

Device for Producing Container Products Consisting
of Plastic Materials

The invention relates to a device for manufacturing container products made of plastic materials, in particular by carrying out a molding, filling and sealing process, said device having a molding device, which can be supplied with a molding tube of plasticized plastic material, and which has a movable molding surface that adapts to the predefined container geometry, on which said molding tube can be placed for a molding, filling and/or sealing procedure.

Devices for manufacturing container products made out of plastic are prior art. In order to manufacture the respective product, a tube of plasticized plastic material is extruded into the appropriate molding device, the leading end of the tube is sealed by means of welding, and said tube is expanded by generating a pneumatic pressure gradient on the tube and placed on the mold surfaces of the molding device in order to mold the container. When carrying out such production methods, for example according to the bottelpack® method known in this technical field, the respective container is then filled in a sterile manner via a corresponding filling mandrel and hermetically sealed after removing the filling mandrel.

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In order to achieve the economic and efficient production of container products at a predetermined output rate, it is also prior art (see US patent 8 486 324 B2) that mold surfaces for the uniform molding of a plurality of containers located one above the other be formed in the molding device. In this case, however, the increase in production speed through the simultaneous formation of a plurality of contiguous containers is achieved at the cost of processing difficulties. Thus a reliable demolding process of a container group having correspondingly extensive dimensions is dependent on the use of plastics that can be easily processed such as polyethylene, for example. Manufacturing problems arise in applications that are subject to stringent sterility standards and when, instead of polyethylene, polypropylene is to be used, which allows for a higher autoclaving temperature. Thus the production speed of the device known from the US patent 8 486 324 B2 is likewise limited because, despite the simultaneous molding of the containers, manufacturing of the containers is done in a piece-work process because two or at most, three superimposed rows of containers are formed in each production cycle, which accrue separately for additional handling. A continuous manufacturing process is thus not possible.

DE 10 2008 006 073 A1 discloses a device of the above mentioned generic class that, in terms of the increase in production speed, rather than a kind of piece-work process, allows for the production of a chain of containers comprising connected containers, wherein the chain of containers is moved away, out of the molding device along the production line. In addition to the more efficient manufacturing that is thereby achieved, this device also makes it possible to use any type of plastic material because a demolding device, which engages with the chain of emerging containers outside the molding device, is provided in order to support the demolding process.

Based on this prior art, the object of the invention is to provide a device that, while retaining the advantages of the above mentioned prior art, is characterized by a simplified design.

This object is achieved according to the invention by a device having the features of Claim 1 in its entirety.

According to the characterizing portion of Claim 1, the device according to the invention is distinguished in that a guide and retaining device is provided, which has movable guide and retaining parts, which parts can be controlled in such a way that, in at least one of the possible functional positions outside of the molding region of the molding device, said parts engage with the molding tube itself and/or with the respective plastic material that surrounds at least one manufactured container product and/or the contents thereof. The guiding and holding effect exerted on the molding tube itself and/or on the container products allows for an easy demolding process, and therefore trouble-free processing of the desired plastic materials without the use of a demolding device disposed outside of the production area that engages with the emerging chain of containers. In addition to the desired simplification, this also gives rise to the advantage of a reduced installation size of the entire device. In addition, the container products can be produced continuously. The solution according to the invention can be easily sterilized and is also designed for small fill quantities of expensive materials.

In especially advantageous embodiments, at the end of a respective molding, filling and sealing process for the container product, the movable guide and retaining parts can be brought into a functional position, in which said parts supportively abut the molding tube in the section adjacent to the inlet

to the molding device on an opposite sides of the tube. The support, which is formed in the immediate vicinity of the head portion of the container, ensures an especially reliable demolding with a uniform separation of the containers from the mold surfaces, which move apart from one another during the demolding process.

