Jan. 16, 1968 G. H. RAINBOW 3,363,394

APPARATUS FOR COLLATING ARTICLES

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Fig. 1.

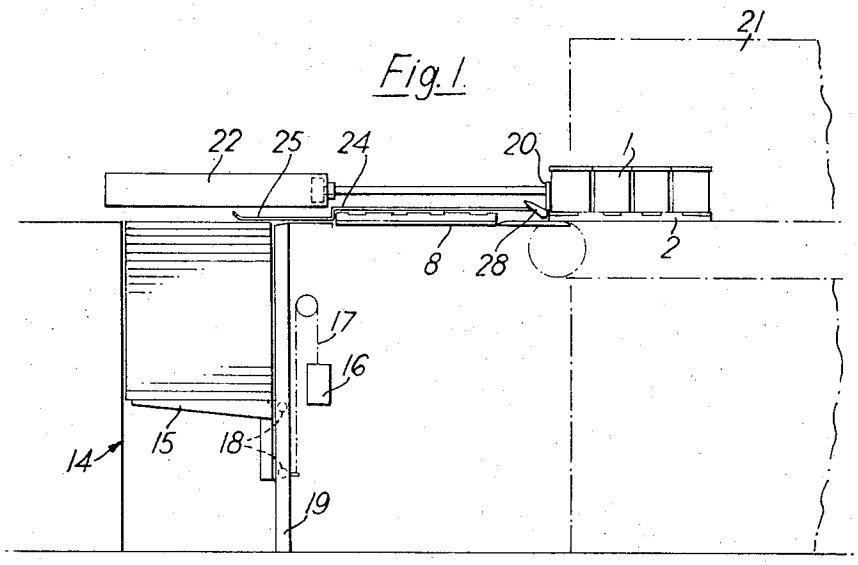
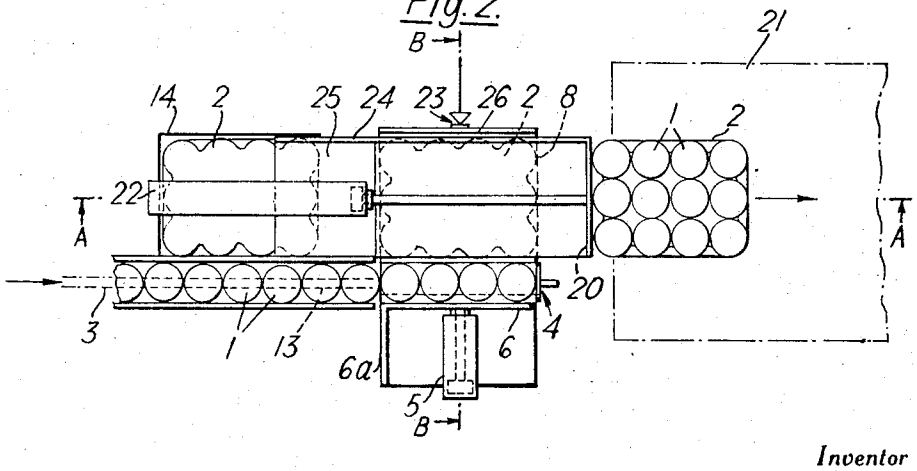


Fig. 2.



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Fig. 3.

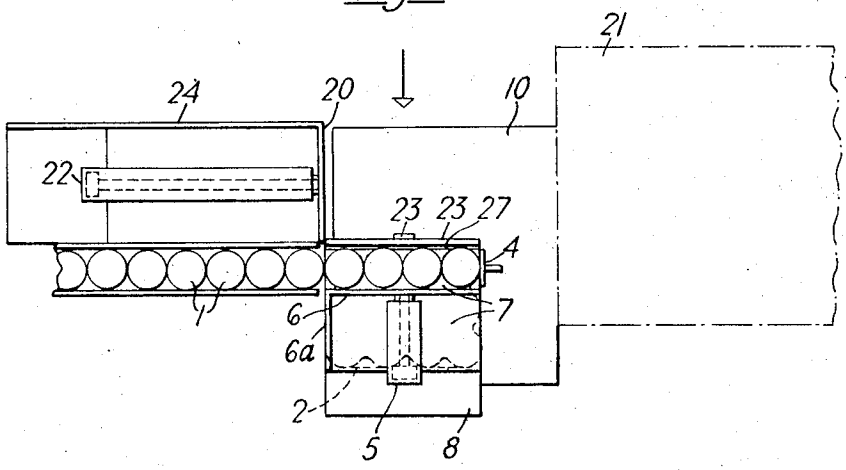
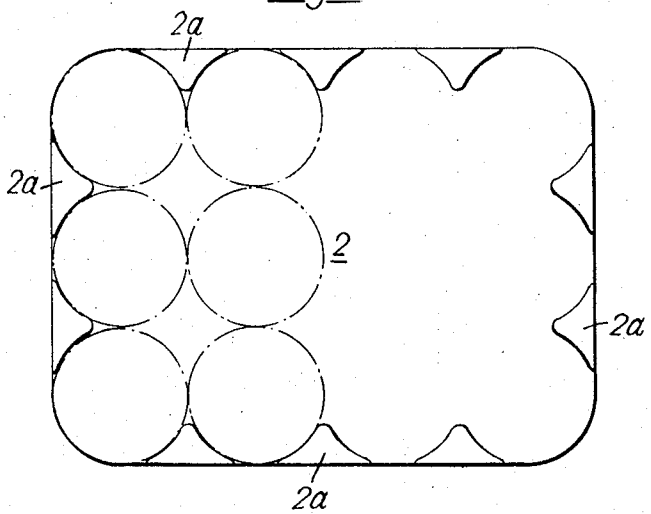


