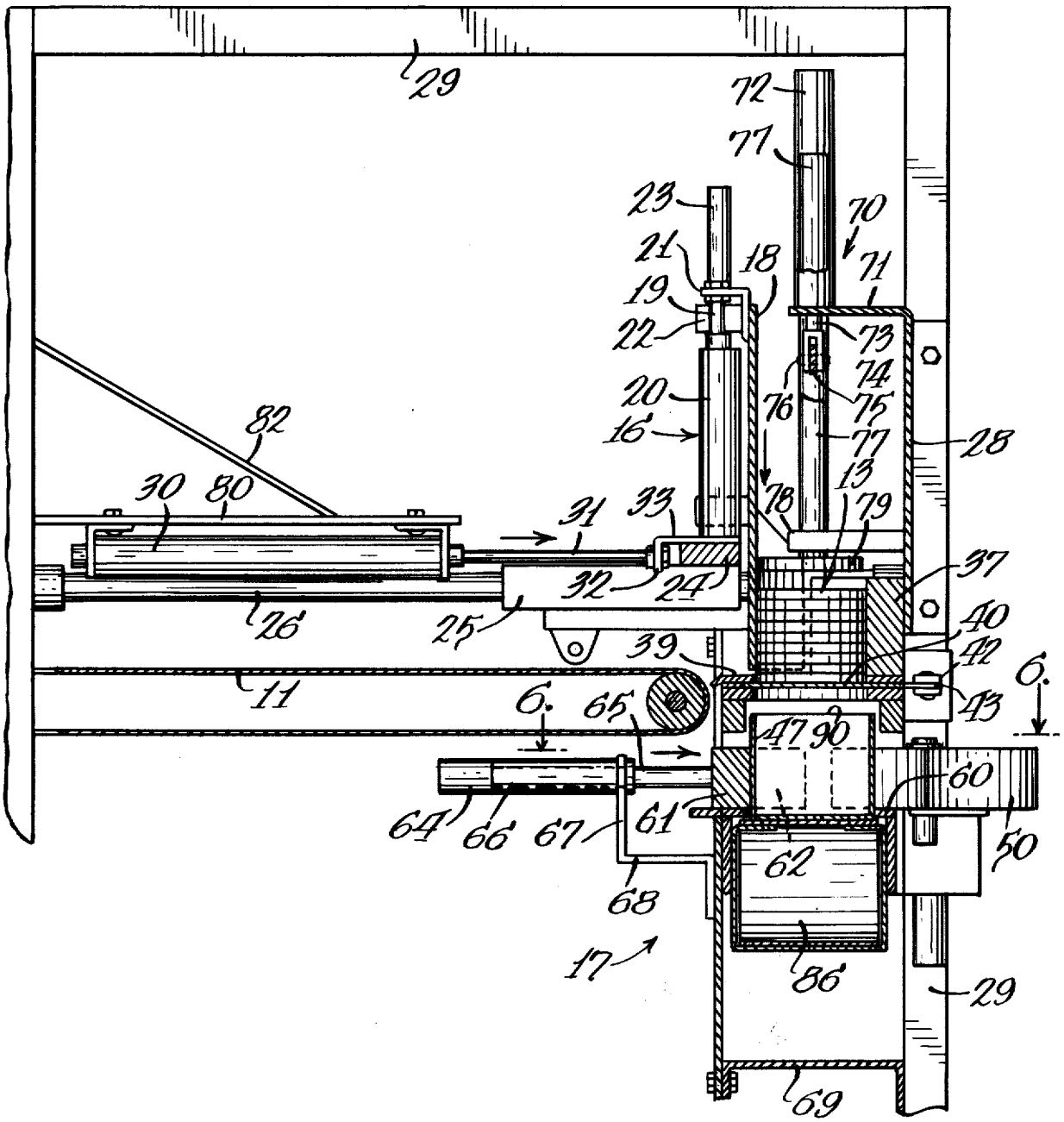

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Fig. 4.

