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(54) **Metal mold structure having gas venting unit and jig for removing the gas venting unit in injection molding apparatus**

Druckgussform mit Entgasungsanordnung und Ausbauvorrichtung für die Entgasungsanordnung

Moule d'injection comprenant un dispositif de dégazage et gabarit pour le dégagement de l'unité de dégazage

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Description

The present invention relates to a gas venting arrangement in an injection molding apparatus such as a die casting machine according to the preambles of claims 1 and 6. More, particularly, the invention relates to a metal mold structure having a gas venting unit provided separately and detachably from a stationary or movable metal mold of the metal mold structure, and a jig for facilitating a removal of the gas venting unit from the stationary or movable metal mold.

One example of a conventional injection molding apparatus is described in: Japanese Patent Application JP-A-63-313645. The disclosed apparatus is shown in Fig. 8. In the injection molding apparatus shown in Fig. 8, a stationary metal mold 1 and a movable metal mold 3 are provided, and a mold cavity 9 is formed therebetween. The mold cavity 9 has a lower end portion in communication with a runner 5 through a gate 7. At a lower portion of the stationary metal mold 1, a casting sleeve 11 is insertedly disposed which is in communication with a lower end of the runner 5. The casting sleeve 11 has another end formed with a casting port 13 through which the molten metal is casted. Within the casting sleeve 11, a plunger 15 is slidably accommodated which is reciprocable in an axial direction of the casting sleeve 11. The plunger 15 is connected to an injection cylinder 19 through a plunger rod 17. Upon operation of the injection cylinder 19, the plunger 15 is reciprocable within the casting sleeve 11 for urging the molten metal toward the mold cavity 9. A striker 21 is provided on the plunger rod 17. Further, a limit switch 23 for starting vacuum evacuation and a high speed limit switch 25 are provided at positions along a moving stroke of the striker 21. In accordance with the axial motion of the plunger rod 17, the striker 21 is abutable against the limit switches 23 and 25.

A parting faces 27 are defined at confronting surfaces of the stationary and the movable metal molds 1 and 3, and a gas vent passage 29 is formed at an upper portion of the parting face 27. The gas vent passage 29 is connected to a vacuum suction means 33 through a pipe 31. The vacuum suction means 33 includes an electromagnetic change-over valve 35, a tank 37, a vacuum pump 39 and a drive motor 41. The electromagnetic change-over valve 35 has a first change-over position 35a and a second change-over position 35b, and when the valve 35 is changed over to the first change-over position 35a, the gas vent passage 29 is brought to fluid communication with the vacuum suction means 33.

A gas vent valve 43 is positioned in the gas vent passage 29. The gas vent valve 43 is opened or closed by a valve driving mechanism 45. That is, the gas vent valve 43 includes a valve body 47 and a valve stem 49 which is connected to a piston 53 slidably disposed in a valve driving cylinder 51. The valve driving mechanism 45 includes a compressor 55 and an electromagnetic change-over valve 57. The compressor 55 is connected

to the valve driving cylinder 51 through the electromagnetic change-over valve 57 and pipes 59, 61. A compressed air from the compressor 55 is applied to one of a front chamber 63 and a rear chamber 65 of the valve driving cylinder 51 through the valve 57 and one of the pipes 59 and 61.

Thus, the piston 53 is slidably moved in the cylinder 51 so as to move the valve body 47 toward and away from a valve seat portion 67 for closing or opening the gas vent valve. The electromagnetic valve 57 has a first change-over position 57a and a second change-over position 57b. When the valve 57 has the first change over position 57a, the compressive air is supplied to the front chamber 63 through the pipe 59 for retractingly moving the piston 53 to seat the valve body 47 onto the valve seat 67, to thereby shut off the fluid communication between the gas vent passage 29 and the pipe 31. On the other hand, when the electromagnetic valve 57 has the second change-over position 57b, the compressed air is supplied to the rear chamber 65 through the pipe 61 for frontwardly moving the piston 53 to move the valve body 47 away from the valve seat 67, to thereby provide fluid communication between the gas vent passage 29 and the pipe 31.

