

[54] **METHOD AND APPARATUS FOR PACKING ARTICLES WITH LONGITUDINAL AND CROSS-MEMBERS**

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[76] Inventors: **Heinz Focke**, Moorstrasse 64, 3090 Verden; **Jürgen Bretthauer**, Friedrich-Ebert-Str. 35, 2800 Bremen, both of Germany

Primary Examiner—Robert C. Riordon
Assistant Examiner—E. F. Desmond
Attorney—Sughrue, Rothwell, Mion, Zinn & Macpeak

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[58] Field of Search.....53/26, 48, 157, 3

[56] **References Cited**

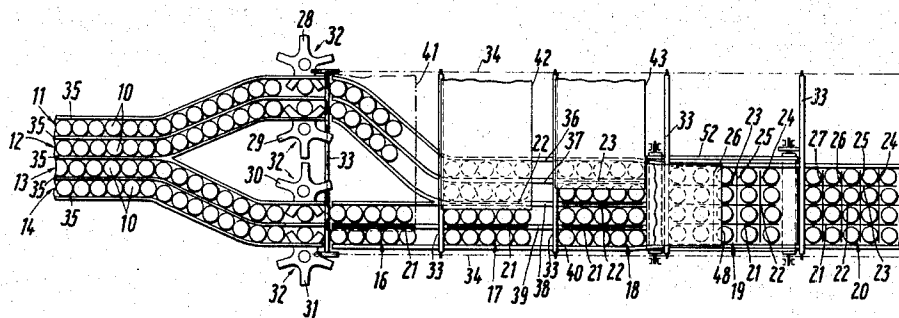
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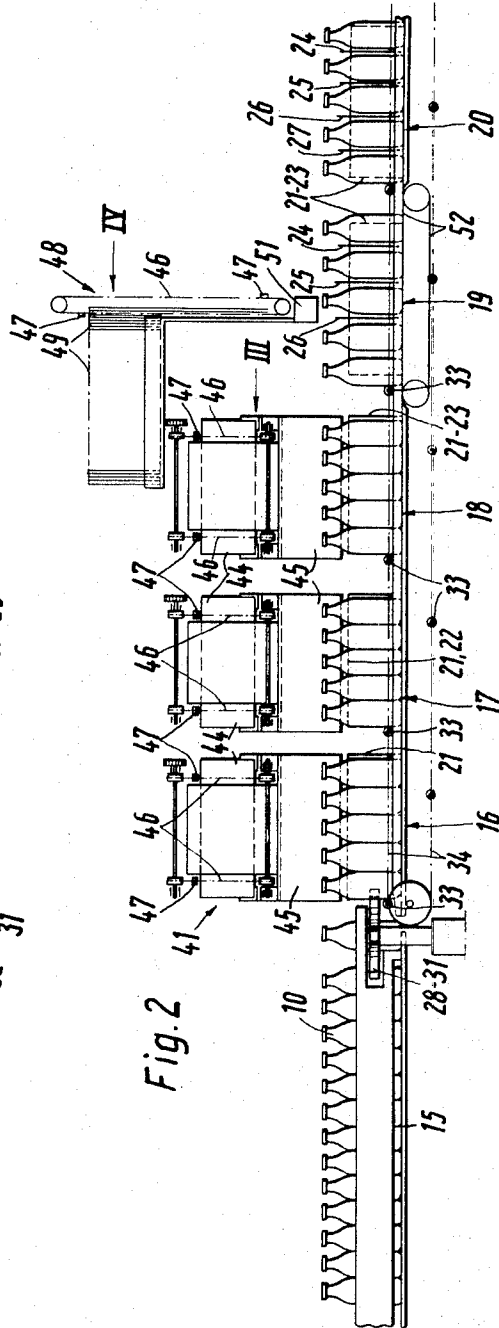
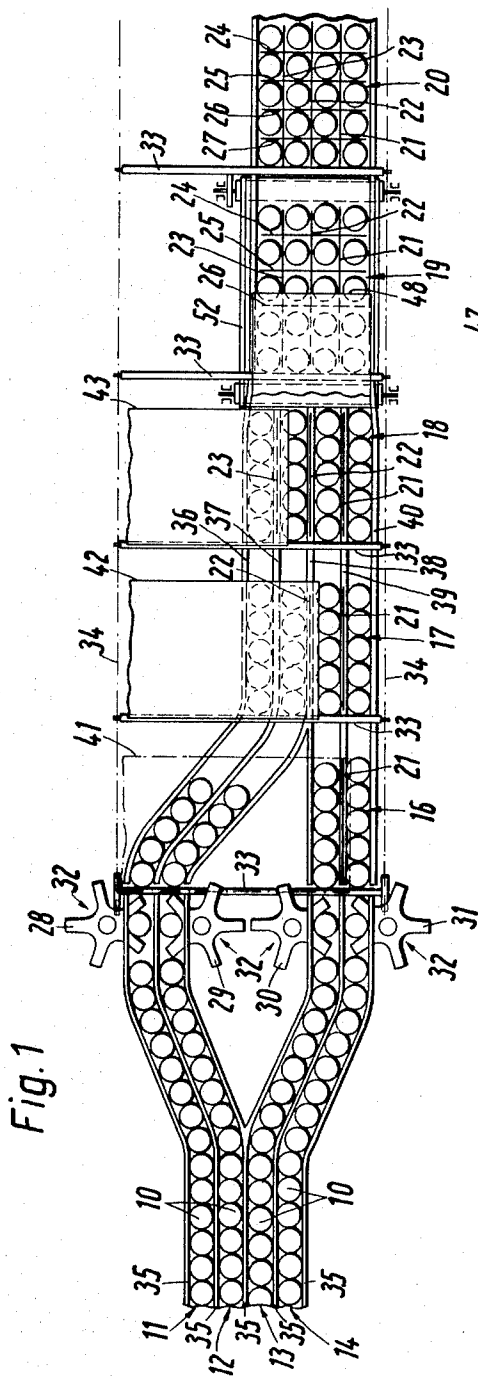
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[57] **ABSTRACT**