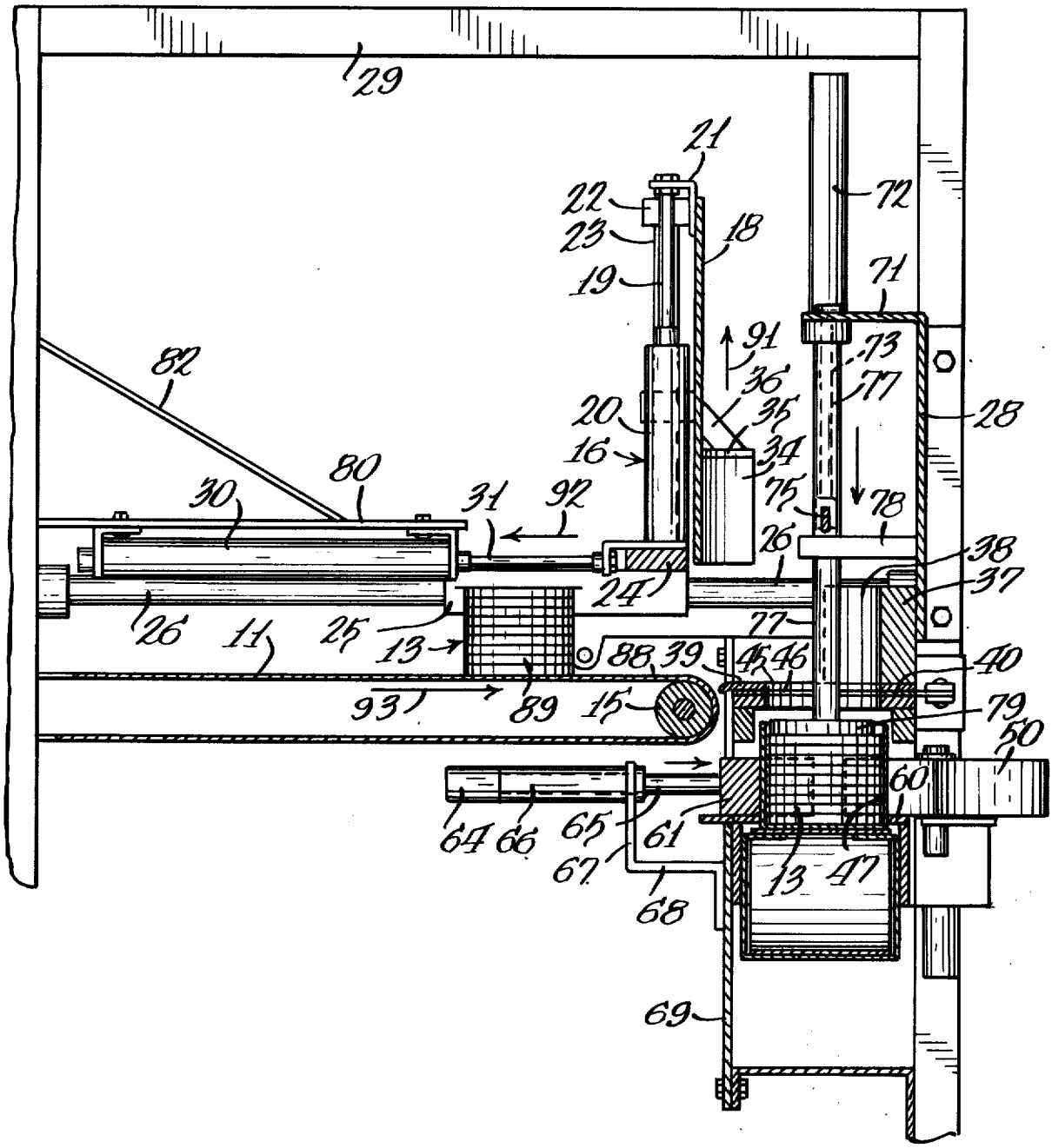

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Fig. 5.

