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- (54) **Title:** BLOW MOULDED WIDE MOUTH PET CONTAINER AND PROCESS OF MANUFACTURE THEREOF

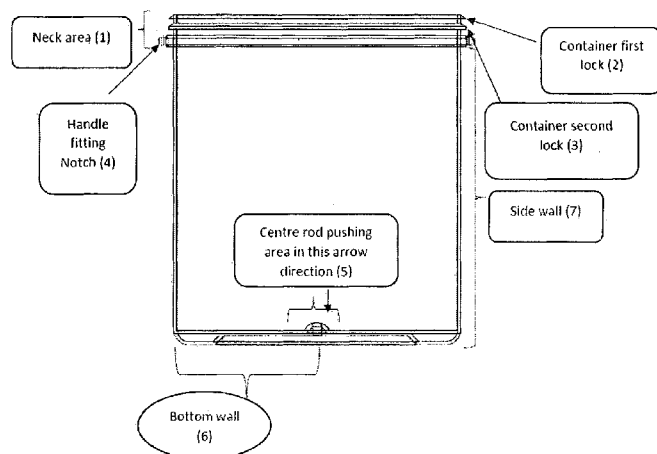


FIGURE 1

(57) **Abstract:** In one aspect of the invention, the present disclosure describes a blow moulded wide mouth container. The blow moulded container comprises a wide mouth coupled to a snap-fitting lid. The container includes a neck area comprising of first lock area, second lock area. The container includes a cylindrically flowing body blow moulded from an injection moulded perform/ a body segment blow moulded from an injection moulded perform of a pre-determined shape. The container further includes a container side wall with handles herein referred as handle fitting notches and a container bottom wall, wherein the container side wall tapers towards the container bottom wall. The said handle fitting notches of the container are positioned just below the neck/lid fitting area. In another aspect of the invention, the present disclosure describes a broadly two staged process of manufacture of a blow moulded wide mouth container. The process includes a multi-cavity injection moulding followed by a single cavity blow moulding. The process includes injection moulding of a preform in an injection-moulding apparatus followed by placing the preform in a blow moulding cavity of a blow-moulding apparatus, wherein the body segment of the finished container is devoid of undercuts.



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5 **TITLE**

BLOW MOULDED WIDE MOUTH PET CONTAINER AND PROCESS OF
MANUFACTURE THEREOF

10 **FIELD OF INVENTION**

The present invention generally relates to a blow moulded plastic containers and more particularly to a wide open mouth pet container having a snap fitted double lock and devoid of any undercut from the side wall of the container.

15

BACKGROUND OF INVENTION:

Polyethylene terephthalate (PET) containers are mainstream these days owing the accepted form to numerous advantages. PET containers are lightweight, easily
20 usable, and economical to the manufacturer and consumer likewise; apart from being environment-friendly as opposed to the erstwhile containers.

The existing PET containers in the prior art come in various shapes and with numerous undercuts to attain the desired shapes thereby undermining the capacity,
25 volume and more specifically the width of the mouth of container. Narrow mouth of the existing containers requires specific positioning and great attention while filling the containers with content thereby causing spillage. In the process of mitigating the problem, the cycle time in filling and packaging plants and industries are increased, affecting the economics in the long run.

30

Therefore there exists a need for a sustainable container which is economical, requires short cycle spans in the packaging industry and facilitates easy usage for consumers.

5 SUMMARY OF INVENTION

Blow moulded wide mouth container and process of manufacture of the wide mouth container addresses the need for a container that accommodates highly viscous content without any spillage thereby accelerating the cycle time of filling and
10 leveraging a high speed automatic filling line.

This summary is provided to introduce concepts related to the apparatus and methods used in the development of a blow moulded wide mouth pet container and process of manufacturing the same. The key concepts have been discussed below
15 in detail. This summary is not intended to identify essential features of the claimed subject matter nor is it intended for use in determining or limiting the scope of the claimed subject matter.