The molding device may have jaws that form the mold surfaces, which jaws can be moved by means of a clamping unit in a direction of movement that is perpendicular to the vertical direction of movement of the molding tube between a position in which the mold is closed, and a position that opens the mold, wherein a sliding device is provided, by means of which the clamping unit can be moved vertically downward from a starting position during the molding, filling and sealing process, together with the movement of the molding tube, and can be moved upward into the starting position at the end of the molding, filling and sealing process. A continuous production process can be implemented by means of this kind of vertical movement with minimum equipment cost because only one pair of jaws is needed for each molding process, so that a plurality of carousel-like pairs of jaws that close together is not needed.

Advantageously, the molding device may include the main molds that mold the main part of the container, as well as the head molds, which can be moved independently of the main molds by means of the clamping unit for a filling and subsequent sealing process in order to seal the head of the container.

The configuration for the transformation of the guide and retaining parts into respective functional positions may be advantageously such that the guide and retaining device can be displaced by means of a second sliding device, which can be actuated independently of the sliding device of the clamping unit

between an upper position, which corresponds to the operative position of the guide and retaining parts, and lowered positions.

In terms of the structural design of the guide and retaining device, the configuration may be advantageously such that these provide an actuation unit for each guide and retaining part, which can be displaced in a direction that extends perpendicular to the vertical direction, between a position in which these parts are in proximity to one another, which corresponds to the operative position of the guide and retaining parts, and a position in which these parts are moved apart from one another. In so doing, the actuation units for the associated guide and retaining parts may have a swivel drive, by means of which the guide and retaining parts can be pivoted back and forth between a pivoting position taken while in the operative position, in which these parts are located in a pivoting position that is aligned with the molding tube, and positions, in which these parts are located outside of the region of the molding device.

The guide and retaining parts may be provided in the form of support rails, which extend over the entire length of the die parting plane of the molding device in the case of the pivoting position that corresponds to the operative position, and which are mounted on pivot shafts of the associated actuation unit for pivoting movements that extend in a horizontal plane, which shafts extend vertically and parallel to one another beside the die parting plane. The support for a correspondingly lengthened series of containers can be implemented in a simple manner by elongated guide rails.

In especially advantageous embodiments, the actuation units of the guide and retaining devices may have additional guide and retaining parts that can be moved towards one another in the direction of a closed position, and moved away from one another in the direction of at least one opened position such that, in at least one of the closed positions, said parts engage, at least in part, with the respective plastic material that surrounds at least one manufactured

container product and/or the contents thereof. In this way, the demolding process can be designed in an especially reliable manner.

In so doing, it can be especially advantageous if, when viewed in a vertical plane, the dimensions of the axial spacing between the respective actuation unit and the associated support rail are such that a container product that is still warm from the molding device is received prior to transfer to the additional guide and retaining parts of the actuation units in order that a kind of cooling segment is formed.

The support rails, which rest against the molding tube, can have conically converging bearing surfaces in order to form an especially secure retaining engagement.

In terms of the structural design of the clamping unit of the molding device, the configuration may be advantageously such that the clamping unit has a primary support, on which the main molds and head molds are movably guided independently of one another in a horizontal direction, and which primary support is adjustably mounted on vertical guides of the device frame such that it can be slid by means of the first sliding device.

In order to produce the opening and closing movements of the main molds and the head molds, these molds can each be connected to an allocated, individual drive mechanism. Of these, at least one may have a lever mechanism that can be actuated by means of an actuator, wherein such an actuator may be provided, for example, in the form of an electric motor-operated spindle drive.

The actuation units may also be advantageously guided on the vertical guides of the device frame such that they can be vertically displaced by means of a second sliding device.

Advantageously, each of the two sliding devices may have a separate motor-driven ball screw in order to generate the respective vertical movements.

The sliding device of the actuation units may advantageously have a transverse guide that extends vertically between the associated vertical guides of the device frame, along which transverse guide the actuation units with the additional guide and retaining parts are guided for the horizontal movement thereof, and can be moved by means of at least one actuator, wherein there is a coupling device between the actuation units in order to synchronize the horizontal movements of said units.

