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(54) Air conditioning blow-out port

(57) An air-conditioning blow-out port 1 for an automobile includes a housing 3 of synthetic resin, which includes pairs of shaft bores 10 provided in a coaxial arrangement in opposed wall portions 9 of a peripheral wall 6, and a plurality of blades 5 of synthetic resin, which each includes a pair of support shafts 15 projectingly provided on opposite ends of a blade body and rotably fitted in the shaft bores. Each of the blades 5 has a pivotally mounting portion 17 connected to an interlocking link 16 for operatively connecting the blades. The pivotally mounting portion is comprised of a shaft 20 which is parallel to the support shaft 15 at a common end of each blade body to extend through a pivotally supporting bore 19 in the link 16 and a slip-off preventing projection 21 located at a projecting end of the pivotally supporting shaft to engage an edge of the bore. Thus, the pivotally mounting portion 17 can be provided within the thickness of the blade to provide a reduced spacing between the blades. The housing and blades are formed during a two stage injection moulding process, using the bores 10 to mould shafts 15. Each stage employs opposed dies clamping opposed slide dies.

FIG.3

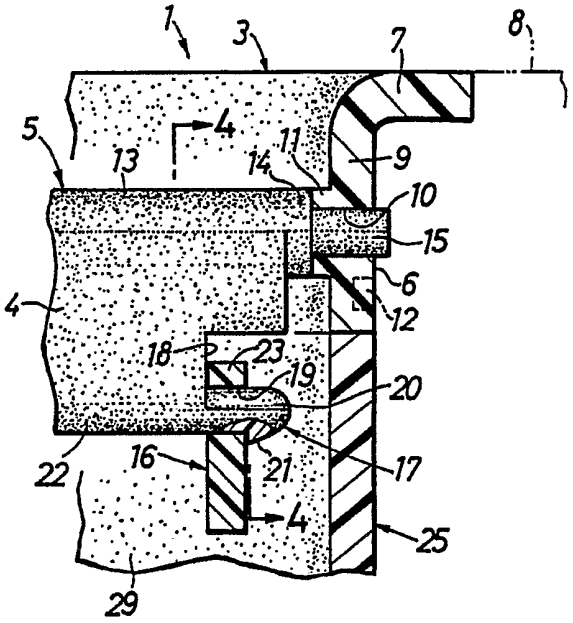

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FIG.1

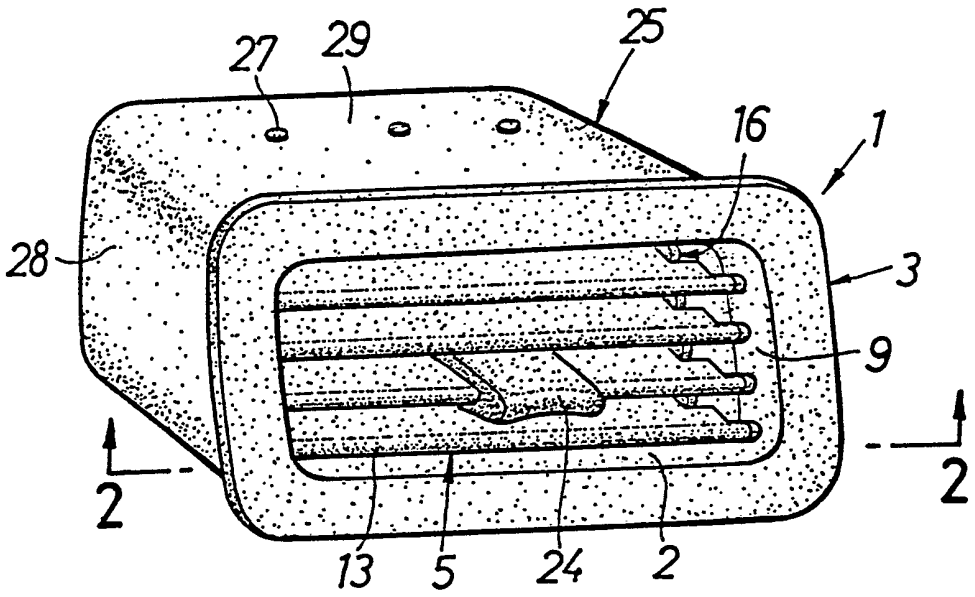
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FIG.2

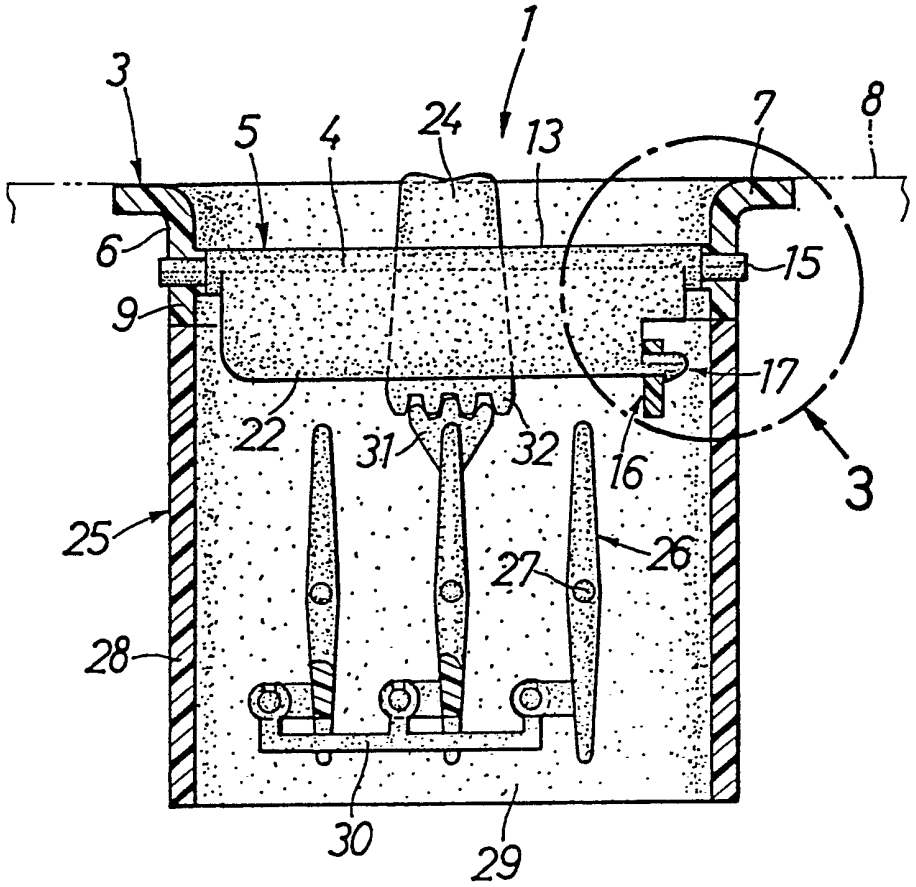
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FIG.3

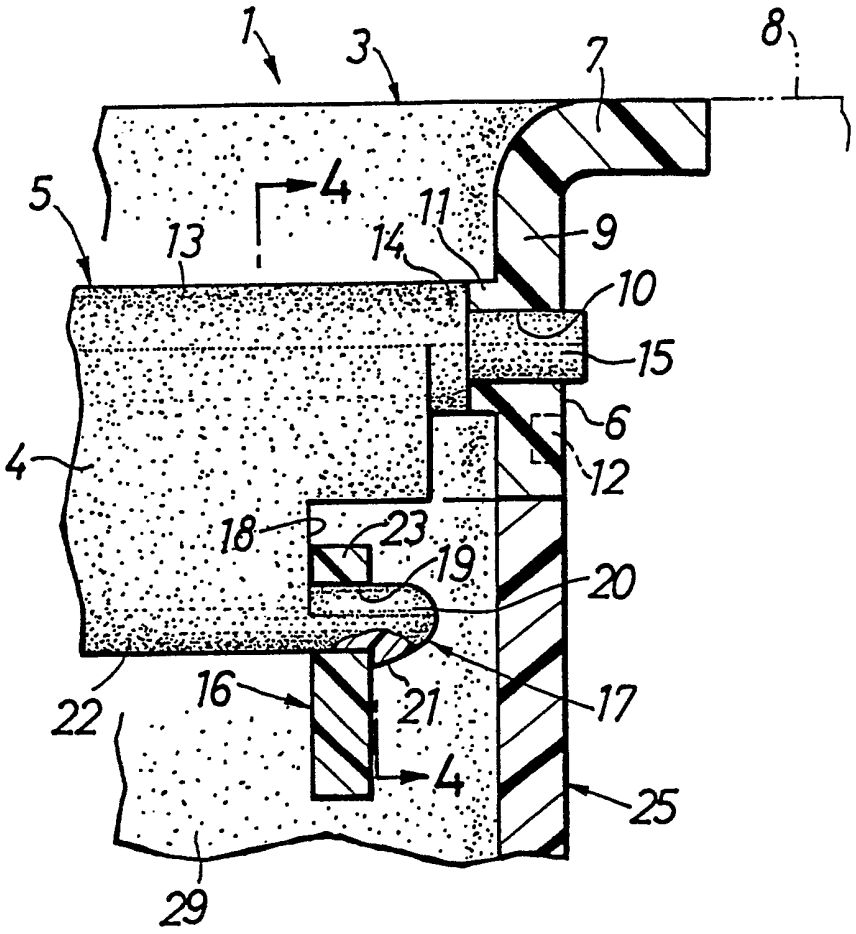
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FIG.4