In one aspect of the invention, the present disclosure describes a blow moulded
20 wide mouth container. The blow moulded container comprises a wide mouth coupled to a snap-fitting lid. The container includes a neck area comprising of first lock area and a second lock area. The container includes a cylindrically flowing body, blow moulded from an injection moulded perform/ a body segment blow moulded from an injection moulded perform of a pre-determined shape. The
25 container further includes a container side wall with handles herein referred as handle fitting notches and a container bottom wall, wherein the container side wall tapers towards the container bottom wall. The said handle fitting notches of the container are positioned just below the neck/lid fitting area.

30 In another aspect of the invention, the present disclosure describes a broadly two staged process of manufacture of a blow moulded wide mouth container.

The process includes a multi-cavity injection moulding followed by a single cavity blow moulding. The process includes injection moulding of a preform in an injection-moulding apparatus followed by placing the preform in a blow moulding
35 cavity of a blow-moulding apparatus. The process further includes moving of a

- 5 body segment of the perform for defining a cylindrical shape/pre-determined shape on a container side wall and tapering the container side wall towards a container bottom wall.

The ensuing step after the above step comprises stretching of the container bottom wall with a centre rod to the bottom of the blow mould mechanically followed by
10 blowing and inflating the container via compressed air to produce a finished container removed from the cavity.

BRIEF DESCRIPTION OF DRAWINGS

- 15 The figures listed below have been explained in detail in this section. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the drawings to refer like features and components.

- 20 Figure 1 is a side sectional view of a container in accordance with the present invention;

Figure 2a is sectional view of a container through the injection moulded perform indicative of a container in accordance with the present invention. Figure 2b
25 represents the various wall thicknesses of the preform have been represented.

Figure 3a & 3b is a sectional view of the container, wherein the shaded region in fig 3a shows the preform shapes before the blowing process and the shape of the container after blowing process and fig 3b shows the cavity of the mould used for
30 blowing the preform in accordance with the present invention;

Figure 4 is a flow diagram illustrating the step by step process involved in the manufacturing of blow moulded wide mouth pet container.

5 DETAILED DESCRIPTION

The present disclosure relates to blow moulded plastic containers and more particularly to a wide open mouth pet container having a snap fitted double lock and devoid of any undercut from the side wall of the container.

10

In an exemplary embodiment of the present disclosure, a blow moulded container has been described herein. According to Figure 1, a blow moulded container comprises a wide mouth coupled to a snap-fitting lid. In the container, an injection moulded perform is blow moulded with the help of compressed air and a centre rod (5); the said centre rod (5) stretches the perform at a downward direction towards the bottom wall (6) of the container with the help of the compressed air; wherein the said compress air is injected in a large volume with high speed and pressure inside the container within 20 to 30 mili seconds before the preform cools down and loses in stretching ability, to form a cylindrically flowing body/ a body segment of a pre-determined shape. Based on the pre-determined shape of the body segment of the container, the associated injection mould and blow mould is made use of. The perform may have lugs for attaching a snap-fitted handle after the container is blow moulded in a blow moulding machine. Further the container formed includes a neck area (1) comprising of a first lock area (2) and a second lock area (3). The container further includes handles referred as handle fitting notches (4), said handle fitting notches (4) of the container are positioned just below the neck/lid fitting area. The container is further defined by a container side wall (7) at the inner periphery of the cylindrical body/body segment across the perform, and a container bottom wall (6).

30

The container sidewall (7) is of a pre-determined wall thickness and a pre-determined diameter in terms of the peripheral circumference that is covered in lieu of the container in totality. The container side wall (7) is devoid of undercuts unlike the existing containers in the market. Again, the container bottom wall (6) is of a diameter less than the pre-determined diameter of the container side wall (7). The

35

5 bottom end/bottom wall (6) of the container is shaped such that the container side wall (7) tapers towards the container bottom wall (6) as represented in Figure 1.

The container's material can be a thermoplastic resin, and in particular selected from a group of polyethylene terephthalate (PET), polyethylene naphthalate (PEN),
10 a PET and PEN blend, or polypropylene (PP).