Fig. 7.



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APPARATUS FOR COLLATING ARTICLES

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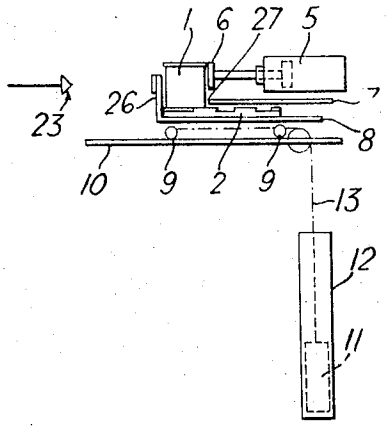


Fig. 4.

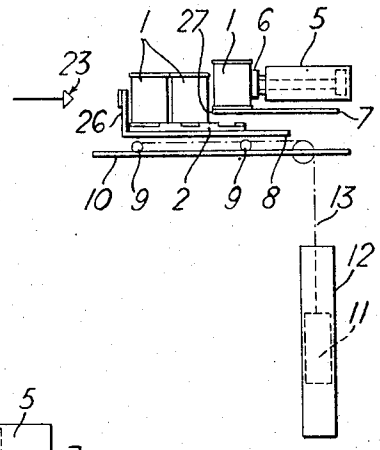


Fig. 5.

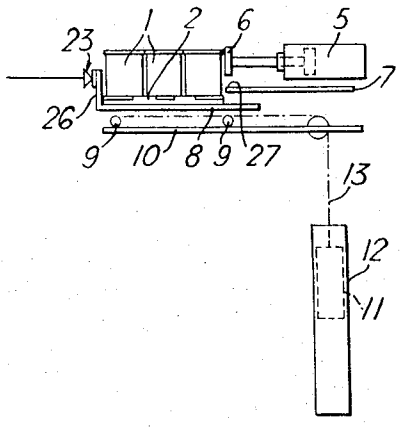


Fig. 6.

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APPARATUS FOR COLLATING ARTICLES

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Claims priority, application Great Britain, Sept. 8, 1964, 36,768/64
10 Claims. (Cl. 53—61)

This invention relates to apparatus for collating articles, and in particular to apparatus for collating articles on a supporting base designed to locate the articles in rows on the supporting base.

Supporting bases of the kind above-mentioned are usually open-topped trays and the articles are retained in position in the trays by a covering of transparent synthetic organic thermoplastic material, such as polyethylene, which is applied and secured to the trays by a process known as shrink wrapping. Shrink wrapping is a relatively cheap form of packaging which is popular because the articles are visible but are hygenically protected until the wrapping is opened. The wrapping material which covers the containers has no rigidity until it is cold, following shrinking thereof onto a tray, and for this reason it is preferred to position the articles on supporting bases which not only position the articles for the shrink wrapping process but also give strength to the finished package.

The problem when using trays as referred to above for articles to be contained in a shrink wrapped package is to effect automatic filling of the trays by dropping the articles in rows into the trays and it is the object of the present invention to provide an apparatus capable of performing this function when using a supporting base as mentioned above.

According to the invention there is provided apparatus for collating articles on a supporting base designed to locate the article in rows, wherein a first pusher member is operable to push rows of articles from a conveyor over a stationary plate and to deliver the articles row-by-row into locations provided on a supporting base initially positioned beneath said plate on a carriage movable over guides therefor and biassed towards the starting position thereof, said carriage being movable away from the starting position by rows of articles delivered by the pusher member from said plate, and a second pusher member is movable in a direction at right angles to the direction of movement of the first pusher member to move a loaded supporting base off the carriage and out of alignment with said plate.