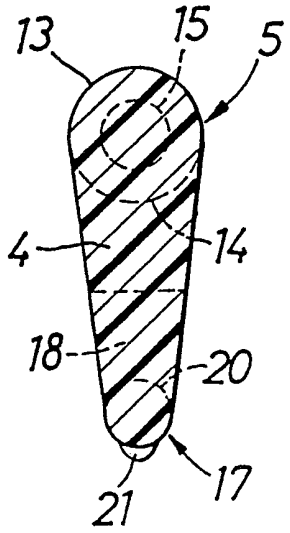
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FIG.5

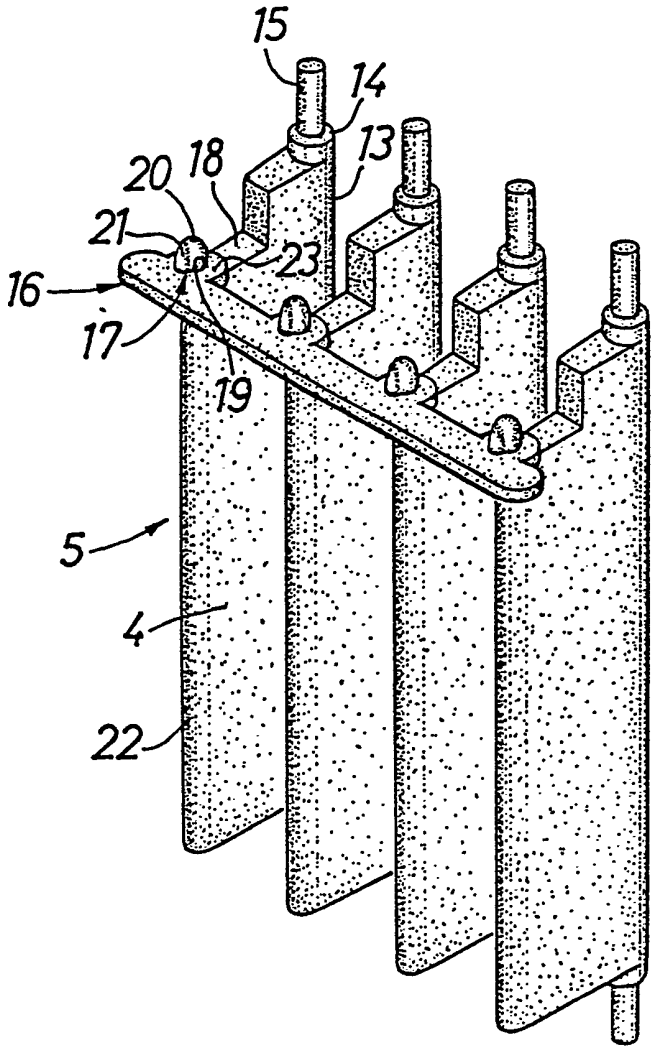

FIG.6

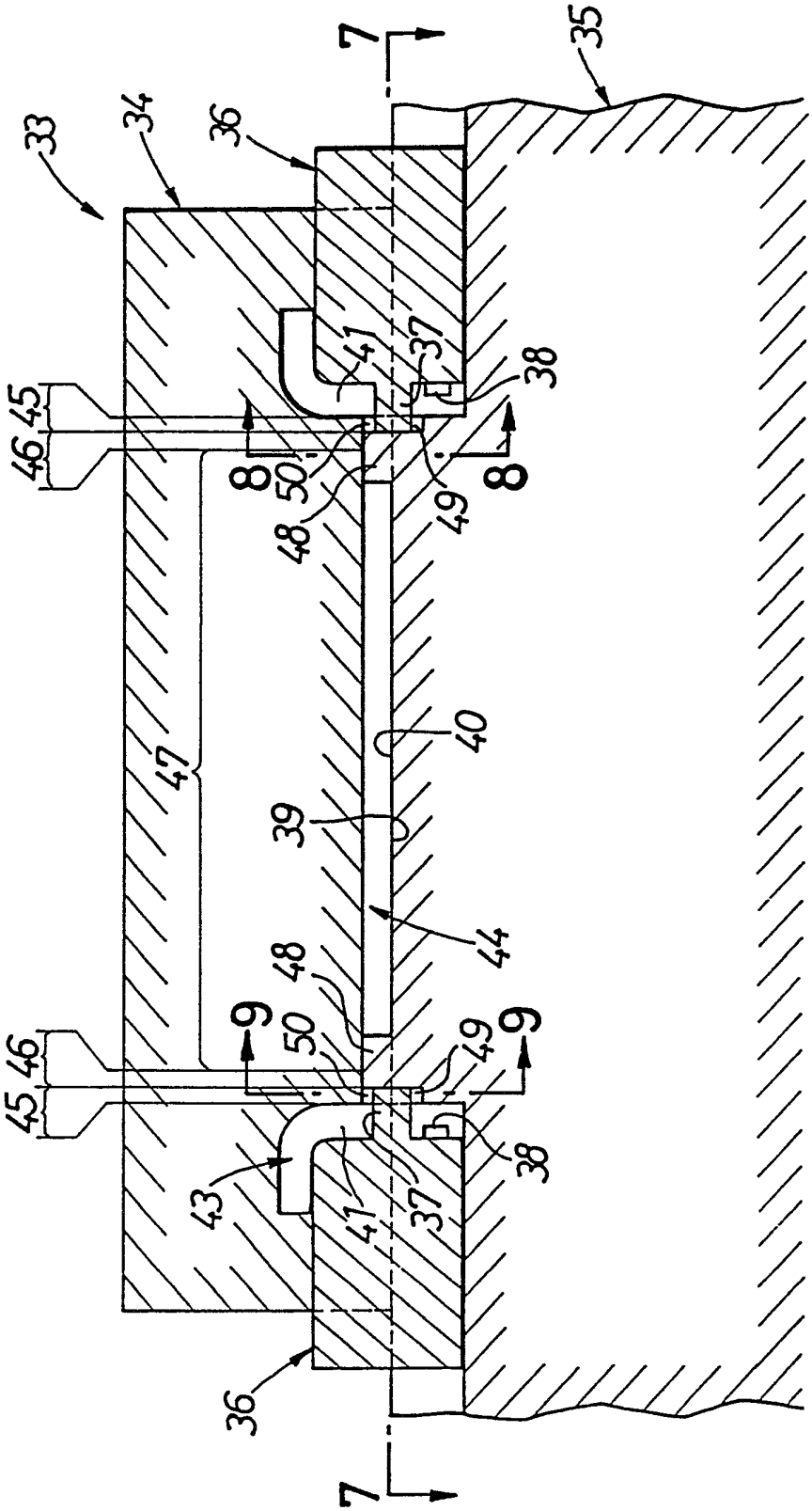
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FIG.7

