

Oct. 5, 1965

G. BARGEL ETAL
BOTTLES AND THE LIKE

3,209,923

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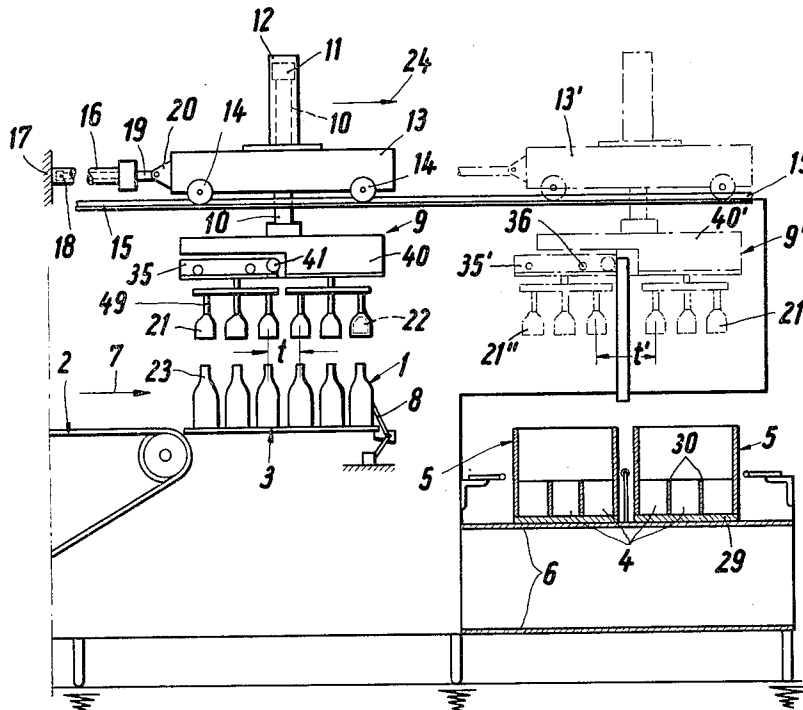


