

Aug. 23, 1966

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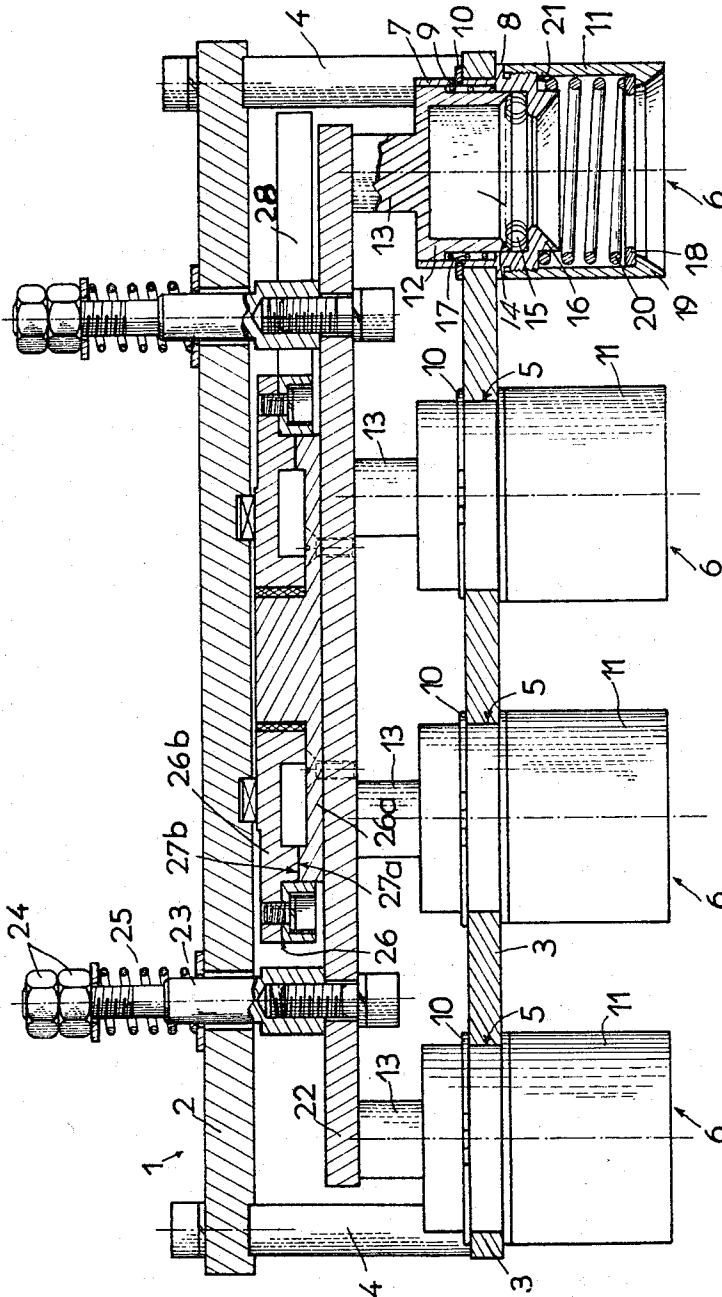
3,267,643

GRIPPING HEADS FOR BOTTLES OR THE LIKE

Filed Nov. 5, 1963

3 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

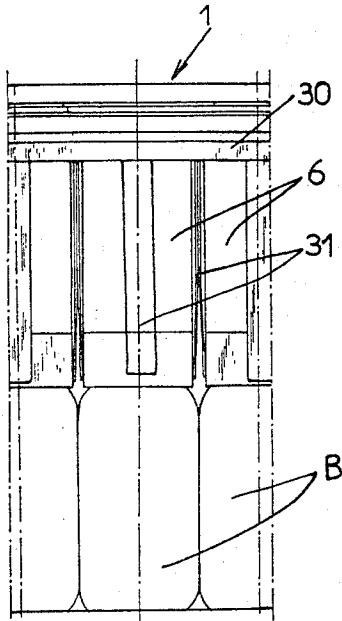


Fig. 5.