Referring to Figure 2a & 2b, wherein the various wall thicknesses of the preform has been represented. The injection moulded perform has a wall thickness in relation to the blowing operation performed during blow moulding of the container,
15 such that the area/side walls of the container (7) that are to be stretched the maximum has to be kept thicker to achieve desired thickness of the container. The side wall (7) thickness has typical relation to the neck (1) & bottom wall (6) thickness of the container. The container has a snap-fitting lid which is again blow moulded in relation to the pre-determined diameter and wall thickness of the
20 container and the container side wall.

In another embodiment, a process of making a wide open mouth container is provided below. Preferably the material employed in making the wide open mouth container is polyethylene terephthalate (PET). The process includes a multi-cavity
25 injection moulding followed by a single cavity blow moulding.

Referring to Figure 3a & 3b is a sectional view of the container, wherein the shaded region in fig 3a shows the preform shapes before the blowing process and herein is referred to as the preform before blowing (8) and the shape of the container after
30 blowing process is achieved, herein referred to as the bottle after blowing (9), wherein further fig 3b shows the cavity of the mould (10) used for blowing the preform in accordance with the present invention;

Referring to Figure 4, a process of manufacturing wide mouth container has been
35 described in detail. At block 402, injection moulding of a preform in an injection-

5 moulding apparatus occurs. The perform may have a snap fitting region and a handle fitting region on either sides of the container. A twin cavity preform moulding apparatus may be used for making two performs. The twin cavity preform moulding apparatus has the facility to extrude semi solid small pellets of thermoplastic resins after heating and melting the thermoplastic resin to form small
10 melted pellets.. The small pellets of thermoplastic resin are then injected into the injection mould to form the preform. Furthermore, after cooling the injection moulds by transferring heat from the mould cooling channels of the injection moulding apparatus, the perform solidifies consisting a snap-fitting region and a handle fitting region.

15

The injection moulded preforms are stackable one inside the other thereby facilitating low cost transportation of the preform for distant blowing. This aspect is advantageous in comparison with blown bottles

20 This process of injection moulding determines the wall thickness pattern of the preform article in various area and ration of wall thickness. Thus it determines the wall thickness patter after blow moulding.

Further, at block 404, the ensuing step involves placing the preform in a blow
25 moulding cavity of a blow-moulding apparatus. After placing the perform, the step involves moving a body segment of the perform for defining a cylindrical shape without undercuts on a container side wall and tapering the container side wall towards a container bottom wall. The absence of undercuts is detrimental towards the functionality of the wide mouth container. The body segment may also be blow
30 moulded as per the requirements of a pre-determined shape of the wide mouth container. At block 406, the ensuing step involves stretching the container bottom wall with a centre rod to the bottom of the blow mould mechanically followed by blowing and inflating the container via compressed air. The inflating of the container occurs as per the pre-defined shape of the blowing mould.

- 5 At block 408, the concluding step is removing the bottle from the mould for a finished container.

The side wall thickness of the container is again pre-determined at the perform stage as per the associated mould. The container in the present disclosure having snap-
10 fitted lid will be blown in a mould with the help of a centre rod (5) and compressed air. The blowing operation is determined such that a specific side wall thickness is achieved to sustain the load while fitting the snap lid & stacking containers one above the other with the filled content in a high speed automatic filling line.

- 15 In the above process, the process being broadly a two staged process, the second broad step has a lower cycle time in comparison with the former step, the injection moulding process which involves the injection moulding performs, thereby facilitating a faster overall process.

- 20 The blow moulded wide mouth pet container in lieu of the two staged process employed in the process of manufacturing the same as described in the present disclosure works advantageously over the erstwhile conventional pet containers in numerous ways.

- 25 The convenience with which removal of inner content of any product filled in the container to the optimum level can occur is extensive due to the pet containers being devoid of undercuts inside the container. The wide mouth PET containers can be specially used for high viscous filled content. High viscosity usually makes the content highly sticky thereby making its removal a tedious one while in the present
30 scenario in lieu of lack of undercuts and wide mouth of the PET containers the highly viscous can be physically removed by using a spatula.