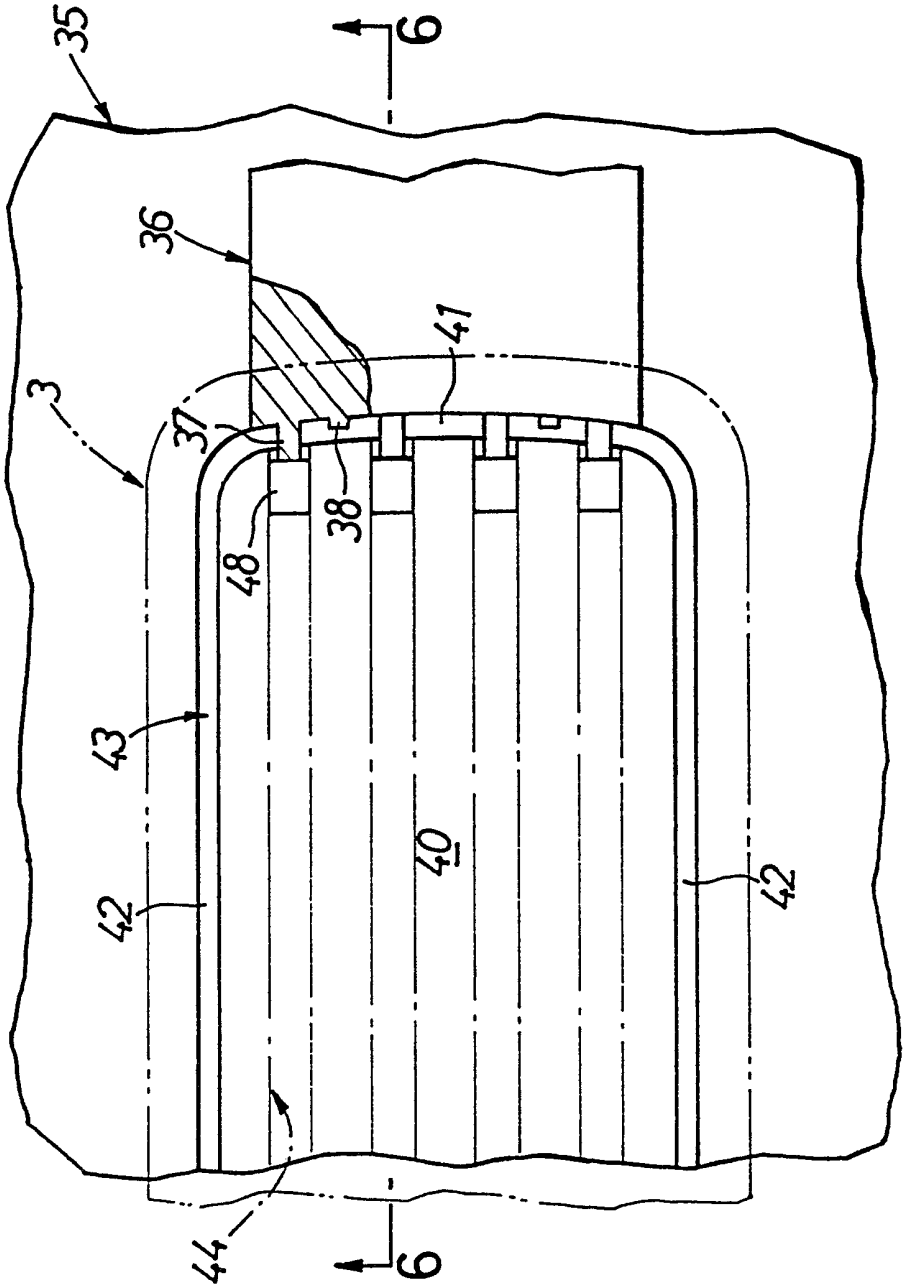

FIG.8

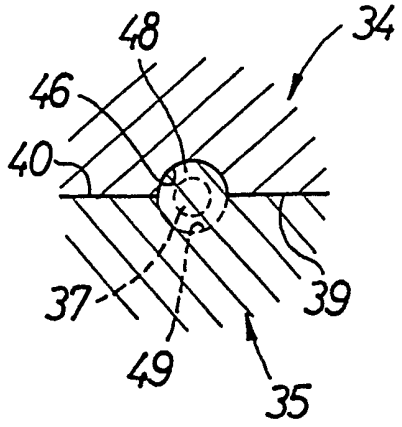

FIG.9

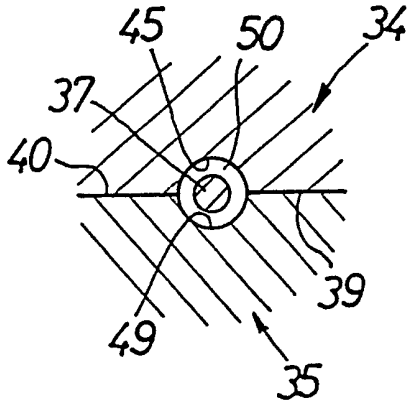

FIG.10

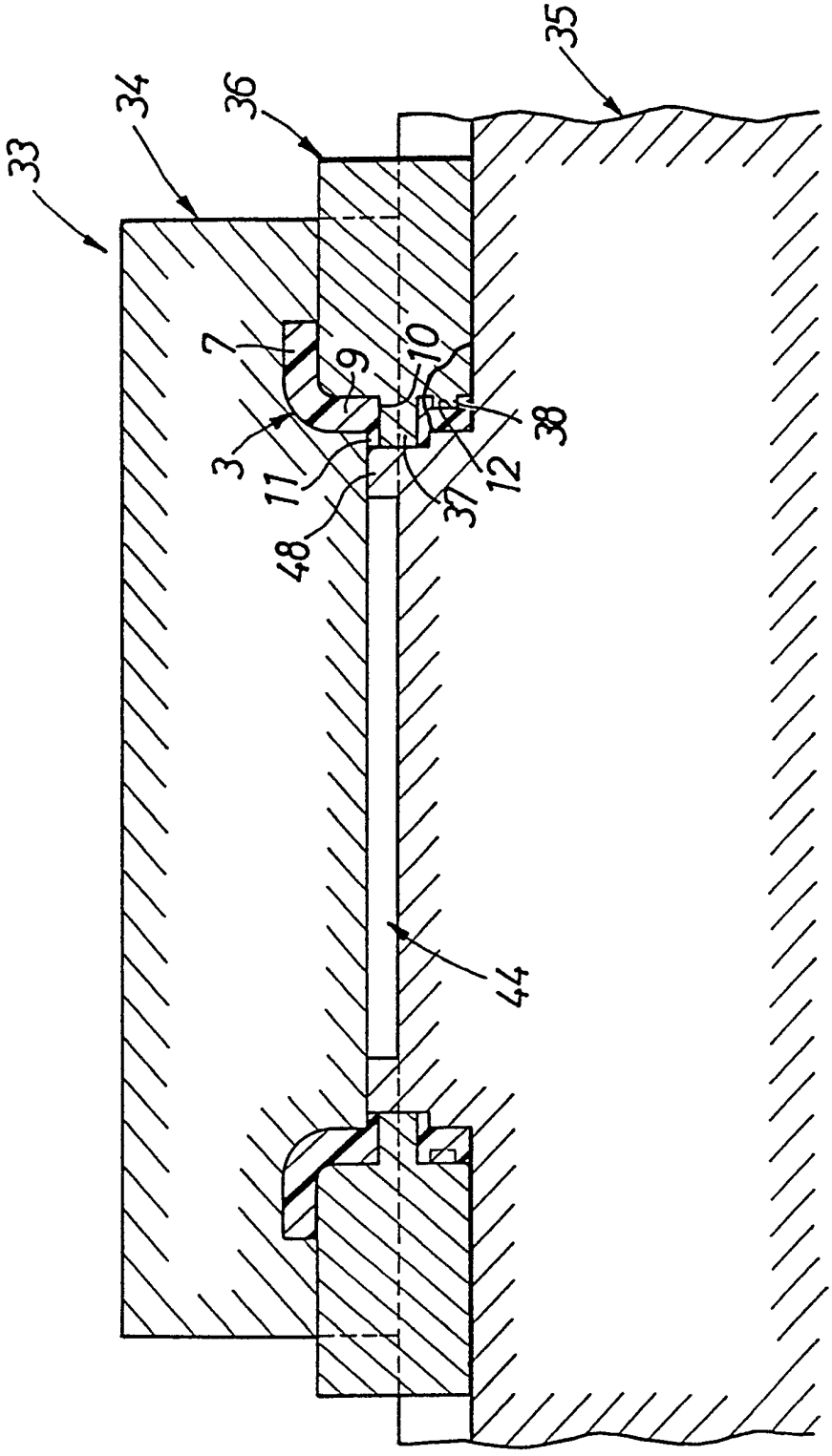

FIG.11

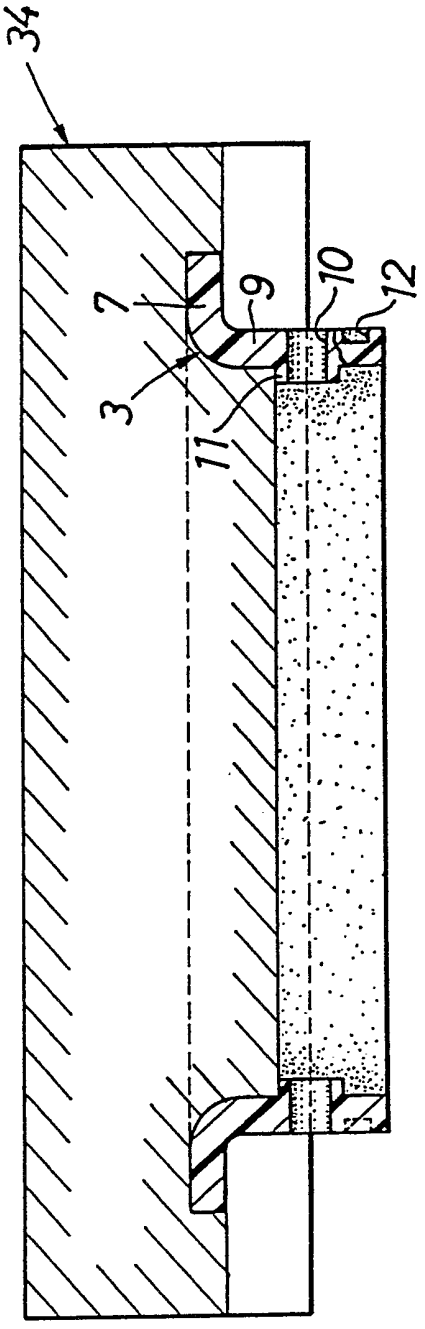

FIG.12

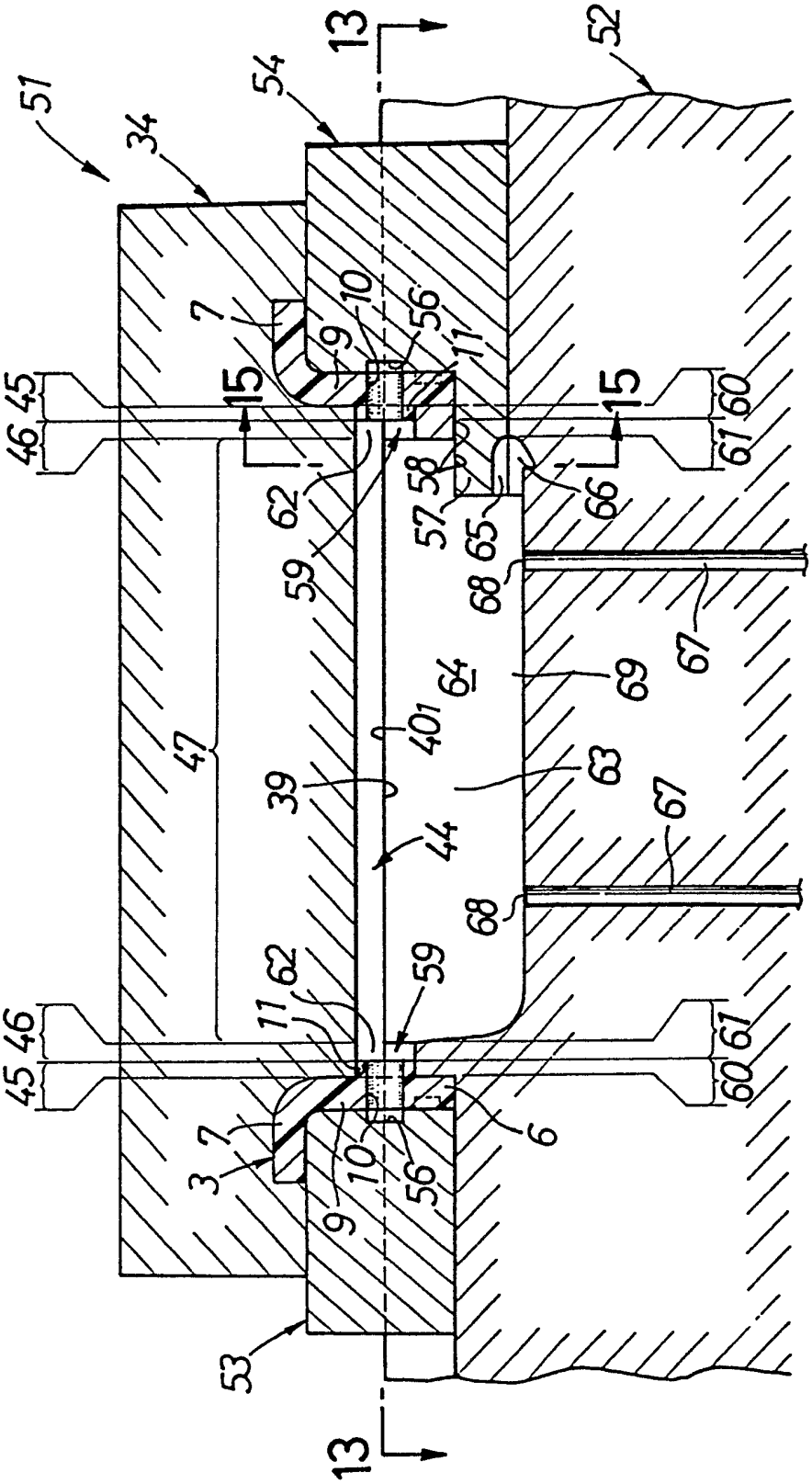
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FIG.13

