Sept. 27, 1955 T. R. BAKER ET AL 2,718,992

PACK-DOWN MACHINE FOR FOLDING BOXES AND CANS

Filed May 26, 1953 3 Sheets-Sheet 1

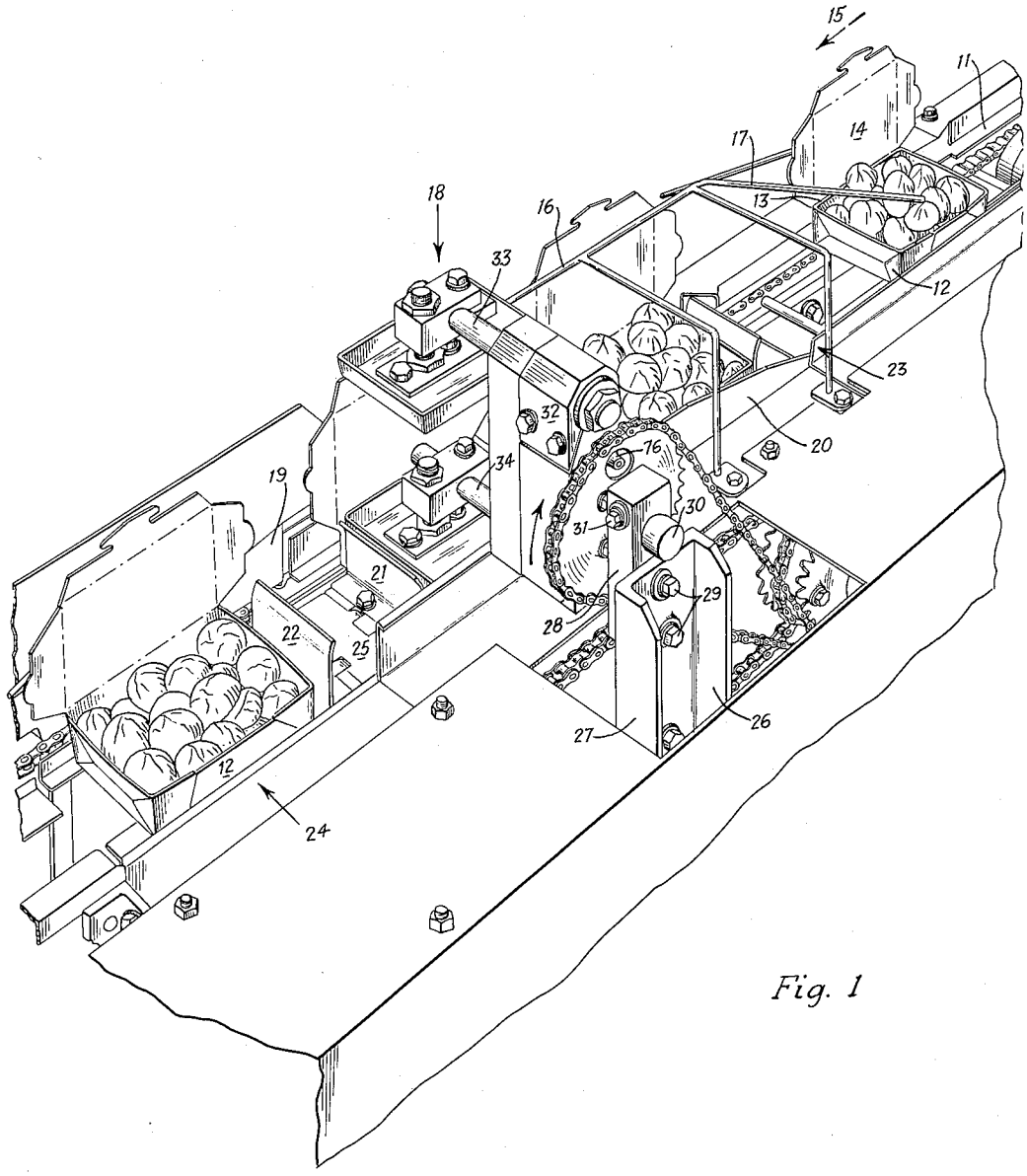


Fig. 1

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Filed May 26, 1953 3 Sheets-Sheet 2

