March 9, 1971 J. W. KING ET AL 3,568,393

CAN PACKAGING METHOD AND APPARATUS

Filed Feb. 24, 1969 5 Sheets-Sheet 1

Fig. 1

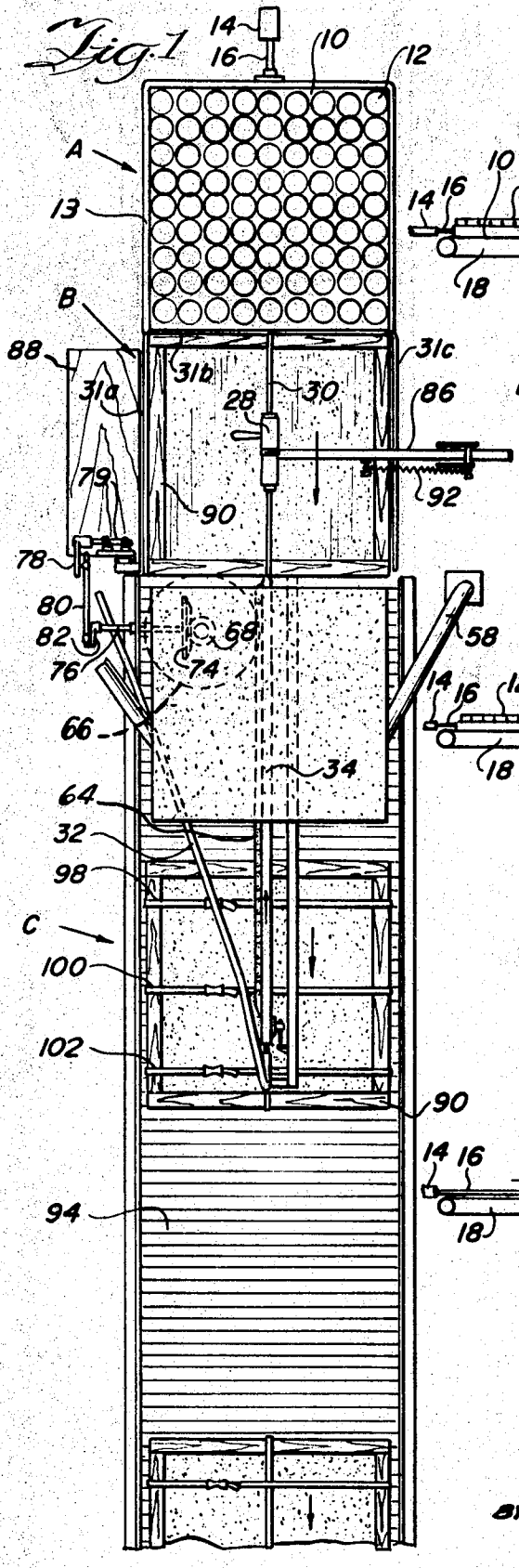


Fig. 2

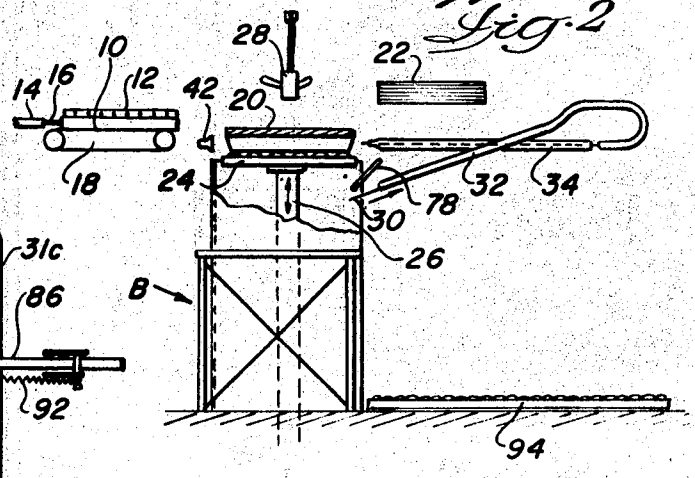


Fig. 3

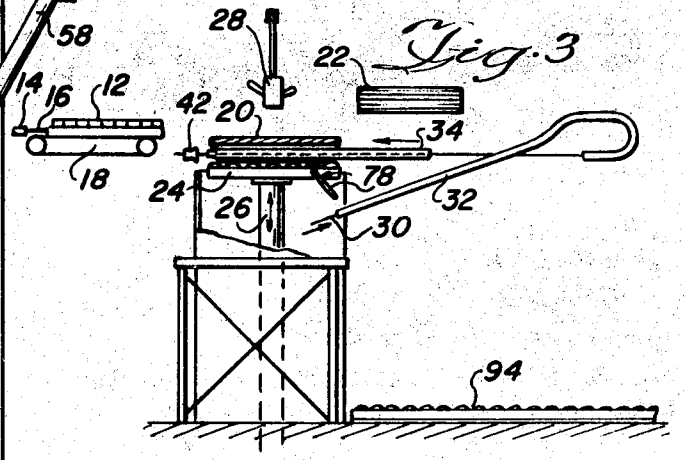
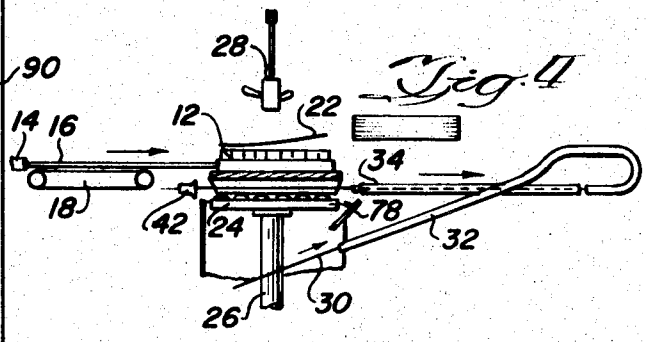