- Furthermore, the absence of undercuts in the container as described in the present disclosure also enables minimal residuals as compared to the present type of pet
35 blow moulded containers available in the market.

5 The above mentioned advantage automatically ensures minimum wastage of the inner content filled in the container. Easy recycling and hassle-free cleaning of the container prior to disposal makes it environment friendly.

Also, the wide mouth PET containers as described in the present disclosure can be
10 filled at a faster speed at a higher volume feed rate due to a wide nozzle. The faster filling into the container thus saves time & can reduce cycle time massively; specially in packaging and filling plants.

The problem of wastage and spillage due to improper positioning in lieu of smaller
15 nozzles can be mitigated in the PET containers as per the present disclosure and therefore traces of the filled content is not seen after lidding the container.

One skilled in the art will realise the disclosure may be embodied in other specific forms without departing from the disclosure or essential characteristics thereof.
20 Scope of the invention is thus indicated by the appended claims, rather than the foregoing description, and all changes that come within the meaning and range of equivalence of the claims are therefore intended to be embraced therein.

We claim:

1. A blow moulded container comprising:
a wide mouth coupled to a snap-fitting lid ; characterized in that : ;
a container including a neck area comprising of first lock area and a second lock area;
a cylindrically flowing body blow moulded from an injection moulded perform devoid of undercuts/ a body segment blow moulded from an injection moulded perform of a pre-determined shape devoid of undercuts;
a container further includes handle fitting notches , such that said handles are positioned just below the neck area on the container side wall;
a container side wall at the inner periphery of the cylindrical body/body segment across the perform, wherein the container sidewall is of a pre-determined wall thickness and a pre-determined diameter devoid of undercuts; and
a container bottom wall of a diameter less than the pre-determined diameter of the container side wall, wherein the container side wall tapers towards the container bottom wall.
2. The blow moulded container as claimed in claim 1, wherein the container material is a thermoplastic resin.
3. The blow moulded container as claimed in claim 1, wherein the container material is polyethylene terephthalate.
4. The blow moulded container as claimed in claim 1, wherein the perform further comprises a snap-fitting region to facilitate the snap-fitting lid.
5. The blow moulded container as claimed in claim 1, wherein the container has a snap-fitting double lock mechanism.

6. A process of manufacturing wide mouth container comprising:
 - injection moulding of a preform in an injection-moulding apparatus, the perform having a snap fitting region and a handle fitting region on either sides of the container;
 - placing the preform in a blow moulding cavity of a blow-moulding apparatus and moving a body segment of the perform for defining a cylindrical shape without undercuts on a container side wall and tapering the container side wall towards a container bottom wall;
 - stretching the container bottom wall with a centre rod to the bottom of the blow mould mechanically followed by blowing and inflating the container via compressed air, said compressed air is injected in a large volume with high speed and pressure inside the container within 20 to 30 mili seconds before the preform cools down and loses in stretching ability wherein inflating of the container occurs as per the pre-defined shape of the blowing mould; and
 - removing the bottle from the mould cavity for finished container.
7. The process as claimed in claim 6, wherein the injection moulding step involves a twin cavity perform moulding apparatus.
8. The process as claimed in claim 6, wherein the injection moulding step further involves:
 - heating followed by melting of a thermoplastic resin to form melted pellets of thermoplastic resin; and
 - injecting the melted pellets of thermoplastic resin into the injection mould to form the perform.
9. The process as claimed in claim 6, wherein the blow moulding step has a lower cycle time in comparison with the injection moulding step.