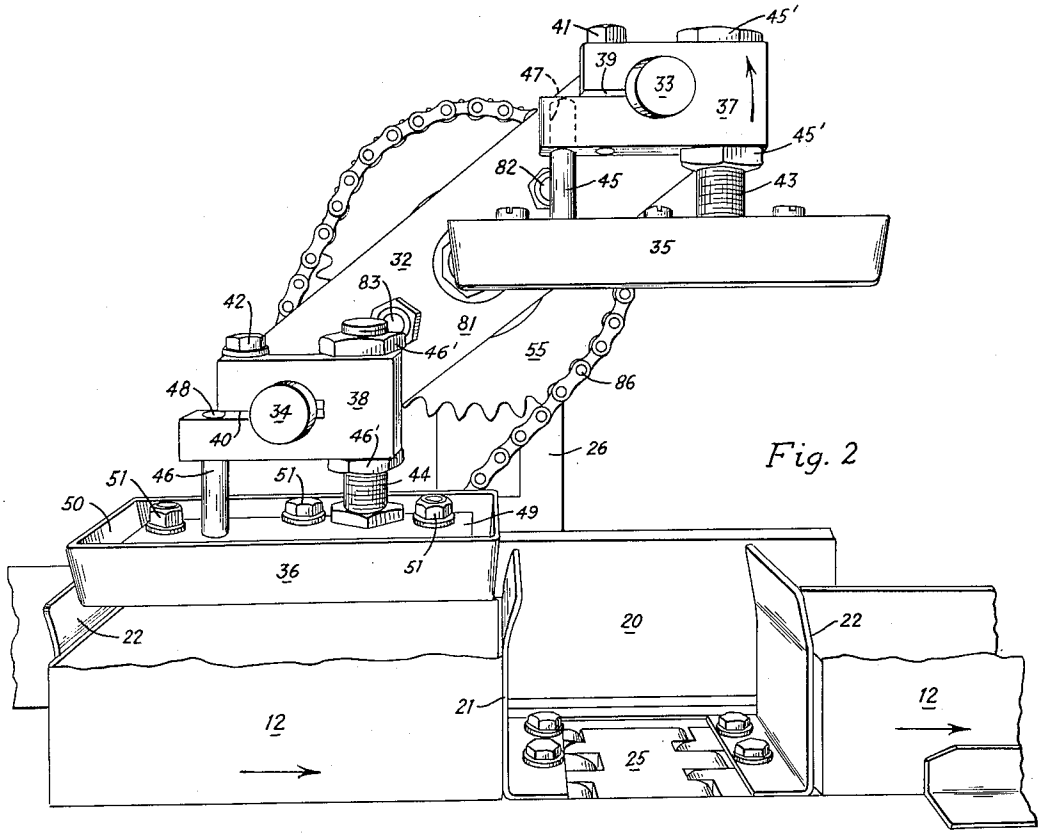


Fig. 2

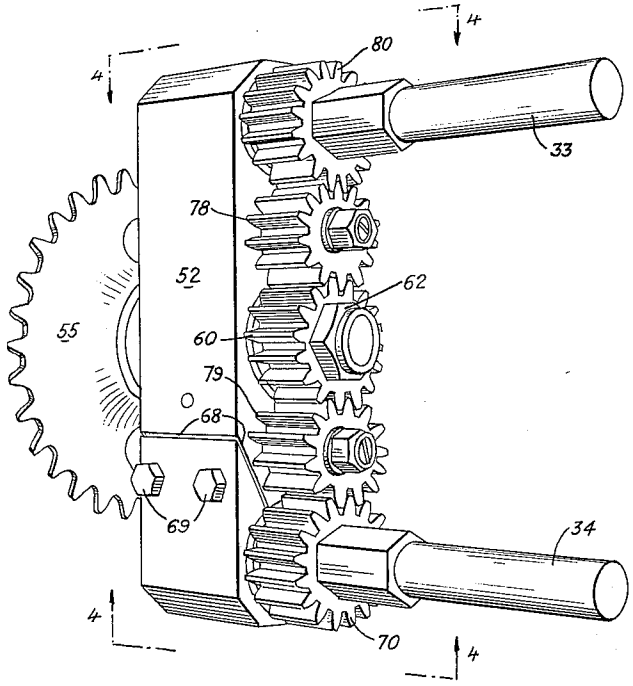


Fig. 3

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Filed May 26, 1953 3 Sheets-Sheet 3