The invention is described in greater detail below on the basis of an embodiment shown in the drawings. Shown are:

- Fig. 1 a schematically simplified, oblique perspective view of an embodiment of the device according to the invention;
- Fig. 2 an oblique perspective view of only a portion of the device, wherein the mold clamping unit and the guide and retaining device are each shown with associated functional elements;
- Fig. 3 a top view of the portion of the device shown in Fig. 2 having components in functional positions that differ from those in Fig. 2;
- Fig. 4 a front view of the upper main part of the device;
- Fig. 5 a front view in a larger scale than that which is shown in Fig. 4 showing the operating state upon the conclusion of a molding, filling and sealing process;

Fig. 6 a partial depiction that is further enlarged as compared to Fig. 5, showing the operating state of a filling process with a partially closed molding device, and

Figs. 7 to 11 depictions corresponding to Fig. 6, in which additional operating states over the course of the production cycle are shown.

Fig. 1 shows a simplified depiction of an overall view of an embodiment of the device according to the invention, in which a device frame, which is designated as 1, has a rectangular box form having a front wall 3 that extends in a vertical plane. An extruder device, which is designated as a whole as 5, is disposed on the upper side of the box form of the frame 1, which extruder device is designed in accordance with the relevant prior art, and which has a feed hopper 7 for plastic granules and a motor-driven extruder worm unit 9 in order to supply plasticized plastic material to an extrusion head 11. This extrusion head is likewise designed in accordance with the prior art and extrudes the heated, plasticized plastic material in the form of a flat tube, which extends along the entire width of a molding device 13 measured along the die parting plane. Depending on the design of the molding device 13, a plurality of container products corresponding to the number of adjacent mold surfaces 17 in the row can thereby be formed in one molding step out of a single extruded molding tube, which is designated as 15 in Fig. 5.

Of these, the mold surfaces 17 of the left side of the molding device 13 are visible in Figures 1 and 2, which show the molding device 13 in an opened state. A filling device 19 for a metered supply of fill quantities for a filling process of the container formed in the molding device 13 is provided on the upper side of the device frame 1. The filling device 19 has a number of filling mandrels, which corresponds to the

number of containers that are to be molded, of which mandrels, only a single filling mandrel, which is designated as 21, is indicated in Figs. 4, 6 and 7. The plastic material is extruded through the extrusion head 11 in such a way that the molding tube that is formed surrounds the row of filling mandrels 21, which can thereby be lowered within the molding tube 15 into a filling position, in which position said mandrels fill the containers formed between the mold surfaces 17. Additional expansion is provided for the molding of those container parts, which thereby receive the filling quantity, in the case of which expansion, a negative pressure is applied within the container mold in order to lay the corresponding wall parts against the mold (negative pressure gradient). Additionally or alternatively, this expansion process may also be performed by injecting support or molding air (positive pressure gradient).

Figures 2 and 3 each show a separate depiction of the clamping unit 23 of the molding device 13, as well as the guide and retaining device 25 of the embodiment. As shown in Fig. 2, both the clamping unit 23 and the guide and retaining device 25 each have support plate 27 or, respectively, 29, which extends in a vertical plane. As shown in Figures 4 to 11, there is a vertical guide 31 on the outside on each side on the front side 3 of the device frame 1, which vertical guides are formed as guide rails 33 (Fig. 6), which, together with guide rails 35 on the support plate 27 and corresponding guide rails 37 on the support plate 29, form a ball track, so that the clamping unit 23, and guide and retaining device 25 can be displaced in a vertical direction on the vertical guide 31. Spindle drives, which can be actuated by the machine control, are provided for the corresponding vertical movement, said spindle drives having a ball screw 39 for the clamping unit 23, and having a ball screw 41 for the guide and retaining device 25, see Fig. 3.

