A stackable box, a machine for packing such boxes, and a container processed by one such machine. The box has a shape such as a conical shape (2) which enables the box to be stacked by the largest opening (3) therein. The container can include one such box, closed by a cover.
STACKABLE BOX AND MACHINE FOR PACKING SUCH BOXES

[0001] The present invention relates to a stackable box. It also relates to machines for the packaging of such boxes. It also relates to a container processed by means of such a machine.

[0002] In the prior art, it is known to carry out packagings of bulk products, such as food products, veterinary products, cosmetic products, chemical products or the like, in closed containers comprising a box of cylindrical shape, one end of which is equipped with an orifice which, when the pack is not being used, is in a closed, in particular leaktight state.

[0003] Such boxes, in particular, are known in the packaging industries in the form of aerosol cans composed of an elongate box, the interior of which will be filled with a product to be dispensed. The box presented at the entrance of a packaging machine has an orifice. It is therefore first filled with the product to be dispensed and is then closed by means of a diffusion valve. Once the product is loaded into the aerosol can, the handling of the valve by the user makes it possible to bring about the diffusion of the product. These products are widely used in the cosmetic, agricultural food and chemical industries for dispensing products under pressure in the form of a mist or in the form of a solution, such as paints or varnishes or lacquers.

[0004] Due to the specialization of industries and to the extremely large quantities of such products in the form of various packs, the manufacture of the boxes, of the caps and of the valves is carried out in different locations.

[0005] For example, in the industry for the production of aerosol cans, it is known to manufacture in one location the box, generally produced from a metallic material and manufactured in a cylindrical shape, and in another location a means for dispensing the product to be diffused with the aid of the aerosol can, such as a valve, and its valve carrier cap.

[0006] In particular, the cylindrical box is produced in large quantities. It is subsequently loaded into packing cases and transported by road. Such loads have a low mass per unit volume, the cases of cylindrical boxes being virtually empty because the empty boxes are stored side by side. This leads to a high transport cost in relation to the manufacturing cost of a container.

[0007] When the load of cylindrical boxes is presented at the entrance of a packaging machine for producing containers, a loader makes it possible to transfer a series of empty boxes and to present each of them in sequence in front of a filling station, then to put in place and fix a valve carrier cap and a dispensing valve, and, finally, to arrange the filled and finished container in its own packaging so as to be discharged toward a place of use.

[0008] One object of the present invention is to reduce the manufacturing cost of a container.

[0009] To be precise, the present invention relates to a box for a container, of the type comprising an orifice designed for receiving a closing means. The box of the invention is characterized in that its profile, before its filling and closing, allows it to be stacked, a box being capable of being inserted over a large proportion of its length through the orifice of the box immediately preceding it in a stack when a plurality of boxes are stacked, so as to reduce the volume occupied in packing cases for the boxes, before their storage and/or transport toward a filling machine.

[0010] One advantage of this arrangement is, in particular, that, except for the lower box of the stack, the first box in the stack, all the other boxes are essentially protected within the other boxes, thus making it possible to reduce the risks of scratches on the outer surfaces of said boxes. It is consequently possible, in particular, to carry out an outer and/or inner deposition of a layer or of a covering, particularly of a covering comprising a publicity message or a message identifying the future produce which will subsequently be arranged in the box.

[0011] The invention also relates to a machine for the packaging of industrial, agricultural, food, pharmaceutical, chemical and cosmetic products, comprising a loader of stacked boxes, a transfer chain, a filling station, a station for putting in place a closing means and a final packaging station.

[0012] The invention finally relates to a container composed of at least one box, previously stackable before its use for the manufacture of said container, of a closing means and of a product to be dispensed through a dispensing means associated with the stackable box.