A method and apparatus for inserting longitudinal members and cross-members between rows of articles. The articles are formed into longitudinal rows on a conveyor and then formed into groups of a fixed number of transverse rows. After the groups are formed the longitudinal members and cross-members are mechanically inserted between the rows. The group with the members inserted between the rows is then passed to a packaging station.

14 Claims, 4 Drawing Figures





Inventors

HEINZ FOCKE

JÜRGEN BRETTHAUER

By Sughrue, Rothwell, Miron, Zimm & Mayspeak
ATTORNEYS

Fig. 3

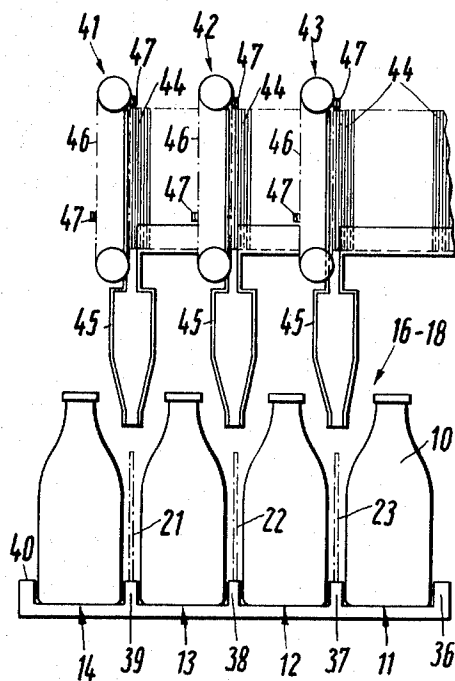
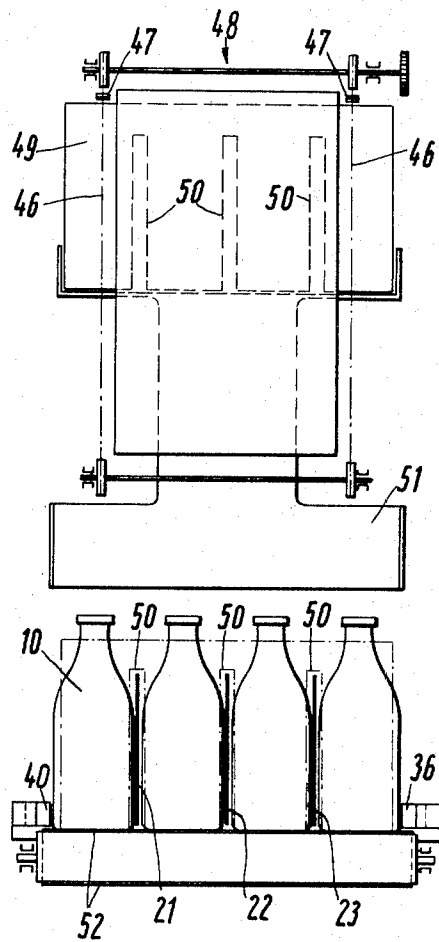