Further, a detection rod 69 is disposed at the gas vent passage 29. The detection rod 69 detects the molten metal urged upwardly in the gas vent passage for transmitting a molten metal detection signal to an electrical or electronic circuit (not shown). In response to the detection signal, the electrical circuit will send control signal to the electromagnetic change-over valve 57 for closing the gas vent valve 43.

With the structure thus organized, an operation will be described. With the gas vent valve 43 being opened, the molten metal is casted into the casting sleeve 11 through the casting port 13. Then, the injection cylinder 19 is driven for slidably moving the plunger 15 toward the stationary metal mold 1. By the sliding movement of the plunger 15, the casting port 13 is closed by the plunger, and further, the vacuum start limit switch 23 is actuated by the striker 21. In response to the actuation of the vacuum start switch 23, the electromagnetic change-over valve 35 is changed-over to the first change-over position 35a by way of the electric circuit (not shown). By the change-over operation of the electromagnetic change-over valve 35, the gas vent passage 29 becomes communicated with the vacuum suction means 33. Therefore, gas in the casting sleeve 11, the runner 5 and the mold cavity 9 is sucked and discharged through the gas vent passage 29 and the pipe 31.

When the plunger 15 is further slidably moved, the casted molten metal is filled in the mold cavity 9 and is flowed into the gas vent passage 29, so that the molten metal is brought into contact with the detection rod 69. Therefore, the molten metal detection signal is generated. In response to the detection signal from the detection rod 69, the electromagnetic change-over valve 57 is changed-over to the first change-over position 57a by

way of the electrical circuit (not shown). By the actuation of the electromagnetic change-over valve 57, the compressed air from the compressor 55 is supplied to the front chamber 63 of the cylinder 51, to thereby retractingly move the piston 53 (rightwardly in Fig. 8). When the piston 53 is retracted to a predetermined position, the valve body 47 is seated onto the valve seat 67 to provide the valve closing position. By the closure of the gas vent valve 43, the gas vent passage 29 is shut off for suspending the vacuum sucking operation by the vacuum suction means 33.

Generally, in the conventional injection molding apparatus, the molten metal may be entered into the gas vent passage 29 and the gas vent valve 43 during the injection molding operation. Due to the repeated injection molding operations, a small mass of solidified molten metal may be deposited onto a position adjacent the valve stem 49 and the valve body 47. Further, oil may also be adhered to the valve stem 49, and is baked and deposited thereon. Accordingly, the gas vent valve 43 is rendered inoperable due to the deposited materials. In this case, maintenance and inspection have to be carried out for removing the adhered or deposited materials. Alternatively, required is the replacement of several mechanical component by new components.

However, in the conventional arrangement, the gas vent passage 29 is directly formed in the metal molds 1 and 3, and the gas vent valve 43 or ambient components are not easily disassembleable from the stationary metal mold 1 or the movable metal mold 3. Therefore, it would be difficult to achieve the above described maintenance, inspection and replacement work.

Further, in order to deal with this problem, a proposal is made such that a component around the gas vent passage 29 and the gas vent valve 43 is provided as a separate unit so as to permit the unit to be detachable from the stationary and movable metal molds 1 and 3. However, in case of the detachment of the unit, molten metal flash and relative surface deformation between the molds and the unit may render the detaching work difficult.

The present invention has been established in view of the above described standpoint, and it is an object of the present invention to provide a metal mold structure having a gas venting unit in which a part of a gas vent passage and a gas vent valve are provided, which unit is provided detachably from a stationary or movable metal mold, and to provide a jig for facilitating removal of the gas venting unit from the metal molds in an injection molding apparatus.

