of the open-close bendable lid 1A, the hinge part 15 is movable, and therefore the front lid part 11 is swingably or rotatably connected to the rear lid part 13 around the hinge part 15 as indicated by an arrow R shown in Fig. 1 (the front lid part 11 has a knob 111).

[0017]

The container 1B (Fig. 2 and Fig. 3) is a molded article having a lid part 11 (first part), a container part 13 (second part), and a hinge part 15 connecting them. In the case of the container 1B, the hinge part 15 is movable, and therefore the lid part 11 is swingably or rotatably connected to the container part 13 around the hinge part 15 as indicated by an arrow R shown in Fig. 2 or Fig. 3. In the container 1B shown in Fig. 2, the hinge part 15 is widely formed along the boundary between the lid part 11 and the container part 13. On the other hand, in the container 1B shown in Fig. 3, the lid part 11 and the container part 13 are separately formed and are therefore connected together by two narrow hinge parts 15 provided outside the container.

[0018]

(2) Part for hinge (part for hinge molded separately from other parts)

A part for hinge 1C is a repeatedly-movable part that can repeatedly be bent or curved substantially as a whole (Fig. 4). That is, the part for hinge 1C is a molded article that can repeatedly be moved as a whole. More specifically, the part for hinge 1C can have two base portions 151 and 153 and an intercalated portion 155 interposed between them. As shown in Fig. 4, the base portion 151 can be fixed to a lid body 91 with, for example, screws 95 and the base portion 153 can be fixed to a containing body 93 with, for example, screws 95. In this case, the part for hinge 1C itself is movable, and therefore the lid body 91 is swingably or rotatably connected to the containing body 93 around the intercalated portion 155 as indicated by an arrow R shown in Fig. 4.

[0019]

(3) Bellows part

The bellows part usually has a continuous concavo-convex-shaped appearance. Specific examples of the bellows part include a part having an appearance like stacked inner tubes (Fig. 5) and a zigzag-shaped part (Fig. 6). Such parts can be used as, for example, bellows hoses and boot products. Similarly to the hinge part, this bellows part is also a repeatedly-movable part that can repeatedly be bent (in a direction indicated by an arrow R_1 shown in Fig. 5 or Fig. 6) or curved (in a direction indicated by an arrow R_2 shown in Fig. 5 or Fig. 6).

An example of a molded article having a bellows part as a repeatedly-movable part includes a molded article having a bellows part interposed between a first part and a second part to connect them together. A specific example of such a molded article includes a bellows tube 2A (Fig. 5).

The bellows tube 2A (Fig. 5) is a molded article having a straight tube part 21 (first part), a curved tube part 23 (second part), and a bellows part 25 connecting them together. As indicated by the arrow R_1 shown in Fig. 5, the bellows part 25 of the bellows tube 2A can be moved so as to expand and contract in a longitudinal direction, and therefore the positional relationship between the straight tube part 21 and the curved tube part 23 can also be changed accordingly. Likewise, as indicated by the arrow R_2 shown in Fig. 5, the bellows part 25 can asymmetrically expand and

and a dispersed phase (B_{A2}) dispersed in the continuous phase (A_2) and containing a modified elastomer (see Fig. 9)

Among these phase structures, the phase structure (1) or the phase structure (3) is preferred.

[0049]

In the phase structure (1), the dispersed phase (B) in the phase structure (1) may further have a continuous phase (B_1) that is present in the dispersed phase (B) and contains the polyamide resin and a fine dispersed phase (B_2) that is dispersed in the continuous phase (B_1) and contains the modified elastomer (see Fig. 8). In this case, the phase structure (1) has a multiple phase structure having a fine dispersed phase (B_2) further dispersed in the dispersed phase (B).

It is to be noted that the modified elastomer present in the phase structure (1) may be an unreacted modified elastomer, a product obtained by reaction with the polyamide resin, or a mixture of them.

[0050]

The phase structure (3) can be a co-continuous phase structure in which two continuous phases, the continuous phase (A_1) and the continuous phase (A_2), coexist. The dispersed phase (B_{A1}) present in the continuous phase (A_1) may have a continuous phase (B_{A11}) that is present in the dispersed phase (B_{A1}) and contains the polyamide resin and a fine dispersed phase (B_{A12}) that is dispersed in the continuous phase (B_{A11}) and contains the modified elastomer. In this case, the phase structure (3) is a multiple phase structure having a fine dispersed phase (B_{A12}) further dispersed in the dispersed phase (B_{A1}).