Fig. 4



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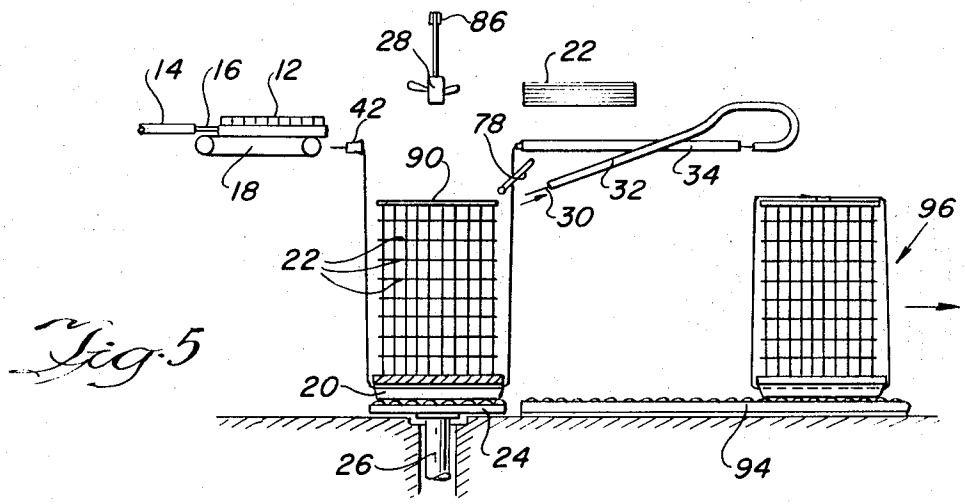


