

[54] PACKAGING APPARATUS

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53/390

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[57] ABSTRACT

The invention provides apparatus for feeding articles, for example apples, tomatoes or other fruit to a package of the kind which locates the articles with respect to one another. A carrier for the package is filled by drawing it from a ready-position beneath a feeder for the articles, through a filling stroke to a filled position. The articles are fed to the package during the filling stroke. Conveniently, the feeder normally communicates with a supply of the articles, but is isolated therefrom during the filling stroke. Having the carrier manually movable for the filling and return strokes gives satisfactory and economic operation together with mechanical simplicity. A very simple, purely manual apparatus has a feeder pivoted by engagement with a ramp on the carrier. For packaging in layers, the carrier may be movable stepwise downwardly between the filling strokes, e.g. by a fluid operated mechanism mounted together with the carrier upon a manually reciprocable carriage.

11 Claims, 4 Drawing Figures

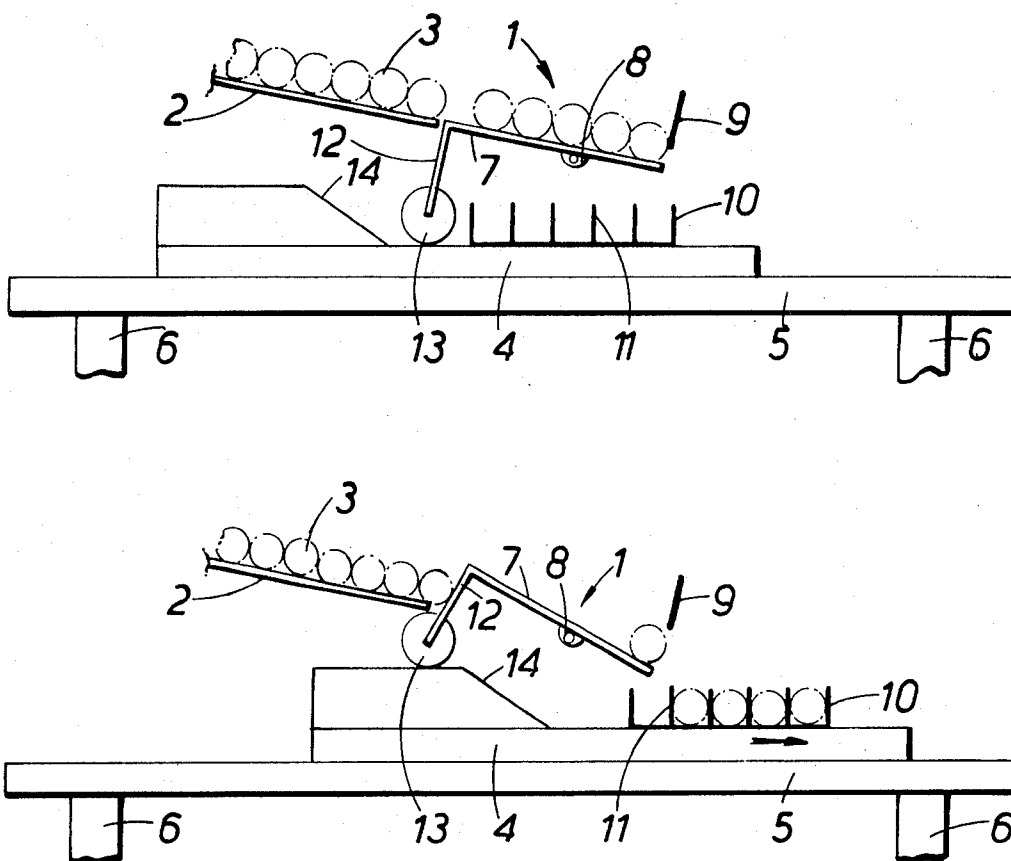


FIG. 1

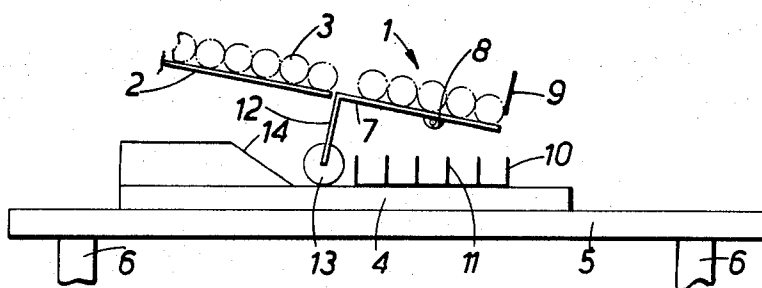


FIG. 2

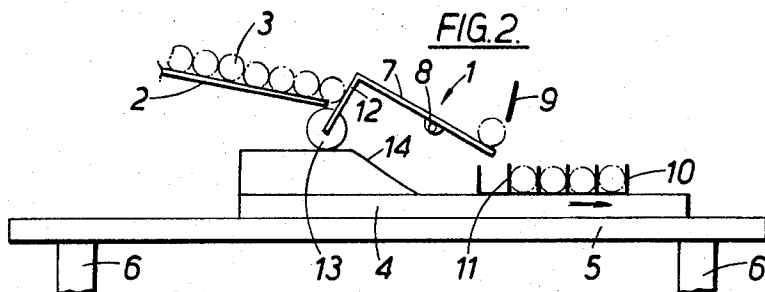
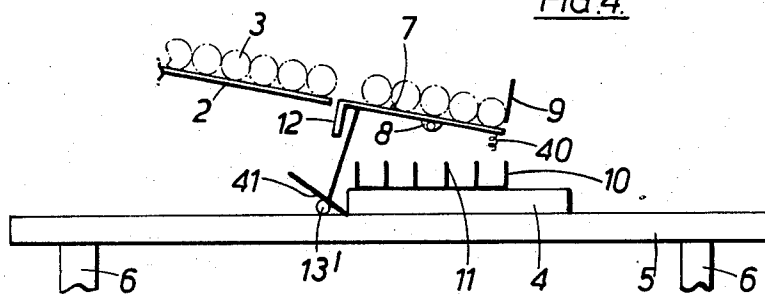


FIG. 4





## PACKAGING APPARATUS

The present invention relates to the packaging of articles in packages of the kind which serves for locating the articles with respect to one another in a layer. For many applications, and especially the packaging of fruit such as apples or tomatoes, it is convenient to form such packages of expanded structural honeycomb material superposed on a layer of cardboard or other sheet material, which layer may be loose or may form the bottom of a box in which the honeycomb material is contained. Other forms of such packages are known, including packages incorporating a grid of strips interlocked in an egg-box structure, and packages formed of synthetic resinous or cellulosic material moulded to provide compartments for the articles.

