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(54) IMPROVEMENTS IN OR RELATING TO THE MANUFACTURE OF
MODEL TOYS

(71) We, BRITAINS LIMITED, a British Company, of Blackhorse Lane, London, E17 5QJ England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of manufacturing a model toy moulded from thermoplastics material.

In the Complete Specification of our Patent No. (Serial No. 1,565,655) (Application No. 50793/75) (hereinafter referred to as the "parent Patent"), there is described a method of manufacturing a model toy including the steps of positioning a base member, having an opening therethrough, in a mould, and injecting a thermoplastics material in a fluid state through said opening and into a mould cavity of the mould, the thermoplastics material subsequently solidifying into a moulding which includes a part located in said opening.

The parent Patent includes a description of the preferred method of performing this invention by pressing the nozzle of an injection moulding machine into contact with a part of the base member surrounding the opening and injecting thermoplastics material from the nozzle through the opening and into the mould cavity. When the mould cavity and the opening in the base member have been completely filled with thermoplastics material the injection of thermoplastics material is discontinued. In order subsequently to remove the moulding from the mould it is then necessary to break the thermoplastics material in the nozzle from that in the opening of the base member, thereby leaving the thermoplastics material in the opening with a poor finish, when the model toy is viewed from below, compared with that obtainable from a moulded finish.

The present invention seeks to overcome this disadvantage by providing a model toy having a good surface finish when viewed from below.

According to the present invention a method of manufacturing a model toy includes the steps of positioning in a mould a base member having a substantially flat lower surface destined to become the supporting surface of the finished model toy, a recess opening into the said lower surface, and at least one hole extending from the bottom of the recess and opening into an upper surface of the base member, the base member being positioned so that the or each hole, at its end adjacent the said upper surface of the base member, opens into a first mould cavity and, at its opposite end, opens into a second mould cavity defined by at least part of the recess and a mould part and positioned between the bottom of the recess and a plane containing the said lower surface of the base member, and injecting a thermoplastics material in a fluid state into said first mould cavity, the thermoplastics material filling the first mould cavity and flowing through the or each hole into the second mould cavity before solidifying into a moulding with the base member retained thereon.

Suitably said mould part comprises a raised portion which projects into the recess and seals against surfaces of the latter to define part of the second mould cavity during the injection of thermoplastics material into said first mould cavity. The recess may be in the form of a counterbored recess, an end surface of the raised portion sealing against a shoulder interconnecting parts of the counterbored recess having different cross-sectional areas to define part of the second mould cavity during injection of thermoplastics material into the first mould cavity.

The said mould cavity part, defining in part the second mould said opening may be finished, e.g. engraved, so that the part of the thermoplastics material, which solidifies within the second mould cavity against said mould part and which is visible when viewed from beneath the finished model toy,

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is suitably marked, e.g. with writing (a trade name and/or model type designation) and/or other distinguishing marks.

5 Suitably the mould comprises a first and a second part which together define the said first mould cavity and a third part which constitutes the said mould part. Typically the mould parts are clamped together during injection of the thermoplastics material into the first mould cavity.

10 At least one subsequent over-moulding operation may be performed on the moulding in similar manner to that described in the parent Patent.

15 The invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

20 Figure 1 is a perspective view of a three-part mould for use in the manufacture of a model toy according to the method of the invention,

25 Figure 2 is a perspective view of moulding apparatus, including a mould holder, for use with the mould shown in Figure 1 in performing the method of the invention,

30 Figures 3 and 4 are a schematic side view and a schematic plan, respectively, of the mould of Figure 1 positioned within the mould holder of Figure 2,

35 Figure 5a is a side sectional view of a base member for positioning in the mould shown in Figure 1, the dotted lines showing the position of the mould when the base member is positioned therein, and