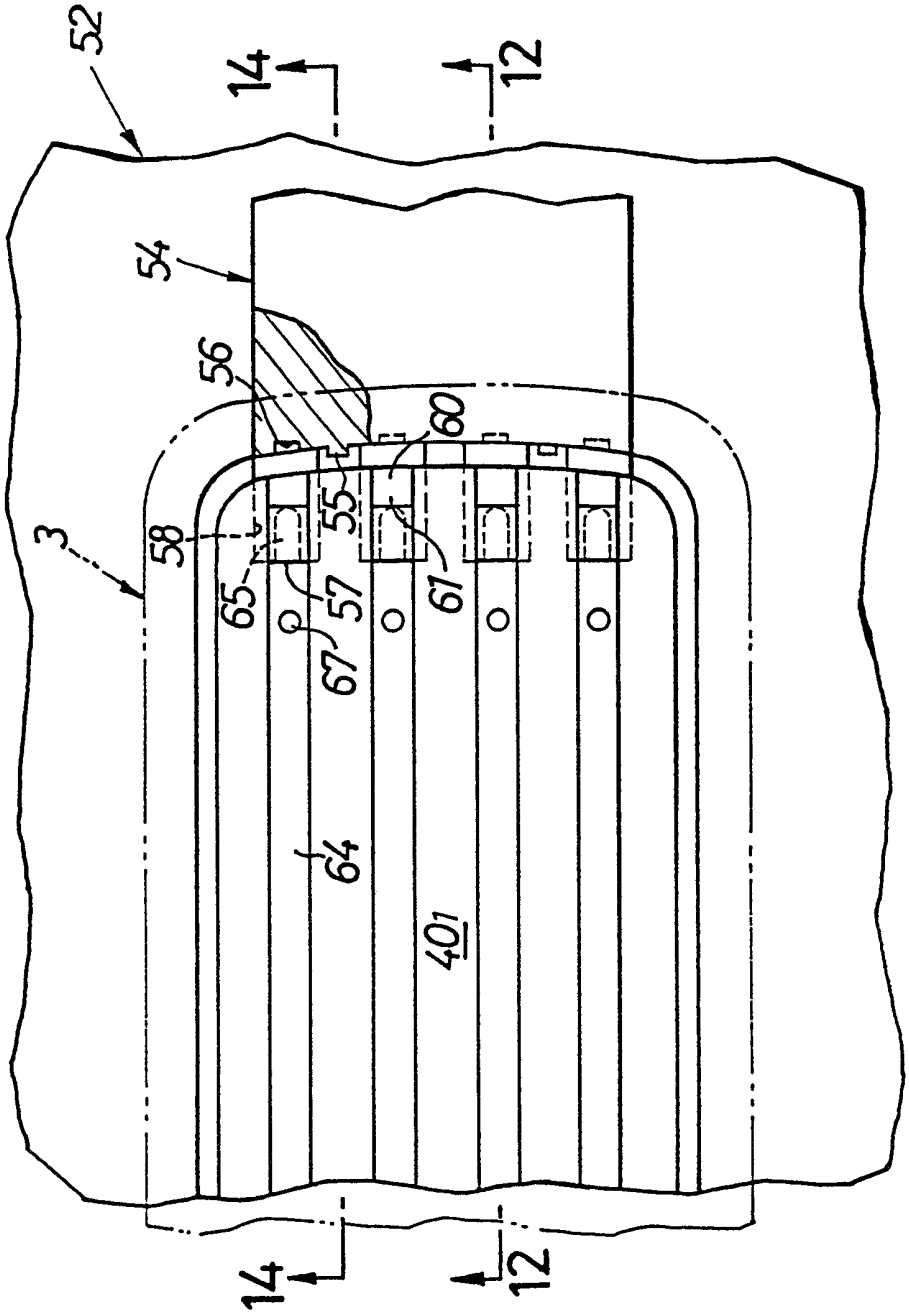


FIG.14

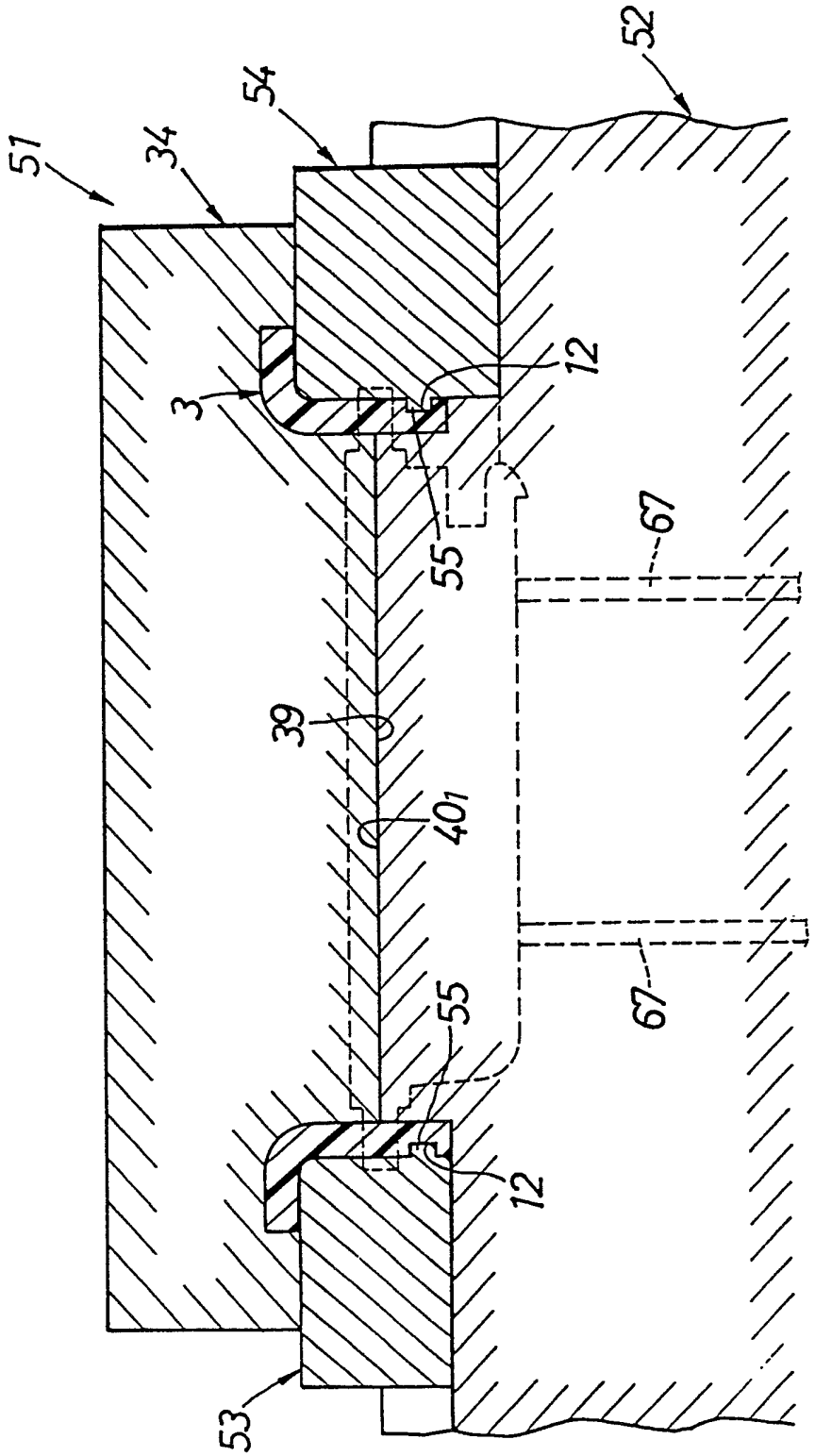


FIG.15

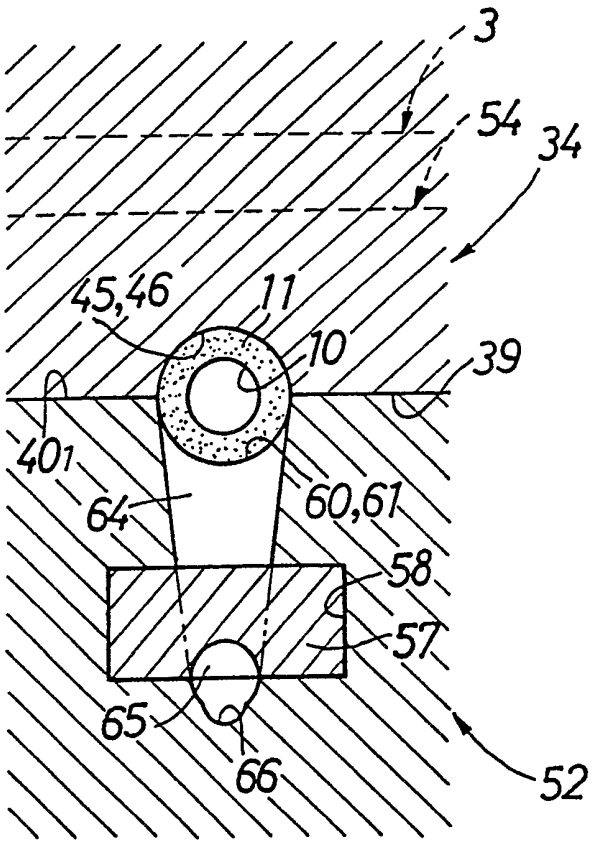


FIG.16

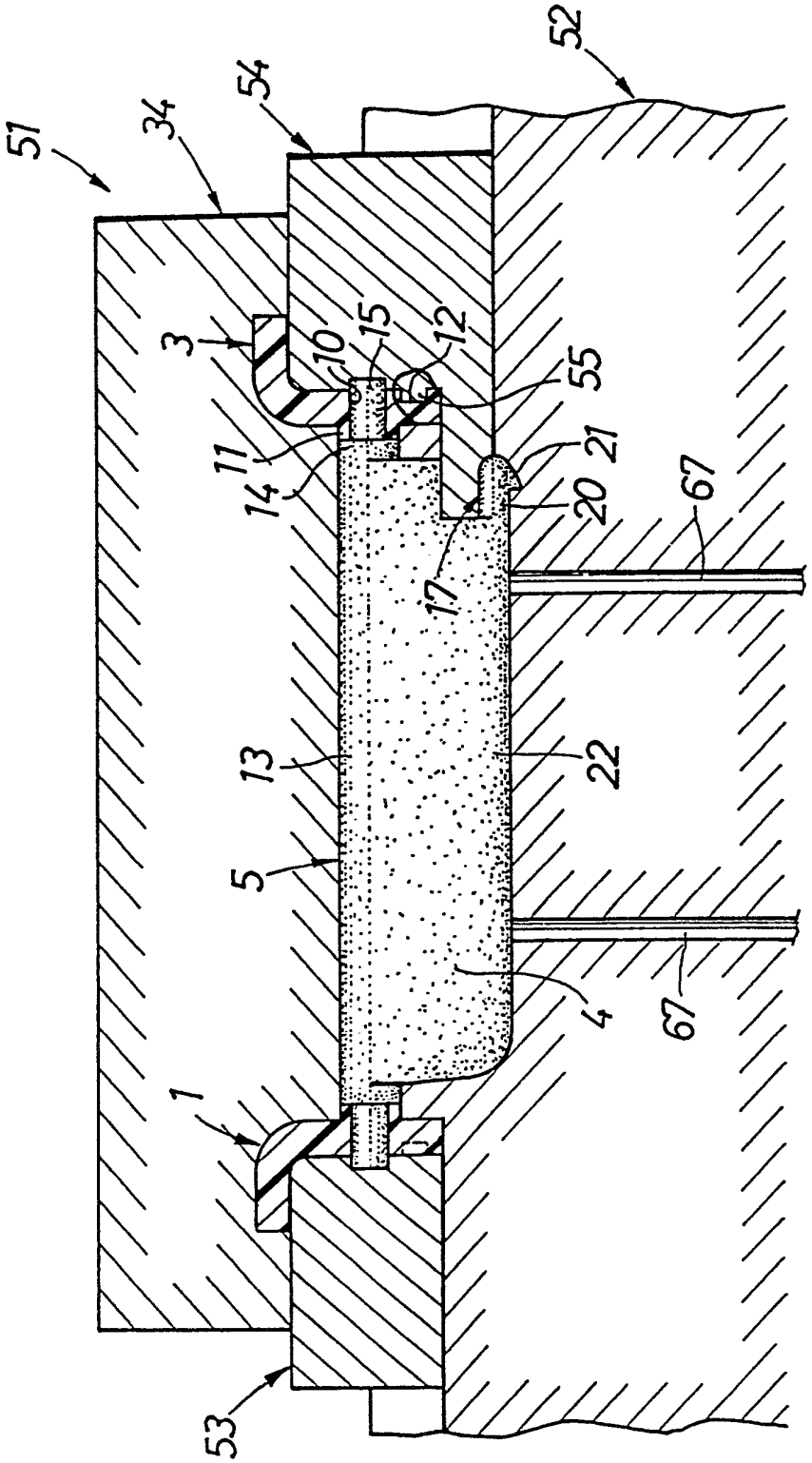


FIG.17

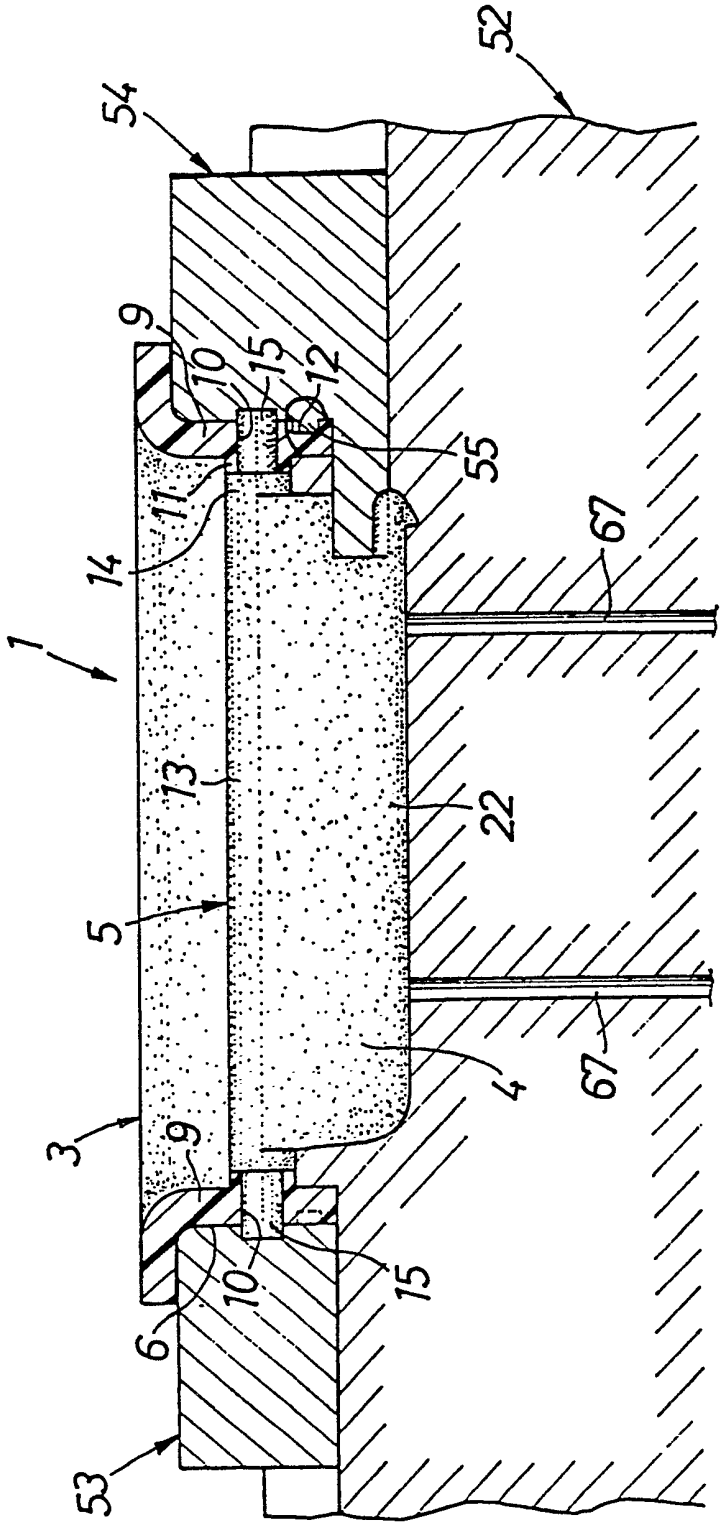
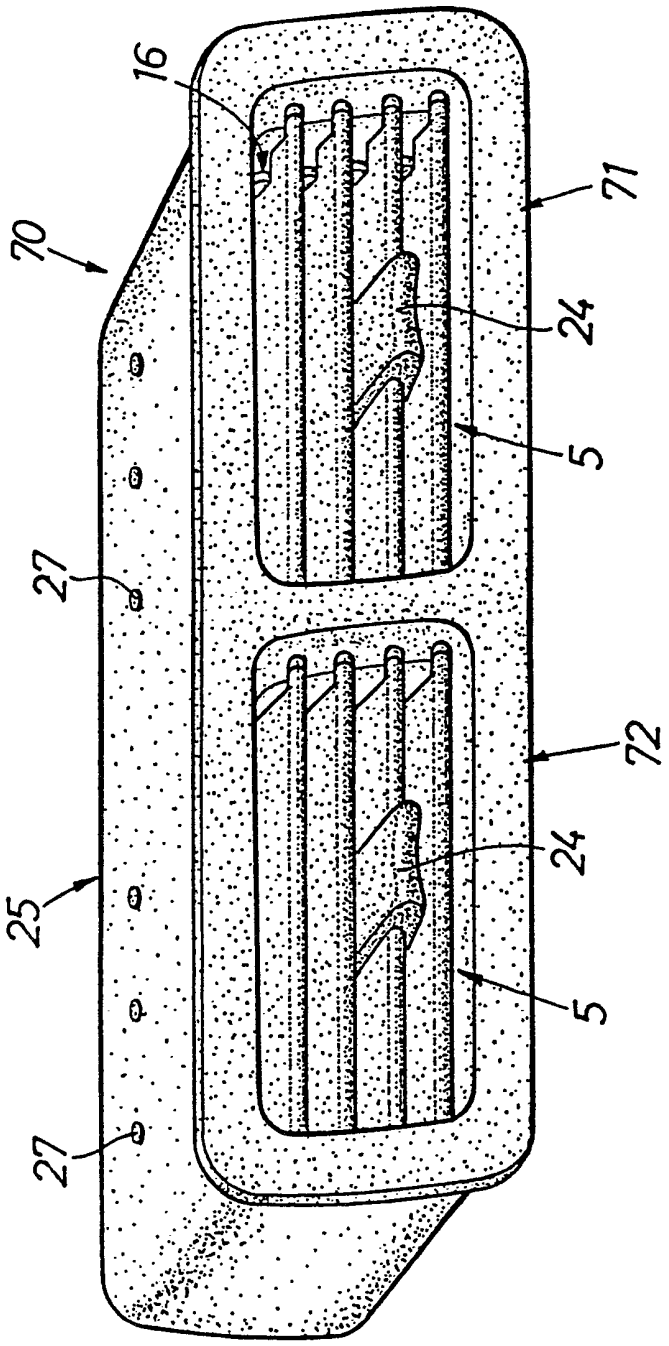


FIG.18



AIR-CONDITIONING BLOW-OUT PORT DEVICE AND PROCESS FOR MOLDING OF THE SAME

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to an air conditioning blow-out port device such as mounted in an instrument panel or the like in an automobile.

DESCRIPTION OF THE PRIOR ART

The pivotally mounting portion in the conventional device of this type is comprised of a pair of projecting pieces which are mounted in an opposed relation to each other on one side of the blade body, and a pivotally supporting shaft spanned between both the projecting pieces, with a C-shaped pivotally supporting portion of the interlocking link being engaged with the pivotally supporting shaft with a resilient force.

The above prior art device is produced by a two-stage injection

molding process which comprises forming a housing at a primary injection step, and forming the blades at a second injection step by using the shaft bores in the housing as support shaft-forming cavities.

However, if the pivotally mounting portion is constructed in the above manner, a projecting piece is located between the adjacent blades. Therefore, the spacing between the blades is determined in accordance with the projection length of the projecting piece, but the area of the blow-out port in the housing is spontaneously limited for appearance, thereby bringing about a reduction in number of blades mounted, resulting in a failure to adjust the direction of wind as intended. Another problem is that depending on the turned position of the blade, the pivotally mounting portion is protruded from one surface of the blade and is seen from the blow-out port, which deteriorates the good appearance.

Moreover, even with respect to the execution of the two-stage injection molding process, there is encountered a problem that the structure of opening-closing dies is complicated in correspondence to the pivotally mounting portion of the above-described construction, resulting in an increased cost of the opening/closing dies and in its turn, bringing about an increase in cost of manufacture of the above-described device.