In accordance with the present invention there is provided a method of packaging articles in a package of the kind aforesaid, which comprises positioning the articles on a feeder and locating the package below the feeder in a ready-position and withdrawing the package from below the feeder through a filling stroke to a filled position whilst feeding the articles progressively from the feeder so that they are distributed over the package for location thereby.

Further in accordance with the present invention, there is provided apparatus for feeding articles to a package of the kind aforesaid, which apparatus comprises a feeder for holding the articles, a carrier for holding the package and enabling it to be withdrawn whilst so held from a ready-position beneath the feeder, through a filling stroke, to a filled-position and feeder means operable to cause the articles to be fed progressively from the feeder to the package during the filling stroke thereof so that they are distributed over the package for location thereby.

In a preferred construction the feeder is mounted for pivotal movement between an article-holding position and a feeding position in which it is inclined and allows the articles to roll and/or slide to the package, and the feeder means is arranged to pivot the feeder from the article-holding position to the feeding position for the filling stroke of the package. This arrangement is especially convenient when the apparatus has, as is preferred, a supply station for the articles to be packaged and the feeder normally communicates with the supply station in article-receiving relationship therewith but is isolated from the supply station during the filling stroke. The feeder may then be provided with a projection arranged to close an outlet from the supply station to the feeder when the feeder is pivoted to its feeding position so that a cycle of terminating the supply of articles from the supply station to the feeder, feeding articles to the package and replenishing the feeder, is achieved in a very simple manner.

For pivoting the feeder to produce the said cycle, the carrier may be provided with at least one formation, e.g. a ramp, which engages the feeder. The apparatus is then very simple in its construction. It need have no power-operated parts, and may be provided in a simple manually operable form. Power-operated pivoting of the feeder is most conveniently achieved by a fluid operated, preferably pneumatic, ram.