This and other object of the invention will be attained by providing a metal mold structure in an injection molding apparatus, the metal mold structure including a metal mold in which a mold cavity is formed, and a gas venting arrangement in which a gas vent passage is communicated with the mold cavity and the gas vent passage is selectively shut off from an exterior by means of a gas vent valve means; the metal mold struc-

ture comprising (a) a metal mold whose one surface defines a parting face and formed with an upper opening at a side of the parting face, (b) a gas venting unit provided separate from the metal mold and having a given external contour, the gas vent valve means being disposed in the gas venting unit, (c) an insertion segment fittingly insertable into a part of the upper opening, a unit insertion recessed portion being defined by the upper opening and the insertion segment when the insertion segment is inserted therein, the unit insertion recessed portion having an configuration substantially coincident with the external contour of the gas venting unit for receiving the unit into the unit insertion recessed portion, and (d) a fixing means for fixing the gas venting unit in the unit insertion recessed portion.

In another aspect of the invention there is provided a combination comprising the metal mold structure in an injection molding apparatus, and a jig device. The metal mold structure comprises the metal mold, the gas venting unit, the insertion segment, and the fixing means. The gas venting unit has a top portion formed with an exhaust pipe attachment hole. The jig device is adapted for removing a gas venting unit from the unit insertion recessed portion of the metal mold structure, and the jig device comprises (a) a jig body mounted on the metal mold at a position in confrontation with the exhaust pipe attachment hole, the jig body being formed with a through hole alignable with the exhaust pipe attachment hole, (b) a bolt-like moving means comprising a head portion and a shaft portion integral therewith and formed with a threaded portion at least at a tip end portion thereof, the shaft portion being passable through the through hole and the threaded portion being threadingly engageable with the exhaust pipe attachment hole, and (c) means for driving the bolt-like moving means, the driving means being positioned between the bolt-like moving means and the jig body and being driven for upwardly moving the bolt-like moving means, to thereby lift the gas venting unit engaged with the bolt-like moving means for removing the gas venting unit from the unit insertion recessed portion.

With the structure, the gas venting unit is a separate unit in which gas vent valve is disposed, and the unit is detachably insertable into the unit insertion recessed portion defined by a combination of the upper opening of the metal mold and the insertion segment inserted in the upper opening. Therefore, the gas venting unit can be easily detached at any time, which in turn facilitates maintenance, inspection and replacement work to the gas venting unit.

For removing the gas venting unit from the unit insertion recessed portion by using the jig device, the jig is firstly mounted on the metal mold. then, the tip end of the bolt-like moving means is threadingly engaged with the gas venting unit. Thereafter, the drive means is operated for upwardly moving the bolt-like moving means. As a result, the gas venting unit positioned in the recessed portion can be easily removed therefrom.

In the drawings;

Fig. 1 is an exploded perspective segmental view showing a metal mold structure according to a first embodiment of the present invention;

Fig. 2 is an exploded perspective segmental view showing a metal mold structure according to a second embodiment of the present invention;

Fig. 3 is an exploded perspective segmental view showing a metal mold structure according to a third embodiment of the present invention;

Fig. 4 is an exploded perspective segmental view showing a metal mold structure according to a fourth embodiment of the present invention;

Fig. 5 is a side view showing a jig for removing a gas venting unit from a metal mold according to one embodiment of this invention;

Fig. 6 is a side view for description of operation of the jig of the first embodiment shown in Fig. 5;

Fig. 7 is a side view showing a jig for removing the gas venting unit according to another embodiment of this invention; and

Fig. 8 is a schematic cross-sectional view showing a conventional injection molding apparatus.

A metal mold structure having a gas venting unit in an injection molding apparatus according to a first embodiment of the present invention will be described with reference to Fig. 1. The metal mold structure according to this embodiment generally includes a stationary metal mold 101, an insertion segment 105 and a gas venting unit 113. The stationary metal mold 101 has an upper surface portion confronting a movable metal mold (not shown) formed with a T-shaped opening 103 (in horizontal cross section) for receiving therein the insertion segment 105. Upon fitting engagement of the insertion segment 105 with the T-shaped opening 103, a cruciform shaped opening (unit insertion recessed portion) 111 is provided into which the gas venting unit 113 is insertable.