Fig. 1

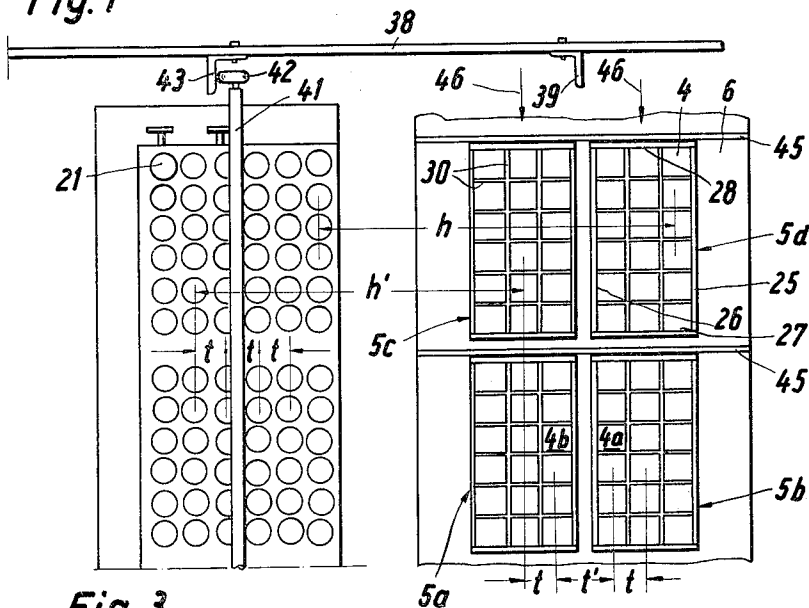


Fig. 3

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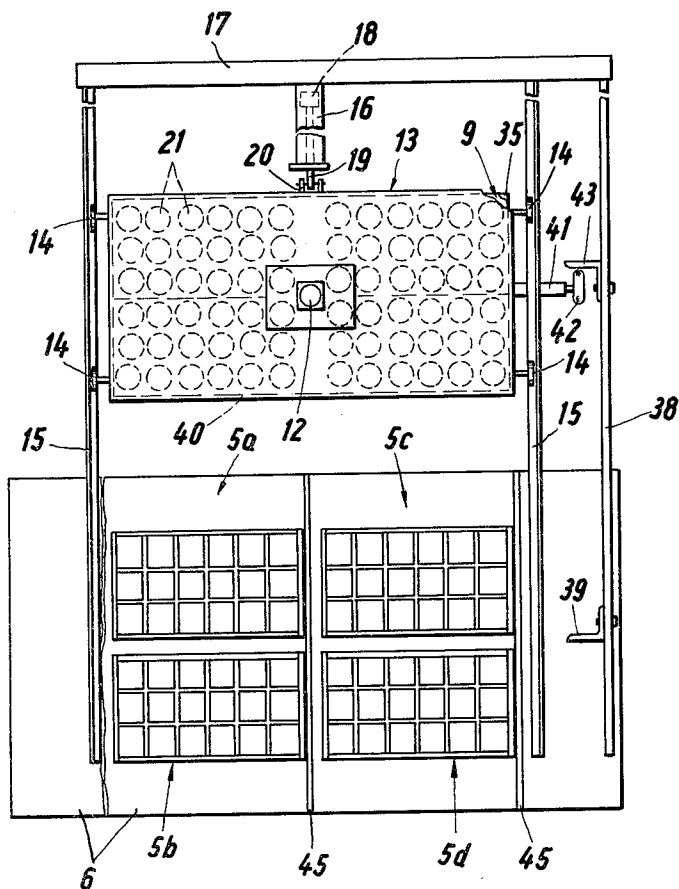
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Fig. 2



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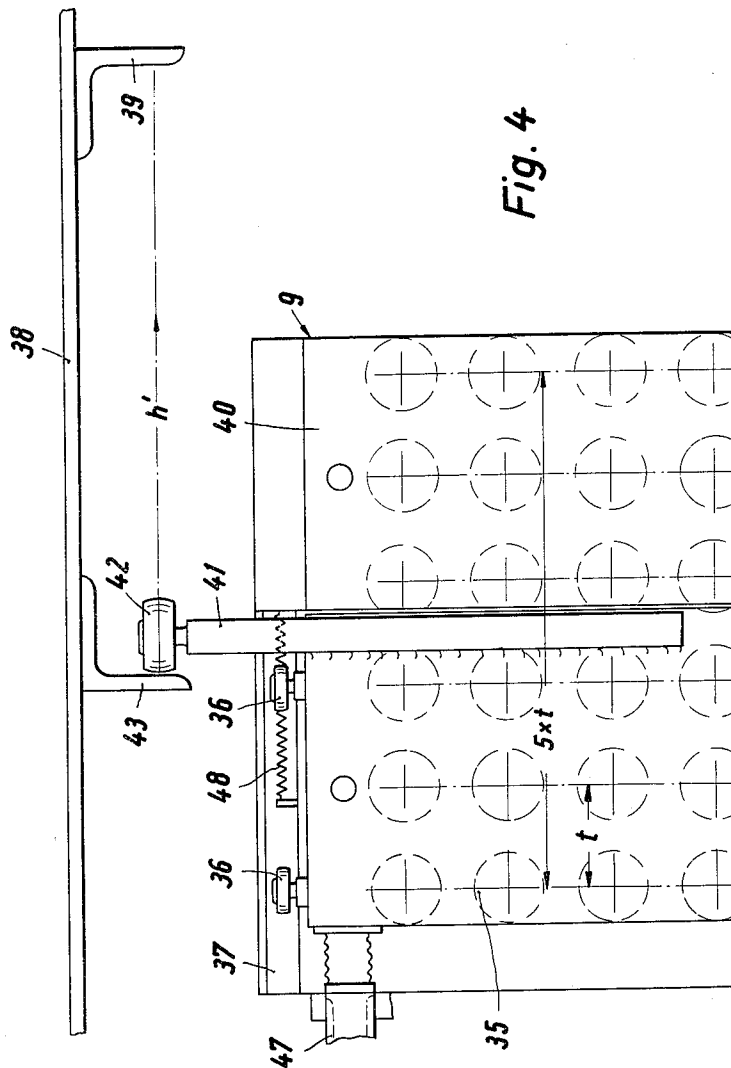
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BOTTLES AND THE LIKE

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6 Claims. (Cl. 214—1)

The present invention relates to an apparatus for handling bottles and similar articles, and more particularly to a machine for transferring bottles or similar articles to and from crates, boxes and other types of containers. Still more particularly, the invention relates to a machine for simultaneously filling or evacuating two or more crates or similar receptacles.

