

SPECIFICATION**1. TITLE OF THE INVENTION**

Method for molding an article.

2. BACKGROUND OF THE INVENTION**(1) Field of the Invention**

This invention relates to a method of molding a bottle with an ear made of synthetic resin, by injection orientation blow molding.

(2) Prior Art

In a bottle molded by injection molding a preform, and orientation blow molding portions other than a mouth portion of the preform into a thin wall-thickness configuration while holding said mouth portion, it is technically difficult to mold a part of the preform into an ear during orientation blow molding, unlike normal blow molding. Therefore, in case of mounting an ear, the ear is molded below the mouth portion integral with the preform.

Molding of such a bottle can be achieved by a cold parison system which molds a preform using a normal injection mold to mold the preform into a bottle by an orientation blow molding machine, but has been difficult to be employed in case of a hot parison system in which an operation from injection molding of a preform to orientation blow molding is carried out by a single apparatus.

In view of the foregoing, an attempt has been made to mount an ear after a bottle has been molded. In this case, however, a position at which an ear is mounted is limited to a portion above a support ring.

Therefore, the mouth portion of the bottle with an ear is formed to be longer than that of a normal bottle and a position at which an ear is mounted is high. Therefore, particularly in a large bottle, it is difficult to incline the bottle while holding the ear, often wanting in smooth pouring of contents.

Such a problem as just mentioned can be solved by an arrangement wherein a lower side of a mouth is formed to have a large diameter, and threads are provided in the outer periphery of the large diameter portion, to which the ear is threadedly mounted, as disclosed in British Registered Design No. 1,039,436. However, in the injection orientation blow molding, it is impossible to orientation blow mold portions up to the large diameter portion without impairing the dimension of the thread formed in the outer peripheral side.

In the injection orientation blow molding, the thread of the mouth portion, the support ring and the like remain injection molded with a view to maintaining molding accuracy, and making the wall portion thin by the orientation blow molding is carried out from the underside of the support ring. For this reason, in the

case where a large diameter portion having threads is formed below the support ring to threadedly mount an ear thereon, portions up to the large diameter portion need to leave therein a thick-wall portion resulted from injection molding. As a result, the use of material per bottle increases, thus increasing cost.

The orientation blow molding has the merit in that since portions other than the mouth portion can be molded to have a thin wall-thickness, there can be obtained a bottle which is lighter than that obtained by the normal blow molding and is excellent in falling strength, because of which an increase of non-oriented portions left to be thin in wall-thickness is not unpreferable, and accordingly, a position of a large diameter portion at which an ear is mounted is limited to a portion near the mouth portion.

Moreover, mounting of an ear by means of a screw causes the ear to be easily loosened due to vibrations or the like, and a lower end of the ear is not connected to the body of a bottle and in a state in which the ear is easily disengaged. When the bottle is inclined to pour the content, the load is concentrated on a bended portion at the upper portion of the ear to generate a flexure thereat. In case of an ear made of synthetic resin, a gripping portion thereof is opened.

3. SUMMARY OF THE INVENTION

According to the present invention there is provided a method for molding a plastic hollow article having an edge on an outer surface between a mouth portion of the article and a body portion thereof prepared by injection orientation blow molding method, the method comprising: closing a neck mold, a cavity mold, and a core mold; injection molding a preform by injecting molten resin into a continuous cavity formed between the neck mold and the cavity mold and between the cavity mold and the core mold, wherein the neck mold and the cavity mold are

respectively so shaped as to define a flange formed of the resin on a continuous portion of the preform between the mouth portion and the body portion and at a parting portion of the cavity mold with the flange being shaped so as to have a free end and being formed below the mouth portion of the preform defined at the neck mold; releasing the preform from the cavity mold and the core mold while retaining the preform with the neck mold, transferring the preform with the neck mold into a blow mold having a cavity that surrounds the neck mold and that extends beyond the neck mold to, in use, define the body of the article; closing the blow mold over the neck mold and the preform; with the portion of the preform within the neck mold down to the flange being prevented from being enlarged outward by blowing in the blow mold, orientation blow molding the portion of the preform below the flange to press the thus enlarged preform outwardly against the interior of the blow mold while the free end of the flange is held in the neck mold and the shape thereof is maintained by overlapping the flange with an opening of the blow mold such that the preform is enlarged to merge with the flange and the blow mold is so shaped as to alter the free end of the flange into an edge of the article by integrating the surface of the flange opposed to the outer surface of the article with the corresponding outer surface of the expanded preform and releasing and ejecting the molded article from the molds.