The clamping unit 23 of the molding device 13 has a sliding carriage as a support for each mold half of the complete mold, of which sliding carriages, the sliding carriage 43 shown on the left side of the Figures is designated as 43, and the sliding carriage shown on the right side is designated as 45. The sliding carriages 43, 45 can be horizontally displaced on the guide rails 48 of the support plate 27. On the sliding carriage 43, a left-hand main mold 47 is mounted on a holding body 44, which is attached to said carriage. On the right-hand sliding carriage 45, a right-hand main mold 49 is mounted on a holding body 46, which is attached to said carriage. As shown, inter alia, in Fig. 3, when brought together into a closed position, the main molds 47, 49 mold the main part of the container, which receives the respective container contents. A holding body 50 that forms a kind of slide plate is adjustably mounted on the upper side of the holding body 44 of the left-hand main mold 47, which forms a flat plate, on which holding body a left-hand head mold 51 is mounted. In a corresponding manner, a holding body 52 is disposed on the upper side of the holding body 46 of the right-hand main mold 49 such that it can be displaced horizontally, which forms the support for a right-hand head mold 53. As a result, the head molds 51, 53 can be moved independently of the main molds 47, 49 into the closed position, in order to mold the head portion of the container and to seal the filled container in a sterile manner.

For the horizontal movements between the position in which the mold is closed, and the position in which the mold is open, as shown in Fig. 2, in each case the main molds 47, 49 and the head molds 51, 53 are provided with an actuator, of which, the actuator provided for the main molds 47, 49 is coupled with the support plates 43 and 45 in order to move this plate along the rails 48 on the support plate 27 that are visible in Fig. 3. The actuator allocated to the head molds 51, 53 is coupled with the holding bodies 50 and 52 the head molds 51, 53. Both actuators each have a lever mechanism 57, which are disposed one above the other, so that essential parts of the underlying lever mechanism are not visible in Figures 2 and 3.

In terms of functional range however, this lever mechanism has the same design as the visible lever mechanism 57 disposed thereabove, as a drive for the head molds 51, 53. As its drive, each of the lever mechanisms 57 has a spindle drive 62 or, respectively, 63 each has an electric drive motor 65 allocated thereto. In Fig. 3, only the spindle drive 63 and the associated motor 65 of the upper lever mechanism 57 are visible. The spindle drives 62, 63 are connected to a transverse support 70 on the reverse side of the support plate 27 by means of struts 68, so that the unit formed by the lever mechanisms 57 and the spindle drives 62, 63 can move together with the support plate 27 on the vertical guide 31 according to the activity of the ball screw 39.

Fig. 3 shows the main molds 47, 49 in a closed position while the head molds 51, 53 are opened. In this position, the associated spindle drive 63 with its associated actuation spindle for the head molds 51, 53 is retracted and the underlying, comparably designed spindle drive 62 is extended, thus the spindle of the drive in one of the front operating positions thereof. In Fig. 3, the connecting rods 58 and 60, which are coupled with the spindle drive 63 are drawn upward, as a result of which the pivot levers 59 and 61 are each pivoted around a pivot point 67 into the position shown in Fig. 3, wherein the hinged ends of the pivot levers 59, 61 on the holding bodies 50 and 52 are pivoted outward, and the head molds 51, 53 are moved apart from one another. The position of the pivot points 67 of the pivot levers 59, 61 can be modified through the movement thereof in a guide slot 69 in the transverse support 70. For the closing movement of the head molds 51, 53, the spindle drive 63 is extended so that the connecting rods 58, 60 spread pivot levers 59 and 61 at the upper ends thereof, so that the ends coupled with the holding bodies 50, 52 pivot against one another and the head molds 51, 53 close. In the closed position of the main molds 47, 49 shown in Fig. 3, the lower spindle drive 62 is extended so that the pivot levers 64 of the lower lever mechanism 57 at the upper end in Fig. 3

are spread apart and the lower ends of the pivot levers 62, 64, which are not shown, are brought together in order to close the main molds 47, 49.