Fig. 5

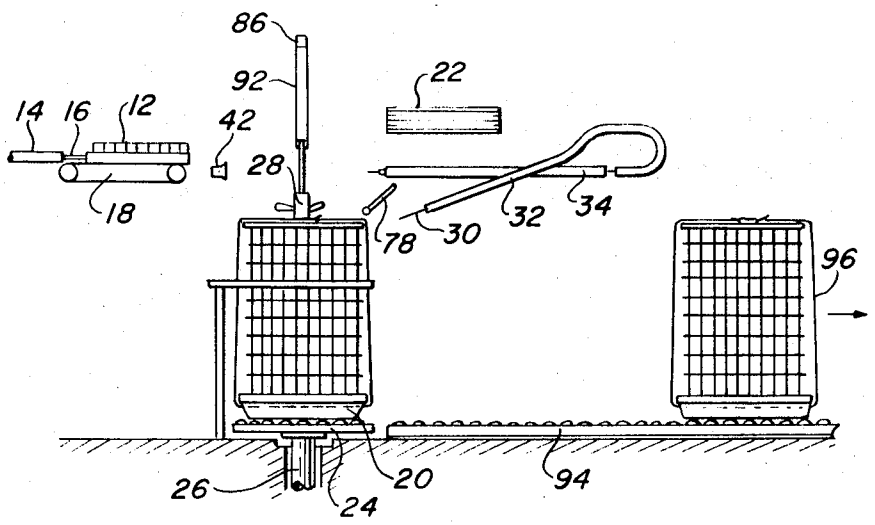


Fig. 6

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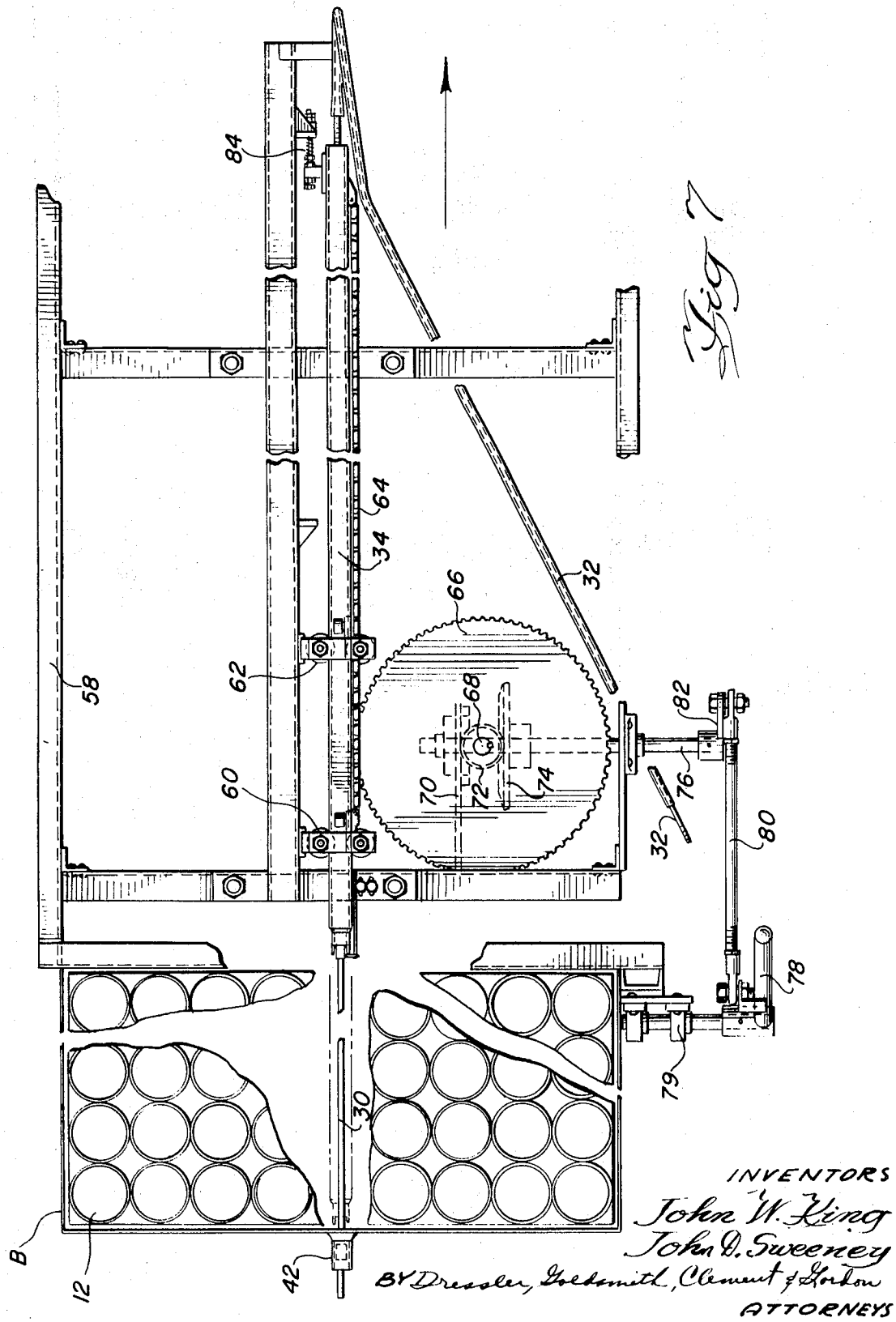


Fig 7

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CAN PACKAGING METHOD AND APPARATUS

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Fig. 8

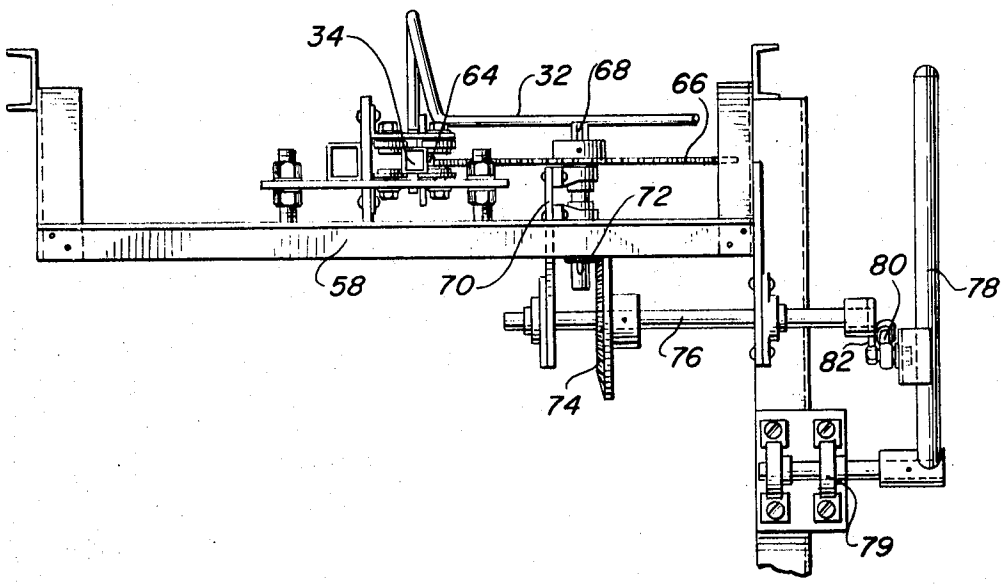
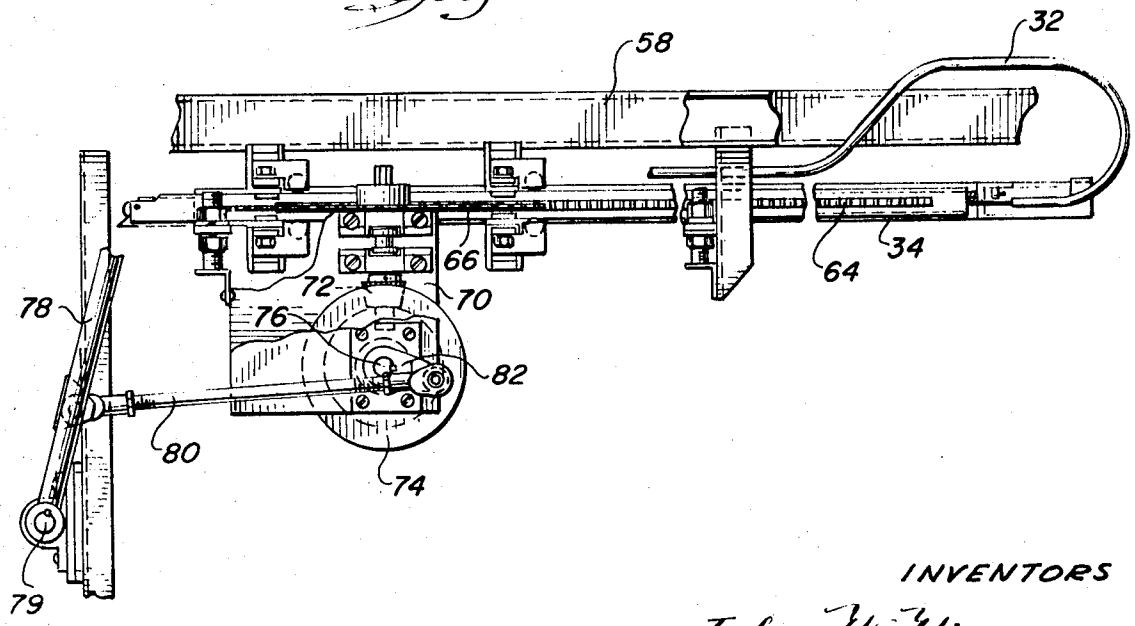