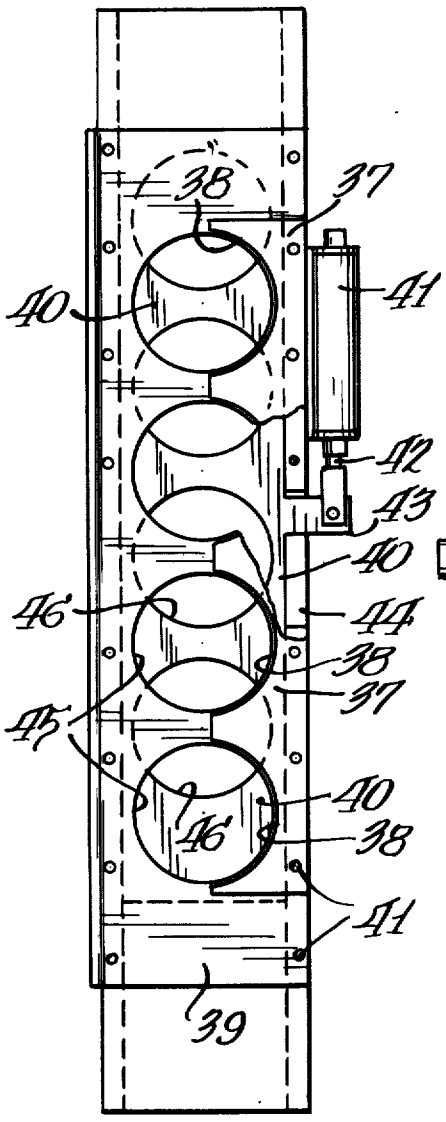


Fig. 6.

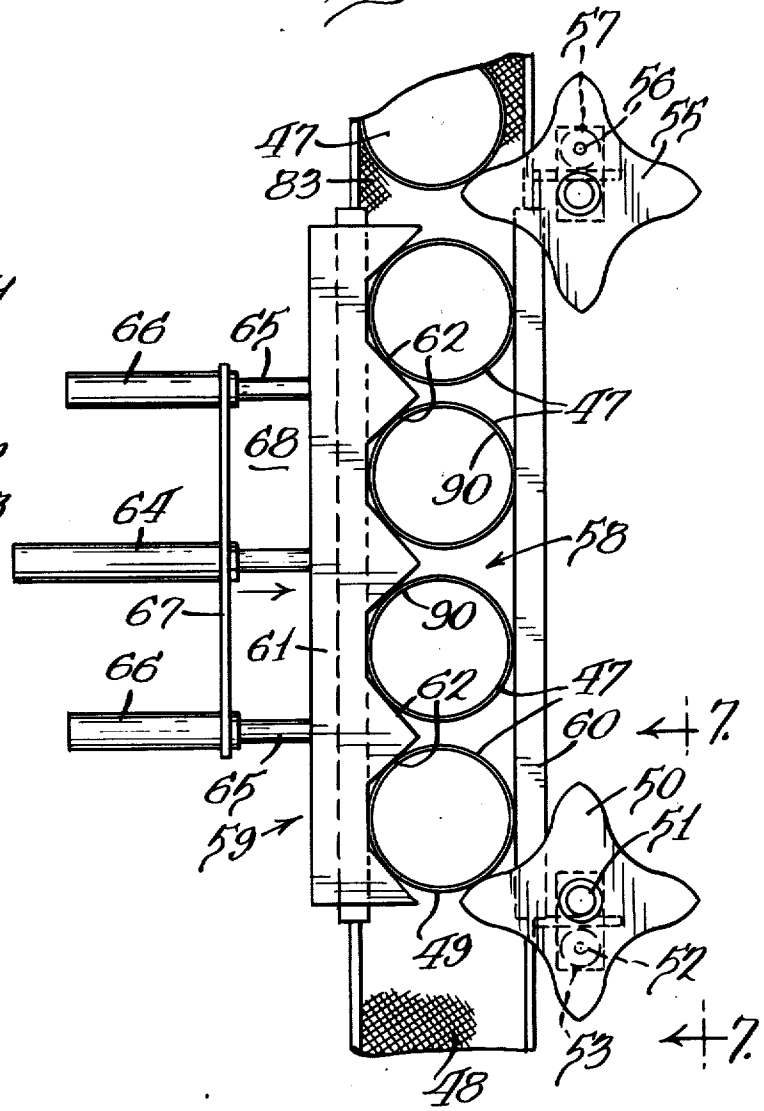
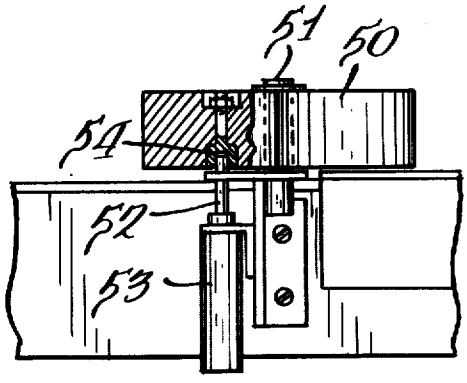


Fig. 7.