In a manner similar to the support plate 27, the guide and retaining device 25, the support plate 29 of which, like the support plate 27 of the clamping unit 23, can be displaced on the vertical guide 31 of the frame 1, has horizontal guide rails 71, on which a left-hand actuation unit 73 and a right-hand actuation unit 75 can be horizontally, adjustably guided. The actuation units 73, 75 form the actuators for associated guide and retaining parts, wherein the actuation unit 73 actuates a first left-hand guide and retaining part and a second left-hand guide and retaining part, while the actuation unit 75 actuates a first right-hand guide and retaining part, and a second right-hand guide and retaining part, see Fig. 2. The left-hand first guide and retaining part and right-hand first guide and retaining part are each formed by pivotable support rails 77 or, respectively, 81, which are of identical design and which extend in a direction that is parallel to the die parting plane 85 (Fig. 3) when in the pivoting position thereof that corresponds to the operative position. In order to adjust the pivoting position, each support rail 77, 81 is mounted on an associated swivel shaft 87 or, respectively, 89, which extend out of the housing of the respectively associated actuation unit 73 or, respectively, 75 parallel to one another in a vertical direction beside the die parting plane 85. A swivel drive for each of the swivel shafts 87, 89 are located in the housing of the actuation units 73, 75, which swivel drives can each be actuated by the machine control.

As previously mentioned, the actuation units 73, 75 can be horizontally displaced on the support plate 29, wherein a hydraulic cylinder 91 is provided as an actuator, as is shown only in Figures 9 to 11. In order to synchronize the horizontal movements of the actuation units 73,

75 a coupling device 93 is provided, which is visible in the case that the actuation units 73, 75 are in an opened state, as shown in Figures 6 to 8, and which is formed on each actuation unit 73, 75 by a gear rack, which mesh with a common pinion gear. As shown in Figures 4 and 6 to 11, a gear rack 95 extends downward from the support plate 29. Fig. 2 shows that a corresponding gear rack 96 is mounted on the support plate 27 of the clamping unit 23. The gear racks 95, 96 form a fail-safe against the clamping unit 23 and guide and retaining device 75 lowering in the event of a loss of power. To this end, a safety catch (which is not shown in the drawings) is provided for each gear rack 95, 96, which safety catch is pretensioned against the locked position, whereas during normal operation, the device can be retracted against the pretensioning.

The actuation units 73 and 75 each have a housing part that contains the rotary drive for the allocated swivel shaft 87, 89, which, when said housing parts are in a state in which they have been brought together, as shown in Fig. 2, form a housing having a shape that corresponds to a truncated triangle. A second guide and retaining part 79 on the left-hand side, and a second guide and retaining part 83 on the right-hand side, which parts are each formed by a guide rail body, are each mounted on the flat upper side such that they extend parallel to the die parting plane 85 and which rest against the row of formed containers when the actuation units 73, 75 are in a position in which they are brought together, as shown in Fig. 2.

Figures 5 to 11 serve to illustrate the operating cycle during the production process. In so doing, Fig. 5 shows a schematically simplified illustration of the operating state at the end of a production process, wherein the clamping unit 23 with the support plate 27 thereof, and the guide and retaining device 25 with the support plate 29 thereof, have moved downward together with the molding tube 15, which moves at the speed of extrusion. The main molds 47, 49 and head molds 51, 53 are each closed,

and the guide and retaining parts of the guide and retaining device 25 are each located in the operative position thereof. This means that the support rails 77 and 81, which form the first guide and retaining parts, are pivoted towards one another above the head molds 51, 53 so that these engage with the molding tube 15 with the conically converging bearing surfaces 97 thereof above the head portion of the formed container.

At the same time, the second guide and retaining parts 79 and 83, which are disposed on the upper side of the housing of the actuation units 73 and 75, engage with the respectively molded containers when the actuation units 73, 75 are in the closed position. With the mold opening that now arises, the completed containers are received between the first 77, 81 and second 79, 83 guide and retaining parts and are carried by further vertical movement. The dimensions of the axial length of the pivot shafts 87, 89 which support the support rails 77, 81 is such that there is a cooling segment located between the first and the second guide and retaining parts for the containers coming from the molding device. The vertical movement of the guide and retaining parts 77, 81, 79, 83 may be such that the molding tube 15 is slightly stretched, which results in especially precise guidance of the tube. In the case of the opening movements of the jaws 47, 49, 51, 53 that follow from the operating state in Fig. 5, the reliable sequence of the demolding process is ensured by the supportive function of the guide and retaining device 25.