The supporting bases to be filled may be housed in a vertical magazine including means to urge the supporting bases towards the top of the magazine and on movement of the second pusher member to move a loaded supporting base off the carriage a container feeding member may be movable with the second pusher member to move the uppermost supporting base out of the magazine and on to said carriage for movement thereby into position beneath said plate. The means for urging the supporting bases towards the top of the magazine may comprise a platform biassed towards the top of the magazine and guided for movement lengthwise of the magazine. The platform may be biassed upwards by a weight connected with the platform by a flexible connecting element passed around a freely rotatable roller located at a position near the top of the magazine.

The carriage may be biassed to the starting position thereof by a weight co-operating with a dash-pot to control the rate of return of the carriage to the starting position thereof.

Movements of the first and second pusher members may be initiated by first and second switch devices connected therewith and actuated respectively by the leading article of a row fed by the conveyor into position for delivery by the first pusher member and by the loaded supporting base reaching the position thereof from which it is moved by the second pusher member.

The pusher members may be actuated by fluid-pressure operated devices.

The first pusher member may be operable to deliver one row of articles at a time to a supporting base.

In order that the invention may be clearly understood one embodiment thereof will now be described, by way of example, with reference to the accompanying diagrammatic drawings, in which:

FIG. 1 is a section on line A—A, FIG. 2, of apparatus according to the invention,

FIG. 2 is a top plan of FIG. 1,

FIG. 3 is a top plan illustrating the position of parts at the beginning of a cycle of operation of the apparatus,

FIGS. 4 to 6 are diagrammatic sections on line B—B, FIG. 2 and illustrate the mode of operation of the apparatus, and

FIG. 7 is a top plan of a form of supporting base to be loaded by the apparatus.

Referring to the drawings, the articles to be collated are shown as cans **1**. The articles are to be collated on supporting bases **2** which may be as shown in FIG. 7 and provided with rim elements **2***a* arranged to locate the cans **1** in rows. The supporting base shown in FIG. 7 is arranged to receive twelve cans and to locate them in three rows each of four cans. It will, however, be understood that a supporting base may be arranged to receive and locate a greater or a lesser number of cans as desired.

The cans **1** are moved to the collating position by an endless conveyor **3**, FIG. 2, the cans being moved in close succession by the conveyor to a position at which the leading can engages and operates a first switch device **4** connected in suitable manner, not shown, with an actuating device **5** for a first pusher member **6**. As shown in the drawings the actuating device is a fluid-operated device, for example a hydraulic or pneumatic cylinder.

The switch device **4**, on engagement thereof by the leading can, operates the actuating device **5** which in turn causes operation of the first pusher member **6** and causes the pusher member to move a row of four cans off the conveyor **3** and across a stationary plate **7**, FIGS. 3 to 5, and to deliver the row of cans in a row into the appropriate locations therefor on a supporting base **2**. A wing **6***a*, FIGS. 2 and 3, on the pusher member **6** prevents further feeding of cans by the conveyor **3** until the pusher member **6** is restored to the starting position thereof.

The supporting base **2** is initially positioned beneath the plate **7**, being supported on a carriage **8** provided with rollers **9**, FIGS. 4 to 6, which permit movement of the carriage over guides **10** on which the rollers **9** run. The carriage **8** supports the supporting base with the top thereof in close proximity with the underside of the plate **7**. The carriage **8** is biased to the starting position thereof by a weight **11**, FIGS. 4 to 6, which co-operates with a dash-pot **12** to control the rate of return of the carriage to the starting position thereof. The weight **11** is connected with the carriage **8** by a flexible element such as a chain or cable **13**.

Supporting bases **2** which are to be filled are housed as a stack in a vertical magazine **14**, FIG. 1, which includes means to urge the supporting bases towards the top of the magazine. As shown in the drawings, the means to urge the supporting bases towards the top of the magazine comprises a platform **15** biassed towards the top of the magazine by a weight **16** connected with the platform by a flexible connecting element such as a chain or cable **17**. The platform is guided for movement lengthwise of

the magazine by rollers **18** which run in a channel member **19**. Supporting bases are fed from the top of the magazine one at a time as described below.