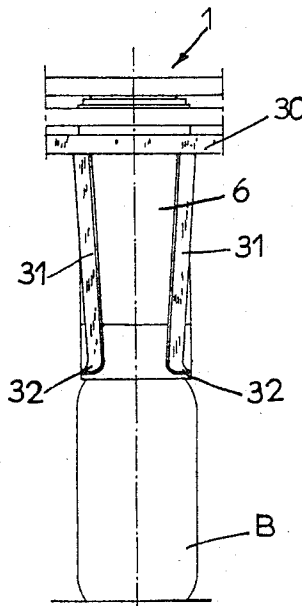


Fig. 3.

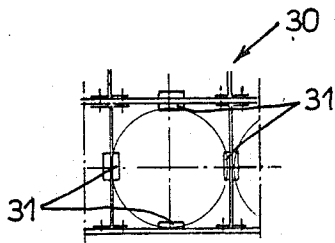


Fig. 6.

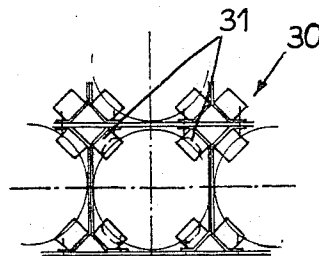
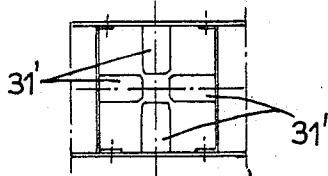
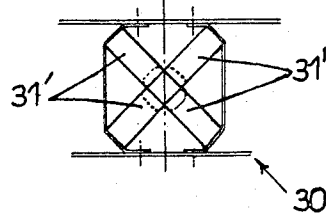


Fig. 4.

Fig. 7.



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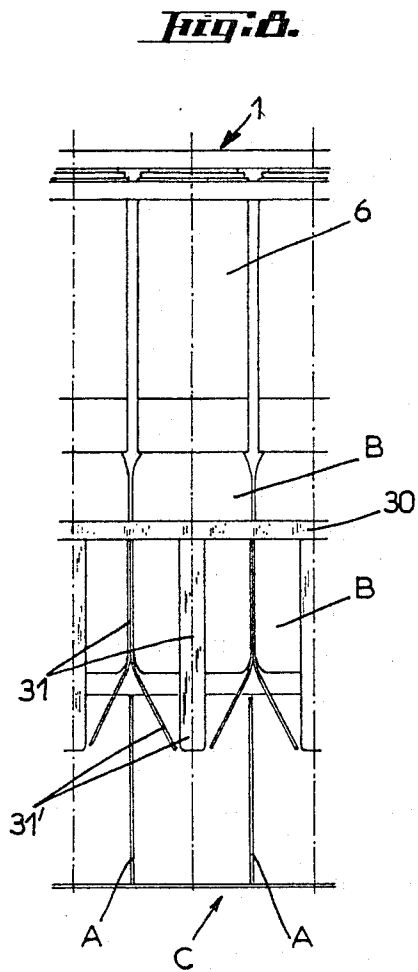
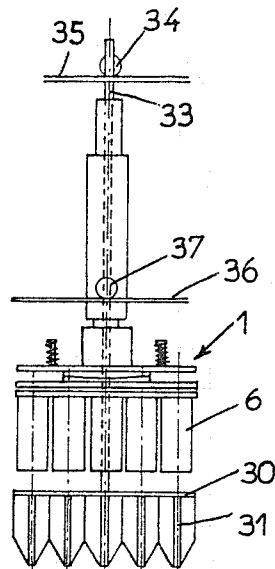
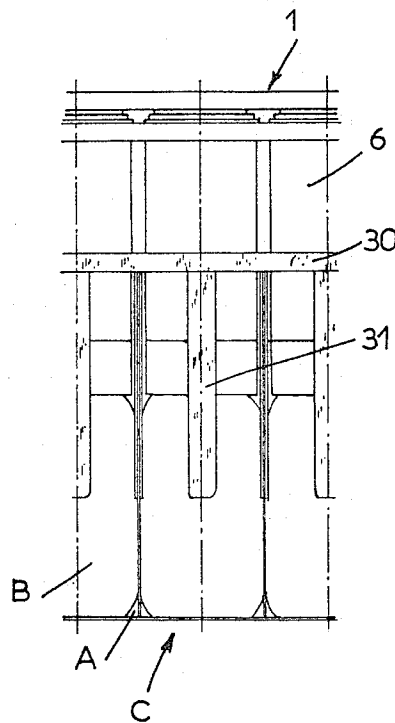
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GRIPPING HEADS FOR BOTTLES OR THE LIKE

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3 Sheets-Sheet 3



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GRIPPING HEADS FOR BOTTLES OR THE LIKE
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 914,661

11 Claims. (Cl. 53—246)

This invention relates in general to gripping devices of machines for automatically handling bottles, containers and similar articles, of the type comprising a gripping member or a series of gripping members mounted on a common support, and has specific reference to a gripping member of this character which consists of a cylindrical sleeve member adapted to cap the neck of the bottle or like container to be gripped. This head is intended more particularly for equipping machines or installations designed for casing or uncasing bottles.