40 Figure 5b is a plan, from below and on a reduced scale, of the base member shown in Figure 5a.

45 Figure 1 shows a first mould part 1 having a recess formed in its upwardly facing surface 2, a second mould part 3 pivotally connected at 4 to the mould part 1, having a surface 5 which can be moved into contact with the first mould part 1 on pivotal movement of the mould part 3 and which is provided with a raised plate 15, and a sloping surface 6 which meets the surface 5, and a third mould part 7 detachable from the mould parts 1 and 3, provided with a recess (not shown) formed in its downwardly facing surface, and having a chamfered upper edge 8. The three mould parts can be assembled together so that the mould part 7 is positioned on top of the mould part 1, with its chamfered edge 8 bearing against the sloping surface 6 on the mould part 2, so as to provide a substantially parallelepipedic mould generally designated by the reference numeral 9 (see Figures 3 and 4). The recesses formed in the confronting surfaces of the mould parts 1 and 7 together define a first mould cavity 10 in the mould 9, the mould cavity 10 including an injection duct 11 leading from the mould cavity 10 to a side wall 12 of the mould 9 and a recess 13 for holding a

metallic base member 14 (see Figures 5a and 5b). It should be realised that in Figure I the parts numbered 10 to 13 have been indicated for simplicity on the mould part 1 although these parts are only formed when the mould parts 1, 3 and 7 are clamped together.

70 A mould holder 16 (see Figure 2) forming part of a moulding assembly, generally designated by the reference numeral 17, is provided for clamping the mould parts 1, 3 and 7 together. The mould holder 16 is formed from a casing 18 secured to a table 19 to define an open-ended substantially parallelepipedic compartment 20. The casing 18 has opposed side walls 21a and 21b, the wall 21a having an opening 22 therethrough communicating with the compartment 20. A similar opening 23, communicating with the compartment 20, is provided in the table 19. Fluid, e.g. air, actuable cylinders 24 and 25 are aligned with the openings 22 and 23, respectively, for movement through the openings into and out of the compartment 20.

80 In order to manufacture a model toy, it is first necessary to position the base member 14 (see Figures 5a and 5b) within the recess 13 of the first mould cavity 10. The base member 14 has a flat lower surface 26, intended to provide the supporting surface of the finished model toy, and an upper surface 27. A counterbored recess 28 opens into the lower surface 26, the recess 28 having a bottom surface 29 and an endless shoulder 30, spaced between the surfaces 26 and 29, interconnecting the innermost, counterbored part of the recess 28 with the outermost part of the recess 28. A pair of holes 32, 33, each of square cross-section, extend from the bottom surface 29 of the recess 28 and open into the upper surface 27 of the base member 14. When the base member 14 is positioned within the first mould cavity 10 (the mould part 7 having been placed on top of the mould part 1), the mould part 3 is pivoted with respect to the mould part 1 so that the raised plate 15 on its surface 5 is positioned within the recess 28 of the base member 14.

115 The mould is then moved in the direction A (see Figure 2) into the compartment 20 provided by the mould holder 16 so as to adopt the position shown in Figures 3 and 4. The cylinders 24 and 25 are then actuated, the cylinder 24 moving in the direction X through the opening 22 into contact with the mould 9 so that the latter is moved against the wall 21b and the mould part 3 is pressed against the mould parts 1 and 7 with the raised plate 15 sealing against the shoulder 30 to define a second mould cavity between the bottom surface 29 of the recess 28 and the confronting surface of the raised plate 15. The cylinder

25 moves in the direction Y through the opening 23 into contact with the mould 9 so that the latter is moved against the casing 18 and the mould parts 1 and 7 are clamped firmly together.

5 With the mould parts 1, 3 and 7 clamped firmly together, a nozzle 34 of an injection moulding machine is pressed against the mould 9 and thermoplastics material is injected through the duct 11 and into the first mould cavity 10. Injection of thermoplastics material continues until the entire first mould cavity 10, the holes 32 and 33 in the base member 14 and the second mould cavity formed between the bottom surface 29 of the recess 18 and the raised plate 15 provided on the mould part 3 are filled with the thermoplastics material. After the thermoplastics material has solidified, thereby retaining the base member 14 on the moulding, the fluid actuatable cylinders 24 and 25 are retracted through the openings 22 and 23, respectively, the mould 9 is removed from the mould holder 16, the mould 9 opened and the moulding removed therefrom. One or more over-moulding operations may then be performed on the moulding in a manner similar to that described in the Patent to form the finished model toy.

30 It will be appreciated that by closing the recess 28 in the base member 14 with a part of the actual mould 9 it is possible to obtain a good surface finish to the finished model toy when viewed from below. It is also possible to mark the raised plate 15 so that special markings, e.g. product name, where product made, etc., are moulded onto the base of the model toy.