Fig. 4



METHOD AND APPARATUS FOR PACKING ARTICLES WITH LONGITUDINAL AND CROSS-MEMBERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to methods and apparatus for packing articles, more particularly bottles, cans and the like, in packs with longitudinal and/or cross-members of cardboard or the like disposed between the articles.

1. Description of the Prior Art

When large quantities of identical articles, e.g. bottles, cans and the like, are packed, the procedure is frequently to form a lattice of intersecting longitudinal and cross-members in a container, e.g. a carton. The longitudinal and cross-members define rectangular or square compartments in each of which an article, such as a bottle, is accommodated. Such packs were heretofore produced by manually inserting separator members in a carton. The articles to be packed are then introduced from above into the compartments in the pack. Since this method requires a considerable proportion of manual labor, it is accordingly expensive. In addition, when the articles are introduced into the individual compartments of the pack, the labels and other adornments on the outside may easily be damaged, since the transverse dimensions of the individual compartments which receive the articles are not much greater than the transverse dimensions of the articles themselves.

Another known type of packing for a large number of identical articles comprises introducing a flexible strip of corrugated paper or similar material between the articles. The disadvantage of this packing system is that when individual articles are withdrawn from the pack, the articles left in the pack become all mixed up, since there is no permanent and substantially invariable division into individual compartments.

SUMMARY OF THE INVENTION

The invention relates to packs containing a lattice consisting of longitudinal and/or cross-members. The object of the invention is to propose methods and apparatus whereby the production of such packs is facilitated. More particularly, the invention is intended to enable such packs to be produced and filled entirely by machine.

The method according to the invention is characterized in that the longitudinal and/or cross-members are introduced between articles disposed in rows in a group associated with one pack, and the group provided with the longitudinal and/or cross-members is then introduced into the pack.

With the invention, therefore, the lattice is produced and filled before being introduced into the pack by introducing the longitudinal and cross-members between the articles grouped in rows and belonging to one pack.

According to a further proposal of the invention, for the purposes of introducing the longitudinal and/or cross-members, the bottles belonging to one group are temporarily spaced apart in longitudinal and/or transverse rows in such a manner that the longitudinal and/or cross-members can pass between the rows of articles from above, preferably under their own weight.

The apparatus according to the invention comprises a conveyor for the articles arriving in rows. It further

includes a plurality of insertion devices for the longitudinal members and with one insertion device for the cross-members, said devices each being disposed above the conveyor for the bottles. The apparatus is also provided with means whereby the longitudinal and transverse rows of bottles belonging to one group can be temporarily moved apart.

Further details will be explained hereinafter with reference to one embodiment of the apparatus according to the invention as illustrated in the drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic plan view of the apparatus according to the invention.

FIG. 2 is a side elevation of the apparatus shown in FIG. 1.

FIG. 3 is an elevation in the direction of the arrow III in FIG. 2.