An ear is mounted on a molded bottle later but a mounting portion of the ear is molded to have a thin wall-thickness and mounted below a support ring whereby a position of the ear mounting portion can be set downwardly, thus solving the problem encountered in a conventional bottle with an ear in which the mounting position is apt to be limited to a portion near the mouth portion.

Furthermore, a mounting portion to be located at a predetermined height which is larger in diameter than that of a mouth portion and of which upper edge is formed to be edged is subjected to orientation blow molding, but the upper edge formed to be edged maintains its injection molded state and the upper edge and a ring member formed integral with a base end of the ear are fitted with each other whereby the ear is mounted positively and without being loosened, thus solving the problem encountered in a conventional bottle with an ear.

Moreover, an ear is mounted on a molded bottle later but a lower end of the ear can be firmly fixed to the body of the bottle by extremely simple means, thus solving the problem encountered in a conventional bottle with an ear in which a gripping portion thereof is opened due to the load when the bottle is inclined.

For achieving the aforesaid object, there is provided an arrangement wherein a mounting portion positioned at a predetermined height which has a large diameter and has a mounting groove having a predetermined width in an outer periphery thereof is formed below a mouth portion of a bottle by injection orientation blow molding, an upper edge of said mounting groove is formed to have an edge having a plurality of notches at equal intervals, a mounting ring internally provided with a plurality of projecting surfaces positioned at the mounting groove through said notches is formed integral with a bended end of an ear, and the projecting surfaces of said mounting ring and the upper edge of said mounting groove are fitted with each other whereby the ear and the bottle are integrally connected.

The upper portion of the ear mounting portion is composed of an outer wall of a flange injection molded below the mouth portion and an inner wall internally oriented and placed in close contact, and the upper edge fitted into the mounting ring is formed to be edged by an acute free end of the flange.

According to another feature of this invention, the lower end of the ear mounted on the bottle is attached to the side of the body by means of a heat-shrinkable

band fitted around the body of the bottle.

In the bottle with an ear as described above, since the mounting portion of the ear is formed to have a large diameter, the insertion of a mounting ring is not impaired by the threads in the outer periphery of the mouth portion and the support ring but when the ear side is slightly turned, the upper edge of the mounting groove formed to have an edge and the upper edge of the projecting surface internally of the mounting ring are firmly engaged with each other. Therefore, mounting is simpler than the case which relied upon engagement between threads. Even if a load is imposed on the engaging portion, the ear is not disengaged unless the mounting ring is broken.

Moreover, only the upper portion of the ear mounting portion is composed of a flange injection molded below the mouth portion and a wall portion oriented internally thereof and placed in close contact therewith, and other portions are subjected to orientation blow molding. Therefore, the ear can be formed to have a thin wall-thickness configuration as compared with the case where the whole mounting portion is subjected to injection molding. The upper portion has a strength due to the orientation of the inner wall portion, and a molding position thereof is not limited to a portion near the mouth portion.

Furthermore, since the lower end of the ear is

attached to the side of the body by means of a heat-shrinkable band fitted around the body of the bottle, when the bottle is inclined, the load is not concentrated on only the upper portion of the ear by the integration of the lower end of the ear and the body. In addition, the gripping portion is not opened due to the load, and therefore, even a large bottle which is heavy because of contents can be easily handled.

The present invention will be described in detail by way of embodiments shown in the accompanying drawings.

4. BRIEF DESCRIPTION OF THE DRAWINGS

The drawings show embodiments of a bottle with an ear according to this invention.

Fig. 1 is a longitudinal sectional side view of an upper half portion of a bottle.

Fig. 2 is a plan view of a bottle.

Fig. 3 is a side view of a bottle.

Fig. 4 is a side view of a bottle with an ear in which a lower end of the ear is attached to a body of the bottle.

Fig. 5 is a plan view of Fig. 4.

Fig. 6 is a developed view of a mouting ring.