[0013] The various elements making it possible to carry out the production of such products are also covered by the invention, as will be described with the aid of the description of the accompanying figures which are:

[0014] FIG. 1 is a sectional diagram of a box produced according to the invention;

[0015] FIG. 2 is a diagram of the exit of a line for the manufacture of boxes, according to a preferred embodiment of the invention;

[0016] FIGS. 3a and 3b are respectively a top view and a sectional front view of a packing case for stacks of a plurality of conical boxes, once they have been manufactured, at the exit of the line for the manufacture of the boxes of FIG. 1;

[0017] FIG. 4 is a diagrammatic view of the loading part at the entrance of a machine for the packaging of containers, using boxes manufactured according to the invention;

[0018] FIG. 5 shows a diagrammatic view of a machine for the packaging of containers, which receives the stackable boxes from a packing case produced according to FIGS. 1 to 3;

[0019] FIGS. 6 and 7 are two diagrammatic sectional half views of stackable boxes when they are being used during the manufacture of a container produced in the form of an aerosol can.

[0020] FIG. 1 illustrates a preferred embodiment of the invention. In a line for the production of a stackable box according to the invention, a pellet consisting of tin plate or of another formable material, with a substantially flat shape, is presented from a pellet supply station. A tool 5 makes it possible to give the pellet a hollow shape so as to form the stackable box 1. The stackable box 1 has side walls 2 which are inclined at a predetermined angle 6 to the vertical in the drawing. The stackable box 1 has an orifice 3 in its upper part. This orifice 3 makes it possible for the press tool 5 to pass through during manufacture.
The press tool 5 cooperates with a forming die (not illustrated), in such a way that the bottom 4 of the box 1 has a convex appearance with radii of curvature determined according to the prior art in order to make it possible, with very small thicknesses of material, to produce a pressure-resistant box when it is used in a container into which a product to be diffused is filled under pressure.

When the stackable box 1 of FIG. 1 is intended for the manufacture of an aerosol can, a valve carrier cap and a valve are subsequently put in place above the orifice 3.

Various stackable shapes are possible. In particular, a conical shape, as illustrated in FIG. 1, makes it possible to achieve the aim of the invention of producing stacks of boxes, such as the box 1, one above the other. In this case, the cross section of the box may be substantially circular, the orifice being arranged on the side of largest diameter of the cone frustum.

FIG. 2 illustrates a stack of a plurality of conical boxes produced in the same way as the stackable box of FIG. 1.

At the exit of the line for the production of the stackable box of FIG. 1, a conveyor belt 11 carries, according to the movement 12, a box placed vertically on the belt. A stack 14 of conical boxes being stacked on a platform 15 is illustrated, the orifice 18 of the last box of the stack 17 being directed upward, in such a way that, when a transfer arm or spider causes the conical box 10 to pass onto the top of the stack, the box 10 is added to the stack of the various boxes of the stack 14. So as to ensure correct stacking, the platform 15 is driven in a descending movement according to the arrow 16 at each arrival of a new box.

It can thus be seen that it is possible, depending on the geometric characteristics of the stackable boxes, to produce stacks of empty boxes in suitable packagings with a high density or number of boxes per unit of packaging volume.

It can thus be seen that it is possible for the major part of the outer and inner faces of the stacked boxes to be protected by one another, with the exception of the outer face of the stackable box at the bottom of the stack and of the inner face of the stackable box at the top of the stack.

In a special arrangement of the invention, before the stackable box 10 is delivered onto the stack 14, it is processed at a station making it possible to carry out the covering of its inner and/or outer faces with the aid of coverings of various treatments, particularly by the application of publicity, commercial or statutory messages, or for the marking of products and, in particular, for the final container which will subsequently be produced, as will be described later.

Two views have been illustrated, which are respectively, in FIG. 3a, a top view and, in FIG. 3b, a partial sectional front view of a packing case comprising a plurality of rows of stacks, such as the stack of stackable boxes of FIG. 2.

In FIGS. 3a and 3b, the same elements bear the same reference numerals and are not described in any more detail.

The packing case 20 is, for example, a packing case with flaps, known as an American case, comprising four flaps, such as the flap 21, for carrying out the closing of the case which is subsequently sealed, for example, by means of an adhesive tape.

Inside the case are arranged two rows of four stacks, each separated from one another by partitions 23, for example made from thick cardboard, so that each stack is protected by a cardboard wall against the shocks and friction which could give rise to scratches or deformations on the boxes.