In many bottle processing plants (e.g., in breweries, dairies, vineries, soda bottling factories and similar commercial establishments), large numbers of crates must be loaded and/or unloaded in a continuous operation. It is often necessary to convey the crates in two or more rows in order to insure that the crates may be loaded or unloaded at the same rate of speed at which a bottle washing, filling or capping machine delivers bottles to the loading station or at which such a machine may receive bottles from an unloading station. Conventional bottle transferring machines cannot be utilized for such types of operations because, and provided that the bottles must be transferred from a conveyor into pairs of transversely aligned crates, the group of bottles to be received in one of the crates must be shifted with respect to the other group, this being due to the fact that the adjacent side walls of aligned crates automatically increase the distance between the bottle-receiving compartments of one crate and the bottle-receiving compartments of the other crate. In addition, the side walls of the crates are often thicker than the partitions which separate the compartments from each other.

Accordingly, it is an important object of the present invention to provide an apparatus which is constructed and assembled in such a way that bottles or other types of articles may be transferred from a stack in which they are disposed at predetermined distances from each other into aligned crates or the like wherein their mutual spacing is different than their spacing in the stack.

Another object of the invention is to provide a reciprocable apparatus of the just outlined characteristics whose construction is such that its parts automatically assume requisite positions of accurate alignment with stacked bottles or similar articles or with the compartments of aligned crates whenever the apparatus is moved to the one or the other of its end positions.

A further object of the invention is to provide a fully automatic apparatus for transferring bottles from a bottle feeding conveyor into the compartments of two or more aligned crates or vice versa.

An additional object of the invention is to provide an improved carriage for bottles or similar articles which may be utilized in an apparatus of the above outlined characteristics.

Still another object of the invention is to provide a novel method of crating or uncrating bottles and similar articles.

With the above objects in view, the invention resides in the provision of an apparatus for changing the mutual distance between and for transferring a first and a second article (or a first and a second group of articles) from a first locale to a second locale or vice versa. In its simplest form, the apparatus comprises a pair of article holding means one of which is movable with respect to the other thereof between a first and a second end position, reciprocating means for moving the pair of holding means in a predetermined path between a first and a second position in which the pair of holding means are respectively adjacent to the first and second locales, first shifting means for maintaining the one holding means in the first end position when the pair of holding means are adjacent to the first locale, and second shifting means for maintaining the one holding means in the second end position when the pair of holding means are adjacent to the second locale whereby the holding means may engage articles at the first locale to transfer and to simultaneously change the mutual distance between the articles not later than at the time the pair of holding means are adjacent to the second locale so that the articles may be released in positions in which their mutual distance is different from their spacing at the first locale. Of course, the operation may be carried out in reverse, i.e., the holding means may engage the articles at the second locale to transfer such articles to the first locale. In one of its preferred forms, the apparatus comprises two conveyors one of which feeds articles to the first locale and the other of which removes articles from the second locale or vice versa, and the holding means are preferably mounted on a common carriage so as to be operable by a single reciprocating means which moves them from the one to the other conveyor or vice versa.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following detailed description of certain specific embodiments with reference to the accompanying drawings, in which:

FIG. 1 is a somewhat schematic side elevational view of an apparatus which embodies our invention;

FIG. 2 is a top plan view of the apparatus;

FIG. 3 is a fragmentary top plan view of the two conveyors and of a portion of the carriage; and

FIG. 4 is an enlarged fragmentary top plan view of the structure shown in FIG. 3.