The T-shaped opening 103 is formed at an uppermost portion of the stationary metal mold 101 at a position close to the movable metal mold (not shown). A head or arm portion of the T-shaped opening 103 has a height equal to a height of the insertion segment 105. Further, a leg portion of the T-shaped opening 103 has a height equal to a height of the gas venting unit 113. Furthermore, the arm portion of the T-shaped opening is provided with abutting surfaces d' and f'.

The insertion segment 105 is inserted into the arm portion of the T-shaped opening 103. The insertion segment 105 is formed with a T-shaped grooved portion 109. Thus, upon insertion of the insertion segment 105 into the T-shaped opening 103, the cruciform shaped opening (unit insertion recessed portion) 111 is provided. In the unit insertion recessed portion 111, the gas venting unit 113 is detachably inserted. In an interior of the venting unit 113, a cylinder, a piston, a valve body and a valve seat, such as those described in the "Background of the Invention" section are assembled. The gas venting unit 113 has a cruciform shape in a hor-

izontal cross-section, and includes frontward/rearward positioning protrusions 113a, 113b and a lateral positioning protrusion 113c extending perpendicular to the protrusions 113a, 113b and in a direction from the stationary metal mold 101 to the movable metal mold (not shown).

A width (in a direction X in Fig. 1) and a length (in a direction Y in Fig. 1) of the lateral positioning protrusion 113c are equal to a width and a length of the leg portion of the T-shaped grooved portion 109 of the insertion segment 105. The lateral positioning protrusion 113c has abutting surfaces a and b at lateral end faces thereof in the widthwise direction (X), and has a bottom abutting surface g. Further, the frontward/rearward positioning protrusions 113a and 113b are formed with abutting surfaces e, f, and c, d. A width (in the direction Y in Fig. 1) of the frontward/rearward positioning protrusions 113a, 113b is equal to a distance between the abutting surface c', e' of the insertion segment 105 and the abutting surface d', f' of the T-shaped opening 103 of the stationary metal mold 101. Further, a distance between the lateral end surfaces of the frontward/rearward positioning protrusions 113a, 113b of the gas venting unit 113 (in the X direction in Fig. 1) is made slightly smaller than the length (in the X direction) of the head portion of the T-shaped groove 109 of the insertion segment 105. Furthermore, a width (X direction) and a length (Y direction) of the major portion of the gas venting unit 113 are made slightly smaller than the width and the length of the leg portion of the T-shaped opening 103 of the stationary metal mold 101. That is, an external contour of the gas venting unit 113 is substantially similar to the cruciform shaped opening 111 defined by the T-shaped opening 103 of the stationary metal mold 101 and the T-shaped grooved portion 109 of the insertion segment 105. With this arrangement, the gas venting unit 113 can be detachably and position-adjustably inserted with respect to the cruciform shaped opening 111.

At one face of the gas venting unit 113 (the face confronting the movable metal mold) and at the face of the lateral positioning protrusion 113c, a valve hole 115 is opened, and at an upper face of the gas venting unit 113 an exhaust pipe attachment hole 117 is formed with which an exhaust pipe (not shown) is threadingly engageable. The exhaust pipe attachment hole 117 is in fluid communication with the valve hole 115 within the unit 113, and the above described valve body and the valve seat are provided at the communicating portion. A female thread is formed at an inner peripheral surface of the exhaust pipe attachment hole 117. The hole 117 is threadingly engageable with a pipe (see 31 in Fig. 8) which is connected to a vacuum pump (see 39 of Fig. 8) through an electromagnetic change-over valve (see 35 in Fig. 8).