10. The process as claimed in claim 6, wherein a specific ratio is maintained between the container side wall thickness and the container bottom wall thickness.
11. The process as claimed in claim 6, wherein the process produces a polyethylene terephthalate (PET) material container.
12. The process as claimed in claim 6, wherein the injection moulding step includes multi-cavity moulds.
13. The process as claimed in claim 6, wherein the blow moulding step includes single-cavity moulds.
14. The process as claimed in claim 6, wherein the process further includes producing a snap-fitting lid for the container in a blow mould cavity, wherein the blow moulding occurs via a stretch pin to achieve a thickness as per the pre-determined thickness of the container.

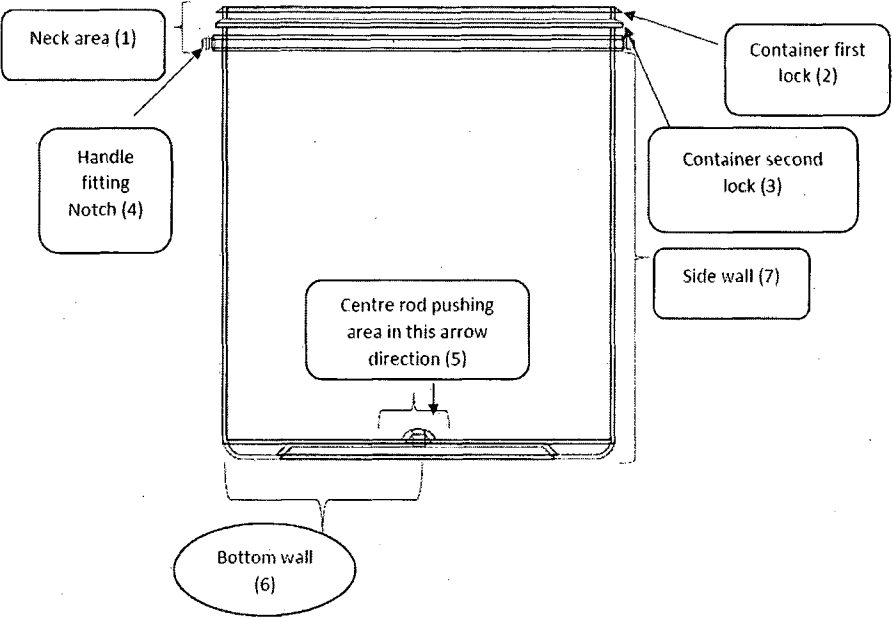


FIGURE 1

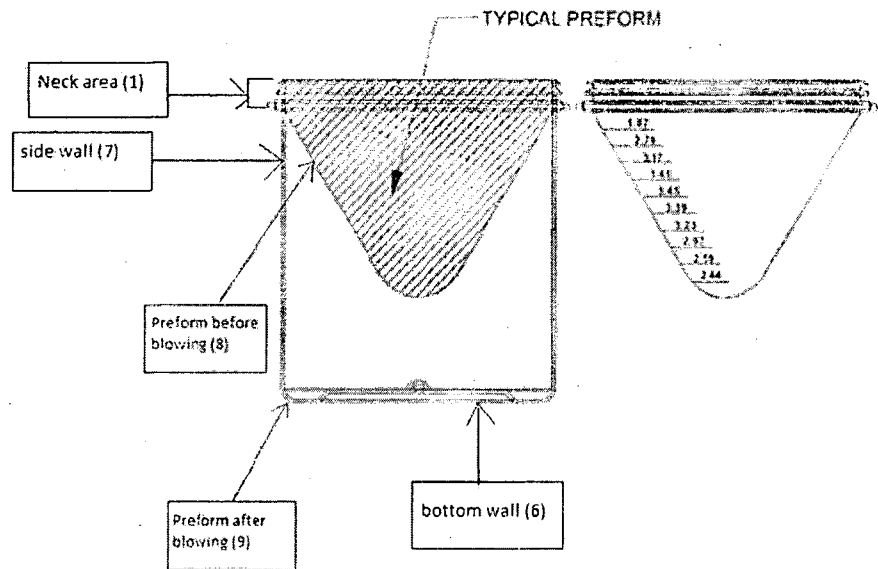


FIGURE 2A & 2B

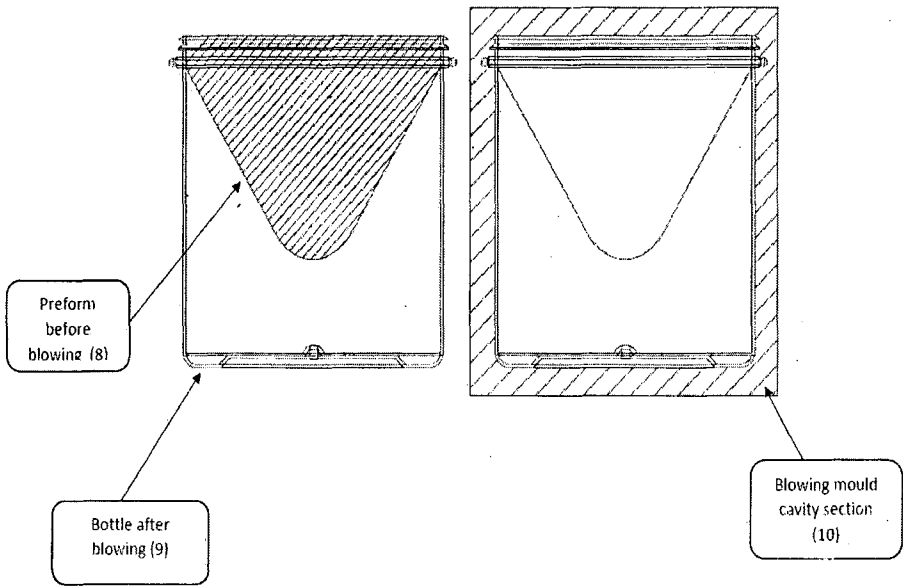


FIGURE 3A &3B

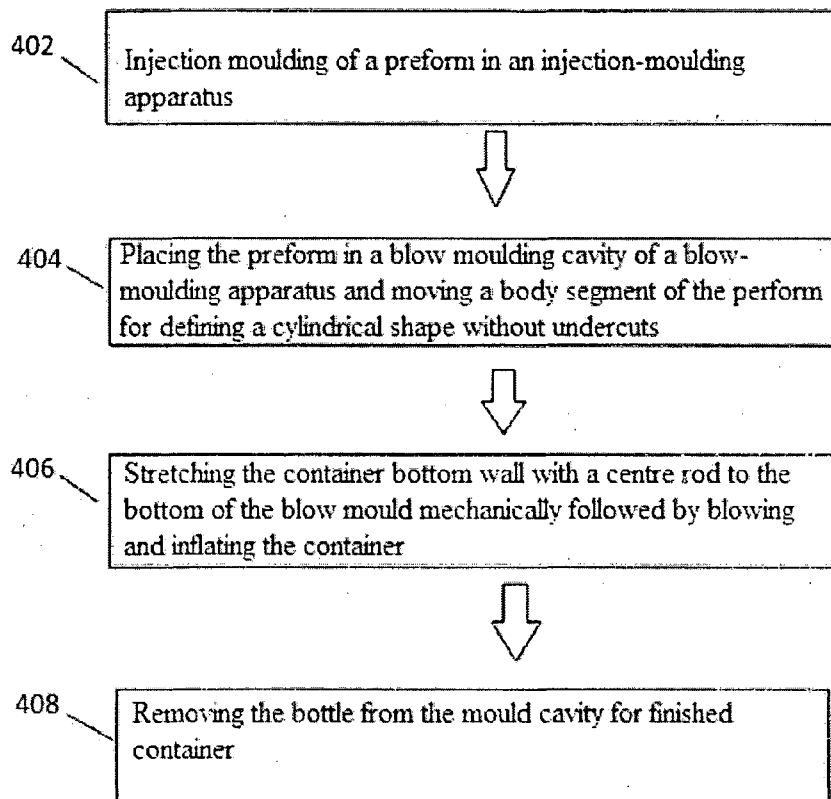


FIGURE 4