As so far described, the apparatus is suitable for feeding articles to packages which are removed after the filling stroke and handled singly. However, by making the carrier adjustable in its height, a stack of filled

packages may be formed progressively on the carrier. This arrangement is especially attractive for the packaging of apples which must normally be packed in a multi-layer arrangement. Here it is to be noted that the load-bearing properties of structural honeycomb material may be used advantageously to protect the packaged product. Packages of the moulded tray type are not always suitable for multi-layer packaging.

In a preferred form of the apparatus having a carrier adjustable in its height, means are provided for locating a box at substantially constant height whilst enabling the box to be moved beneath the feeder with the carrier, the arrangement being such that the packages are located at the top of the box whilst the articles are fed thereto and the stack is lowered progressively into the box. A convenient form for the carrier is a set of supporting columns arranged for retractable upward projection through the bottom of the box.

Conveniently the carrier is mounted for movement upon a support to convey the packages to and fro between the ready-position and the filled position thereof and a fluid actuated ram is operable to raise the support and lower it stepwise. For best results the ram is at least partially hydraulically operated and the support is positively located by hydraulic pressure whilst being lowered.

The following description in which reference is made to the accompanying diagrammatic drawing is given in order to illustrate the invention. In the drawing:

FIG. 1 shows a first embodiment of the apparatus with a package in the ready-position,

FIG. 2 shows the same embodiment whilst the package is being moved through a filling stroke,

FIG. 3 shows a second embodiment of the apparatus at the end of the filling stroke thereof, and

FIG. 4 shows a third embodiment of the apparatus with a package in the ready-position.

In the embodiment shown in FIGS. 1 and 2, a feeder 1 is shown in communication with a supply station 2 which may be manually loaded or automatically loaded, for example by a grading apparatus for tomatoes or other product 3. A carrier 4 is slidably mounted upon a support 5 having legs or a framework shown in part at 6 which locates it at a convenient working height. At the stage shown in FIG. 1, the product is held from rolling off the end of base part 7 of feeder 1 by a stop bar 9 fixedly mounted relative to the support 5. A package in the form of a box 10 containing an expanded slice of structural honeycomb material 11 which divides its interior into compartments, is shown positioned below the carrier.

Feeder 1 is pivotably mounted at 8 about a horizontal axis.

On its underside the feeder has a stop plate 12, positioned as shown, which carries a wheel 13 at its lower edge. By moving the carrier 4 in a filling stroke in the direction of the arrow (FIG. 2), the wheel 13 is caused to ascend a ramp 14 on the feeder 1 so that the carrier 7 pivots about to the position shown in FIG. 2. The supply station is closed-off by the stop plate 12 and the product is free to roll or slide from the feeder, under the bar 9, to be fed progressively to the package during the filling stroke. Operation of the apparatus is entirely manual and, while making the filling stroke, the operator is readily able to adjust the positioning of the articles so that they fall into the cells. An article which does not fall immediately into a cell obstructs delivery

from the feeder so that unacceptable localized accumulation of articles is minimized.

When the package has been filled and pulled clear of the feeder, it is replaced by an empty one. By pushing the carrier into the position shown in FIG. 1, the empty package is carried to the ready-position. The wheel 13 descends the ramp 14 allowing the feeder to pivot into communication with the supply station 2, and stop bar 9 prevents delivery from the feeder before the next filling stroke.

The apparatus of FIG. 3 has a supply station and feeder arrangement similar to that of FIGS. 1 and 2 but with a pneumatic ram 14' for pivoting the feeder 7. As the carrier there is provided a platform 4' mounted upon a pair of rails 31, one only of which is shown in FIG. 1, which extend in the direction of the filling stroke. These rails preferably have a channel shaped cross-section in which rollers 32 are located. Extending upwardly from the platform 4' is a set of pillars 33 which can project upwardly through apertures 34 in the bottom of a box 35 to be packed.

A ram 36 carries the rails 31 via a framework 37 (only part of which is shown) for vertically upwards and downwards motion. Pneumatic pressure is used for raising the rails quickly and the downward motion is positively controlled by hydraulic fluid. Stopwise descent is obtained by cam pieces, adjustably mounted on the framework, which actuate a stop-valve.

The operation in the apparatus for packaging the structural honeycomb material 38 is expanded manually and placed in position by the operator, and the filling of the honeycomb material is achieved by moving the box manually together with the pillars and platform 4' to and fro along the rails. Filling is obtained substantially as described with reference to FIGS. 1 and 2 hereof. Ram 14' is operated automatically by a valve responsive to the movement of the platform 4'.