Fig. 9



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CAN PACKAGING METHOD AND APPARATUS

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Fig. 10

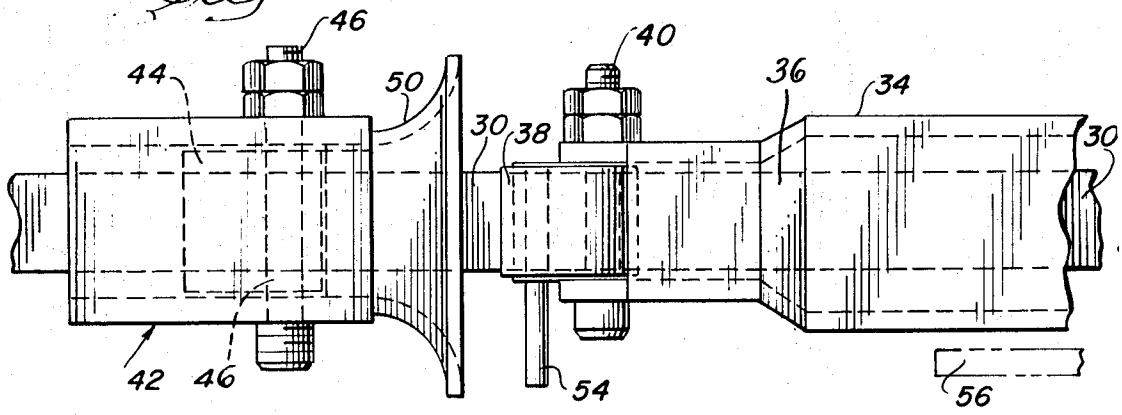
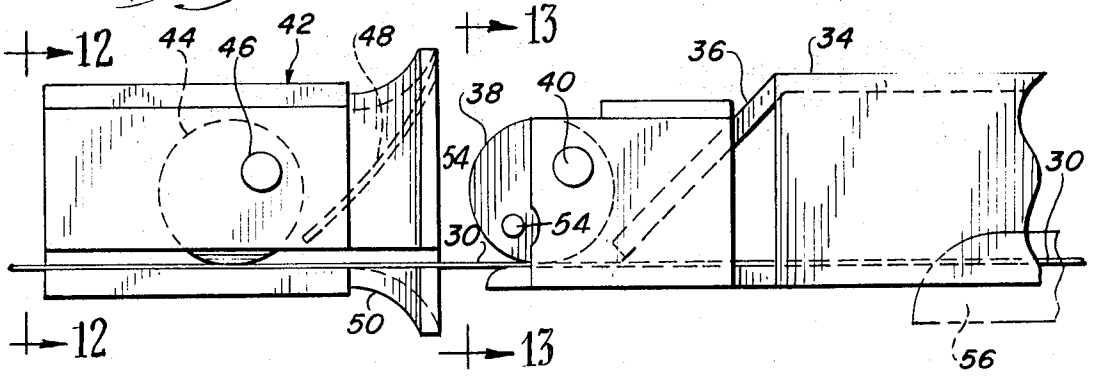