It is to be noted that the modified elastomer present in the phase structure (3) may be an unreacted modified elastomer, a product obtained by reaction with the polyamide resin, or a mixture of them.

[0051]

In the case of the phase structure (1), the continuous phase (A) contains a polyolefin resin. The polyolefin resin is a main component of the continuous phase (A) (the ratio of the polyolefin resin is usually 70% by mass or more and may be 100% by mass with respect to the total mass of the continuous phase A). Further, the dispersed phase (B) contains a polyamide resin and a modified elastomer. The polyamide resin (when the dispersed phase (B) contains a modified elastomer, the polyamide resin and the modified elastomer) is (are) a main component of the dispersed phase (B) (the ratio of the polyamide resin (the polyamide resin and the modified elastomer) is usually 70% by mass or more or may be 100% by mass with respect to the total mass of the dispersed phase B).

When the phase structure (1) is the above-described multiple phase structure, the continuous phase (B_1) contains the polyamide resin. The polyamide resin is a main component of the continuous phase (B_1) (the ratio of the polyamide resin is usually 70% by mass or more and may be 100% by mass with respect to the total mass of the continuous phase B_1). The fine dispersed phase (B_2) contains the modified elastomer. The modified elastomer is a main component of the fine dispersed phase (B_2) (the ratio of the modified elastomer is usually 70% by mass or more and may be 100% by mass with respect to the total mass of the fine dispersed phase B_2).

[0052]

(3) Measurement of flexural modulus

Measurement of flexural modulus was performed in accordance with JIS K7171 using the test specimens for measurement obtained above in [3](1). As a result, the flexural modulus of the molded article using the thermoplastic resin composition of Example 1 was 885 MPa. On the other hand, the flexural modulus of the molded article using the thermoplastic resin composition of Example 2 was 779 MPa.

The flexural modulus was measured in the following manner. Each of the test specimens for measurement was supported by two supporting points (curvature radius: 5 mm) the distance (L) between which was 64 mm, and a load was applied at a rate of 2 mm/min on a point of action (curvature radius: 5 mm) located at the center between the two supporting points.

[0082]

[4] Preparation of hinge parts

A plate-like member having a length of 100 mm, a width of 30 mm, and a thickness of 2.3 mm was obtained as a molded article by injection molding. The plate-like member had a hinge part (thickness: 0.5 mm) provided at the center in the longitudinal direction thereof so as to be parallel with the width thereof. The injection molding was performed by providing a gate in a direction parallel with the hinge part. As a result, no weld was observed near the hinge part. That is, even when the injection direction was not perpendicular to the hinge part, the hinge part was integrally molded in the molded article so as not to be fractured by bending. Further, the hinge part could be formed without performing preliminary bending after mold opening.

[0083]

[5] Effects of Examples

As can be seen from the results of the mechanical strength evaluation in the above [3], the molded article according to the present invention has a Charpy impact strength of 83 to 120 kJ/m^2 and a flexural modulus of 779 to 885 MPa, and therefore can have excellent mechanical strength. On the other hand, the results of the fatigue resistance evaluation in the above [2] reveal that the molded article according to the present invention can exhibit excellent fatigue resistance at a stress of 7.4 MPa or less (the molded article of Example 1 (Test No. 1-4) and the molded article of Example 1 (Test No. 1-5) were whitened but not fractured). Further, the results reveal that when the stress is 6.7 MPa or less, the molded article according to the present invention can have fatigue resistance even when the number of times of repeated bending exceeds 1×10^7. That is, it can be seen that the molded article according to the present invention can achieve both high fatigue resistance and excellent mechanical strength. Particularly, it can be seen that the molded article of Example 2 is not fractured irrespective of the value of stress (6.7 to 11.9 MPa) and has extremely high fatigue resistance. This can be considered as an effect resulting from the fact that the molded article of Example 2 has a co-continuous phase structure. That is, it can be seen that the molded article of Example 2 can achieve both fatigue resistance and mechanical strength at extremely high levels.

Further, the results of the above [4] reveal that the method according to the present invention is a production method capable of improving the design flexibility of a mold and the shape flexibility of a molded article and of reducing the number of processes.