A pair of rails 39 (one only shown in FIG. 3) supports the box at constant height whilst allowing it to be moved to and fro. As the weight of the product is carried by the pillars 33 the effect of friction between the box and the rails 39 is unimportant.

It is found that a high rate of packaging is obtainable in practice, often a significantly higher rate than with a fully automatic machine even though more action by the operator is required.

The embodiment shown in FIG. 4 is similar to that shown in FIGS. 1 and 2 except that springs 40 (only one shown) at either side of the feeder 7 are arranged to tilt the feeder for the filling stroke, and a cam plate 41 on the carrier 4 cooperates with a wheel 13' to bring the carrier into the position shown when the package 10 is in the ready-position.

When the wheel 13' clears the cam plate 41 the feeder 7 is tilted promptly and positively by the springs 40 to deliver the product for the filling stroke. Inadequate delivery at the beginning of the filling stroke is thereby avoided.

We claim:

1. Apparatus for feeding articles to packages of the kind which serve for locating the articles with respect to one another in a layer, which apparatus comprises a supply station for the articles, said supply station terminating in an outlet, a feeder having an entrance end and an exit end, a fixed gate member at said exit end, said feeder being pivotably mounted for pivotal movement between an article-receiving position in which the

feeder is in article-receiving relationship via its entrance end with the supply station outlet and a feeding position in which its exit end is lowered to allow progressive gravitational feeding of the articles under the fixed gate member and over the exit end, a manually slidable carrier for holding the packages in turn, means mounting said carrier for reciprocating movement, said carrier being reciprocably slidable manually to withdraw a package from a ready-position beneath the feeder through a filling stroke, during which the articles fed progressively over the exit end of the feeder are distributed over the package for location thereby, to a filled position, and subsequently to carry the next package to the ready position, and interengaging parts on the feeder and the carrier formed to pivot the feeder into its feeding position as the package is withdrawn from the ready position and to return the feeder to its article-receiving position as the next package is carried to the ready position, the pivotal movement of the feeder being manually powered via the carrier and said interengaging parts.

2. Apparatus according to claim 1 in which the feeder has a projection arranged to close the outlet of the supply station when the feeder is pivoted to its feeding position.

3. Apparatus according to claim 2 in which said projection engages a part on the carrier to produce said pivoting of the feeder.

4. Apparatus according to claim 1, in which the carrier has a ramp which engages an abutment on the feeder to produce the pivoting thereof.

5. Apparatus according to claim 1, in which the carrier is adjustable in its height so that a stack of filled packages may be formed progressively.

6. Apparatus for feeding articles to packages of the kind which serve for locating the articles with respect to one another in a layer, which apparatus comprises a supply station for the articles, said supply station terminating in an outlet, a feeder having an entrance end and an exit end, a fixed gate member at said exit end, said feeder being pivotably mounted for pivotal movement between an article-receiving position in which the feeder is in article-receiving relationship via its entrance end with the supply station outlet and a feeding position in which its exit end is lowered to allow progressive gravitational feeding of the articles under the gate member end over the exit end, a manually slidable carrier for holding the packages in turn, means mounting said carrier for reciprocating movement, said carrier being reciprocably slidable manually to withdraw a package from a ready-position beneath the feeder through a filling stroke, during which the articles fed progressively over the exit end of the feeder are distributed over the package for location thereby, to a filled position, and subsequently to carry the next package to the ready position, and an actuator ram adapted and arranged to pivot the feeder into its feeding position as the package is withdrawn from the ready position and to return the feeder to its article-receiving position as the next package is carried to the ready position.

7. Apparatus according to claim 6 in which the actuator is a fluid operated ram.

8. Apparatus according to claim 6, having means for locating a box at substantially constant height while enabling the box to be moved beneath the feeder with the carrier, the arrangement being such that the packages are located at the top of the box while the articles are

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fed thereto and the stack is lowered progressively into the box.

9. Apparatus according to claim 8 in which the carrier has a set of supporting columns arranged for retractable upward projection through the bottom of the box.

10. Apparatus according to claim 8, in which the carrier is mounted for movement upon a support to con-

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vey the packages to and fro between the ready-position and the filled position thereof and a fluid actuated ram is operable to raise the support and lower it stepwise.

11. Apparatus according to claim 10 in which the fluid actuated ram is at least partially hydraulically operated and the support is positively located by hydraulic pressure while being lowered.

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