Fig. 11



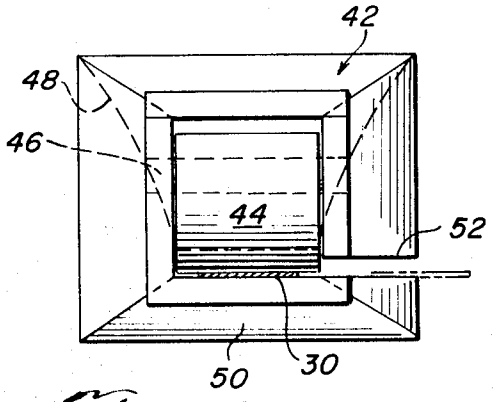


Fig. 12

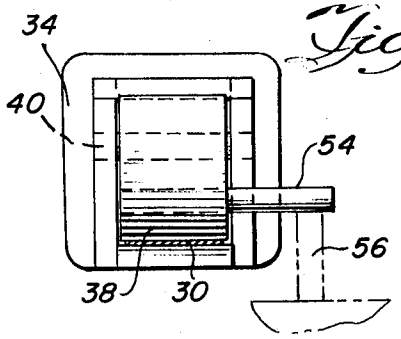


Fig. 13

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United States Patent Office 3,568,393 Patented Mar. 9, 1971

3,568,393

CAN PACKAGING METHOD AND APPARATUS

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Filed Feb. 24, 1969, Ser. No. 801,525
Int. Cl. B65b 13/04, 35/50; B65d 63/16
U.S. Cl. 53—3 8 Claims

ABSTRACT OF THE DISCLOSURE

An apparatus and a process for insuring that the open-ended cans that are loaded onto a pallet in layers within a palletizer maintain their proper position thereon as the loaded pallet is moved to a strapping station where the cans are moved securely affixed in place.

To insure that the cans will not move out of alignment during movement of the loaded pallet between the palletizer and the final strapping station, the stacks of cans are strapped to the pallet within the palletizer. Before the pallet is loaded in the palletizer, a strap is directed under the pallet into a clamping apparatus which will hold the strap in position relative to the pallet as the pallet is being loaded with layers of cans. After the strap is so positioned, the strap feeder or chute used to direct the strap under the pallet into a holding mechanism is withdrawn to permit the loaded pallet to be retracted and accept additional layers of cans, during which time, strap is payed out from a supply source. The strap is then disposed completely around the loaded pallet, after which it is tensioned and secured in position.

BACKGROUND OF THE INVENTION

Empty, open-top cans currently are palletized in palletizers of the type shown in U.S. Pat. 3,166,203, which is assigned to the assignee of the present invention. In such palletizers, the cans are placed in layers on a pallet and then the loaded pallet is moved along a strapping station, where the cans are secured in place on the pallet. Heretofore, no means have been provided for retaining the cans in position while the cans are moved from the palletizer to the strapping station. Such an arrangement is subject to the deficiency that during the transport of the loaded pallet from the palletizer to the strapping station, the cans loaded on the pallet may become jarred and moved out of the alignment in which they were placed during the palletizing operation. It can be readily appreciated that when dealing with empty cans, the possibility exists that if an outside vertical row of cans ends up substantially out of line, an erratic column could be formed which would tend to buckle during the subsequent strapping operation. If this were to take place, or if individual cans at preipheral locations of the above described pallet load become mispositioned so as to project substantially outward from their position of their column, the straps disposed around the loaded pallet when tensioned would tend to bend the lips of the cans subjected to the buckling force and prevent accurate capping of the cans after they are filled.

It is not uncommon in installations where cans are palletized to provide an operator located adjacent the palletizer to visually observe the stacks of cans and by means of a stick or some other guide member act to move the cans back into position before they are strapped to prevent bending of the can lips. It is obvious that such a situation is time-consuming, costly, subject to the human equation and, within the framework of the time normally allowed, it is possible that if the cans are out of line to any extent, the whole operation may have to be shut down, or temporarily stopped until the stacks of cans can be reoriented.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a process which includes apparatus located within the palletizer to pre-strap the cans to the pallet, which eliminates or substantially minimizes the possibility of the cans on the pallet becoming unaligned during the movement of the loaded pallet on the conveyor from the palletizer to the strapping station. The loaded pallet is normally moved on a conveyor a relatively short distance and thus a single strap could effectively prevent jarring of the cans relative to the pallet. It is not intended that the strapping done within the palletizer be sufficient to retain the cans in place when subjected to substantial forces which occur during transport. This is accomplished within the palletizer by directing a strap chute containing a strap through the pallet to where the strap is moved into a clamp located on the far side of the pallet. When the strap is so located, the strap chute is withdrawn and the loaded pallet is permitted to take on the requisite layers of cans. The strap held in clamping position continues to pay out as the pallet is lowered, which results in strap being disposed about the bottom of the two vertical sides of the loaded pallet during the can stacking operation. When the stacking is completed, an operator located on a platform adjacent the top of the loaded pallet places a wooden top frame over the top layer of cans. The operator then (1) pulls the strap out of the clamp and directs it over the top of the wooden frame, (2) grips the strap located on the other vertical side of the pallet and overlaps the strap, (3) moves a strapping tool into position to (4) tension the strap, and (5) seal the overlapped portions together. When this is completed, the strap is then severed from the strap loaded pallet and the strapped pallet is moved on the conveyor into an adjacently located strapping machine where additional straps are disposed about the loaded pallet to more securely maintain the cans in position on the pallet.