ARTICLE PACKER APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to an apparatus for packing groups of articles such as stacks of food patties into receivers such as boxes, cans or the like automatically and rapidly so that the articles are removed and packed as fast as they are formed.

The most pertinent prior art of which applicant is aware but which does not disclose the features of this invention are prior U.S. Pat. Nos. **2,718,993, 3,431,702** and **3,673,756.**

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a fragmentary plan view of an article packer apparatus embodying the invention.

FIG. **2** is a vertical sectional view taken substantially along line **2—2** of FIG. **1** and illustrating an initial step in the operation of the apparatus.

FIG. **3** is a view similar to FIG. **2** and illustrating the next step in the operation of the apparatus.

FIG. **4** is a view similar to FIG. **3** and illustrating the next step in the operation of the apparatus.

FIG. **5** is a horizontal sectional view taken substantially along line **5—5** of FIG. **2.**

FIG. **6** is a view similar to FIG. **5** but taken substantially along line **6—6** of FIG. **3.**

FIG. **7** is a fragmentary side elevational view partially broken away and taken substantially along line **7—7** of FIG. **6.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings illustrate one embodiment of the invention and specifically a packer apparatus for packing stacks of freshly formed ground meat patties having their sides aligned so that the stack is in the shape of a cylinder and in this embodiment the stacks are in groups of four aligned transversely to the patty forming apparatus. The successive steps in the operation of the apparatus are illustrated by the successive views of FIGS. **2, 3** and **4.**

The article packer apparatus **10** of this invention comprises an article conveyor **11** which is part of a patty machine which may be a conventional machine that arranges individual patties **12** in vertical stacks **13** transversely to the conveyor **11** with each vertically adjacent pair of patties in a stack being separated by a conventional separator paper of which only one **14** is shown for illustrative purposes although it is understood that conventionally each adjacent pair of patties in the stack will be separated by a separator sheet.

In the illustrated embodiment the conveyor belt **11** carries the stacks of patties in groups of four in aligned rows extending transversely across the belt **11.** It is to be understood that the stacks will be in successive transverse rows so that the patties are arranged in stacks in groups of four stacks as they come from the patty forming machine which feeds the formed patties to the belt **11.** Such patty machines are well known in the art and are illustrated in U.S. Pat. No. **3,654,665** as well as other patents.

The conveyor belt **11** for the stacks of patties **13** operates to convey them from the patty former and the forward end of the belt passes over a roller **15.** Located adjacent to this forward end of the belt **11** is a locator **16** which is operable for successively segregating the groups of articles, here the four stacks **13** of transversely aligned patties, and simultaneously transferring the assembly to a packing station **17** which is adjacent to and generally opposite the forward reach of the conveyor **11** as defined by the return roller **15.**

The locator which successively segregates the groups of articles, here the transversely aligned rows, and transfers these articles to the packing station **17** comprises a vertical plate **18** that is mounted on the top end of a vertical piston **19** that is moved in a vertical path by a compressed air cylinder **20** of conventional construction.

The top edges of the vertical plate **18** on opposite sides of the piston **19** and bracket **21** are each attached to a slide block **22** which is slidably mounted on a vertical rod **23** so as to guide the vertical movement of the plate **19.**

The bottom end of each rod **23** is attached to a cross bar **24** which extends transversely of the conveyor **11** and whose opposite ends are mounted on an elongated cylindrical slide **25** each of which is mounted on a longitudinal rod **26.** The rods **26** therefore are parallel to each other, are located adjacent to but above the opposite sides of the conveyor belt **11** and extend forwardly with their forward ends held in mounting blocks **27** secured to a vertical plate **28** that forms a forward end of the framework **29** of the article packer apparatus.

With this arrangement the entire locator **16** is movable longitudinally parallel to the direction of movement of the conveyor **11** and transversely to the groups of patty stacks **13.** In order to cause this longitudinal movement the cross bar **24** which serves as the mounting for the vertical plate **19** is moved forwardly and rearwardly, or to the right and left as viewed in FIGS. **2–4,** by a compressed air cylinder **30** of conventional construction and similar to the previously described cylinder **20.** The piston **31** of this air cylinder **30** is attached to the vertical leg **32** of a mounting bracket **33** that is attached to the cross bar **24** at substantially the center thereof.