Referring now in greater detail to the drawings, and first to FIG. 1, there is shown an apparatus which is utilized for transferring bottles 1 from a feeding conveyor 2, and more particularly from a first locale at the upper side of a horizontal platform 3 which receives bottles from the conveyor 2, to a second locale defined by compartments 4 in transversely aligned pairs of crates 5 which travel intermittently with the upper stringer of an advancing conveyor 6. It is assumed that the direction (arrow 7) in which the first conveyor 2 feeds bottles to the first locale at the upper side of the platform 3 makes right angles with the direction in which the crates 5 advance with the conveyor 6. There is a stop 8 which limits the forward movement of the foremost row of bottles 1 on the platform 3, and the arrangement is such that the bottles come to rest at the time they form two slightly spaced groups in each of which the adjacent bottles are equidistant from each other. Each group is assumed to contain 36 bottles and the bottles of each group are arranged in transversely and longitudinally aligned rows each of which includes six equidistant bottles.

The apparatus for simultaneously transferring two groups of such bottles from the first locale at the upper side of the platform 3 to the second locale in the compartments of four crates 5a, 5b, 5c, 5d comprises a carriage 9 which is suspended at the lower end of a vertically reciprocable piston rod 10. The upper end of this piston rod is secured to a piston 11 which is reciprocable in a double-acting cylinder 12 mounted at the upper side of a dolly 13 whose wheels 14 are mounted for travel along

a pair of spaced horizontal rails 15, see FIG. 2. The rails 15 are located above the level of the conveyors 2, 6 and are parallel with the direction indicated by the arrow 7, i.e., these rails are perpendicular to the path in which the crates 5 advance with the upper stringer of the conveyor 6. The means for reciprocating the dolly 13 comprises a double-acting cylinder 16 which is secured to a stationary frame member 17, a piston 18 which is reciprocable in the cylinder 16, and a piston rod 19 one end of which is secured to brackets 20 provided at the left-hand side of the dolly, as seen in FIG. 1.

The carriage 9 supports two groups of specially constructed pneumatic gripping or holding devices 21. These holding devices comprise elastically deformable cups 22 which may be lowered (piston rod 10) onto the upper ends or tops 23 of bottles 1 to engage the respective bottle tops and to thereupon lift the bottles above and away from the platform 3 prior to movement of the dolly 13 to its phantom-line position 13' (arrow 24). In the next step, the cylinder 12 is caused to lower the carriage 9 toward the crates 5 and the holding devices 21 are caused to release the bottle tops 23 at the time the bottles come to rest in the respective compartments 4. It will be noted that the parts 13-20 together constitute a reciprocating means for moving the holding devices 21 between a first and a second position in which the holding devices are respectively adjacent to the conveyors 2 and 6, or vice versa. The path in which the holding devices 21 move between such positions is defined by the rails 15.

As shown in FIGS. 1 and 3, each crate 5 comprises four rectangularly arranged side walls 25, 26, 27, 28; a bottom wall 29, and intersecting partitions 30 which define the aforementioned compartments 4. The wall thickness of the partitions 30 is normally less than the thickness of a side wall and, as a rule, the transversely aligned crates 5a, 5b, or 5c, 5d (see FIG. 3) are not immediately adjacent to each other. Consequently, the apparatus of our invention must embody means for shifting a number of trailing holding devices 21 (as seen in the direction of the arrow 24) away from the leading holding devices in order to insure that two groups of simultaneously transferred bottles 1 are accurately aligned with the compartments of all four crates. The shifting means comprises a reciprocable supporting member 35 which constitutes a rear portion of the carriage 9 and whose wheels 36 travel along rearwardly extending horizontal rails 37 of the carriage 9, a further horizontal rail 38 (see particularly FIGS. 2, 3 and 4) which is supported by the frame member 17, and a stop bracket 39 which is mounted on the rail 38 in such position that it moves the supporting member 35 away from the front portion 40 of the carriage 9 when the latter assumes the phantom-line position 9'. The supporting member 35 comprises a transversely extending bar 41 which is provided with a preferably elastic roller follower 42. This follower comes into abutment with the bracket 39 when the carriage assumes the position 9'. It will be noted that the path in which the supporting member 35 is movable along the rails 37 between two end positions is parallel with the path in which the carriage 9 is movable along the rails 15.