This method of operation permits one man to handle the various jobs at the palletizer at a rapid rate with a high degree of efficiency.

Other features and adavntages of the invention will be apparent from the following description and claims, and are illustrated in the accompanying drawings, which show structure embodying features of the present invention, and the principles thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view illustrating the overall system including a can receiving area, palletizer incorporating a preliminary strapping means, and a final strapping area;

FIG. 2 is a schematic view illustrating a pallet in position to receive a first layer of cans with the under-pallet strap chute shown in the retracted position;

FIG. 3 is a schematic view similar to FIG. 2, but with the strap chute shown extended under the pallet to locate the end of a strap in a strap clamp;

FIG. 4 is a schematic view similar to FIG. 3, but with a layer of cans and separator disposed on top of the pallet and the strap chute returned to the position shown in FIG. 2, but with the strap retained in position under the pallet;

FIG. 5 is a schematic view similar to FIG. 4 showing the pallet completely loaded, but prior to the strap ends being overlapped and sealed to retain the cans in place;

FIG. 6 is a view similar to FIG. 5, but showing the strap being secured in position about the loaded pallet;

FIG. 7 is a plan view showing the mechanism for reciprocating the strap chute with the strap chute shown retracted after having located the strap in the strap clamp;

FIG. 8 is a front view of the mechanism for operating the strap chute, taken in a direction looking forward from the can feeder;

FIG. 9 is a side elevation of the reciprocating mechanism shown in FIG. 8;

FIG. 10 is a partial view showing the strap chute in the extended position to dispose the strap in the strap clamp;

FIG. 11 is a side elevation of the mechanism shown in FIG. 10;

FIG. 12 is a view taken along line **12—12** of FIG. 11; and

FIG. 13 is a view taken along line **13—13** of FIG. 11.

DESCRIPTION OF THE PREFERRED EMBODIMENT

While the invention is susceptible of embodiment in many different forms, there is shown in the drawings, and as will herein be described in detail, a preferred embodiment of the invention and modifications thereof, with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawings, the general arrangement and sequence of operation is best illustrated in FIG. 1.

The apparatus includes a can receiving area A, a palletizer B, wherein preliminary strapping of the loaded pallet is performed, and a strapping station C where final strapping takes place. The actual sequence of operation beginning with the loading of a pallet with cans and the strapping of the cans to the pallet while in the palletizer is shown schematically in FIGS. 2, 3, 4, 5, and 6. The invention will be described with respect to these figures and where appropriate to the other figures in the drawings when specific details are required.

Referring first to FIG. 1, there is shown a plate **10** on which a layer of cans is disposed from a can loading station (not shown). It is to be noted before proceeding with the remainder of the description that can loaders and palletizers of the type which could be used in conjunction with the present invention are shown in assignee's patent to Jeremiah 3,166,203. The details of the can loading apparatus, palletizer and final strapping equipment are not part of the present invention and references to these portions of the machine are principally to orient the reader so that he may have a better understanding of the present invention.

Referring again to the drawings, and particularly FIG. 2, the plate **10** on which a layer of cans **12** is located is shown in position on a conveyor **18**. This can layer **12** will be moved onto a pallet **20** of conventional structure located on the palletizer B after a strap has been disposed through the pallet and clamped in position, as shown in FIG. 3. The palletizer is surrounded on three sides by walls **31***a*, *b*, and *c*, which serve as a guide for the cans on the pallet as the pallet vertically retracts into the palletizer as it receives succeeding layers of cans. The layer of cans **12** on plate **10** is located within a guide **13** which when operated by a piston **14** through the action of a piston rod **16** connected to the guide **13** moves the layer of cans off of the conveyor **18** onto the pallet **20**.

Prior to the disposal of the first layer of cans **12** onto the pallet **20**, a strap **30** is directed under the platform portion of the pallet **20**. This step is necessary in order to properly position the strap, so that a single operator can efficiently strap the loaded pallet while it is in the palletizer.

As will be apparent, the strap must be disposed beneath the pallet while the pallet is in the raised position shown in FIG. 3. It is in this position that this can be conveniently done, since as successive layers of cans are placed on the pallet, the pallet is drawn into the palletizer into the position shown in FIG. 6. Thus, when the pallet

located on support **24** is retracted by the action of the piston **26**, the final position of the pallet will be such as to prevent the operator from placing a strap through the bottom of the pallet to a position where it can be gripped and disposed about the loaded pallet to be secured in place.

The strap **30** received from a strap source (not shown) is directed through a strap conduit **32** and into strap feeder tube **34** where the end of the strap **30** is moved by a downwardly positioned guide **36** underneath a roller **38**, which is pivoted about an eccentrically located pin **40** (see FIG. 11). Thus, the strap is permitted to move forwardly beneath the roller **38**, but cannot be retracted due to the eccentric mounting of the roller **38**. A sufficient length of strap is directed through the strap feeder tube **34**, so that when the strap feeder tube is moved underneath the pallet, the free end of strap will be directed into the strap gripper **42**.