The locator **16** is provided with arcuate pushers **34** positioned side-by-side across the bottom of the vertical plate **18** and spaced correspondingly to the stacks **13** of patties **12** as illustrated in FIG. **1.** Each of the pushers **34** extend beneath a horizontal cross bar **35** that is mounted on the forward side of the vertical plate **18** and sturdily attached thereto by spaced reinforcements **36.** As can be seen in FIG. **1** each of the arcuate pusher surfaces **34** is located immediately behind a corresponding stack **13** of patties.

Located forwardly, or to the right in the illustrated embodiment, of the locator **16** is the packing station **17** which comprises a vertical positioner block **37** having four transversely aligned vertical arcuate surfaces **38** that are similar to the locator surfaces **34** so that when the four stacks are moved to the position illustrated in FIG. **3** each stack **13** will be retained between the facing arcuate surfaces **34** and **38** so as to be held in proper lateral and longitudinal position for proper packing.

Immediately in front of the positioner block **37** is a "trap door" construction that comprises a pair of superimposed elongated plates **39** and **40** with the top plate being fixed in position as by spaced mounting screws **41** (FIG. **5**) and the lower plate **40** being horizontally movable relative to the top plate **39** as by means of a customary air cylinder **41** whose piston **42**

is attached to a transversely extending tab **43** that forms a part of the lower plate **40.**

Each of the top and bottom plates **39** and **40** is provided with an opening **45** and **46** that is slightly larger in diameter than the diameter of the stack **13** of patties. When the plates are in the relative positions of FIG. **5** the openings **45** and **46** are out of alignment with each other to produce the trap door effect so that the pair of plates retain the stacks **13** of patties on them as illustrated in FIG. **3.** However, when the air cylinder **41** operating through the tab **43** slides the bottom plate **40** relative to the top plate **39** the openings **45** and **46** become aligned so that the stacks **13** can drop through the aligned openings from the transversely aligned passages of FIG. **3** to the bottommost position in FIG. **4** during the packing operation to be explained in more detail hereinafter.

In the illustrated embodiment the groups of articles which are illustrated by the four transverse stacks **13** of individual patties **12** are loaded into receivers which in this embodiment are individual cans each receiving a stack **13.** It is of course obvious that two or more articles such as two or more of the stacks **13** may be received in a single receiver such as an elongated box, if desired, without departing from the invention.

In the illustrated embodiment the open topped cans **47** are transported into the packing station **17** on a continuously operating conveyor belt **48.** The cans are positioned in groups of four as illustrated in FIG. **6** immediately beneath the transversely aligned groups **13** of patties **12** which have been properly located by the locator **16** which includes the positioner block **37.** Thus the receivers, here the cans **47,** are retained in groups of four by the leading can **49** of the group of four contacting a star wheel **50** having four points. This star wheel is rotatable about a vertical axle **51** but is held against rotation during the positioning and loading of the cans **47** by means of a vertical piston **52** projected upwardly by means of its air cylinder **53** to engage a socket **54** in the bottom of the star wheel **50** as illustrated in FIG. **7.** The opposite end of the group of four cans **47** is defined by a similar star wheel **55** also having four points and which is rotated in a counterclockwise direction as viewed in FIG. **6** by the entering cans **47.** As soon as the four cans have been assembled, however, as shown in FIG. **6** this star wheel **55** is also locked against rotation by a similar piston **56** and air cylinder **57** that are similar in construction and operation to the piston **52** and cylinder **53** of the opposite wheel **50.** This wheel **55** when locked in position as described prevents additional cans **47** from entering the filling station **58** where the four preceding cans **47** are located in the manner previously described. If desired, either of the wheels **50** or **55** may also be used to operate a counter as each rotates a full **360°** for each group of four cans.

In order to retain the receivers or cans **47** in proper loading position there are provided retaining means which securely lock each can in proper position both laterally and longitudinally for receiving the groups **13** of patties. In the illustrated embodiment this retaining means or receiver lock **59** (FIG. **6**) comprises a transversely extending base bar **60** against which the receivers or cans **47** are held in a horizontally movable clamp bar **61** that is provided with four sockets **62** defined by angular sides each of which is adapted to embrace the side of a can **47** opposite the base bar **60** so as to retain the can in position.