Hitherto known gripping heads of this type are characterized by various drawbacks limiting their use considerably.

Thus, for example, it is frequently observed that as a consequence of a faulty centering of the bottle with respect to the gripping member the neck engages improperly or fails to engage the members provided for retaining it, and as a result, certain bottles are not gripped by the head or escape therefrom during their conveyance. On the other hand, these known gripping heads are designed with a view to grip the bottles only by the upper end of their necks, so that during the transfer operation the bottles oscillate more or less about their point of suspension, thus producing shocks and consequently the risk of breakage. Finally, when the bottles are released by the gripping head above the conveyor belt or in the crates or cases provided for receiving them, some bottles may be inclined more or less to the vertical, this constituting another cause of fall and breakage.

Moreover, this known type of gripping head, which has come into general use, is designed mainly for transferring the bottles into or out from crates formed with compartments and consisting of rigid material such as wood or metal, and therefore not quite liable to undergo a deformation.

On the other hand, when semi-rigid packings are used, such as cardboard, plastic or like crates formed internally with compartments having similarly partitions or walls of cardboard, plastic or like material, it is a frequent occurrence that these compartments become distorted, that is, that their side walls are not strictly vertical, so that these partitions are liable to be stricken, crushed or torn by the bottoms of the bottles lowered into the crates. Thus, defects and considerable losses of time and material are experienced.

To facilitate the introduction of bottles in cardboard or like packages of the type set forth hereinabove, it has already been proposed to use frustoconical guide members disposed above the compartments or cells of the package. However, these guide means are objected to because they prevent the use of gripping heads, whereby the bottles have to be released above the crates and dropped through the aforesaid guide members into the compartments or cells.

The gripping head according to the present invention avoids the inconveniences set forth hereinabove and is remarkable notably in that each gripping member thereof comprises in combination clamping means disposed in close vicinity of its bottom and adapted to grip the upper portion of the bottleneck, and resiliently mounted positioning and wedging means adapted to bear on the bottle

body or the like in order to center and hold same against motion in relation to said gripping member.

Under these conditions, the gripping member according to the present invention will safely and automatically center the bottle in relation to the clamping means while preventing any relative movement of the bottle during its transfer.

According to another feature characterizing this invention, the aforesaid clamping means consist, on the one hand, of an elastically deformable member of substantially annular configuration engageable by the end of the bottleneck and, on the other hand, of a movable member overlying said annular member and adapted to exert thereon a pressure so that the resulting deformation reduces its inner diameter.

According to a further feature of the present invention, the aforesaid elastically deformable member consists preferably of a coil spring having the shape of a tore or a tore section, said spring being disposed between said movable member and a fixed shoulder solid with said mandrel.

According to this invention the gripping head comprises, at its lower portion, a device including resilient means adapted to be lowered onto each bottle held by gripping members and also to occupy a low position in which said means surround the bottle engaged thereby while extending somewhat beyond the bottom of this bottle, the portion of said means which lies beneath said bottom converging towards the axis of said bottle in order to constitute a kind of funnel.

Thus this invention, by associating with a gripping head already known per se a device adapted to facilitate the introduction of bottles into cardboard and like packings, permits of accompanying these bottles during their downward travel until they attain the bottom of the packing.

According to another feature of this invention, the aforesaid resilient means consist of fingers or blades of elastically deformable material which are secured on the mesh structure of a grid or the like adapted to receive a vertical movement of translation in relation to the gripping head.

Still in accordance with the teachings of this invention, the aforesaid grid is solid with a shank or like member carrying a roller displaceable on a guide rail of a contour adapted to bring said grid to a low position in relation to the gripping head, just before the bottles are caused to engage the crates destined to receive them, and to subsequently restore said grid to a high position in relation to the same head when said bottles have engaged the crate compartments.