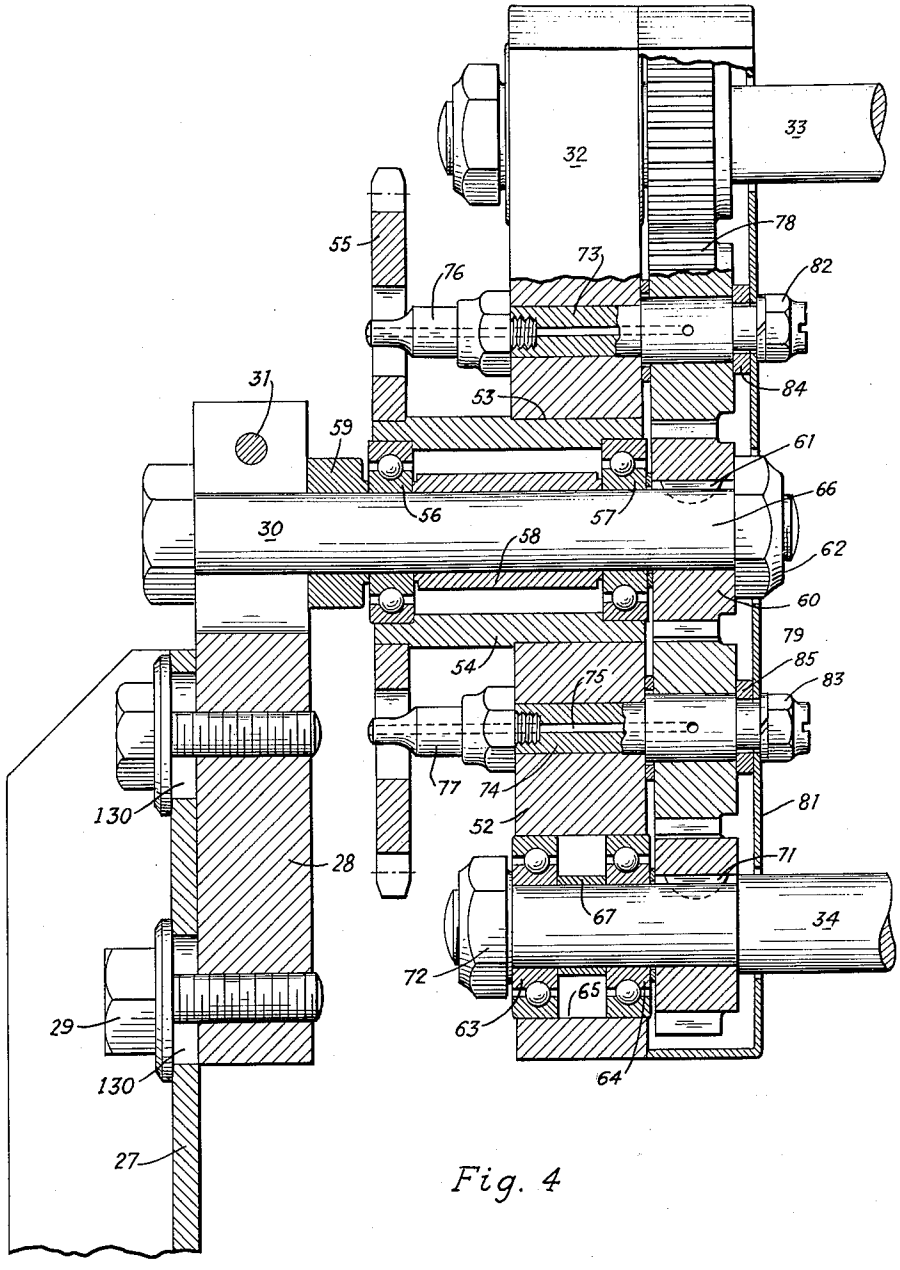


Fig. 4

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2,718,992

PACK-DOWN MACHINE FOR FOLDING BOXES AND CANS

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Application May 26, 1953, Serial No. 357,476

7 Claims. (Cl. 226—71)

This invention relates to the art of packaging and provides an improved mechanism for compressing the contents of boxes and cans prior to closing or sealing of the boxes or cans.

It is common practice in the art of food canning to compress the contents of the food cans to a certain level below the rim of the can prior to application of the can top. The operations of filling, compressing and closing are usually performed while the cans travel along a conveyor.

In the packaging of frozen foods in paper board boxes it is likewise necessary to bring the top of the contents below the top edge of the box side walls, since otherwise the hinge cover of the box cannot be properly closed.