The clamp bar **61** is horizontally movable by being attached at about its midpoint to a horizontal piston **63** of a horizontal air cylinder **64.** In order to provide stability the clamp bar **61** is also provided with a pair of guide rails **65** that are parallel to each other and to the piston **63** and that are horizontally slidable in cylinders **66.** These cylinders **66** are mounted on the opposite ends of a horizontal strap **67** that is essentially parallel to the clamp bar **61** with this strap comprising the vertical upper part of a mounting bracket **68** that is attached to a frame part **69** of the apparatus.

In order to press the stacks **13** of patties firmly into the cans **47** despite the resistance of the separator sheets **14** previously described there are provided a loader piston assembly **70** that forms the top part of the packing station **17.**

This loader piston assembly comprises the horizontal top flange **71** forming a part of the mounting plate **28** and having attached thereto an upwardly extending air cylinder **72** at about the midpoint of the flange **71** and with this air cylinder being provided with the customary movable piston **73.** This piston **73** is provided on its lower end with an inverted U-shaped bracket **74** (FIG. **3**) that embraces the sides of a horizontal bar **75.** This bar is loosely mounted on the bracket **74** by means of a transverse piston **76.** Spaced along this horizontal bar **75** are vertical loader pistons **77** that include vertical shafts guided for vertical movement by slidably engaging the top flange **71** of the plate **28** and a lower horizontal flange **78** that is mounted on the plate **28.**

The bottom of each loader piston **77** is provided with a pusher plate **79** each of which is adapted to contact the top of a stack **13** of patties and force the stack downwardly into its can **47** against the usual resistance including the paper separator sheets **14.** In its bottommost position each pusher plate **79** is slightly within the top of its can **47** at the bottom of the movement of the pusher assembly as illustrated in FIG. **4.**

The air cylinder **30** that with its piston **31** moves the arcuate pushers **34** forwardly or to the right from the position in FIGS. **1** and **2** to the loading position of FIG. **3** is mounted on a support strap **80** between a pair of end flanges **81** and this strap and the attached cylinder are held in the horizontal position shown by an angled brace **82.**

In order to move the receivers here illustrated by the cans **47** forwardly there is provided the continuously operating can conveyor belt **48** which is operated by an electric motor **83** through a gear reducer **84** and a belt drive **85.** The gear reducer **83** serves to reduce the speed of rotation to rotate an end roller **86** over which the belt **48** passes with the belt moving in the direction indicated by the arrow **87** of FIG. **1.**

In order to move the sets of receivers **47,** here shown as four, into the receiving station **58** the downstream star wheel **50** is latched against rotation by its piston **52** being in the locked position illustrated in FIG. **7.** This first wheel **50** therefore acts as a stop with the other star wheel **55** having its piston **56** retracted being rotated in a counterclockwise direction in FIG. **6** by the oncoming cans **47.** Thus this second star wheel **55** can also function as a counter, if desired.

As soon as the required number of receivers or cans which in the illustrated embodiment are four in number reach the filling station area **58** between the two star

wheels the upstream wheel **55** is latched against rotation in the manner previously described so as to block the next entering can which is the one shown in FIG. **6** in engagement with the upstream star wheel **55.**

The operation of the article packer apparatus is as follows. The specific embodiment articles, the patties **13,** come from the patty machine (not shown) in the manner described in the above U.S. Pat. No. **3,654,665** in four transverse stacks **13** and with each movement of the stacks of patties being separated from the next succeeding movement which is not shown here for simplicity of illustration by a relatively short distance that is still enough for the locator **16** to enter between the rows of patties and engage the leading row as illustrated in FIG. **2.** The conveyor **11** transports the rows of patty stacks **13** from the patty machine. When the leading row of stacks **13** has reached the position shown in FIG. **2** the air cylinder **20** is energized with compressed air to lower the piston **19** which operates through the bracket **21** and the guide rails **23** to lower the arcuate pushers **35** at the bottom of the vertical plate **18** to a position behind the transverse rows of patty stacks **13** or to the position shown in FIG. **2.**