FIG. 4 is an elevation in the direction of the arrow IV in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The method and apparatus according to the invention will be explained hereinafter with reference to the drawings and with reference to the packing of bottles 10. These bottles 10 are fed in four individual lines 11, 12, 13 and 14 by a feed chain 15. The bottles 10 are then divided up into groups 16, 17, 18, 19 and 20 which each have a given number of bottles 10 and which are each allocated to one pack (not shown). Longitudinal members 21, 22 and 23 and cross-members 24, 25, 26 and 27 are then introduced into these groups 16 - 20 between the bottles 10 disposed in longitudinal and transverse rows. To form the groups 16 - 20, a number of bottles 10 corresponding to one longitudinal row of each group 16 - 20 are first separated from each individual line - 14. In the exemplified embodiment illustrated, five bottles 10 are separated from each line 11 - 14. To accomplish this, grouping discs 28, 29, 30 and 31 are associated with each individual line 11 - 14. The continuously rotating grouping discs 28 - 31 are provided with radial recesses 32 each intended to receive a bottle 10. The speed of rotation of the grouping discs 28 - 31 is so adjusted with respect to the speed of the other moving parts of the apparatus that after, for example, five bottles 10 have been separated from each individual line 11 - 14, a driver rod 33 engages the rear of each separated group of five bottles 10 from the individual lines 11 - 14 to further convey them. A plurality of such driver rods 33 are disposed with suitable spacing from one another on each conveyor chain 34. The driver rods 33 of the continuously driven conveyor chain 34 engage the bottles 10 from below.

The individual 11 - 14 supplied to the apparatus are separated from one another by upright partitions 35. These partitions diverge in pairs upstream of the grouping discs 28 - 31 so that there is room to provide them next to each of the associated lines 11 - 14.

Over part of the transportation path, the longitudinal rows of groups 16 - 20 are separated from one another and laterally guided by separating members 36, 37, 38, 39 and 40. The latter determine the distance between the longitudinal rows of a group 16 - 20. The bottles 10 of groups 16 - 20 are driven by the driver rods 33.

The group 16 consisting of longitudinal rows is then conveyed into the region of a first insertion device 41 for insertion of longitudinal members 21. The insertion device 41 is disposed above the path of conveyance of the groups 16 - 20, in such a manner that an upright longitudinal member 21 can be deposited in each case between two adjacent longitudinal rows of the group 16. The longitudinal member 21 drops down from above into the space formed between the longitudinal rows by the separating member 39.

The first insertion device 41 is followed by other insertion devices 42 and 43, depending upon the number of longitudinal members 21, 22 and 23 to be inserted.

The insertion devices 41, 42 and 43 for the longitudinal members 21, 22 and 23 are of identical construction. They each comprise a supply 44 of longitudinal members fed to a delivery outlet 45 by a suitable conveyor means. Ejectors 47 are disposed in the region of the delivery outlet 45. Chains 46 act on a longitudinal member 21, 22 and 23 from above and push the same into the delivery outlet. The lower end of the delivery outlet is positioned in the region between adjacent rows of the groups 16, 17 and 18 and thus ensures that the longitudinal members 21, 22 and 23 are fed without any tilt in the region between the longitudinal rows of the groups. The delivery outlets 45 of the insertion devices 41, 42 and 43 are disposed in staggered relationship in plan view, to correspond to the distance between the longitudinal members 21, 22 and 23 in the groups.

During the introduction of the longitudinal members 21, 22 and 23, the longitudinal rows of the groups 16, 17 and 18 are spaced apart as a result of the separating members 37, 38 and 39. After the introduction of the longitudinal members 21, 22 and 23, the inner separating members 37, 38 and 39 diverge while the outer separating members 36 and 40 converge and thus transversely push together the longitudinal rows of the bottles so that the distance between the longitudinal rows is decreased until they bear against the longitudinal members 21, 22 and 23.

The insertion devices 41, 42 and 43 for the longitudinal members are followed by an insertion device 48 for the cross-members 24 - 27. The insertion device 48 is also provided with a supply 49 of cross-members which again are introduced from above successively into the zone between transverse rows of the group 19. The cross-members 24-27 have upright slots 50 which the longitudinal members 21, 22 and 23 engage after they have been inserted. The insertion device 48 for the cross-members 24-27 is provided with a guide 51 which is U-shaped and which ensures that the cross-members are introduced without any tilt into the zone between the transverse rows.

Since the bottles 10 of the individual groups 16, 17 and 18 are conveyed without any spacing in the direction of conveyance, means are provided in the region of the insertion device 48 whereby spacing is periodically introduced between adjacent transverse rows to enable the cross-members to be introduced. In the exemplified embodiment illustrated, the groups pass successively over an accelerator belt 52 which is driven at a higher speed in the direction of conveyance than the driver rods 33. In this manner, spacing is automatically produced in the region of accelerator belt 52 between the transverse rows of the group 19 and of the

following groups, so that the cross-members 24, 25, 26 and 27 can be readily introduced into the zone between the transverse rows. The insertion device 48 is adjusted to the speed of the groups 16 - 20 so that a cross-member 24 - 27 is released at the correct time in each case.