The conventional packing devices used in the canning industry, as far as we are aware, do not perform successfully when applied to folding boxes. Difficulties are experienced which are traceable to certain differences in the characteristics of the can or the folding box, and also in the nature and the handling of the food.

Packing devices of the general type with which this invention is concerned consist basically of a number of pads which move up and down, and during their downward movement enter the open top of a container, thereby pushing the contents down to a desired level, whereafter the pads rise and leave the container. Means are provided for maintaining the pads more or less level during the movement into and out of the container. This is not particularly difficult to attain when the food container happens to be a can, since the can diameter is relatively small in relation to the volumetric content of the can. Accordingly, certain angular deviations of the pad from the level position are not disturbing, particularly not, since it is customary to push the food to a safe level below the top rim of the can, the space above the food being then filled up with liquid.

In the packaging of frozen foods liquid is generally not added, but the food is packaged in a dry state. It is, therefore, not desirable to compress the food an appreciable distance below the edge of the side walls, since the box contents would rattle. In addition, the size of the pad is many times larger in relation to the volumetric content of the folding box than a pad of a can packing machine due to the fact that frozen food boxes are shallow.

In compressing foods to be frozen in folding cartons it is important to compress the contents evenly and it is not admissible to let the pad tilt an appreciable amount with regard to the level position. This is more difficult to attain since foods to be frozen are generally more resistant to compression than foods to be canned because they are commonly in a raw state. Broccoli, Brussels sprouts or chicken legs are examples of foods which, during compression, tend to bear much more heavily against one end of the pad than against the other, thereby tilting it, if the drive mechanism of the packing device permits such tilt by reason of play in the drive mechanism.

In a packing mechanism for frozen food boxes, it is

further desirable to provide for a convenient and rapid change-over from one box size to another. Box sizes vary in bottom area and in height. Changes in the bottom area require a pad of corresponding area. Changes in the height require a change in the stroke of the pad.

Changes in the size of the pad are easily taken care of by an exchange of one pad for another pad of a different size. Changes in the stroke or distance of the pads from one another present certain problems unless the mechanism is constructed to permit an exchange of one packing head for another in which the distance of the pads from the central axis of the head is greater or less.

The present invention is directed particularly to a type of packing device in which the pads are maintained level during their up and down movement by a train of gears. Packing devices of this type have been used in the canning industry. They may be compared, for the sake of convenient illustration, to a Ferris wheel constituting the packing head, in which the cars of the wheel are the pads, the only distinction being that in a Ferris wheel the cars are maintained level by gravitational force, whereas in the known packing device they are maintained level by gears.

One packing device of the aforementioned type has been proposed for use in the canning industry. It involves a relatively complex gear train for driving it at a predetermined speed ratio with relation to the rate of travel of the conveyor. The great number of gears in the known device involves a correspondingly great amount of total play between the gears, permitting the pads to tilt appreciably with respect to their level position when a greater force is exerted against one end of the pad than against the other. In the known device the entire gear train consists of two units, one unit being in the packing head revolving about a horizontal axis, the other gear train being stationary and serving to drive the head and to operate the gear train within the head which maintains the pads level. If it is necessary to change the stroke of the device, or what would amount to the same, if it were necessary to exchange a head of a certain diameter for a head of larger or smaller diameter, it is also necessary to exchange the stationary gear train. This is cumbersome.

The present invention provides an improved packing device of great simplicity. The improved device does away with a necessity of a stationary gear train, permits a substantial reduction in the total number of gears employed, thereby reducing the total play between the gears, and permits heads of different size to be exchanged without any further changes in the ratio of the drive of the mechanism. Simplicity of design not only leads to greater reliability, but also leads to greater accuracy in that it is possible to maintain the pads level with very small deviations from the true level position even in instances where the box contents bear against one end of the pads more heavily than against the other.

These and further features, aims and advantages of the invention will appear more fully from the detailed description which follows, accompanied by drawings, showing for the purpose of illustration, a preferred embodiment of the invention. The invention also resides in certain new and original features of construction and combination of elements hereinafter set forth and claimed.