40 It should be understood that the number of holes (32, 33) provided in the base member 14 can be altered within the scope of the invention although the type of model toy to be moulded will affect this choice. For example if the model toy represents a pirouetting ballerina, only one foot will be in contact with the base member 14 (representing the floor on which the ballerina is performing) and hence only one hole will be provided in the base member 14. Alternatively in other model toys more parts of the model will be in contact with the base member allowing for more than one hole to be provided in the base member. Furthermore it will be appreciated that more than one recess may open into the lower surface 26 of the base member 14 to enable at least one further mould cavity to be placed in communication with the first mould cavity 10 through at least one further hole extending from the bottom of the or each further recess and opening into the upper surface 27 of the base member 14.

WHAT WE CLAIM IS:—

65 1. A method of manufacturing a

model toy including the steps of positioning in a mould a base member having a substantially flat lower surface destined to become the supporting surface of the finished model toy, a recess opening into the said lower surface, and at least one hole extending from the bottom of the recess and opening into an upper surface of the base member, the base member being positioned so that the or each hole, at its end adjacent the said upper surface of the base member, opens into a first mould cavity and, at its opposite end, opens into a second mould cavity defined by at least part of the recess and a mould part and positioned between the bottom of the recess and a plane containing the said lower surface of the base member, and injecting a thermoplastics material in a fluid state into said first mould cavity, the thermoplastics material filling the first mould cavity and flowing through the or each hole into the second mould cavity before solidifying into a moulding with the base member retained thereon.

2. A method according to claim 1 in which the said mould part comprises a raised portion which projects into the recess and seals against surfaces of the latter to define the said second mould cavity during the injection of said thermoplastics material into the said first mould cavity.

3. A method according to claim 2, in which the recess is in the form of a counter-bored recess, an end surface of the said raised portion sealing against a shoulder inter-connecting parts of the counter-bored recess having different cross-sectional areas to define part of the second mould cavity during the injection of the thermoplastics material into the first mould cavity.

4. A method according to any one of the preceding claims, in which the said mould part defining in part the second mould cavity has a surface such that the part of the thermoplastics material which solidifies within the second mould cavity against said mould part is provided with a trade name and/or model type designation.

5. A method according to any one of the preceding claims, in which the thermoplastics material injected into the first mould cavity fills at least one further mould cavity positioned between the said plane containing the lower surface of the base member and the bottom of at least one further recess opening into the said lower surface of the base member, the thermoplastics material flowing from the first mould cavity into the further mould cavity or cavities through at least one further hole extending from the bottom of the or each further recess and opening into the upper surface of the base member.

6. A method according to any of the

- preceding claims, in which the mould is in three parts which are clamped together during the injection of thermoplastics material into the first mould cavity.
- 5 7. A method according to any of the preceding claims, in which further thermoplastics material is over-moulded over only part of the surface of the solidified first-mentioned thermoplastics material in at least one subsequent over-moulding operation.
- 10 8. A method according to claim 7, in which the, or at least some of the, said over-moulding operations is or are performed in a further mould.
- 15 9. A method according to claim 7 or 8, in which the original moulding, formed from the first-mentioned thermoplastics material, is formed with at least one spigot onto, and/or at least one recess into, which
- 20 said further thermoplastics material is injected in said subsequent over-moulding operation or operations.
10. A method according to claim 7, 8 or 9, in which said further thermoplastics material is of a different colour or colours to said first-mentioned thermoplastics material.
- 25 11. A method of manufacturing a model toy substantially as herein described with reference to, and as illustrated in, Figures 1 to 4 and Figures 5a and 5b of the accompanying drawings.
- 30 12. A model toy manufactured by the method claimed in any of claims 1 to 11.

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Fig.1.