Fig. 7 is a sectional view of essential parts of an injection mold for explaining the injection molding step of an upper edge of an ear mounting portion.

Fig. 8 is a sectional view of essential parts of

a blow mold for explaining the blow molding step of an ear mounting portion and an upper edge.

5. MODE OF PREFERRED EMBODIMENTS

In the drawings, reference numeral 1 designates a bottle form of polyethyleneterephthalate (PETP) subjected to injection orientation blow molding. A support ring 3 is provided below a mouth portion 2.

A continuous portion to a body 11 below the support ring 3 of the bottle 1 is formed with an ear mounting portion 4 positioned at a predetermined height which is larger in diameter than the support ring 3, and a mounting groove 4a having a predetermined width is formed in the outer periphery thereof.

The lower edge of the mounting groove 4a is connected to a curve portion of a shoulder 12 which forms an upper portion of the body 11, and an upper edge 5 is formed to be edged. At four locations of the upper edge 5, there are formed inserting notches 6 at equal intervals.

Reference numeral 7 designates an ear formed of PETP, at an end of which is integrally formed a mounting ring 8. The mounting ring 8 is internally formed with four projecting surfaces 9 corresponding to the notches 6, and the upper edge of the projecting surfaces 9 is formed into a shoulder 10 which is fitted into the upper edge 5 of the mounting groove 4a.

The upper edge of the projecting surface is provided

with a recess 14 which is fitted into an attachment mechanism 13 projected on the upper edge 5 of the mounting groove 4a to prevent a lateral deviation of the mounting ring 8.

The upper edge 5 of the ear mounting portion 4 is formed from an injection molded member. Figs. 7 and 8 explain the molding steps therefor. First, when a neck mold 21, a cavity mold 22 and a core mold 23 are closed to injection mold a preform 24, a flange 27 whose lower edge 26 is acute along with threads 25 in the outer periphery of the mouth portion 2 and the support ring 3 are inwardly integrally molded below the mouth portion by making use of a parting portion between the neck mold 21 and the cavity mold 22.

After the injection molding, the preform 24 is held by the neck mold 21 above the flange 27 and transported to the blow mold 28, where the molds are closed. Thereby, the preform body below the lower edge 26 of the flange 27 is positioned at the blow cavity. Within the blow cavity, a space 29 is formed between the inside of the flange and the wall portion 24a of the preform indicated at the phantom line.

Next, when air blowing is carried out while longitudinally orienting the preform 24 by means of an orientation rod 30, the preform body is longitudinally oriented from the end of the flange 27 and also laterally

expanded to form a bottle 1 having an ear mounting portion 4 having a large diameter below the flange. In this bottle 1, the preform wall portion 24a internally of the flange is extended to have a thin wall-thickness till coming into close contact with the inside of the flange by the space 29 internally of the flange 27, and a constriction thereunder constitutes a mounting groove 4a.

Thereby, the flange 27 forms an upper outer wall of the ear mounting portion 4 of the bottle 1, and the lower edge 26 forms the upper edge 5 formed to be edged so that the ear mounting portion 4 has an upper portion composed of an outer wall subjected to injection molding and an oriented inner wall, other portions being formed by thin walls by way of orientation blow molding.

While molding of notches 6 of the upper edge 5 is omitted in this step, it is to be noted that the notches 6 can be molded during molding of the flange.

In the above-described construction, the mounting ring 8 is placed over the mounting groove 4a from the mouth portion, and positioning between the notches 6 and the projecting surfaces 9 internally of the mounting ring is carried out for insertion, after which the mounting ring 8 is forcibly turned. Then the projecting surfaces 5 are positioned under the upper edges 5 and firmly fitted.

Thereby, the ear 7 is mounted on the side of the bottle. The ear 7 is not disengaged from the bottle 1

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unless the bottle 1 is held and the ear 7 is forcibly deviated laterally.

Figs. 4 and 5 show a bottle in which a lower end 71 of the ear 7 is integrally attached to the body using a heat-shrinkable band 15.

The heat-shrinkable band 15 is formed of PETP or the like. The band 15 before being shrunk has a larger diameter than that of the body, and after the ear 7 has been mounted on the bottle 1, the band 15 is fitted from the top of the bottle into an annular groove 16 formed around the body.