The stacks 22, 24 and 26 are repeated as many times as is necessary in American cases designed for this purpose. FIG. 3b illustrates a sectional view of the case 20, flap 21 open, in partial section, making it possible to see from the outside a stack comprising a lower box 25a and up to the last box but one 25n-1, which is the last conical box of the stack 25. It can thus be seen that a plurality of conical boxes occupy a reduced space, as compared with the space of the packing cases in the prior art, each box being placed on a cardboard blank and its volume being completely empty.

FIG. 4 illustrates a loader of conical boxes produced according to an embodiment of FIGS. 1 to 3. A packing case, such as the case 20 of FIG. 3b, is unloaded, for example manually, in successive stacks, such as the stack 42, onto a transfer conveyor belt 41 according to the arrow of direction of advance 40.

A tool 43 for gripping the first available box of the stack 42 is arranged so as to pick up a box, with the orifice directed upward. In a preferred embodiment, the conical box is produced from tin plate which is a magnetic body. As a result, the gripping tool 43 may comprise a magnetic shoe which makes it possible to take the box firmly from the top of the stack and to load it according to the arrow 45 into a transfer arm 44 which carries out its transfer according to the arrow 46 and then its arrival on a conveyor belt 48 for transfer toward a filling station according to the arrow 49. It can be seen that, on the conveyor belt 48 which is the start of the machine for the packaging of containers according to the invention, the still empty box 47-1 or 47-2 is presented with its orifice open upward, thus making it possible to introduce the product and then put in place the cover or the valve carrier cap on this orifice 47.

In another embodiment of the stackable box according to the principle of the invention, the orifice through which the following box will be stacked is intended for receiving an attached bottom comprising a part substantially perpendicular to the axis of the stack and a part for fixing to the conical body of the stackable box.

FIG. 5 illustrates an embodiment of a packaging machine capable of processing stackable boxes according to the invention in order to produce, fill and package containers, such as aerosol cans.

After the pick-up from the stack of stackable boxes and the placing by a supply station 50 onto a conveyor belt 48, for example that of FIG. 4, boxes B, B1, B2 are displaced sequentially in front of a filling station 51, a station 52 for putting in place a cover, a station 57 for crimping the cover on the filled box and a station 59 for packaging a batch of filled and closed containers.
Such a container may be:

- a drink can;
- a preserves can;
- an aerosol can.

Deposited onto the conveyor belt 48 by the loader of FIG. 4, the box B subsequently passes in the position B1 under a filling station 51. For this purpose, a filling spout 53 is placed in relation to the orifice 55 of the box to be filled. When it begins the filling operation, a controller (not illustrated) takes into account the physical parameters of the filling product (density, fluidity or viscosity) and geometric parameters of the box, in such a way that the filling product is inserted into the empty box in a minimum time, without the filling spout being soiled by the product or the latter being mixed with the ambient atmosphere of the filling station. In particular, the filling spout 53 can be lowered, within the box to be filled, into the position B1. After filling begins. The spout 53 rises progressively under the action of a motor-driven carriage under the control of the above-mentioned filling controller, so that filling takes place without bubbles or emulsion and without the spout being soiled since it follows the above the filling level.

At the end of filling, the box, driven by the conveyor belt 48, passes in the position B2 under a station 52 for putting in place a cover 53 on the orifice 55 of the filled box.

After the closing cover has been put in place, the box is transferred by suitable transfer means 56 toward a station 57 for carrying out a crimping of the cover or another operation designed to ensure the reliable fixing of the closing cover to the body of the filled box, so that the cover and the latter are fixed permanently.

According to the filling techniques and the type of box and/or cover 53, the operation of putting in place the cover and the crimping operation are carried out at the filling station with the aid of a complex tool known to a person skilled in the art. This will apply particularly to the filling of an aerosol can, of which the valve carrier cap forming part of the closing cover of the box is arranged in relation to the orifice 55 of said box. A plurality of filling spouts are directed through the orifice 55 which, however, is partially obstructed by the valve carrier cap and by the valve associated with the valve carrier cap.