Next the air cylinder **30** is energized by being placed in communication with a source (not shown) of compressed air to extend the cylinder piston **31** forwardly or to the position of FIG. **3** from the position of FIG. **2.** This forward movement of the piston **31** as well as the downward movement of the previously described piston **19** is at a linear rate greater than the rate of movement of the conveyor belt **11** carrying the stacks of patties from the machine. This greater linear rate is provided in order that the forward end **88** of the conveyor belt **11** will be cleared prior to the approach of the next row **89** of stacks **13** as illustrated in FIG. **4.**

The forward movement of the piston **31** and thus the locator **16** to the position of FIG. **3** slides the forwardmost row of stacks **13** onto the trap door plate **39** which is fixed in position with the cooperating plate **40** being retracted to the position shown in FIG. **5** where the openings **45** and **46** in the superimposed plates are out of registry as previously described.

In the meantime, the moving belt **48** has moved the four sets of cans to the loading position shown in FIG. **6** where their open tops **90** are generally beneath the four forwardmost stacks **13** of patties **12.**

Next the air cylinder **64** is energized with compressed air so that the armature **63** in cooperation with the side guide rods **65** move the clamp bar **61** forwardly so that the four angular sockets **62** not only center each can **47** with its open top **80** beneath the corresponding stack **13** of patties but also clamps the cans **47** immovably against the opposite base bar **60** so that the cans cannot move in any direction in spite of the fact that during the entire operation the conveyor belt **48** continues to rotate. For this reason the surface of the belt is treated with any of the customary low friction surfacing materials.

With the cans properly centered, as described beneath the four stacks the air cylinder **41** is energized with compressed air to move its piston **42** to extended position or toward the bottom of FIG. **5** so that the openings **45** and **46** in the superimposed plates **39** and **40** coincide with each other. Because of the locator **16** operating in conjunction with the arcuate surfaces **38** of the positioner block **37** the stacks **13** are held against lateral movement in the proper position to pass downwardly through the aligned openings **45** and **46** in the manner illustrated in FIG. **4** into the respective cans **47.** In order to insure that this downward movement of the articles into the receivers or cans is complete, rapid and positive even when the articles are stacks of patties with separator paper between the air cylinder **72** is energized with compressed air to force its piston **73** downwardly and by operating through the yoke bracket **74** and the cross bar **75** on the pistons **77** each stack **13** is pressed downwardly into its receiver or can by its pusher plates **79** and their respective stacks **13** of patties are forced downwardly by a combination of gravity and compressed air acting through the air cylinder **72** to move the patties from their external position of FIG. **3** downwardly to the can **47** filled position of FIG. **4.**

As soon as this has been accomplished the following operations occur. The air cylinder **72** is again energized with compressed air but in the opposite direction to lift the pusher plates **79** from the stacks **13** of patties within the cans **47.** The star wheels **50** and **55** are released by lowering their locking pistons **52** to release the sockets **54** and the clamp bar **61** is moved to release position or to the left as shown in FIG. **6.** This releases the filled cans **47** in the filling or loading station **58** so that the continuously operating conveyor belt **48** can carry the four filled cans away and move four succeeding cans into position as previously described.

When the pusher plates **78** have been returned to their raised positions as illustrated in FIG. **2** through the action of their operating air cylinder **72** the air cylinder **41** (FIG. **5**) is re-energized to move its piston **42** to the retracted position of FIG. **1** so that the openings **45** and **46** are again out of register as shown in FIG. **5** preparatory to receiving the next row of patties.

Then in order to move and load the next transverse row **89** of patty stacks **13** the arcuate pushers **34** moved from the lowered position of FIG. **3** to the raised position of FIG. **4** by energizing the air cylinder **20** for movement of the piston **19** in attached plate **18** upwardly as indicated by the arrow **91** of FIG. **4.**

When the pushers **34** are in their elevated position of FIG. **4** so as to clear the top of the next succeeding row **89** of patty stacks **13** the horizontal air cylinder **30** is again energized with compressed air to move its piston **31** in the opposite direction or to retracted position as indicated by the arrow **92** in FIG. **4.** In the meantime the conveyor belt **11** moves the next row of patties **89** forwardly as shown by the arrow **93** of FIG. **4.**

Once this next row **89** of patties has reached the forward position illustrated by the stacks **13** of patties in FIG. **2** the operation is repeated to load this now forwardmost row **89** into the succeeding set of four cans in the same manner as just described.