From the foregoing it is clear that in contradistinction with hitherto known devices wherein the bottles extend through the guide members, in the device of this invention the relative motion of the bottles with respect to the fingers is a reciprocating motion.

Other features and advantages of this invention will appear as the following description proceeds with reference to the accompanying drawings, in which:

FIGURE 1 shows in vertical section a gripping head according to a first form of embodiment of the present invention;

FIGURE 2 is a fragmentary elevational view showing a device according to this invention, mounted on a gripping head and assumed to be in its upper position in relation thereto;

FIGURE 3 is a diagrammatic view from above of the device of FIGURE 2;

FIGURE 4 is a view similar to FIGURE 3, the bottle and gripping head being assumed to be removed from the device;

FIGURE 5 is a fragmentary elevational view showing a modified embodiment of the device of this invention, which is assumed to be in its upper position relative to the gripping head;

FIGURE 6 is a plane view from above of the device shown in FIGURE 5;

FIGURE 7 is a view corresponding to FIGURE 6, the bottle and gripping head having been removed from the device;

FIGURE 8 is a view corresponding to FIGURE 2, the device being assumed to be in its low position with respect to the gripping head;

FIGURE 9 is a view similar to FIGURES 2 and 8, taken during the upward stroke of the device in relation to the gripping head, and,

FIGURE 10 is an elevational view showing on a reduced scale a device according to this invention, mounted on a gripping head, this view further showing the control means of the device.

In the exemplary form of embodiment of the invention illustrated in the drawings, the gripping head consists essentially of a support designated generally by the reference numeral 1 and comprising an upper plate 2 and a lower or carrier plate 3, these plates being rigidly assembled by means of distance-pieces 4. The lower carrier plate 3 is formed with a plurality of circular apertures 5 adapted to receive the gripping members 6.

Each gripping member consists of a hollow cylindrical sleeve member 7 formed with a shoulder 8 adapted to engage the carrier plate 3, and also with a groove 9 adapted to receive a circlips or like member 10 for securing the gripping member on said carrier plate 3. A hollow cylindrical body 11 is screwed on the lower portion of sleeve 7.

Mounted inside the sleeve member 7 is a hollow sliding piston 12 formed at its top with an integral shank 13. The lower edge of this piston is bevelled as shown at 14. A coil spring 15 of toroidal or part-toroidal configuration is disposed between said piston and an inner shoulder 16 formed at the lower end of sleeve member 7. A coil compression spring 17 coaxial with said piston 12 urges the latter upwards whereby in the absence of any pressure exerted on the shank 13 no deformation of spring 15 is produced by the piston.

Slidably mounted in the cylindrical body 11 is a ring 18 urged against a shoulder 19 of said body by a coil compression spring 20 bearing with its other end against an inner shoulder 21 of sleeve member 7.

The gripping members 6 are actuated from a common control member consisting of a presser plate 22 suspended from the upper plate 2 by means of screw-threaded rods 23 and coil compression springs 25 the tension of which may be adjusted at will by means of nuts 24. The presser plate 22 is movable vertically by means of a cam 26 of known type consisting on the one hand of a lower member 26a solid with the presser plate 22 and formed with a sinusoidal upper edge 27a and on the other hand of an upper member 26b rotatably mounted on, and adapted to slide in relation to, the other member 26a, this upper member 26b being formed likewise with a sinusoidal edge 27b. A control lever 28, rigid with member 26b, is provided for rotating the latter.

The above-described device operates as follows:

The members 26a and 26b of cam 26 are firstly assumed to have a relative position such that the hollows of one member register with the swells of the other member (as shown in the figure), the springs 17 urging the pistons 12 upwards while the springs 25 hold the presser plate 22 in its uppermost position by means of the rods 23. The gripping head is then lowered onto the bottles, each gripping member 6 capping a bottleneck. If one of the bottles were not properly centered in relation to the aforesaid member, the ring 18 engaging the bottle body before the top of the bottleneck has penetrated into the hollow piston 12 would cause the bottle to assume such

a position that its axis would be coincident with the axis of the gripping member. It will be noted that the fact that the ring 18 can slide vertically in its cavity eliminates substantially any risk of breaking the bottleneck. When the lever 28 is actuated to rotate the upper cam member 26b until its swells register with those of member 26a, the two members 26a and 26b move away from each other, member 26a carrying along the presser plate 22 whereby the pistons 12 are moved downwards. Each piston 12 will thus slide downwards in the relevant sleeve member 7 and cause with its bevel 14 the toroidal spring 15 to exert a radial inward pressure against the upper end of the bottleneck. Thus it will be seen that the bottle is held in position on the one hand by the spring 15 and, on the other hand, by the ring 18 bearing against the bottle body.