When a supporting base has had the full complement of cans delivered thereto by the first pusher member **6**, it is engaged by a second pusher member **20**, FIGS. 1 to 3, which moves the loaded supporting base off the carriage **8** and into a shrink wrapping machine **21**, of known construction, indicated in broken lines in FIGS. 1, 2 and 3. The second pusher member **20** is movable in a direction at right angles to the direction of movement of the first pusher member **6** and, like the first pusher member, is actuated by a fluid-pressure operated device **22**, for example a hydraulic or pneumatic cylinder. Operation of the device **22** is initiated by a second switch device **23**, FIGS. 4 to 6, when the carriage **8** reaches the position thereof, FIG. 6, at which the loaded supporting base is to be removed therefrom and fed to the shrink wrapping machine **21**.

The second pusher member **20** has secured thereto, for movement therewith, a supporting base feeding member **24**, FIGS. 1 to 3, which is operable to move the uppermost supporting base from the top of the magazine **14** and on to the carriage **8** for movement by the carriage into position beneath the plate **7**. The feeding member **24** is provided with a trailing tail piece **25**, which restrains the next succeeding supporting base until the feeding member **24** has returned to the starting position thereof when said next supporting base is moved upwards by the platform **15** in preparation for feeding by the member **24** on the next forward movement of the second pusher member **20**.

At the commencement of a collating operation, the carriage **8**, with an empty supporting base thereon, is retained in position, FIG. 3, beneath the plate **7** by a projection **26** which is upstanding from the carriage and is engaged with the forward edge **27** of plate **7**. At this time the first pusher actuating device **5** and the actuating device **22** are fully retracted, as are the pusher members **6** and **20**. The switch **4** is so timed that it will not operate until the second pusher member **20** and the carriage **8** are in the positions thereof shown in FIG. 3. As the first row of cans is moved across plate **7** by the first pusher member **6** the projection **26** is engaged by the cans thus moving carriage **8** until the row of cans tilt over the edge **26** of plate **7** and drop as a row on to the supporting base carried by the carriage, FIG. 4. The row of cans is then engaged with the edge **26** of plate **7** to constrain the carriage against movement thereof towards its starting position. As the second row of cans is delivered by the first pusher member **6** it engages the row of cans already delivered to the supporting base and so effects further movement of the carriage to a position at which the second row of cans is delivered on to the supporting base, FIG. 4. The third, and, in the embodiment being described, last, row of cans is then similarly delivered to the supporting base. The row of cans moved by the first pusher member **6** is supported on both sides, at the rear by the pusher member **6** and at the front by the projection **26** or by the preceding row of cans, and the pusher member **6** operates with sufficient power and speed to force the carriage **8** a short distance greater than the exact diameter of the cans. The pusher member **6** then retracts rapidly thus permitting the cans to drop, without tilting, on to their locations on the supporting base **2**. This arrangement is of particular advantage when the articles have irregular outlines, or have projections, for example as on beaded cans or heavily embossed glassware. When the last row is in position on the supporting base **2**, FIG. 6, the second switch device **23** is operated to initiate operation of the second pusher member **20** which, as described above, moves the loaded supporting base off the carriage **8** and into the shrink wrapping machine **21**, at the same time feeding a further empty supporting base from the magazine **14** on to the carriage **8**. When the second pusher member has returned sufficiently to permit movement thereof the carriage **8**, with the

empty supporting base located thereon, is returned by the weight **11**, under control of dash-pot **12**, to the starting positon thereof in which the supporting base is located under the plate **7** and the projection **26** is engaged with the edge **27** of plate **7**, and the cycle of operations starts again.

As shown in the drawings, the first pusher member **6** is arranged to deliver the rows of cans one at a time to a supporting base but, if desired, the first pusher member **6** may effect full loading of a supporting base during only one forward movement of the pusher member, in which case the conveyor **3** is arranged to feed the cans in three side-by-side rows for removal by the pusher member **6**.

When, as shown in FIG. 7, the supporting base has a discontinuous rim, a dropping dog **28**, FIG. 1, is provided to ensure that the supporting base and the cans move together during the final forward movement of the first pusher member **6** when this member is arranged to deliver one row of cans at a time to the container. The dog **28** is raised on the return movement of the pusher member **6** to pass over the next empty supporting base.

To enable the articles to fall freely when the articles being collated are irregular articles, or are rimmed articles such as cans, a ratchet device, not shown, may be provided on the lower side of carriage **8** to hold the carriage at the position to which the first pusher member **6** has moved the carriage until the next stroke of the pusher member when the ratchet again engages to hold the carriage in the next position thereof to which it is moved by a row of articles. The ratchet releases the carriage when the supporting base thereon is fully loaded and the carriage is, at this point, held in position by the trailing edge of the second pusher member **20** until the second pusher member is retracted when the carriage returns to the position thereof shown in FIG. 3 under the influence of the dash-pot **12** and weight **11**. It is preferred to use a dash-pot and weight control device rather than a spring or other biassing means because the inertia of the dash-pot ensures that the carriage moves comparatively slowly to rest against the edge **27** of the plate **7** after it has been forced against the biassing means by the first pusher member **6**.