According to a first aspect of the present invention, there is provided an air-conditioning blow-out port device comprising a housing of synthetic resin, which includes pairs of shaft bores provided in a coaxial arrangement in opposed wall portions of a peripheral wall, and a plurality of blades of synthetic resin, which each include a pair of support shafts projectingly provided on opposite ends of a blade body disposed within the housing and rotatably fitted in the shaft bores, each of the blades having a pivotally mounting portion to an interlocking link for operatively connecting the blades, wherein the pivotally mounting portion is comprised of a pivotally supporting shaft which is projectingly provided in parallel to the support shaft at a common end of each blade body to extend through a pivotally supporting bore in the interlocking link, and a slip-off preventing projection located at a projecting end of the pivotally supporting shaft to engage an edge of an opening of the pivotally supporting bore.

With the above device, the pivotally mounting portion, i.e., the pivotally supporting shaft and the slip-off preventing projection can be provided within an extend of thickness of each blade to reduce the spacing between the blades. Therefore, it is possible to increase the number of blades mounted, thereby effectively adjusting the direction of wind. In addition, the pivotally mounting portion cannot look to protrude from one surface of the blade as viewed at any turned position of the blade, leading to a good outward appearance.

According to a second aspect of the present invention, there is provided a process for two-stage injection molding of an air-conditioning blow-out port device comprising a housing of synthetic resin, which includes pairs of shaft bores provided in a coaxial arrangement in opposed wall portions of a peripheral wall to extend through the opposed wall portions, and a plurality of blades of synthetic resin which each includes a pair of support shafts