Although the characteristic features of the invention, which are believed to be novel, will be particularly pointed out in the claims appended hereto, the invention itself, its objects and advantages, and the manner in which it may be carried out may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part of it in which:

Fig. 1 is a perspective view of a portion of a conveyor for handling frozen food boxes and a packing device for

compressing the box contents during continuous travel along the conveyor;

Fig. 2 is a perspective front view of the packing device, the box covers being removed in order to show the details of the mechanism fully;

Fig. 3 is a perspective view of the gear mechanism of the packing head, the pads being removed from their respective shafts; and

Fig. 4 is a vertical cross-section through a portion of the packing device shown in Fig. 1, the section being taken in plane 4—4—4 of Fig. 3.

In the following description and in the claims, various details will be identified by specific names for convenience. The names, however, are intended to be as generic in their application as the art will permit. Corresponding reference numerals refer to corresponding parts in the several figures of the drawings.

In the drawings accompanying, and forming part of, this specification, certain specific disclosure of the invention is made for the purpose of explanation of broader aspects of the invention, but it is understood that the details may be modified in various respects without departing from the principles of the invention, and that the invention may be applied to other structures than the ones shown.

Referring to Fig. 1, a conveyor **11** transports frozen food cartons **12** from a filling machine (not shown) to the right of the picture, to a closing machine (not shown) to the left of the picture. In the illustrated example, the frozen food boxes are filled with Brussels sprouts, and it is apparent that in the box farthest to the right the contents extend appreciably above the hinge line **13** of the box cover **14**.

As the boxes approach the packing device in the direction indicated by the arrow **15**, the box covers are engaged by a guide rail **16** having an angular leading portion **17** which serves to move the box covers into upright position, if accidentally a box cover should lean towards the contents.

Shortly before entering the packing station, generally indicated as **18**, the boxes move between front and back rails **19** and **20** to prevent the front and back walls from bellying out during compression of the contents. Leading and trailing plates **21** and **22** on the conveyor proper engage the leading and trailing side walls of the boxes, which thus are completely boxed in on all sides during the compression of the box contents.

The leading and trailing plates **21** and **22** travel only a relatively short distance and rise above the bottom level of the boxes about at the point indicated by the arrow **23** to descend approximately at the point indicated by the arrow **24**. For this purpose, the leading and trailing plates **21** and **22** are linked together by connecting plates **25**, particularly well shown in Fig. 2.

The packing device proper includes a standard **26** mounted alongside the conveyor. The standard comprises a base member **27** and a top member **28** vertically adjustable on the base member by means of bolts **29** extending through elongated holes **130** in the base member **27**.

A horizontal stud shaft **30** is securely clamped in the top member **28** by a bolt **31** and extends towards the conveyor. A head **32** is rotatably supported on the stud shaft **30** and carries a pair of pad shafts **33** and **34**.

Pads **35** and **36** of the size approximately equal to the bottom area of the boxes are secured to the pad shafts **33** and **34**. The mounting of the pad shafts preferably comprises blocks **37** and **38** slotted at **39** and **40** respectively, and tightened against the stud shafts **33** and **34** by bolts **41** and **42**. Threaded posts **43** and **44** with lock nuts **45'** and **46'** permit adjustment of the base **49** of the pads with respect to the pad shafts **33** and **34**. Cylindrical posts **45** and **46** in the bases extend through vertical bores **47** and **48**, and insure parallel adjustment of the pads **35** and **36** with respect to the blocks **37** and **38**. The pads proper consist of base plates of which one is visible at **49**, to which a pad shoe **50** of appropriate size is secured by bolts **51**.

Turning now to the construction of the head, the head **32** consists preferably of a piece of bar stock **52** having a central hole **53** bored therethrough. A bushing **54** is fixedly fitted within the bore **53** and carries a sprocket gear **55**. A pair of ball bearings **56** and **57** support the bushing **54** on the stud shaft **30** and are spaced by a sleeve **58**. A spacer **59** is fitted between the standard **27** and the bearing **56**.

It is thus apparent that the head bar **52** is freely rotatable on the stationary stud shaft **30**. The end of the stud shaft carries a central pinion **60** which is prevented from rotating relatively to the shaft **30** by a key **61** and is held in place by a stop nut **62**.

The pad shafts **33** and **34** are of identical construction and it is therefore sufficient to describe the construction and mounting of the shaft **34**, shown in detail in Fig. 4.