Figures 6 to 11 show several details of the functional positions of the support plate 27 of the clamping unit 23 and of the actuation units 73, 75 of the guide and retaining device 25. In the case of the state shown in Fig. 6, subsequent to a starting position of the cycle with the support plate 27 in the upper position, the molding device is partially closed in that the main molds 47, 49 are brought together, however the head molds 55 and 53 are still opened. The main part of the container is molded by

bringing the main molds 47, 49 together. The filling process is started by retracting the filling mandrels 21. The guide and retaining device 25 is located in a lower position, in which the support rails 77, 81 are located below the molding device and the actuation units 73 and 75 have been moved apart from one another. The support rails 77, 81 are pivoted outward and away so that the actuation units 73, 75 are able to move freely upward, as is shown in Fig. 7, wherein the support rails 77, 81 are further pivoted outward and away above the molding device. In addition, the actuation units 73, 75 are moved apart from one another.

Fig. 8 shows the additional step, in which the actuation units 73, 75 have been moved apart from one another, the support rails 77, 81 are pivoted inward to a parallel course, wherein the conical supporting surfaces 97 are spaced apart from one another when the actuation units 73, 75 are still open. The clamping unit 23 and guide and retaining device 25 move downward together at a constant speed that corresponds to the extrusion speed of the molding tube 15, while the filling mandrels 21 move upward and away.

As shown in Fig. 9, the head molds 51, 53 are now brought together, wherein the head portion is formed and the containers are sealed. Upon the conclusion of this process, the actuation units 73, 75 are also brought together so that the bearing surfaces 97 of the first guide and retaining parts 77, 81 and likewise the second guide and retaining parts 79 and 83 assume their operative position. Fig. 10 shows main molds 47, 49 and head molds 51 and 53 in an open position, while the actuation units 73, 75 continue to move downward at a constant speed depending on the speed of the tube.

Fig. 11 shows that, for the start of a new cycle, the actuation units 73, 75 are moved downward, while the support plate 27

of the clamping unit 2, 3 has moved upward into the starting position and the main molds 47, 49 are brought together again in order to close the main part of the mold for a molding process.

Claims

1. A device for manufacturing container products made of plastic materials, in particular by carrying out a molding, filling and sealing process, said device having a molding device (13), which can be supplied with a molding tube (15) of plasticized plastic material, and which has a movable molding surface (17) that adapts to the predefined container geometry, on which said molding tube (15) can be placed for a molding, filling and/or sealing procedure, characterized in that a guide and retaining device (25) is provided, which has movable guide and retaining parts (77, 81; 79, 83), which parts can be controlled in such a way that, in at least one of the possible functional positions outside of the molding region of the molding device (13), said parts engage with the molding tube (15) itself and/or with the respective plastic material that surrounds at least one manufactured container product and/or the contents thereof.
2. The device according to Claim 1, characterized in that the movable guide and retaining parts (77, 81) at the end of a respective molding, filling and sealing process for the container product can be brought into a functional position, in which said parts supportively abut the molding tube (15) in the section adjacent to the inlet to the molding device (13), on opposite sides of the tube (15).
3. The device according to Claim 1 or 2, characterized in that the molding device (13) has jaws (47, 49; 51, 53) that form the mold surfaces (17), which jaws can be moved by means of a clamping unit (23) in a direction of movement that is perpendicular to the vertical direction of movement of the molding tube (15) between a position in which the mold is closed, and a position that opens the mold, and in that a sliding device (39)

is provided, by means of which the clamping unit (23) can be moved vertically downward from a starting position during the molding, filling and sealing process, together with the movement of the molding tube (15), and can be moved upward into the starting position during the molding, filling and sealing process at the end of the molding.