In order to insure that the supporting member 35 returns the respective holding devices to the full-line end position of FIG. 1 when the carriage 9 is located above the platform 3, the rail 38 supports a second stop bracket 43 which forms part of the shifting means and against which the follower 42 abuts when the piston 18 completes a return stroke in a direction toward the frame member 17 so that the holding devices supported by the member 35 automatically return to the end position which is shown in FIG. 3.

The belt of the conveyor 6 is provided with transversely extending motion transmitting members 45 which engage and entrain the respective pairs of transversely

aligned crates when the conveyor 6 is in motion (arrows 46).

The apparatus of our invention operates in the following manner:

It is assumed that the feeding conveyor 2 has transferred onto the platform 72 bottles 1 which are arranged in the same way as the holding devices 21 of FIG. 3, i.e., the right-hand rows of both groups of bottles abut against the stop 8 and the spacing between the bottles in each of the two groups or stacks is the same. The manner in which the bottles may be arranged in such spaced positions at the locale defined by the platform 3 forms no part of this invention, it being sufficient to say that the spacing *t* between the center of adjacent bottles in each group is the same and is sufficient to insure that a pair of so spaced bottles may be deposited in two adjacent compartments of a single crate 5 without it being necessary to change the mutual distance between such pair of bottles.

It is further assumed that the motion transmitting members 45 of the conveyor 6 have advanced two pairs 5a, 5b and 5c, 5d of transversely aligned crates to the locale of FIG. 3 in which the horizontal rows of compartments 4 (as seen in FIG. 3) are aligned with rows of bottles 1, the latter being supported by the platform 3.

The dolly 13 is in the full-line first position of FIG. 1 which corresponds to the position of FIG. 2, and the follower 42 abuts against the rear stop bracket 43 so that the supporting member 35 abuts against the front portion 40 of the carriage 9. In other words, each holding device 21 is in a position of vertical alignment with a bottle top 23 and, after the cylinder 12 receives pressure fluid at a point above the piston 11, the piston rod 10 descends and moves the cups 22 into engagement with the respective bottle tops 23. The cups 22 are then deformed in response to change in pressure effected through a pneumatic conduit 47 (FIG. 4) so that the holding devices engage the bottle tops with a force which is sufficient to insure that the bottles will follow the holding devices when the latter are lifted in response to admission of pressure fluid into the cylinder 12 at a point below the piston 11. The holding devices then return to the full-line end positions of FIG. 1 and entrain the bottles 1 to a position above the level of the stop 8 without, however, changing the mutual positions of the bottles.

The apparatus then admits pressure fluid to the cylinder 16 in a sense to move the piston rod 19 in a direction to the right, as viewed in FIG. 1, whereby the dolly 13 assumes the phantom-line position 13' and the carriage 9 moves to the phantom-line position 9'. However, shortly before the carriage reaches the position 9', the follower 42 comes into abutment with the stop bracket 39 and causes the supporting member 35 to move away from the front portion 40 of the carriage, i.e., the parts 35, 40 then respectively assume the phantom-line positions 35', 40' of FIG. 1 with the result that the front (leading) group of holding devices assumes the positions 21' and that the rear (trailing) group of holding devices assumes the end positions 21''. Consequently, the holding devices 21' are located above the compartments of the crates 5b, 5d and the holding devices 21'' are located above the compartments of the crates 5a, 5c. In the next step, the apparatus causes the piston rod 10 to descend and to lower the bottles into the respective compartments. As soon as or shortly before the bottles come to rest on the bottom walls 29 of the respective crates, the cups 22 of the holding devices release the respective bottle tops 23 and, by suitable actuation of the cylinders 12 and 16, the carriage may thereupon return first to the position 9' and thereupon to the full-line position of FIG. 1.

It goes without saying that the apparatus of the present invention is equally useful for transferring bottles into or from a single pair of crates 5a, 5b or 5c 5d. In other words, it is not important that the apparatus should simultaneously fill or unload four or more crates. Fur-

thermore, it is not necessary that the crates be provided with partitions 30 since the apparatus can deposit bottles into the internal spaces of crates which are without such partitions. As a matter of fact, such operation results in substantial simplification of the apparatus because the bottles supported by the platform 3 may be in actual abutment with each other.