Once in the strap gripper **42**, the strap **30** moves underneath a strap hold-back roller **44**, which is pivotally mounted about an eccentrically disposed pin **46**, which prevents the strap from moving out of the strap gripper when the strap feeder tube is withdrawn. The strap **30** is guided into position beneath the roller **44** by guide **48** (FIG. 11), which is located inside the mouth opening **60** of the strap gripper **42**. As will be discussed later during the method of operation, the strap is removed from the strap gripper through a side opening **52** in the strap gripper housing.

When the strap feeder tube is withdrawn, an eccentrically disposed pin **54** secured to the roller **38** contacts a cam **56** which moves the roller **38** about its pivot **40** out of position to permit the strap to move more freely through the strap chute during the palletizing operation, and also permits the strap to be withdrawn into the strap tube after the pre-strapping operation has been completed and the unused strap has been severed from the loaded pallet.

The mechanism for reciprocating the strap chute or feeder tube **34** can best be seen by referring to FIGS. 7, 8, and 9. The strap chute is supported by a frame **58** and extends through pairs of guide rollers **60** and **62** which guide the strap chute during its reciprocating motion. The actual movement of the strap chute is accomplished through the action of a chain **64** which is secured to the side of the strap chute. The chain **64** is driven by a sprocket wheel **66** mounted on a shaft **68**. The shaft **68** is supported by a bearing support **70**, and is in turn rotated by a pair of bevel gears **72**, **74**. Bevel gear **74** is located on a suitably journaled shaft **76** which is rotated through the action of a handle **78**. As best seen in FIG. 9, angular movement of the handle **78** which is journaled at **79** acts to move a link **80** which rotates bell crank **82** in a clockwise direction (see FIG. 9) to rotate shaft **76** and thus move the strap chute to the left through the bottom of the pallet, as shown in FIG. 9. The handle **78** moves from the position shown in FIG. 2 to that shown in FIG. 3 when the strap chute is moved underneath the pallet platform. After the strap is clamped in the gripper **42**, the handle **78** is moved clockwise to the position shown in FIG. 4 to withdraw the strap chute leaving the strap **30** secured in place in the gripper **42**. During its return movement, the strap chute is stopped by a bumper stop **84**.

Subsequent layers of cans are then placed on the pallet, which layers are spaced by separators **22** until the requisite number of layers have been placed thereon. It will be seen by referring to FIG. 5 that as the palletizer is lowered the strap is maintained in the gripper **42**, but is payed out through the strap conduit **32** and strap guide **34** to drape about the two vertical sides and the bottom of the platform of the pallet. After the last layer of cans is placed on the pallet, a wooden top frame **90** is placed thereover. When this has been completed, the operator located on platform **88** moves the strapping tool **28**, which

is resiliently mounted to tool support **86** by means of a spring **92**, into position over the top of the loaded pallet. The strap end is moved out of the gripper **42** and the strap is withdrawn from the strap chute **34** and placed into overlapping relationship in the strapping tool **48**. The strapping tool is then operated to tension the strap and a seal is applied to retain the strap in position. The strap is then severed, leaving a strapped loaded pallet. The pallet is then moved onto conveyor **94** and to the strapping station C, where three straps **98**, **100**, and **102** are disposed and sealed about the package. This final strapping operation is necessary to insure that the cans will remain in place when the pallet is moved great distances and subjected to relatively heavy shock loads. It is, of course, understood that three straps are merely exemplary, since any number can be used.

METHOD OF OPERATION

A pallet **20** is initially placed on pallet support **24**, which is secured to piston rod **26** located within palletizer B. With the pallet **20** in its uppermost position, strap **30** is directed underneath the pallet platform by strap feeder tube **34**, which receives strap from a supply source through a strap conduit **32**. This is accomplished by the counterclockwise movement of the handle **78** through the action of rod **80**, bell crank **82**, shaft **76**, bevel gears **74**, **72**, shaft **68**, sprocket wheel **66**, and chain **64**, which moves the strap feeder tube from the position shown in FIG. 2 to that shown in FIG. 3. When this occurs, the strap in the strap feeder tube **34** is directed underneath the roller **44** into clamping engagement in strap gripper **42**. The handle **78** is then moved clockwise to the position shown in FIG. 4 to withdraw the strap chute **34** from underneath the pallet **20**, leaving the strap **30** secured in gripper **42**.

After this is completed, the first layer of cans **12** is located on the pallet **20** by the action of piston **14** and piston rod **60** (see FIG. 4). A separator **22** is then placed on top of the first layer of cans. The piston **26** is then retracted a predetermined amount (substantially a can height) by mechanism which is not important to an understanding of the present invention. The particular arrangement that has been illustrated is but a schematic representation of one that can be used. If information is desired about a mechanism of the type that is generally employed, reference is made to Jeremiah Pat. 3,166,203. The pallet is then loaded with a second and succeeding layers of cans and separators until the pallet is fully loaded, which is the position shown in FIG. 5. It is to be noted that as this takes place, the strap end is maintained in gripper **42**, while the strap is pulled through strap conduit **32** and strap feeder tube **34** by the downward movement of piston **26** to where the strap is loaded about both vertical sides of the loaded pallet and underneath the pallet platform.