4. The device according to one of the preceding Claims, characterized in that the molding device (13) includes the main molds (47, 49) that mold the main part of the container as well as the head molds (51, 53), which can be moved independently of the main molds (47, 49) by means of the clamping unit (23) for a filling and subsequent sealing process in order to seal the head of the container.
5. The device according to one of the preceding Claims, characterized in that the guide and retaining device (25) can be displaced by means of a second sliding device (41) between an upper position, which corresponds to the operative position of the guide and retaining parts (77, 79, 81, 83), and lowered positions.
6. The device according to one of the preceding Claims, characterized in that the guide and retaining device (25) has an actuation unit (73, 75) for each guide and retaining part (77, 79, 81, 83), which can be displaced in a direction that extends perpendicular the vertical direction between a position in which these parts are in proximity to one another, which corresponds to the operative position of the guide and retaining parts (77, 79, 81, 83), and a position in which these parts are moved apart from one another.
7. The device according to one of the preceding Claims, characterized in that the actuation units (73, 75) for the associated guide and retaining parts (77, 81) have a swivel drive, by means of which these guide and retaining parts (77, 81) can be pivoted back and forth between a

between a pivoting position taken while in the operative position, in which these parts are located in a pivoting position that is aligned with the molding tube (15), and positions, in which these parts are located outside of the region of the molding device (13).

8. The device according to one of the preceding Claims, characterized in that the guide and retaining parts are provided in the form of support rails (77, 81), which extend across the entire length of the die parting plane (85) of the molding device (13) in the case of the pivoting position that corresponds to the operative position, and which are mounted on pivot shafts (87, 89) of the associated actuation unit (73, 75) for pivoting movements that extend in a horizontal plane, which shafts extend vertically and parallel to one another beside the die parting plane (85).
9. The device according to one of the preceding Claims, characterized in that, as a component of the guide and retaining device (25), the actuation units (73, 75) have additional guide and retaining parts (79, 83) that can be moved towards one another in the direction of a closed position, and moved away from one another in the direction of at least one opened position such that, in at least one of the closed positions, said parts engage, at least in part, with the respective plastic material that surrounds at least one manufactured container product and/or the contents thereof.
10. The device according to one of the preceding Claims, characterized in that when viewed in a vertical plane, the dimensions of the axial spacing between the respective actuation unit (73, 75) and the associated support rail (77, 81) is such that a container product that is still warm from the molding device (13) is received prior to transfer to the additional guide and retaining parts (79, 83)

of the actuation units (73, 75) in order that a kind of cooling segment is formed.

11. The device according to one of the preceding Claims, characterized in that the support rails (77, 81) which rest against the molding tube (15) have conically converging bearing surfaces (97).
12. The device according to one of the preceding Claims, characterized in that the clamping unit (23) of the molding device (13) has a primary support (43), on which the main molds (47, 49) and head molds (51, 53) are movably guided independently of one another in a horizontal direction, and which primary support is adjustably mounted on a vertical guide (31) of the device frame (1).
13. The device according to one of the preceding Claims, characterized in that main molds (47, 49) and head molds (51, 53) are each connected to an allocated, individual drive mechanism for the closing and opening movements, each of which has a lever mechanism (57) that can be actuated by means of an actuator (62, 63).
14. The device according to one of the preceding Claims, characterized in that the actuation units (73, 75) are also guided on the vertical guide (31) of the device frame (1) such that they can be vertically displaced by means of a second sliding device (41).
15. The device according to one of the preceding Claims, characterized in that each of the two sliding devices has a separate motor-driven ball screw (39, 41) in order to produce the respective vertical movements.

16. The device according to one of the preceding Claims, characterized in that the sliding device (41) of the actuation units (73, 75) has a transverse guide (71) that extends vertically between the associated vertical guides (31) of the device frame, along which transverse guide the actuation units (73, 75) with the additional guide and retaining parts (79, 83) are guided for the horizontal movement thereof and can be moved by means of at least one actuator (91), and in that there is a coupling device (93) between the actuation units (73, 75) in order to synchronize the horizontal movements of said units.