A portion of the annular groove 16 at which a lower end 71 of the ear 7 is positioned is formed with a recess 17. The heat-shrinkable band 15 is internally formed with a partial gap by the presence of the recess 17. The aforesaid lower end 71 is positioned at the gap, and the lower end 71 is firmly attached to the body due to the reduction in diameter of the heat-shrinkable band 15 caused by heating.

In mounting the ear 7, the mounting ring 8 is placed over the mounting groove 4, and the notches 6 and the projecting surfaces 9 internally of the mounting ring are adjusted in position and the ear 7 is inserted, after which the mounting ring 8 is forcibly turned, in a manner similar to the case shown in Fig. 1. Then, when the heat-shrinkable ring 15 is placed over the annular groove 16

and the ring 15 is heated by a conventional tunnel type heating device, the heat-shrinkable band 12 is reduced in diameter due to the shrinkage and placed in close contact with the body 11, and the lower end 71 of the ear 7 is pulled toward the body 11 due to the shrinking force and firmly attached.

In the bottle 1 as described above, the lower end 71 of the ear 7 is also attached to the body 11 by means of the heat-shrinkable band 15. Therefore, the load is not concentrated on the upper portion of the ear as so experienced in the past, and when the bottle 1 is inclined, a gripping portion 72 is not opened due to the load. Therefore, the contents are easily poured as compared with the case where an ear is merely mounted on the mouth portion, and even a heavy large bottle is easily handled.

Reference is hereby made to co-pending U.K. Patent Application No. 9121861.0 (published as GB-A-2251844) which relates to a bottle with a handle, the bottle comprising: a mouth portion, a body disposed below said mouth portion and preparable by injection orientation blow molding; a mounting groove formed at a pre-determined height on said body, the mounting groove having a pre-determined diameter greater than the diameter of the mouth portion, an upper edge of said mounting groove being formed with an edge having a plurality of notches at equal intervals; wherein the handle comprises a mounting ring, said mounting ring having an inner side internally provided with a plurality of projecting surfaces opposable to said mounting groove the projecting surfaces of said mounting groove to secure the handle to the bottle.

CLAIMS

1. A method for molding a plastic hollow article having an edge on an outer surface between a mouth portion of the article and a body portion thereof prepared by injection orientation blow molding method, the method comprising; closing a neck mold, a cavity mold, and a core mold; injection molding a preform by injecting molten resin into a continuous cavity formed between the neck mold and the cavity mold and between the cavity mold and the core mold, wherein the neck mold and the cavity mold are respectively so shaped as to define a flange formed of the resin on a continuous portion of the preform between the mouth portion and the body portion and at a parting portion of the cavity mold with the flange being shaped so as to have a free end and being formed below the mouth portion of the preform defined at the neck mold; releasing the preform from the cavity mold and the core mold while retaining the preform with the neck mold; transferring the preform with the neck mold into a blow mold having a cavity that surrounds the neck mold and that extends beyond the neck mold to, in use, define the body of the article; closing the blow mold over the neck mold and the preform; with the portion of the preform within the neck mold down to the flange being prevented from being enlarged outward by blowing in the blow mold, orientation blow molding the portion of the preform below the flange to press the thus enlarged preform outwardly against the interior of the blow mold while the free end of the flange is held in the neck mold and the shape thereof is maintained by overlapping the flange with an opening of the blow mold such that the preform is enlarged to merge with the flange and the blow mold is so shaped as to alter the free end of the flange into an edge of the article by integrating the surface of the flange opposed to the outer surface of the article with the corresponding outer surface



of the expanded preform and releasing and ejecting the molded article from the molds.

2. The method according to Claim 1, wherein the neck mold and the cavity mold are respectively shaped so as to define the cavity between them at the flange formed is inclined outward from the neck of the preform and inclined downward away from the mouth portion of the preform and toward the body portion.

3. The method according to Claim 1 wherein the cavity of the blow mold at the free end of the flange is slightly smaller in cross section than the cavity of the neck mold at the flange so that when the preform is orientation blow molded in the blow mold, the free end of the flange is formed at the hollow plastic article.

4. The method according to Claim 1, wherein the neck mold and the cavity mold are respectively shaped so as to mold a set of notches in the flange.

5. A method of molding an article substantially as hereinbefore defined.

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