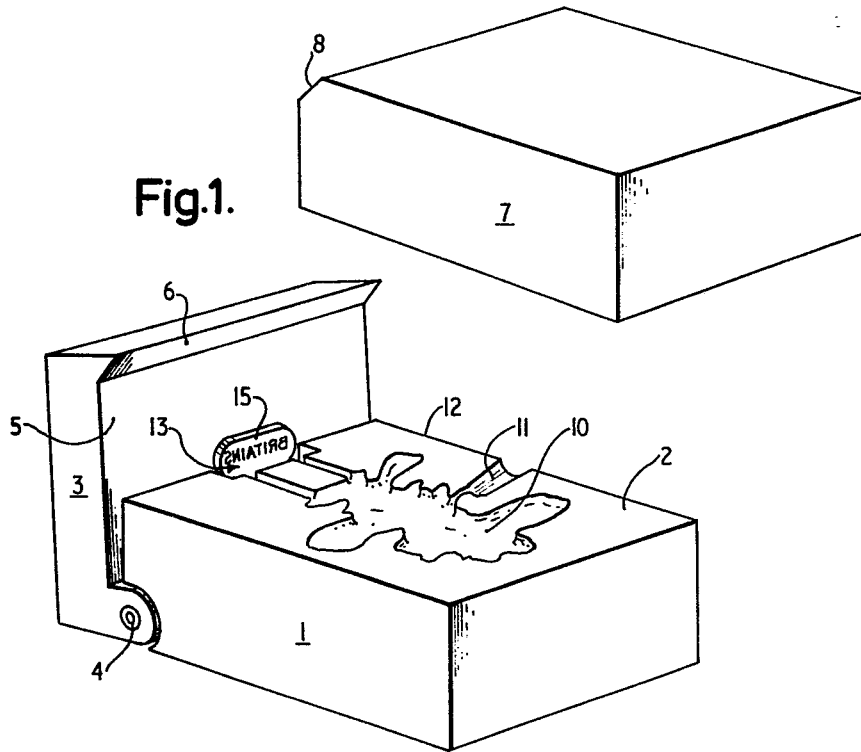


Fig.5a.

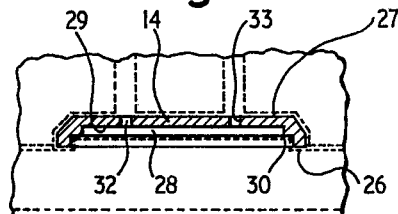
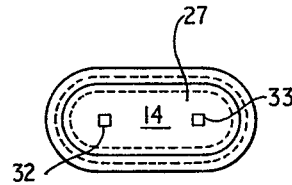


Fig.5b.



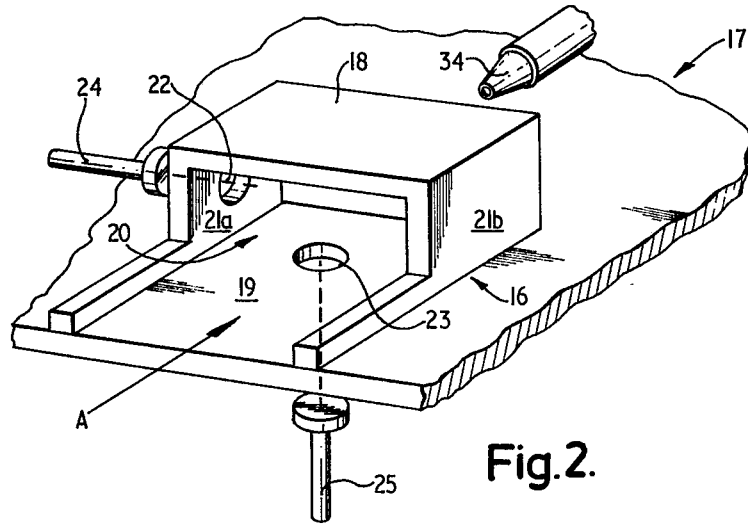


Fig. 2.

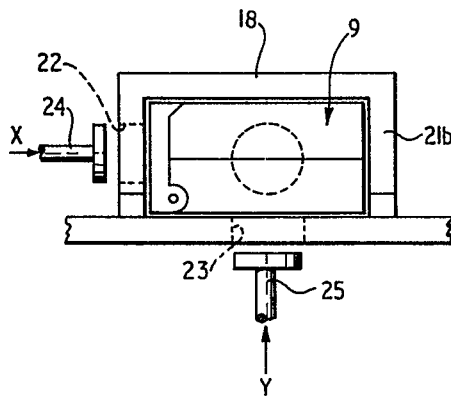


Fig. 3.

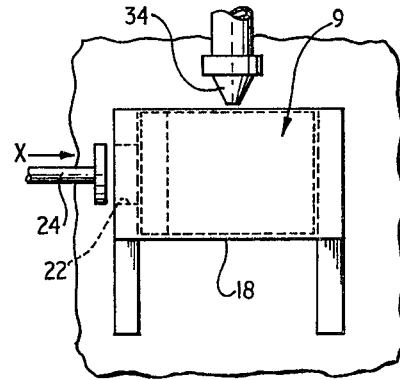


Fig. 4.