When the pallet has been fully loaded, the operator withdraws the strap out of the opening **52** in the strap gripper **42** and pulls the strap extending out of the strap feeder tube into the overlapping position shown in FIG. 6. The strapping tool **28** is then placed in position to receive overlapping strap portions, after which the tool is operated to tension the strap about the package and seal the strap in place. The strap is then severed and pulled back through the strap feeder tube, which is permitted by the fact that the roller **38** is maintained in an open position by the cam **56**. The loaded pallet can then be withdrawn from the palletizer and moved to the strapping station C, where a plurality of additional straps are secured about the loaded pallet.

It can be appreciated that the invention is not limited to the patricular embodiment illustrated and that other similar or equivalent mechanisms can be employed. It is, of course, intended to cover by the appended claims all such embodiments as fall within the true spirit and scope thereof.

What we claim is:

1. The method of strapping articles to a pallet within a palletizer comprising the steps of placing a pallet having a platform in a palletizer, feeding strap into a strap chute, moving the strap and strap chute below the pallet platform, clamping the strap in position to retain it below said pallet platform, withdrawing the strap chute from beneath the pallet platform, loading a layer of articles on the pallet platform, retracting the pallet to receive succeeding layers until the desired number of article layers are located thereon while paying out the strap to further extend it about opposed sides of the loaded pallet, removing the strap from its clamped position and overlapping it with the strap located on the opposite side of the loaded pallet, tensioning the strap about the loaded pallet, and securing the overlapped strap portions together to retain the articles in position.

2. The method as recited in claim **1** including the steps of providing intermediate layers of material between the adjacent layers of articles and a cover layer over the top layer of articles.

3. The method of providing a strapped can loaded pallet within a palletizer, comprising the steps of placing a pallet having a platform in the palletizer, feeding a layer of cans onto a collecting station, feeding strap into holding position in a strap chute, directing the strap chute beneath the pallet platform to clamp the strap into position under the pallet platform, withdrawing the strap chute from beneath the pallet platform, moving a layer of cans from the collecting station onto the pallet platform, vertically retracting the pallet within the palletizer to receive succeeding layers of cans while paying out the strap to extend it about opposed sides of the loaded pallet and underneath the platform thereof, placing succeeding layers of cans on the pallet in the desired sequence until the pallet is loaded to the desired extent, removing the strap from its clamped position and overlapping it with the strap located on the opposite side of the loaded pallet, tensioning the strap about the loaded pallet, and securing the strap in position to retain the cans in position on the pallet.

4. The method of obtaining a strapped can loaded pallet, comprising the steps of providing a layer of cans to a first station adjacent a palletizer, placing a pallet having a platform on a support within the palletizer, feeding strap into holding position in a strap chute, moving the strap chute beneath the platform and clamping the strap to retain it in position under the platform, withdrawing the strap chute from beneath the platform, moving a layer of cans from the first station onto the platform, retracting the pallet to receive succeeding layers of cans while paying out the strap to extend it about opposed sides of the pallet and underneath the bottom thereof, placing succeeding layers of cans on the pallet in the desired sequence, removing the strap from its clamped position and overlapping it with the strap located on the opposite side of the loaded pallet, tensioning the strap about the loaded pallet, securing the overlapping strap portions together to retain the cans in position on the pallet, removing the strap loaded pallet from the palletizer and moving it to a strapping station, and disposing additional straps about opposed sides of the loaded pallet displaced at a 90° angle from said first mentioned opposed sides and securing same thereabout to more securely retain the cans in position on the pallet.

5. Apparatus for strapping cans to a pallet having a platform located in a palletizer comprising means disposed adjacent one side of a palletizer adapted to receive strap, clamping means disposed on the opposite side of said palletizer, means for reciprocating said strap receiving means below said pallet platform to position the strap in said clamping means and to retract said strap receiving means out from below said platform, means for loading said pallet, means for retracting said pallet within said palletizer to receive succeeding layers of articles wherein strap is retained in said clamping means and disposed

about the loaded pallet below said platform and adjacent opposed sides thereof, and means for tensioning and securing the strap about said loaded pallet to retain the articles in position thereon.

6. Apparatus as set forth in claim 5, wherein the means adapted to receive strap includes a strap chute in which strap is gripped and the clamping means disposed on the opposite side of said palletizer includes an eccentrically mounted roller for retaining the strap therein when directed therein by said strap chute.

7. Apparatus as set forth in claim 6 in which the means for reciprocating the receiving means includes a chain secured to said strap chute and a drive assembly including a sprocket wheel positioned to engage said chain.

8. Apparatus as set forth in claim 7, wherein the drive assembly for reciprocating said strap means includes a rotatably mounted handle which is connected to said drive means and when operated through a predetermined arcuate movement acts to move the strap chute back and forth beneath the pallet.

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U.S. Cl. X.R.

24—24, 170; 53—26, 198; 100—17; 214—6