Of course, the relative spacing between the spring 15 and ring 18, on the one hand, and the diameter of this ring 18, on the other hand, are subordinate to the shape of the bottle to be gripped. It is clear that if the bottles to be gripped had different characteristics, as in the case of bottles having a slender neck, it would be sufficient to screw on the sleeve member 7 a cylindrical body 11 of different length and/or diameter. Thus, by providing a set of different cylindrical bodies such as 11, it is possible to adapt the gripping head to bottles having different outlines.

In the form of embodiment illustrated by way of example in FIGURE 2, the gripping head 1 comprising gripping members 6 of substantially cylindrical configuration is provided with a square-mesh grid member 30 wherein the side of each mesh is slightly greater than the diameter of the members 6 and, if desired, of the bottle "B." This grid is provided in turn with fingers, blades or like elements 31 extending vertically in relation to its plane, and of a length slightly inferior to the height of the gripping members 6, so that when the grid 30 is in its uppermost position with respect to the gripping head, i.e., in the position shown in FIGURE 2, said fingers or like elements 31 are engaged integrally on the gripping members 6.

These fingers 31 consist for example of spring blades of hardened steel or any other material having adequate resilient properties. Moreover, the lower portion 31' of these fingers 31 is curved inwards with respect to the mesh whereby, when no stress is applied to the lower portions 31' of said fingers, these portions 31' converge toward one another. Thus, in the absence of any stress, the complete set of fingers carried by the same mesh constitutes a kind of funnel, i.e. a frustoconical assembly of which the small end is the lower base, this funnel having a substantially cylindrical upper extension.

The number of fingers 31 and their relative arrangement on the sides of the meshes of grid 30 are immaterial.

Preferably, four fingers are provided, these four fingers being secured for example centrally of the sides of each mesh of the grid, as shown in FIGURES 3 and 4. The compartments A of crate C which are to receive the bottles B having substantially the same shape and dimensions as the grid meshes, it will be seen that each finger 31 cooperates with one of the walls of these compartments.

If desired, the fingers 31 may also be secured in close proximity of the corners of said grid meshes, as shown in FIGURES 5 to 7 of the drawings. In this last case these fingers engage the angular portions of these compartments during the downward movement in the crate.

Alternatively, the end or tip 32 of each finger 31 may be curved to facilitate its engagement on the walls of the bottles B or of the gripping members 6.

This device operates as follows:

The grid 30 is brought to its upper position in relation to the gripping head, before this head engages the bottles from above for gripping them, and remains in this position until the gripping head, after having been lowered

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and having gripped these bottles, has transferred them to a position in which they overlie the crate C which is to receive them (see FIGURE 2). Assuming now that the gripping head overlies the crate (see FIGURE 8) the grid 30 is lowered until it reaches the lowest position in relation to the head, in which position the lower portions 31' of fingers 31, which have moved beyond the bottoms of these bottles B, resume their natural shape, i.e., their inward curvature converging toward the bottle axis. Then the complete assembly is lowered, this assembly comprising the gripping heads proper 1, the bottles B and the grid 30, in the position shown in FIGURE 8. It will be seen that each bottle is preceded during its downward movement by the funnel formed thereunder by the converging portions 31' of fingers 31 so that if one of the partitions A of the crate is bent inwards as a consequence of a deformation it will be seen that the fingers, due to their shape, can introduce themselves into the compartments and that they gradually expand the distorted partitions thereof to cause them to resume their initial shape. When the fingers 31 are engaged sufficiently into the compartments, only the bottles continue their downward movement until they engage the compartment bottoms where they are released by the gripping head. This step is obtained through the relative movement of grid 30 rising in relation to the head as the latter continues its downward stroke with the bottles in relation to the crate. The fingers 31 will firstly slide on the bottles and then engage the gripping members 6 to resume the relative position shown in FIGURE 2.