In an embodiment of a container as an aerosol can, the orifice diameter of the box is an important characteristic for allowing filling at high rates. To be precise, in the prior art, the diffusion valve is set on as small a diameter as possible, and it is then arranged on an intermediate part which makes it possible to adapt it to boxes with various cylindrical orifices ranging from this smallest dimension to larger dimensions. According to the invention, since the valve carrier cap has the largest diameter, it can make it possible to introduce filling spouts of larger size and therefore to accelerate and facilitate the filling of the box.

FIG. 6 illustrates a container as an exemplary embodiment in the form of an aerosol can based on a stackable box according to the invention. The stackable box 60 has been formed in a single operation with a bottom 60a and a body 60b having a side wall, with an upper orifice 60c of large diameter.

A valve carrier cap 62, specially designed for this type of box, is produced from a sheet of a rigid material and is formed so as to be fitted by crimping to the edge of the orifice 60c of the box 60.

For this purpose, the matching edges of the cap 62 and of the box 60 are bent in semicircles respectively interlocked 65 and 63 on the half section of FIG. 6 and are separated by a plastic seal 64 applied in fluid form by an applicator gun and serving for the tightness and, where appropriate, for the permanent fixing of the cap 62 on the box 60.

The valve carrier cap 62 has a convex shape, for example in the form of a hemisphere, the vertex of which is pierced with an orifice with a suitable fold of material to form a support for the handling button on a valve 61 for the projection of the product which is filled in the aerosol can, after the valve carrier cap 62 has been secured to the box 60.

It can be seen that this arrangement avoids the need to arrange an intermediate part between the valve carrier cap and the box 60, as is the case when, in the prior art, a single diameter of valve carrier cap is produced and the boxes used have different diameters. According to the invention, the valve carrier cap 62 has a shape matched to the edge 65 of the orifice 60c of the stackable box 60.

Moreover, especially to make it possible to fit a cowl or cover for closing and/or protecting the actual valve, an additional bend 66 is provided, which makes it possible to increase the horizontal dimension of the aerosol can in the drawing, so as to make it possible to accommodate the thickness of said cowl 67 therein.

The cowl 67 comprises a part 68 for connection to the box 60 in the bending zone 66, so that the corresponding part 68 of the cowl and the wall 60b in the extension one of the other when the cowl or cover 67 is placed on the aerosol can.

FIG. 6 illustrates, with the aid of the vertical reminder line, the contact zone of the box 60 when it is stacked on an identical box in a stack. It can be seen that the nearer the point 69 is to the orifice 60c, the nearer the slant in the conical shape is to the vertical. It can therefore be seen that the stacking density depends on the maximum angle of inclination of the boxes.

In another embodiment of an aerosol can illustrated in FIG. 7, instead of the bottom 60a being integral with the lateral body 60b of the box 60, the valve carrier cap 62 is in one piece with the lateral body 60b of the box 60.

In this embodiment, the stackable box 70 is in the form of a code frustum inverted in relation to the embodiment of FIG. 6. The lower part 71 is designed in the form of a valve carrier cap and is intended for receiving a valve 73. In a first alternative embodiment, the valve 73 may be mounted during the manufacture of the stackable box. The assembly is then stacked in at least one stack, packed in cases and stored and/or transported toward the filling machine described above.

In a second alternative, only the receptacle 71a for the support and passage of the valve 73 is formed with the integral part of the cap 71. The box 70, once formed, is stacked in packaged stacks via the upper orifice 74. Stored and/or transported, it is subsequently loaded on the filling
machine, so that it is first equipped with the actual valve 73 through the receptacle 71α provided for this purpose.

[0059] Returning to the embodiment of the stackable box of FIG. 7, via the orifice 74, the edge of which is suitably formed with a crimping rim 75, a closing cover 76 of convex shape, as is known in the art of the manufacture of aerosol cans, is arranged. The reciprocal crimping rim 77 is placed above a cylindrical seal 79 consisting of a material, such as an initially fluid material, serving as a leaktight seal and/or as a permanent fixing adhesive. The assembly is then fixed, and the can is formed, for example after having been filled in a known way through the valve 73, once the can is arranged in front of a filling station.

[0060] A person skilled in the art is free to choose a specific slant for the conical or frustoconical shape which is suitable, taking into account the stacking constraint of the invention. In particular, he can look for the smallest slant of the frustoconical shape which ensures the best stacking coefficient of a stack of empty boxes according to the above teaching.