The metal mold structure of this embodiment is also provided with a fixing means 119 for fixing the gas venting unit 113 to the stationary metal mold 101. The fixing means 119 includes a bolt 121 and a plate member 125 formed with an elongated slot 123 to allow a shaft por-

tion of the bolt 121 to pass therethrough. At an upper portion of the insertion segment 105, a pair of threaded bores 127 are formed for threading engagement with the bolt 121. The bolt 121 is threadingly engaged with the threaded bore 127 with interposing the plate member 125 therebetween. The plate member 125 has a sufficient area such that when the plate member 125 is fixed to the insertion segment 105 by the bolt 121, the plate member 125 abuts and depresses the top surface of the gas venting unit 113 for fixing the same 113 at the cruciform shaped opening or gas venting unit insertion recessed portion 111.

Next, assembling work with the thus described metal mold structure will be described. Firstly, the insertion segment 105 is fitted with the head portion of the T-shaped opening 103 of the stationary metal mold 101. Therefore, the cruciform shaped opening 111 is provided by the opening 103 and the T-shaped grooved portion 109 of the insertion segment 105. Next, the gas venting unit 113 is fitted within the cruciform shaped opening 111. In this case, the positioning of the gas venting unit 113 with respect to rightward and leftward direction in Fig. 1 (X direction) is fulfilled by the surface abutment between the abutment surfaces a and b of the gas venting unit 113 and the abutment surfaces a', b' of the T-shaped grooved portion 109. Further, the positioning with respect to frontward and rearward direction in Fig. 1 (Y direction) is fulfilled by the surface abutment between the abutment surfaces c, d, e, f and the abutment surfaces c', d', e' and f'. Furthermore, the positioning with respect to the vertical direction is achieved by the abutment between the surfaces g of the gas venting unit 113 and the abutment surface g'.

Upon completion of the fitting engagement of the gas venting unit 113 with the cruciform shaped opening 111, the gas venting unit 113 is urgedly held into the cruciform shaped opening 111 by the fixing means 119. Firstly, the plate member 125 is positioned on the top surface of the insertion segment 105. In this case, the elongated slot 123 of the plate member 125 is aligned with the threaded hole 127 formed at the top portion of the insertion segment 105, and a part of the plate member 125 is also positioned on the top surface of the gas venting unit 113. Then, the bolt 121 is inserted through the elongated slot 123, and is threadingly engaged with the threaded hole 127. If necessary, another pair of the bolt 121 and the plate member 125 are prepared for threadingly engaging with the other threaded hole 127. Upon fastening of the bolt 121, the plate member 125 is firmly contacted with the top surfaces of the insertion segment 105 and the gas venting unit 113 for preventing the unit 113 from removing out of the cruciform shaped opening 111.

In order to remove the gas venting unit 113 from the stationary metal mold 101, the bolt 121 is unfastened for moving the plate member 123 away from the top surfaces of the gas venting unit 113. Then, a jig (described later) for removing the gas venting unit is employed for removing the unit 113 from the stationary metal mold

101.

Next, a metal mold structure according to a second embodiment of this invention will be described with reference to Fig. 2, wherein essential construction is substantially the same as that of the first embodiment, and therefore, fixing means (119 in Fig. 1) is omitted for simplicity. The primary difference between the first and the second embodiments resides in an external contour of the gas venting unit 113' and a cruciform shaped opening 111' which receives the unit 113' therein.

More specifically, a stationary metal mold 101' is formed with a T-shaped opening, and an insertion segment 105' is formed with a T-shaped grooved portion similar to the first embodiment. Further, similar to the first embodiment, a cruciform shaped opening (unit insertion recessed portion) 111' is defined by the T-shaped opening and the T-shaped grooved portion upon insertion of the insertion segment into the T-shaped opening of the stationary metal mold 101'.