projectingly provided on opposite ends of a blade body disposed within the housing and rotatably fitted in the shaft bores, each of the blades having a pivotally mounting portion to an interlocking link for operatively connecting the blades, the pivotally mounting portion being comprised of a pivotally supporting shaft which is projectingly provided in parallel to the support shaft at a common end of each blade body to extend through a pivotally supporting bore in the interlocking link, and a slip-off preventing projection located at a projecting end of the pivotally supporting shaft to engage an edge of an opening of the pivotally supporting bore, the process comprising the steps of: closing a pair of opposed housing-forming opening/closing dies to clamp a plurality of first opposed slide dies each including a plurality of

shaft bore forming cores between both the opening/closing dies, thereby defining a cavity for forming the housing so as to include the shaft bore forming cores; primarily injecting a synthetic resin into the cavity to form the housing; closing a pair of opposed blade-forming opening/closing dies, thereby clamping the housing between the opening-closing dies and a second slide die clamped between both the opening/closing dies and defining a plurality of cavities for forming the blades, while defining a plurality of pivotally supporting shaft-forming cavities between one of the opening/closing dies and the second slide die, and causing a plurality of slip-off preventing projection-forming cavities located in the one opening/closing die to be exposed to the pivotally supporting shaft-forming cavities; and using the shaft bores in the housing as support shaft-forming cavities and secondarily injecting a synthetic resin into cavities for forming the blade bodies, the support shaft, the pivotally supporting shaft and the slip-off preventing projections to form the blades.

With the above two-stage injection molding process, the structure of the opening/closing dies can be simplified in correspondence to the structure of the pivotally mounting portion. This enables the mass production of the air-conditioning blow-out port device at a reduced cost.