A pair of bearings **63** and **64** are fitted within a bore **65** radially spaced from the center axis **66** of the head. The bearings **63** and **64** are spaced by a sleeve **67** and are clamped within the bore **65** by a clamp-type mounting including a slot **68** (see Fig. 3) and bolts **69**. The pad shaft **34** is freely rotatable with respect to the bar **52** and has a pad pinion **70** keyed thereto at **71**. A stop nut **72** prevents withdrawal of the shaft **34** from the bearings **63** and **64**. A further pair of stud shafts **73** and **74** are fixedly mounted in the head bar **52**. These stud shafts are preferably hollow as shown at **75** and are fitted with grease nipples **76** and **77** providing lubrication for a pair of idler gears **78** and **79**. The idler gears mesh with the center pinion **60** and with the pad pinions **70** and **80**, respectively.

A cover **81** having apertures for the various shafts is secured to the stud shafts **73** and **74** by stop nuts **82** and **83**. Washers **84** and **85** are fitted between the idler gears **78** and **79** and the cover **81**, respectively, to hold the gears **78** and **79** in place.

A chain **86** trained around the sprocket gear **55** and a suitable driving, or driven, shaft (not shown) of the conveyor rotates the head at a predetermined fixed rate of speed in relation to the rate of advance of the conveyor.

The operation of the device is as follows:

The sprocket gear **55** causes the head **32** to rotate about the stud shaft **30** and the stationary center pinion **60** thereon. The gear pinions **70** and **80** have the same number of teeth as the center pinion **60**. There being only one idler gear between the stationary center pinion and the stud shaft pinions **70** and **80**, respectively, it follows, that the pad shafts turn at the same rate with respect to the head **32** as the head turns with respect to the stud shaft **30**. The pads **35** and **36**, originally adjusted to be level, therefore remain in level position throughout rotation of the head **32**.

As the head revolves the pads **35** and **36** enter the filled food boxes on the conveyor in succession and compress the box contents below the top edge of the box body. This is particularly well seen in Fig. 1 in the box farthest to the left. Unevenness of resistance of the box contents to the pressure exerted by the pads does not result in any noticeable tilt of the pads due to the simplicity of the drive, there being only one idler gear between the pad pinion and the stationary central pinion, involving only the play between two pairs of gear teeth.

It is evident that the drive mechanism of each head is self-contained, and that no further gear train in the standard **27**, **28** is required. It is, therefore, possible to exchange one head for another in which the pad shafts have a different spacing to accommodate taller or shallower boxes or to accommodate different spacing between the individual boxes on the conveyor.

It is evident that the drive mechanism of each head

is self-contained, and that no further gear train in the standard 27, 28 is required. It is, therefore, possible to exchange one head for another in which the pad shafts have a different spacing to accommodate taller or shallower boxes or to accommodate different spacing between the individual boxes on the conveyor.

The present packing mechanism is extremely simple and may be operated as fast as the conveyor can run.

What is claimed is:

1. A packing device for comprissing the contents of boxes or cans travelling along a conveyor, the packing device comprising, a standard for mounting alongside the conveyor; a head mounted on said standard for rotation about a substantially horizontal main axis; a drive gear fixed on said head for rotating said head; a shaft rotatably mounted on said head at a distance from said main axis; a pinion fixed on said shaft; a pad mounted on said shaft, said shaft having a compression surface for engaging the said contents; an idler gear mounted for rotation on said head about an axis closer to the main axis than the axis of said shaft, said idler gear meshing with said shaft pinion; and a main pinion stationary with respect to said standard, said main pinion having the same number of teeth as said shaft pinion and meshing with said idler, whereby said compression surface maintains the same angle with regard to said standard during rotation of said head.

2. A packing device for compressing the contents of boxes or cans travelling along a conveyor, the packing device comprising, a standard for mounting alongside the conveyor; a horizontal stud shaft fixedly mounted on said standard; a head rotatably mounted on said stud shaft; a main pinion fixed on said stud shaft; a pad shaft rotatably mounted on said head; a pad pinion fixed on said pad shaft; a pad non-rotatably mounted on said pad shaft to move with said pad shaft; an idler gear rotatably mounted on said head in mesh with said main pinion and said pad pinion; and drive means for rotating said head about said stud shaft.

3. A packing device for compressing the contents of boxes or cans travelling along a conveyor, the packing device comprising, a standard for mounting alongside the conveyor; a head; a main shaft extending rotatably through said head, one end of said shaft being non-rotatably secured to said standard on one side of said head; a pinion fixed on the other end of said shaft and located on the other side of said head; a sprocket wheel mounted on said head for rotating said head about said main shaft; a pad shaft rotatably mounted on said head to extend to said other side of the head; a pad pinion fixed on said pad shaft, said pad pinion also being on said other side of the head; an idler gear mounted on said other side of said head between said main pinion and said pad pinion and in mesh with both said pinions; and a pad non-rotatably secured to said pad shaft to move with the pad shaft when the head is rotated.