As can be seen from the above description of one embodiment of the invention and its operation the article packer apparatus of this invention has a number of very important advantages. Thus it operates continuously and at high speed and automatically to load successive receivers which are transported into and out of the filling or loading station automatically. In order to provide for this automatic operation the illustrated embodiment includes an electric eye control which functions in the customary manner to project a beam of light from the eye **94** transversely to an electric eye receiver **95** so that the interrupting of this light beam by the advancing transverse rows of articles or stacks **13** ener-

gizes the various operating elements of the system but permits it to stop automatically when there are no articles to be loaded. This automatic control by advancing articles such as the articles **13** interrupting a light beam is conventional and widely described in the art of automatic controls.

The apparatus of this invention has the advantage of moving the article receivers which in the illustrated embodiment are individual cans **47** for an individual stack **13** into position and retains them in position during the loading operation. Although in this embodiment there is one stack loaded into one receiver, it is obvious that the apparatus with very slight modifications can be used to load a plurality of stacks into a single receiver such as by loading the four stacks illustrated into a single receiving box. The important factor is that regardless of the character of the articles or the character of the receiver this apparatus is readily adaptable to, first, hold the receivers in proper position, second, hold the articles in proper loading position and, third, load the articles into the receivers by a positive force action during which both the receivers and the articles are completely controlled in their movement during all stages. An additional advantage is that once the articles have been properly loaded into the receivers, then the loaded receivers are automatically removed from loading position and the next receiver or groups of receivers is automatically moved into loading position.

Having described our invention as related to the embodiment shown in the accompanying drawings, it is our intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the appended claims.

We claim:

1. An article packer apparatus, comprising: a continuously operating article conveyor for moving said articles to a packing station; locator means for successively segregating said moving articles and simultaneously transferring said segregated articles to said packing station; receiver conveying means at said station for moving article receivers into article receiving position; means for retaining said receivers stationary in preselected patterns at said station for receiving said articles; transfer means for transferring said segregated articles successively to said receivers at said station; and means for moving said locator means at a rate of speed faster than that of said conveyor to clear the conveyor successively of articles adjacent to said packing station and provide space for the next said articles during said packing.

2. The apparatus of claim **1** wherein said locator means successively segregates said articles in preselected groupings corresponding to said articles patterns and maintains said groupings at said packing station.

3. The apparatus of claim **1** wherein said means for moving said locator means provides four successive motions, a first of which moves the locator means into position for said segregating, another of which moves said segregated articles to said packing station, a third of which moves said locator means away from said segregated articles and a fourth of which returns said locator means to an initial position preparatory to segregating the next articles.

4. The apparatus of claim **3** wherein said locator means is normally positioned above said article conveyor and the articles thereon prior to said first motion.

5. The apparatus of claim **1** wherein said receiver conveying means operates continuously in contact with said stationary receivers at said packing station.

6. The apparatus of claim **1** wherein there are provided stop means for stopping the movement of said receivers at said packing station and locking means for locking each said receiver in a preselected position corresponding to the position of said segregated articles at the packing station.

7. The apparatus of claim **6** wherein said locking means comprises a movable clamp member and means for operating said clamp member intermittently to lock said receivers in position during said transfer of articles to said receivers.

8. The apparatus of claim **1** wherein there are provided at said packing station a movable trap door means on which said segregated articles are retained during the moving of said article receivers into receiving position and means for opening said trap door means to transfer the articles into said receivers.

9. The apparatus of claim **8** wherein said trap door means comprises a fixed plate having article passing openings and a movable plate having article receiving openings out of register with said openings in the first plate and said moving means moves the openings in both said plates into coinciding cooperation.

10. The apparatus of claim **1** wherein said retaining means retain said receivers at said packing station beneath the corresponding segregated articles and said transfer means comprises force operated members for forcing said articles into said receiver at the packing station.

11. The apparatus of claim **1** wherein said receiver conveying means and said means for retaining said receivers in preselected pattern are located beneath said segregated articles at the packing station and said transfer means operates in conjunction with gravity to transfer said articles downwardly to the receivers at the packing station.

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