To obtain this movement automatically, the grid is rigidly assembled with a shank 33 carrying at its upper end a roller 34 travelling on a guide rail 35 of suitable contour, this guide rail overlying another guide rail 36 controlling through another roller 37 the vertical movements of the gripping head proper (see FIGURE 10).

Various modifications and alterations may be brought to the form of embodiment illustrated and described herein, without however departing from the scope of the invention. Thus, for example, the toroidal coil spring 15 may be replaced with any other resiliently deformable member such as a toroidal ring of rubber, plastic or other suitable material; similarly, the coil springs 17 and 20 may be replaced by any other suitable resilient member of known and suitable type.

Of course, the invention should not be construed as being limited by the form of embodiment shown and described herein which is given by way of example only.

What I claim is:

1. A gripping head for gripping miscellaneous articles such as bottles and encasing them into or uncasing them from crate compartments comprising an upper and a lower plate assembled by means of distance pieces, a series of gripping members adapted to cap the necks of a plurality of bottles, each gripping member consisting of a cylindrical sleeve secured to said lower plate and of a cylindrical body secured to said sleeve and extending below said lower plate, resiliently deformable rings in said sleeves, said resiliently deformable rings being engageable by the necks of the bottles, movable members overlying said rings and adapted to exert thereon a pressure causing a reduction of their inner diameter, positioning means resiliently mounted below said rings and adapted to bear against the bodies of the bottles for centering same with respect to said rings and a control member adapted to move simultaneously said movable members and cause them to clamp the necks of the bottles.

2. Gripping head according to claim 1, wherein each resiliently deformable ring consists of a coil spring of toroidal or part-toroidal configuration, said spring being

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housed between said movable member and a fixed shoulder solid with said sleeve member.

3. Gripping head according to claim 2, wherein each movable member consists of a hollow piston slidably mounted in said sleeve and responsive to a return spring urging said movable member upwards and provided with a rod cooperating with said control member.

4. Gripping head according to claim 3, wherein said hollow piston is formed with a bevelled lower edge whereby as said piston is sliding downwards it contracts said toroidal or part-toroidal spring.

5. Gripping head according to claim 4 wherein said positioning means consists of a rigid sliding ring responsive to a return spring urging said rigid ring against a fixed shoulder formed on said cylindrical body.

6. Gripping head according to claim 5 wherein said control member consists of a presser plate disposed above said piston rods, said presser plate being solid with a cam driving same in translation with respect to said upper and lower plates whereby said presser plate urges each piston into said sleeve when it is driven by said cam.

7. Gripping head according to claim 1 further comprising a grid disposed below said lower plate and having meshes corresponding in number to said gripping members, said meshes being engageable by said gripping members, resilient fingers secured on each mesh and extending below said grid, said fingers being so shaped that when they are not stressed they curve inwardly towards the center of said mesh, said grid being movable in vertical translation in relation to said lower plate so as to occupy an upper position in which said meshes surround said gripping members and a low position in which said fingers surround the bottles to be gripped while extending partly beneath the bottoms of said bottles, the portions of said fingers which underlie said bottoms converging toward the bottle axis so as to constitute a kind of funnel.

8. Gripping head according to claim 7, wherein said fingers are adapted, when said grid is in its upper position in relation to said lower plate, to bear against the walls of said gripping members and slide during the downward relative movement of translation of said grid, along said walls and subsequently along the bottles.

9. Gripping head according to claim 7 wherein said grid is solid with a shank carrying a roller rolling on a guide rail having a contour designed to move said grid to its low position relative to said lower plate just before said bottles are engaged into the crate compartments intended for receiving them, and subsequently to restore said grid to its upper position in relation to said lower plate when said bottles are engaged into the crate compartments.

10. Gripping head according to claim 9 wherein said grid is a square-mesh grid said fingers being secured substantially centrally of the sides of said meshes.

11. Gripping head according to claim 9 wherein said grid is a square-mesh grid said fingers being secured on top of said meshes.

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FRANK E. BAILEY, *Primary Examiner.*

P. H. POHL, *Assistant Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,267,643

August 23, 1966

Edgar Jean Marcel Dardaine

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, line 8, after "914,661" insert -- ; Feb. 8, 1963, 924,244 --.

Signed and sealed this 22nd day of August 1967.

(SEAL)

Attest:

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Attesting Officer

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Commissioner of Patents