As soon as the bottles together with the longitudinal and cross-members have left the accelerator belt 52, the space formed between the transverse rows is eliminated by the "pile-up" of the bottles. This "pile-up" results in group 20 forming a finished unit together with the longitudinal members 21, 22 and 23 and cross-members 24 - 27. Group 20 can be conveyed for further processing, i.e., for introduction into a prepared pack.

The method and apparatus may alternatively be embodied by introducing the cross-members first, followed by the longitudinal members provided with appropriate slots. In this embodiment, the insertion devices for the cross-members and longitudinal members are then arranged in the appropriate reverse sequence.

We claim:

1. A method of packing articles, moving in a longitudinal direction, into packs with members disposed between the articles, said method comprising the steps of:
 - a. placing said articles in transverse rows transverse to the direction of travel of said articles;
 - b. accelerating each transverse row of said articles with respect to the succeeding transverse row, thereby forming a space between the accelerated row and the succeeding row;
 - c. inserting cross members in said space of uniform width in said longitudinal direction between the transverse rows; and
 - d. decelerating each transverse row, with respect to the succeeding transverse row, subsequent to the insertion of said cross members, thereby closing said space between the transverse rows wherein the cross members are positioned in the closed spaces.
2. The method as set forth in claim 1 wherein said acceleration and said decelerations are in the longitudinal direction.
3. The method as set forth in claim 1, further comprising:
 - a. placing said articles into longitudinal rows parallel to the direction of travel of said articles; and
 - b. dividing the articles in said longitudinal rows into groups, each group comprising a pack.
4. The method as set forth in claim 3, further including inserting longitudinal members between said longitudinal rows wherein said longitudinal and cross members are inserted by dropping them between the transverse and longitudinal rows under the force of their own weight.
5. An apparatus for packing articles in longitudinal rows into packs with members disposed between the articles in each pack, said apparatus comprising:
 - a. first means for forming transverse rows of said articles, each transverse row including one article from each longitudinal row;
 - b. conveyor means for moving said articles in the longitudinal direction;

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- c. accelerator belt means for engaging each transverse row of said articles and accelerating said transverse row with respect to the succeeding transverse row, thereby producing a space between the accelerated transverse row and the succeeding transverse row;
- d. first insertion means for inserting a transverse member in the space between said accelerated transverse row and said succeeding transverse row; and
- e. decelerating means for decelerating each transverse row with respect to the succeeding row, thereby closing the space between the transverse rows with the transverse member inserted therein.
6. The apparatus as set forth in claim 5, further comprising grouping disc means, operatively coupled to said conveyor means, for forming groups of a plurality of said transverse rows.
7. The apparatus as set forth in claim 6, further including dividing wall means, operatively coupled to said conveyor means, for dividing said longitudinal rows into pairs.
8. The apparatus as set forth in claim 6, further including drive rod means, positioned adjacent to said group disc means, for engaging the last transverse row of articles in each of said groups.
9. The apparatus as set forth in claim 5, further in-

cluding a plurality of second insertion means for inserting longitudinal members between the longitudinal rows of articles in each group.

10. The apparatus as set forth in claim 9, wherein said second insertion means includes a delivery outlet extending down into the region between adjacent longitudinal rows of said articles.

11. The apparatus as set forth in claim 9, wherein said second insertion means are positioned with respect to each other for the sequential insertion of said longitudinal members.

12. The apparatus as set forth in claim 9 wherein said conveyor means includes separating member means for keeping said longitudinal rows separated prior to and during the insertion of said longitudinal members.

13. The apparatus as set forth in claim 12 wherein said separating member means includes two exterior members positioned against the exterior side of the exterior longitudinal rows of said articles, wherein said exterior members converge at a point past the location of said second insertion means.

14. The apparatus as set forth in claim 5 wherein said accelerator belt means and said decelerating means accelerate and decelerate said articles in the longitudinal direction.

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