The gas venting unit 113' has a cruciform shape in a horizontal cross-section similar to the first embodiment. That is, the unit 113' includes a lateral positioning protrusion 113c' extending toward a movable metal mold (not shown), and frontward/rearward positioning protrusions 113a', 113b' extending from a root portion of the protrusion 113c' in a direction perpendicular thereto. As shown in Fig. 2, each of the positioning protrusions 113a', 113b' and 113c' are so configured that widths of these protrusions are gradually small toward a bottom of the gas venting unit 113. That is, a distance between abutment surfaces a and b, between abutment surfaces c and d and between abutment surfaces e and f are gradually small toward the bottom. In conformity with these slanting abutment surfaces, corresponding portions of the cruciform shaped opening 111' also have slanting abutment surfaces a', b', c', d', e' and f'.

More specifically, the abutment surfaces a and b provided at the lateral positioning protrusion 113c' are slantingly and symmetrically oriented so as to gradually reduce its width toward a bottom. Further, abutment surfaces a' and b' at the T-shaped grooved portion formed in the insertion segment 105' have inclination angles the same as those of the abutment surfaces a and b. Similarly, abutment surfaces c and e of the frontward/rearward positioning protrusions 113a' and 113b' are also inclined, and corresponding abutment surfaces c' and e' formed at the insertion segment 105' are inclined to mate with the inclination angles of the surfaces c and e.

In the second embodiment, the abutment surfaces a, b, c, e and a', b', c' and e' are inclined with respect to a vertical plane. However, instead of the inclination of the surfaces c, e and c', e', the abutment surfaces d and f of the frontward/rearward protrusions 113a' and 113b' and corresponding abutment surfaces d' and f' of the stationary metal mold 101' can be slantingly formed. In the latter case, the abutment surfaces a, b, d and f and a', b', d' and f' are inclined. Alternatively, all abutment surfaces a through f and a' through f' can be inclined so

as to provide a gradually thinner wall and thinner groove or opening toward a bottom. With such arrangement, when the gas venting unit 113' is inserted into the cruciform shaped opening or the unit insertion recessed portion 111', the unit 113' can be easily inserted thereinto. For example, when attention is drawn to the inclination surfaces a and b of the lateral positioning protrusion 113c' and the inclination surfaces a' and b' of the cruciform shaped opening 111', since a distance between upper edgelines of the inclination surfaces a' and b' is greater than a distance between lower edgelines of the inclination surfaces a and b, the lateral positioning protrusion 113c' can be easily inserted into the unit insertion recessed portion 111'. However, when the insertion is completed, the gas venting unit 113' is brought into intimate contact with the unit insertion recessed portion 111', similar to the first embodiment.

Next, a metal mold structure according to a third embodiment of this invention will be described with reference to Fig. 3. The third embodiment is fundamentally similar to the first embodiment, and therefore, the fixing means 119 is omitted. The third embodiment has a cross-sectional structure of a gas venting unit 213 different from that of the first embodiment, and has a configuration of a unit insertion recessed portion defined by a T-shaped opening of a stationary metal mold 201 and a T-shaped grooved portion of an insertion segment 205, which configuration is different from that of the first embodiment.

The stationary metal mold 201 is formed with a T-shaped opening 203 similar to the first embodiment. Into the T-shaped opening 203, the insertion segment 209 formed with the T-shaped grooved portion 209 is inserted. However, the figure T of the T-shaped groove portion 209 is oriented in a direction opposite to the first embodiment. At confronting end faces of a head portion of the T-shaped grooved portion 209, abutment surfaces a' and b' are defined, and at one side of the head portion thereof, abutment surfaces c' and d' are defined as shown in Fig. 3.

For insertion of the insertion segment into the T-shaped opening 203, a leg portion of the T-shaped grooved portion 209 is directed in a direction the same as a leg portion of the T-shaped opening 203. As a result, a unit insertion recessed portion 211 is defined, in which two major sides of a rectangle have inwardly protruded rectangular notches so as to provide a generally H-shaped recess in a horizontal cross-section. In this case, the insertion segment 205 has surfaces, which confront the leg portion of the T-shaped opening 203, serving as abutment surfaces d' and f'.