4. A packing device for compressing the contents of boxes and cans travelling along a conveyor, the packing device comprising, a standard for mounting alongside the conveyor; a head; a central shaft extending rotatably through said head, one end of said shaft being non-rotatably secured to said standard to extend towards the conveyor, said shaft extending to one side of the head; a central pinion on the other side of the head, said pinion being fixed on said central shaft; a sprocket wheel concentric to said central shaft, said sprocket wheel being secured to said one side of the head for rotation of the head about said central shaft; a pair of pad shafts evenly spaced from said central shaft and rotatably mounted on said head to extend to the other side of said head; a pad pinion secured to each of said pad shafts, said pad pinions also being on the other side of said head; a pair of stud shafts on said head extending to said other side of the head; an idler gear on each of said stud shafts, each idler gear being in mesh with said center pinion and with one of said pad pinions; and a pad non-rotatably secured to each of said pad shafts to move with said pad shafts when the head is rotated, said pad including a compression surface for engaging said contents.

5. A packing device for compressing the contents of boxes and cans travelling along a conveyor, the packing device comprising, a standard for mounting alongside the conveyor; a head; a central shaft extending rotatably through said head, one end of said shaft being non-rotatably secured to said standard to extend towards the conveyor, said shaft extending to one side of the head; a central pinion on the other side of the head, said pinion being fixed on said central shaft; a sprocket wheel concentric to said central shaft, said sprocket wheel being secured to said one side of the head for rotation of the head about said central shaft; a pair of pad shafts evenly spaced from said central shaft and rotatably mounted on said head to extend to the other side of said head; a pad pinion secured to each of said pad shafts, said pad pinions also being on the other side of said head; a pair of stud shafts on said head extending to said other side of the head; an idler gear on each of said stud shafts, each idler gear being in mesh with said center pinion and with one of said pad pinions; a cover enclosing said gears and pinions, said cover fitting against said head and having four apertures in registry with said pad shafts and said stud shafts, said pad shafts extending through two of said apertures; means for securing the cover to said stud shafts; and a pad non-rotatably secured to each of said pad shafts to move with said pad shafts when the head is rotated, said pad including a compression surface for engaging said contents.

6. A packing device for compressing the contents of boxes and cans travelling along a conveyor, the packing device comprising, a base member for mounting alongside the conveyor; a top member mounted on said base member for vertical adjustment; a head; a central shaft extending rotatably through said head, one end of said shaft being non-rotatably secured to said top member to extend towards the conveyor, said shaft extending to one side of the head; a central pinion on the other side of the head, said pinion being fixed on said central shaft; a sprocket wheel between said top member and said head, said sprocket wheel being concentric to said central shaft and secured to said one side of the head for rotation of the head about said central shaft; a pair of pad shafts evenly spaced from said central shaft and rotatably mounted on said head to extend to the other side of said head; a pad pinion secured to each of said pad shafts, said pad pinions also being on the other side of said head; a pair of stud shafts on said head extending to said other side of the head; an idler gear on each of said stud shafts, each idler gear being in mesh with said center pinion and with one of said pad pinions; and a pad non-rotatably secured to each of said pad shafts to move with said pad shafts when the head is rotated, said pad including a compression surface for engaging said contents.

7. A packing device for compressing the contents of boxes or cans travelling along a conveyor, the packing device comprising, a standard for mounting alongside the conveyor; a horizontal stud shaft mounted on said standard and extending towards said conveyor; a head consisting of a bar having at least three bores therethrough including a central bore and at least two outer bores radially spaced with respect to said central bore, anti-friction bearings in said bores, the central bearing supporting said head for rotation on said stud shaft; a central pinion fixed on said stud shaft; a pad shaft mounted in each of the bearings of the outer bores; a pad pinion fixed on each of said pad shafts; a pad non-rotatably mounted on each of said pad shafts; a further stud shaft between said cen-

tral pinion and each of said shaft pinions; an idler gear rotatably mounted on each of said further stud shafts, said idler gear meshing with said central pinion and the respective shaft pinion; and a chain sprocket fixed on said bar concentric with respect to said central bore.

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