It will be understood that articles other than cans may be collated by apparatus as described herein, for example the articles may be jars, packages, tennis balls, or apples.

The supporting bases may be formed from double-corrugated board compressed over a part of the surface thereof to form the rim elements **2***a*, or the supporting bases may be made of any other suitable material such, for example, as thermoplastic material or aluminum foil.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Apparatus for collating articles on a supporting base designed to locate the articles in rows, comprising a stationary plate, a conveyor operable to move articles on to the stationary plate for collation on the supporting base, a carriage initially positioned in part beneath said stationary plate, guides over which the carriage is movable to and from said initial position thereof, biasing means co-operating with said carriage to urge the carriage towards said initial position thereof, a first pusher member operable to push rows of articles from the stationary plate on to a supporting base positioned on the carriage to receive the first row of articles and to cause the articles of each row after the first to engage the articles of the preceding row positioned on said base and so move the carriage away from the initial position thereof, and a second pusher member movable in a direction at right angles to the direction of movement of the first pusher member to move a loaded supporting base off the carriage and out of alignment with the stationary plate.

2. Apparatus according to claim **1**, including a vertical magazine arranged to house supporting bases, means operable to urge the supporting bases towards the top of

the magazine, and a supporting base feeding member movable with said second pusher member and operable while the second pusher member is moving a loaded supporting base off the carriage to move the uppermost supporting base out of the magazine and on to said carriage for movement thereby into position beneath the stationary plate.

3. Apparatus according to claim 2, wherein the means for urging the supporting bases towards the top of the magazine comprises a platform biased towards the top of the magazine and guided for movement lengthwise of the magazine.

4. Apparatus according to claim 3, wherein the platform is biased upwards by a weight connected with the platform by a flexible connecting element passed around a freely rotatable roller located at a position near the top of the magazine.

5. Apparatus for collating articles on a supporting base designed to locate the articles in rows, comprising a stationary plate, a conveyor operable to move articles on to the stationary plate for collation on the supporting base, a carriage initially positioned in part beneath said stationary plate, guides over which the carriage is movable to and from said initial position thereof, biassing means co-operating with said carriage to urge the carriage towards said initial position thereof, said biassing means including a weight connected to the carriage and housed in a dashpot to control the rate of return of the carriage to said initial position thereof, a first pusher member operable to push rows of articles from the stationary plate on to a supporting base positioned on the carriage to receive the first row of articles and to cause the articles of each row after the first to engage the articles of the preceding row positioned on said base and so move the carriage away from the initial position thereof, and a second pusher member movable in a direction at right angles to the direction of movement of the first pusher member to move a loaded supporting base off the carriage and out of alignment with the stationary plate.

6. Apparatus for collating articles on a supporting base designed to locate the articles in rows, comprising a stationary plate, a conveyor operable to move articles on to the stationary plate for collation on the supporting base, a carriage initially positioned in part beneath said stationary plate, guides over which the carriage is movable to and from said initial position thereof, biassing means co-operating with said carriage to urge the carriage towards said initial position thereof, a fluid-pressure operated first pusher member operable to push rows of articles from the stationary plate on to a supporting base positioned on the carriage to receive the first row of articles and to cause the articles of each row after the first to engage the articles of the preceding row positioned on said base and so move the carriage away from the initial position thereof, and a fluid-pressure operated second pusher member movable in a direction at right angles to the direction of movement of the first pusher member to move a loaded supporting base off the carriage and out of alignment with the stationary plate.

7. Apparatus according to claim 6, including first and second switch devices connected with said fluid-pressure operated first and second pusher members and positioned respectively for actuation by the leading article of a row delivered by said conveyor on to the stationary plate and by a loaded supporting base reaching the position thereof from which it is moved by the second pusher member.

8. Apparatus according to claim 7, including a vertical magazine arranged to house supporting bases, means operable to urge the supporting bases towards the top of the magazine, and a supporting base feeding member movable with said second pusher member and operable while the second pusher member is moving a loaded supporting base off the carriage to move the uppermost supporting base out of the magazine and on to said carriage for movement thereby into position beneath the stationary plate.

9. Apparatus according to claim 8, wherein the means for urging the supporting bases towards the top of the magazine comprises a platform biased towards the top of the magazine and guided for movement lengthwise of the magazine.

10. Apparatus according to claim 9, wherein the platform is biased upwards by a weight connected with the platform by a flexible connecting element passed around a freely rotatable roller located at a position near the top of the magazine.

No references cited.

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