The gas venting unit 213 has a horizontal cross-section the same as the generally H-shaped unit insertion recessed portion 211. That is, the unit 213 is formed with a pair of symmetrically arranged rectangular notches 213b and 213c at major sides thereof, where abutment surfaces c, d, e, and f are defined. Further, by the formation of the rectangular notches 213b and 213c, a T-shaped head portion 213a is provided,

where abutment surfaces a and b are defined. In the third embodiment, the external contour of the gas venting unit 213 is substantially the same as the contour of the unit insertion recessed portion 211, and therefore, the gas venting unit 213 can be inserted into the unit insertion recessed portion 211.

The assembly of the gas venting unit 213 into the unit insertion recessed portion 211 can be made in a manner similar to that of the foregoing embodiment. In this case, the positioning of the unit 213 in the lateral direction (X direction in Fig. 3) can be achieved by the surface abutments between the abutment surfaces a, b and the abutment surfaces a' and b'. Further, positioning in the frontward/backward direction (Y direction in Fig. 3) is achievable by the surface abutments between the abutment surfaces c, d, e and f of the gas venting unit 213 and the abutment surfaces c', d', e' and f' of the insertion segment 205.

A metal mold structure according to a fourth embodiment will next be described with reference to Fig. 4. The fourth embodiment would be substantially similar to the third embodiment except for inclination of abutment surfaces similar to the second embodiment. That is, as shown in Fig. 4, abutment surfaces a, b, d and f of a gas venting unit 213 are slanted with respect to a vertical plane so as to provide a gradually thin wall thickness toward its bottom. Further, abutment surfaces a', b', d' and f' of an insertion segment 205 are correspondingly slanted with respect to a vertical plane so as to matingly receive the gas venting unit. Alternatively, abutment surfaces c and e of the gas venting unit 213 can be slantingly formed, and abutment surfaces c' and e' of the insertion segment 205 can be slanted correspondingly.

In the above described embodiments, the separate gas venting unit can be detachably provided with respect to the stationary metal mold. However, the unit can be provided detachably with respect to the movable metal mold.

Next, a jig for removing the gas venting unit from the metal mold will be described with reference to Figs. 5 and 6. In the depicted embodiment, the jig is used for removing the gas venting unit 113 of the first embodiment.

The jig 129 includes an inverted U-shaped or arch shaped jig body 131, a removing bolt 137 movably extending through the jig body 131, and a nut 135 threadingly engageable with the jig removing bolt 137. The jig body 131 includes two post portions 131b and 131c and a beam portion 131a bridging between the two post portions. The two post portions 131b and 131c are spaced away from each other by a distance at least greater than the lateral length of the lateral positioning protrusions 113a and 113b. At a center portion of the beam portion 131a, formed is a through hole 131d having an inner diameter greater than an outer diameter of a shaft portion 137b of the removing bolt 137.

The removing bolt 137 (a bolt-like moving means) has a head portion 137a having a hexagonal shape and

the shaft portion 137b integral with the head portion. The shaft portion 137b has a length greater than a length of the post portions 131b, 131c, and an end portion of the shaft 137b is formed with a male thread threadingly engageable with the threaded exhaust pipe attachment hole 117 formed at the top portion of the gas venting unit 113. Further, the shaft portion 137b is formed with a male thread engageable with the nut 135 (means for driving the bolt-like moving means 137) mounted on the beam portion 131a. The nut 135 is rotatable about its axis but is stationarily held on the beam portion 131a. With this state, the shaft portion 137b is passed through the through hole 131d formed in the beam portion 131a. A washer 13 is interposed between the nut 135 and the beam portion 131a.