We further wish to point out that the apparatus of our invention may be readily converted for transfer of bottles or other articles into transversely aligned rows of three or more crates. All that is necessary is to replace the supporting member 35 by two or more supporting members which is movable with respect to each other and to provide separate stop brackets 39 for each supporting member. Such modifications are so obvious that they can be readily comprehended by men skilled in this art without necessitating additional illustrations.

Referring again to FIG. 4, there is shown a spring 48 which operates between the supporting member 35 and the front portion 40 of the carriage 9. This spring may be used as a substitute for or in addition to the stop bracket 43 because it also performs the function of normally maintaining the supporting member 35 in abutment with the front portion 40. Two or more such springs may be provided, if necessary. If the apparatus of our invention is provided with such spring or springs, the supporting member 35 returns into abutment with the front portion 40 as soon as the piston 18 causes the carriage 9 to move through the distance $t'-t$, the distance t' corresponding to the distance between the centers of two bottles which are accommodated in a compartment 4a of the crate 5a and in a compartment 4b of the crate 5b. The distance t corresponds to the spacing of two bottles which are accommodated in two adjacent compartments of a single crate. The maximal distance covered by the carriage 9 (i.e., by its front portion 40) corresponds to the distance h , and the distance h' indicates the maximal distance covered by the second portion or supporting member 35.

The apparatus of the present invention is especially useful in breweries and similar commercial establishments wherein the capacity of bottle filling, cleaning and/or capping machines is so great that a single row of crates could not receive bottles at the same rate at which the bottles are being fed thereto. Furthermore, the apparatus is equally useful in establishments wherein bottles are transferred into comparatively small crates each of which is capable of accommodating a limited number of bottles. Still further, the apparatus of this invention may be used in all such establishments wherein the mutual distance of two articles must be increased or reduced and wherein the articles must be transferred from a first to a second locale or vice versa. An important advantage of the apparatus is that its parts occupy less space than if the holding devices depending from the front portion 40 and from the second portion or supporting member 35 were arranged in a single row. Another important advantage of the apparatus is that its parts need not be reciprocated at exceptionally high speeds even if they must transfer large numbers of bottles or other articles at a time, this being especially true in the event that each row of crates comprises three or more crates and if the carriage 9 may transfer bottles into two or more crates at a time.

When the apparatus of our invention is utilized for transferring bottles from crates 5 onto the platform 3 or directly onto the conveyor 2, the operation is carried out in the opposite sense, i.e., the holding devices 21 first descend to engage and to grip bottles which are accommodated in the compartments 4, and the piston 18 thereupon moves the carriage 9 in a direction to the left, as viewed in FIG. 1, so as to move the bottles above the conveyor 2. In such instances, the supporting member 35 may form a rigid component part of the carriage 9 provided that the neck portions 49 of the holding device 21

are sufficiently flexible to move toward and away from each other. If desired, each individual holding device may be movable with respect to some or all other holding devices, i.e., there may be a stop bracket for each holding device or for each row of holding devices.

The two shifting means for the supporting member 35 may be modified in a number of ways without departing from the spirit and scope of the invention as long as such shifting means insure that the supporting member 35 may assume one end position with respect to the front portion 40 at the time the holding devices 21 are adjacent to the conveyor 2 and that the supporting member 35 may assume the other end position (35') at the time the holding devices are adjacent to the conveyor 6 so as to make sure that the distance between the articles respectively held by the devices 21', 21'' is different from the distance between the same articles when they are placed onto the platform 3.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. An apparatus for changing the distance between and for transferring a first and a second group of articles from a first locale to a second locale or vice versa, comprising a carriage including a first and a second portion which latter is movable with respect to the former in a first path between a first and a second end position; a pair of article holding means respectively provided on said portions for releasably supporting the respective groups of articles; reciprocating means for moving said carriage in a second path which is parallel with said first path between a first and a second position in which said carriage is respectively adjacent to the first and second locales; first shifting means for maintaining the second portion in said first end position when said carriage assumes said first position; and second shifting means for maintaining said second portion in said second end position when said carriage assumes said second position, one of said shifting means comprising a follower connected with said second portion and a fixed stop member which is located in the path of said follower in such position that it engages and arrests the follower and the second portion while the carriage moves from the one to the other of said positions thereof.