[0061] It is clear that more complex shapes for the body of the box are possible. In particular, the generatrices 62 of the frustoconical body may be generated not by means of the same straight line or straight line segment, but by a plurality of different slant segments, said slants adhering to the stacking constraint of the boxes. These shapes are at the discretion of a person skilled in the art, depending particularly on the type of filling product and the method of use of the aerosol can. Likewise, the generatrices may be formed not by one or more straight line segments, but by curved segments determined according to the stacking constraint of the boxes.

[0062] The same geometric characteristics also relate to the body of drink cans and of cans for liquid, pasty, fluid or semiliquid products of any type and nature, chemical or otherwise.

1. A box for an aerosol can, of a type comprising an orifice designed for receiving a closing means, characterized in that it is produced, before its filling and closing, according to a profile allowing it to be stacked, a box being capable of being inserted over a large proportion of its length through the orifice of the box immediately preceding it in a stack when a plurality of boxes are stacked, so as to reduce the volume occupied in packing cases for the boxes before their storage and/or transport toward a machine for the filling of aerosol cans.

2. The box as claimed in claim 1, characterized in that it is produced from a pellet consisting of tin plate or of another formable material, with a substantially flat shape, with the aid of a tool (5) for giving the pellet a hollow shape so as to form a stackable box (1).

3. The box as claimed in claim 1, characterized in that the stackable box (1) has side walls (2) which are each inclined at least one predetermined angle to the vertical, and in that it has at least one orifice (3).

4. The box as claimed in claim 1, characterized in that it has a conical shape, the cross section of the box being substantially circular, and the orifice (3) being arranged on the side of largest diameter of the cone frustum.

5. The box as claimed in claim 1, characterized in that, before the stackable box (10) is delivered onto a stack (14), it is processed at a station making it possible to carry out the covering of its inner and/or outer faces with the aid of coverings of various treatments and particularly by the application of publicity, commercial or statutory messages, or for the marking of products and, in particular, of the final container which will subsequently be produced, as will be described later.

6. The box as claimed in claim 1, characterized in that it is loaded from packs in the form of stacks with the aid of an unstacking loader at the entrance of a filling machine.

7. An aerosol can or the like composed of at least one box obtained as claimed in claim 1, previously stackable before its use for the manufacture of said container, characterized in that it comprises a closing means and a product to be dispensed through a dispensing means associated with a stackable box.

8. The aerosol can or the like as claimed in claim 7, characterized in that it comprises a valve carrier cap (62) specially designed for this type of box, produced from a sheet consisting of a rigid material, and formed so as to be fitted by crimping to the edge of the orifice (60c) of the box (60), the matching edges of the cap (62) and of the box (60) being bent in interlocked semicircles (65, 63) separated by a plastic seal (64), the valve carrier cap being intended to be equipped with a valve (61) for the projection of the product which is filled in the aerosol can, after the valve carrier cap (62) has been secured to the box (60).

9. The aerosol can or the like as claimed in claim 8, characterized in that it comprises a cowl or cover for closing and/or protecting the actual valve, which cooperates with an additional bend (66) which makes it possible to increase the horizontal dimension of the aerosol can in the drawing, so as to make it possible to accommodate the thickness of said cowl (67) therein.

10. The aerosol can or the like as claimed in claim 7, characterized in that the stackable box (70) has a part (71) designed in the form of a valve carrier cap intended for receiving a valve (73).

11. The aerosol can or the like as claimed in claim 7, characterized in that the box (70) comprises an orifice (74), the edge of which has a crimping rim (75) receiving a closing cover (76) of convex shape, the reciprocal crimping rim (77) cooperating with a cylindrical seal (79) consisting of a material, such as an initially fluid material, serving as a leaktightness seal and/or as a permanent fixing adhesive.

12. A machine for the packaging of industrial, agricultural, food, pharmaceutical, chemical or cosmetic products, comprising a loader of stacked boxes produced as claimed in claim 1, a transfer line, a filling station, a station for putting in place a closing means and a station for the final packaging of aerosol cans.

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