The above and other objects, features and advantages of the invention will become apparent from a consideration of the following description of the preferred embodiments, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 is a perspective view illustrating one example of an air-conditioning blow-out port device;

Fig.2 is a sectional view taken along a line 2-2 in Fig.1;

Fig.3 is an enlarged view taken along an arrow 3 in Fig.2;

Fig.4 is a sectional view taken along a line 4-4 in Fig.3;

Fig.5 is a perspective view illustrating the relation between blades and an interlocking link;

Fig.6 is a longitudinal sectional view illustrating one example of a primary injection molding apparatus and corresponding to a sectional view taken along a line 6-6 in Fig.7;

Fig.7 is a view taken along a line 7-7 in Fig.6;

Fig.8 is a sectional view taken along a line 8-8 in Fig.6;

Fig.9 is a sectional view taken along a line 9-9 in Fig.6;

Fig.10 is a longitudinal sectional view of the primary injection molding apparatus shown with a housing formed;

Fig.11 is a longitudinal sectional view of a first opening/closing die with the housing attached thereto;

Fig.12 is a longitudinal sectional view illustrating one example of a secondary injection molding apparatus and corresponding to a sectional view taken along a line 12-12 in Fig.13;

Fig.13 is a view taken along a line 13-13 in Fig.12;

Fig.14 is a longitudinal sectional view illustrating another example of the secondary injection molding apparatus and corresponding to a sectional view taken along a line 14-14 in Fig.13;

Fig.15 is a sectional view taken along a line 15-15 in Fig.12;

Fig.16 is a longitudinal sectional view of the secondary injection molding apparatus shown with a blow-out port device formed;

Fig.17 is a longitudinal sectional view of the secondary injection molding apparatus shown with the blow-out port device left on a third opening/closing die; and

Fig.18 is a perspective view illustrating another example of an air-conditioning blow-out port device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figs.1 to 5 illustrate one example of an air-conditioning blow-out port device 1. As best shown in Figs.1 and 2, this device 1 is comprised of a housing 3 of synthetic resin having a substantially rectangular blow-out port 2, and a plurality of blades 5 of synthetic resin having blade bodies 4 disposed within the housing 3 for adjusting the vertical direction of wind. The housing 3 has a front flange 7 at a front end of a peripheral wall 6 thereof and is adapted to be embedded into an instrument panel 8 of an automobile with a front surface of the front flange 7 being aligned with a surface of the instrument panel 8.

As best shown in Figs.2 and 3, the peripheral wall 6 of the housing 3 is provided, at left and right opposed wall portions 9 thereof, with pairs of shaft bores 10 arranged coaxially to extend through the opposed wall portions 9, and pairs of circular-section bosses 11 located coaxially with corresponding one of the shaft bores 10 to define an opening of the shaft bore 10 inside the opposed wall portion 9. Recesses 12 are opened into outer surfaces of the opposed wall portions 9 and

are used at a step of releasing of the device 1 from a molding apparatus.

Each of the blades 5 is provided, at a front edge 13 of the blade body 4, with a pair of protruding portions 14 abutting against the pair of bosses 11 and having the same diameter as the bosses 11, and a pair of support shafts 15 which are projectingly provided coaxially on end faces of the protruding portions 14 and turnably fitted in the shaft bores 10, respectively. A front edge 13 of the blade body 4 is formed to have the same diameter as the protruding portion 14, as clearly shown in Fig.4, whereby the front edge 13 is continuous with the protruding portions 14 with no step created therebetween.

If an area of each blade 5 around its mounting portion is constructed in the above manner, eve if each blade 5 is turned to any wind direction-adjusted position, each protruding portion 14 and each boss 11 cannot be offset from each other and therefore, the appearance of the area around the mounting portion can be improved.

The blades 5 are adapted to be turned in operative association with one another and to this end, each blade 5 has a pivotally mounting portion 17 for an interlocking link 16. As best shown in Figs.3 and 5, the pivotally mounting portion 17 is comprised of a pivotally supporting shaft 20 projectingly provided on a notch-like common end 18 of each blade body 4 in parallel to the support shaft 15 to extend through a pivotally supporting bore 19 in the interlocking link 16, and a slip-off preventing projection 21 located at a protruding end of the pivotally supporting shaft 20 to engage an opening edge of the pivotally supporting bore 19. The slip-off preventing projection 21

protrudes outwardly from an rear edge of the blade body 4 and is forcedly inserted through the pivotally supporting bore 19 in the interlocking link 16 by utilizing the resilient property of an annular portion 23 of the interlocking link 16. As best shown in Figs.1 and 2, an operating knob 24 is slidably mounted to only one of the blade body 4 for sliding movement in a longitudinal direction of the blade body 4. Thus, if the operating knob 24 is turned vertically, the blades 5 are turned upwardly or downwardly through the interlocking link 16.

With the above-described construction, the pivotally mounting portion 17, i.e., the pivotally supporting shaft 20 and the slip-off preventing projection 21 can be accommodated within a range of the thickness of each blade 5, thereby reducing the spacing between the blades. This enables the number of the blades 5 to be increased, so that the direction of wind can be adjusted in accordance with any desire. It does not look that the pivotally mounting portion 17 protrudes from one surface of the blade 5 as viewed at any rotated position of the blade 5, leading to a good appearance.

Referring to Figs.1 and 2, another housing 25 of synthetic resin is bonded to a rear end of the housing 3, and a plurality of blades 26 of synthetic resin for adjusting the lateral direction of wind are mounted within the housing 25. Support shafts 27 are mounted at opposite ends of each of the blades 26, respectively, and are rotatably supported respectively on upper and lower opposed wall portions 29 which constitute a peripheral wall 28 of the housing 25, and an interlocking link 30 is pivotally supported on the blades 26. A toothed portion 31 is

formed on the middle blade 26 and meshed with a toothed portion 32 of the operating knob 24. Thus, if the operating knob 24 is slid in a lateral direction, the blades 26 are turned to change the direction of wind to such lateral direction.

A two-stage injection molding process for producing the above-described air-conditioning blow-out device 1 will now be described. In this molding process, a procedure is employed which comprises forming the housing 3 at a primary injection step, and forming the blades 5 at a secondary injection step by use of the shaft bores 10 in the housing 3 as cavities for molding the support shafts.

Figs.6 to 11 illustrate a primary injection molding apparatus 33 used at the primary injection step for forming the housing 3. The apparatus 33 comprises a first movable opening/closing die 34, a second stationary opening/closing die 35 opposed to the first die 34, and a plurality (e.g., a pair in the illustrated embodiment) of first slide dies 36 adapted to be clamped between both the opening/closing dies 34 and 35. The first slide dies 36 each comprises a plurality of shaft bore-forming cores 37, and a plurality of protrusions 38 each arranged in a row with each core 37 and are slidably mounted in an opposed relation to each other on the second opening/closing die 35.

First step

As is shown in Figs.6 and 7, the first opening/closing die 34 is lowered, and both the opening/closing dies 34 and 35 are closed, and the first slide dies 36 are clamped between both the opening/closing dies 34 and 35.

This causes an axis of each shaft bore-forming core 37 of the first slide die 36 to be aligned with matched surfaces 39 and 40 of the opening/closing dies 34 and 35, thereby defining a pair of areas 41 corresponding to the pair of opposed wall portions (which will be referred to as opposed wall portion-corresponding areas hereinafter) and including the cores 37 and the protrusions 38, and a pair of areas 42 corresponding to the pair of opposed wall portions and substantially perpendicular to the areas 41. Both the areas 41 and 42 constitute a first cavity 43 for forming the peripheral wall 6 and the flange 7 of the housing 3.

The opening/closing die 34 has a plurality of semi-circular section recesses 44 opened into the matched surface 39 thereof with opposite ends communicating with the first cavity 43. Each of opposite ends of each first recess 44 is an area 45 corresponding to the boss (which will be referred to as boss-corresponding area hereinafter) and is used to form a half of the boss 11. A portion located inside each of the boss-corresponding areas 45 is a protruding portion-corresponding area 46 and used to form a half of the protruding portion 14 of each blade 5. Further, there is a front edge-corresponding area 47 lying between both the boss-corresponding areas 46 and used to form the front edge 13 of each blade 13.

As is shown in Figs.6, 7 and 8, a plurality (e.g., a pair per first recess 44 in the illustrated embodiment) of semi-circular section dammed projections 48 projectingly provided on the matched surface 40 of the second opening/closing die 35 are each fitted into the

protruding portion-corresponding area 46 in the first recesses 44 simultaneously with formation of the first cavity 43, respectively.

As a result, a plurality of second cavities 50 for forming the bosses 11 are defined around tip ends of the shaft bore-forming cores 37 which abut against end faces of the dammed projections 48, as shown in Figs.6, 7 and 9, by cooperation of a pair of semi-circular section recesses 49 opened into the matched surface 40 of the second opening/closing die 35 with the boss-corresponding area 45 of each first recess 44. Each of the second cavities 50 communicates with the first cavity 43, but is disconnected from the front edge-corresponding area 47 of each first recess 44 by the dammed projections 48.

Second step

As is shown in Fig.10, a polyethylene (PP)-based resin as a synthetic resin is primarily injected through a gate (not shown) into the first cavity 43 and the second cavities 50 to form the housing 3. The plurality of recesses 12 for use at the releasing step are formed in the outer surfaces of the opposed wall portions 9 of the housing 3 by the protrusions 38. In this case, the boss 11 is formed distinctly, because the protruding portion-corresponding area 46 of each first recess 44 is closed by the dammed projection 48.

Third step

Both the first slide dies 36 are retreated, so that the shaft bore-shaping cores 37 are removed out of the corresponding shaft bores 10. Then, the first opening/closing die 34 is lifted, so that both the opening/closing dies 34 and 35 are opened with the housing 3 left

attached to the first opening/closing die 34, as shown in Fig.11.