2. An apparatus for increasing the distance between and for transferring a first and a second group of articles wherein each group comprises longitudinally and transversely extending rows of articles from a first locale where the articles of both groups form an array of articles with the articles uniformly spaced from each other to a second locale, or vice versa, comprising a carriage including a first and a second portion which latter is movable with respect to the former in a first path between a first and a second end position; a pair of article holding means respectively provided on said portions for releasably supporting the respective groups of articles and for maintaining intact the spacing between the articles of the respective groups, said second portion normally assuming one of such end positions; reciprocating means for moving said carriage in a second path which is parallel with said first path between a first and second position in which said pair of holding means are respectively adjacent to the first and second locales; and shifting means for moving said second portion from said one end position to the other end position in response to movement of said carriage from the first to the second position thereof so that, on movement of said second portion to the other end position, the corresponding group of articles is moved away from the other

group while the uniform spacing between the articles of each group remains unchanged, one of said shifting means comprising a follower connected with said second portion and a fixed stop member which is located in the path of said follower in such position that it engages and arrests the follower and the second portion while the carriage moves from the first to the second of said positions thereof.

3. An apparatus for changing the distance between and for transferring two groups of articles from a first to a second locale or vice versa, comprising first conveyor means for supporting the articles at the first locale in such position that the groups of articles are spaced at a predetermined distance from each other; second conveyor means for receiving the articles at the second locale; a carriage including a first and a second portion which latter is movable with respect to the former in a first path between a first and a second end position; reciprocating means for moving the carriage in a second path which is parallel with said first path between a first and a second position in which the carriage is respectively adjacent to the first and second conveyors; a pair of holding means respectively provided on said portions for engaging and for releasably supporting the respective groups of articles; first shifting means for moving said second portion with respect to said first portion to said first end position in response to movement of the carriage from the second to the first position thereof; and second shifting means for moving the second portion with respect to said first portion to said second end position in response to movement of the carriage toward the second position thereof, whereby the distance between said pair of holding means is changed, one of said shifting means comprising a follower connected with said second portion and a fixed stop member which is located in the path of said follower in such a position that it engages and arrests the follower and the second portion while the carriage moves from the one to the other of said positions thereof.

4. An apparatus as set forth in claim 3, wherein each of said holding means comprises a plurality of gripping devices whose mutual distances are the same as the distances between the articles of the respective groups of articles on said first conveyor.

5. An apparatus as set forth in claim 3, wherein one of said shifting means comprises at least one spring con-

necting said portions to each other and tending to move said second portion nearer to said first portion.

6. An apparatus for changing the distance between and for transferring two groups of articles from a first to a second locale or vice versa, comprising first conveyor means for supporting the articles at the first locale in such position that the groups of articles are spaced at a predetermined distance from each other; second conveyor means for receiving the articles at the second locale; a carriage including a first and a second portion which latter is movable with respect to the former in a first path between a first and a second end position, and which comprises a follower; reciprocating means for moving the carriage in a second path which is parallel with said first path between a first and a second position in which the carriage is respectively adjacent to the first and second conveyors; a pair of holding means respectively provided on said portions for engaging and for releasably supporting the respective groups of articles; first shifting means for moving said second portion with respect to said first portion to said first end position in response to movement of the carriage from the second to the first position thereof, said first shifting means comprising a first stop adjacent to the path of said carriage and arranged to engage said follower to thereby arrest said second portion when the carriage moves toward said first position thereof; and second shifting means for moving the second portion with respect to said first portion to said second end position in response to movement of the carriage toward the second position thereof, whereby the distance between said pair of holding means is changed, said second shifting means comprising a second stop also adjacent to the path of said carriage and arranged to engage said follower to thereby arrest said second portion when the carriage moves toward said second position thereof.

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