The molding of the housing 3 is completed via the above-described steps.

Figs.12 to 17 illustrate a secondary injection mounding apparatus 51 used at the secondary injecting step for forming the blades 5. The apparatus 51 comprises the first movable opening/closing die 34 commonly used in the primary injection molding apparatus 33, a third stationary opening/closing die 52 opposed to the first movable opening/closing die 34, and a plurality (e.g., a pair in the illustrated embodiment) of second slide dies 53 and 54 adapted to be clamped between both the opening/closing dies 34 and 52. The second slide dies 53 and 54 are slidably mounted in an opposed relation to each other on the third opening/closing die 52 and each include a plurality of protrusions 55 corresponding to the plurality of recesses 12 opened in the outer surface of each of the opposed wall portion 9 of the housing 3, and a plurality of recesses 56 adapted to form the support shaft 15 with the tip ends thereof protruding from the outer surface of each of the opposed wall portion 9.

One of the second slide dies 54 has a plurality of forming-projections 57 for forming the notch-like common end 18 of each blade 5.Fourth step

As is shown in Figs.12 to 15, the first opening/closing die 34 is lowered, so that both the opening/closing dies 34 and 52 are closed, and the pair of second slide dies 53 and 54 are clamped between both the opening/closing dies 34 and 52.

Thus, the peripheral wall 6 and the front flange 7 of the housing 3 are clamped between the opening/closing dies 34 and 52 and the second slide dies 53 and 54, so that the protrusions 55 of each of the second slide dies 53 and 54 are fitted into the recesses 12 of the housing 3, respectively. And the recesses 56 are disposed coaxially with the shaft bores 10 in the housing 3, respectively, as best shown in Fig.14. Further, as best shown in Figs.12 and 15, the forming portions 57 of the one second slide die 54 are passed through slide bores 58 in the third opening/closing die 52, respectively.

The third opening/closing die 52 has a plurality of second recesses 59 having a semi-circular section and opposed to the first recesses 44 in the first opening-closing die 34, respectively, so that the bosses 11 are clamped between boss-corresponding areas 45 and 60 of the first and second recesses 44 and 59, respectively. A third cavity 62 for forming the protruding portion 14 is defined between each of the protruding portion-corresponding areas 46 of the first recesses 44 and each of protruding portion-corresponding areas 61 of the second recesses 59. The third cavities 62 communicate with the shaft bores 10 and are disposed coaxially with the shaft bores 10 and the bosses 11, respectively.

Further, a fourth cavity 64 for forming the blade body 4 is defined between the front edge-corresponding area 47 of each of the first recess 44 in the first opening-closing die 34 and each of deep recesses 63 which are opened in a matched surface 40_1 between the two second recesses 59 of the third opening/closing die 52. The fourth cavities 64 communicates with the third cavities 62, respectively. Each of the

shaft bores 10 in the housing 3 functions as a fifth cavity for forming the support shaft 15.

A sixth cavity 65 for forming the pivotally supporting portion 20 is defined between each of the forming portions 57 of the one second slide die 54 and the slide surface of the third opening/closing die 52. A seventh cavity 66 for forming the slip-off preventing projection 21 is defined in the third opening/closing die 52 and opened into each of the sixth cavities 65. In this way, the structure of each of the sixth and seventh cavities 65 and 66 is simplified in correspondence to the structure of the pivotally mounting portion 17.

The third opening/closing die 52 is provided with a plurality of ejector pins 67. Abutment faces 68 of each pair of ejector pins 67 are exposed to rear edge-corresponding area 69 which forms the rear edge 22 of the blade body 4.

Fifth step

As is shown in Fig.16, a polybutylene terephthalate (PBT) based resin as a synthetic resin is secondarily injected through a gate (not shown) into the third to seventh cavities 62, 64, 10, 65 and 66 to form blades 5, thereby providing a blow-out port device 1.

In this case, the protruding portions 14 are formed coaxially with the bosses 11, respectively, because the third cavities 62 for forming the protruding portions of the blades 5 are arranged coaxially with the bosses 11, respectively.

In addition, because the primary and secondary injection steps are carried out by common use of the opening/closing die 34, the cost of the

opening/closing dies can be reduced, and the cost and working time required to replace the die can be omitted to improve the mass productivity of the blow-out port device.

Sixth step

The first opening/closing die 34 is lifted to open both the opening/closing dies 34 and 52. And the blow-out device 1 left on the third opening/closing die 52 by fitting engagement of the recesses 12 in the housing 3 with the protrusions 55 of the second slide dies 53 and 54, respectively.

Then, the second slide dies 53 and 54 are retreated, so that the protrusions 55 thereof are separated from the corresponding recesses 12 of the housing 3, and the recesses 56 are separated from the corresponding tip ends of the support shafts 15, respectively. Then, the ejector pins 67 are brought into abutment against the rear edges 22 of the blade bodies 4 to eject the blow-out port device 1 from the third opening/closing die 52.

When the device is released from the die in this manner, the blades 5 are ejected by the ejector pins 67 and hence, a force supporting the housing 3 is only applied to each of the support shafts 15, and the force of this degree cannot damage each of the support shafts. In addition, because an ejecting force is applied directly to each of the blades 5 which are tightly contacted with the forming surface, the releasability of each blades 5 is good and therefore, the blade 5 cannot be damaged.

Further, the appearance of the blow-out port device 1 cannot be

injured from the view point that each of the recesses 12 in the housing 3 is located in the outer surface of each of the opposed wall portions 9 and that these opposed wall portions 9 are disposed within the instrument panel 8. Further, an ejector pin abutment portion of each of the blades 5 is established at the rear edge 22 of the blade 5 which is not visible from the front of the device 1 and therefore, the appearance of the blow-out port device cannot be injured likewise.

Fig.18 illustrates another example of an air-conditioning blow-out port device 70. This device 70 has a construction similar to the construction of the two blow-out port devices arranged laterally. The above-described two-stage injection molding process is also applicable to the molding of such a blow-out port device 70. In this case, a pivotally mounting portion 17 for an interlocking link 16 is provided at a right end of each of blades 5 in a right blow-out port structure 71, and at a left end of each of blades 5 in a left blow-out port structure 72.

WHAT IS CLAIMED IS

1. An air-conditioning blow-out port device comprising:

a housing of synthetic resin, which includes pairs of shaft bores provided in a coaxial arrangement in opposed wall portions of a peripheral wall, and

a plurality of blades of synthetic resin, which each include a pair of support shafts projectingly provided on opposite ends of a blade body disposed within said housing and rotatably fitted in the shaft bores, each of said blades having a pivotally mounting portion to an interlocking link for operatively connecting the blades, wherein

said pivotally mounting portion is comprised of a pivotally supporting shaft which is projectingly provided in parallel to said support shaft at a common end of each blade body to extend through a pivotally supporting bore in said interlocking link, and a slip-off preventing projection located at a projecting end of said pivotally supporting shaft to engage an edge of an opening of said pivotally supporting bore.

2. A process for two-stage injection molding of an air-conditioning blow-out port device comprising:

a housing of synthetic resin, which includes pairs of shaft bores provided in a coaxial arrangement in opposed wall portions of a peripheral wall to extend through said opposed wall portions, and

a plurality of blades of synthetic resin which each includes a pair of support shafts projectingly provided on opposite ends of a blade body disposed within said housing and rotatably fitted in said shaft

bores, each of said blades having a pivotally mounting portion to an interlocking link for operatively connecting the blades, said pivotally mounting portion being comprised of a pivotally supporting shaft which is projectingly provided in parallel to said support shaft at a common end of each blade body to extend through a pivotally supporting bore in said interlocking link, and a slip-off preventing projection located at a projecting end of said pivotally supporting shaft to engage an edge of an opening of said pivotally supporting bore,

said process comprising the steps of:

closing a pair of opposed housing-forming opening/closing dies to clamp a plurality of first opposed slide dies each including a plurality of shaft bore forming cores between both said opening/closing dies, thereby defining a cavity for forming said housing so as to include the shaft bore forming cores;

primarily injecting a synthetic resin into said cavity to form said housing;

closing a pair of opposed blade-forming opening/closing dies, thereby clamping said housing between said opening-closing dies and a second slide die clamped between both said opening/closing dies and defining a plurality of blade-forming cavities, while defining a plurality of pivotally supporting shaft-forming cavities between one of said opening/closing dies and said second slide die, and causing a plurality of slip-off preventing projection-forming cavities located in said one opening/closing die to be exposed to said pivotally supporting shaft-forming cavities; and

a step of using said shaft bores in said housing as support shaft-forming cavities and secondarily injecting a synthetic resin into cavities for forming the blade bodies, the support shaft, the pivotally supporting shaft and the slip-off preventing projections to form the blades.

3. An air-conditioning blow-out port device according to any one embodiment substantially as hereinbefore described with reference to the accompanying drawings.

4. A process for two-stage injection molding according to any embodiment substantially as hereinbefore described with reference to the accompanying drawings.

Patents Act 1977
Examiner's report to the Comptroller under S. .tion 17 (The Search Report)

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(ii) Int Cl (Edition 5) F24F; B60H

Search Examiner
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Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASE: WPI

Date of Search
29 JULY 1993

Documents considered relevant following a search in respect of claims 1

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	US 4009648 (GENERAL MOTORS) see especially column 3, lines 11-25	1

		to claim(s)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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