Operation for removing the gas venting unit 113 from the metal mold by means of the jig 129 will next be described. Firstly, the jig body 131 is mounted on the stationary metal mold 101 in such a manner that the post portions 131b and 131c are positioned outside the gas venting unit 113. Simultaneously, the bolt 121 of the fixing means 119 is unfastened, and the plate member 121 is moved within a stroke range defined by a length of the elongated slot 123 so as to prevent mechanical interference between the plate member 125 and the gas venting unit 113, so that the gas venting unit 113 becomes removable from the metal mold. Next, the removing bolt 137 is rotated, so that the tip end of the bolt 137 is brought into engagement with the exhaust pipe attachment hole 117 formed in the gas venting unit 113 as shown in Fig. 5. Then, the nut 135 is rotated for upwardly moving the bolt 137 in the axial direction thereof, to thereby removing the gas venting unit from the cruciform shaped opening 111.

As described above, since the tip end of the shaft portion 137b of the removing bolt 137 is engageable with the exhaust pipe attachment hole 117 of the gas venting unit 113, the gas venting unit 113 can be lifted in accordance with the upward movement of the removing bolt 137, to thereby remove the unit 113 from the cruciform shaped unit insertion recessed portion 111. Upon completion of the removal, the bolt 137 is disengaged from the exhaust pipe attachment hole 117 for maintenance, inspection and replacement of mechanical components with respect to the gas venting valve and the valve seat.

Next, a jig of another example will be described with reference to Fig. 7. The jig 129' employs a lever member (means for driving the bolt-like moving means) 140 utilizing a principle of the lever and fulcrum. The lever member 140 lifts a removing bolt 137' (bolt-like moving means) whose tip end portion 137b' engages the exhaust pipe attachment hole 117 of the gas venting unit 113. In the fourth embodiment, an inverted U-shaped jib body 131 is provided similar to the jig of the first example. The jig body 131 has a beam portion 131a whose central portion is formed with a through hole 131d through which a shaft portion 137b' of the removing bolt 137' extends. The shaft portion 137b' has a

threaded portion only at a tip end portion thereof for engagement with the exhaust pipe attachment hole 117 of the gas venting unit 113.

The lever member 140 serving as means for driving the bolt-like moving means 137' has a L-shape configuration as shown in Fig. 7. The lever member 140 has an acting arm 140a, a power-applied arm 140b and a fulcrum point 140c. The acting arm 140a is formed with a notched recess portion 140d engageable with the shaft portion 137b' and abutable on a head portion 137a' of the bolt 137'. A opening width of the notched recess 140d is larger than the diameter of the shaft portion 137b', and smaller than the diameter of the head portion 137a'.

The acting arm 140a of the lever member 140 is positioned immediately below the head portion 137a' and above the beam portion 131a of the jib body 131, and the shaft portion 137b' of the bolt 137' is inserted into the notched recess 140d. After the engagement of the notched recess 140d with the shaft portion 137b', an upper surface of the acting arm 140a abuts the lower surface of the head portion 137a', and the fulcrum point 140c abuts the upper surface of the beam portion 131a of the jig body 131.

In operation, similar to the case shown in Figs. 5 and 6, the jig body 131 is mounted on the stationary metal mold 101 in such a manner that the post portions do not ride on the gas venting unit 113. Further, the fixing means 119 is unfastened from the gas venting unit 113, and the tip end portion of the shaft portion 137b' of the removing bolt 137' is brought into threading engagement with the exhaust pipe attachment hole 117 of the gas venting unit 113. Then, the notched recess portion 140d at the acting arm 140a of the lever member 140 is engaged with the shaft portion 137b', and the power applied portion 140b is depressed toward the stationary metal mold 101 as indicated by an arrow shown in Fig. 7. By this depression, the acting arm 140a urges the head portion 137a' of the bolt 137' upwardly, so that the shaft portion 137b' is also lifted upwardly. Thus, the gas venting unit 113 engaged with the bolt 137' can be moved upwardly whereupon the gas venting unit 113 can be removed from the cruciform shaped unit insertion recessed portion 111. Instead of the employment of the lever member 140 for lifting the bolt 137', a jack is available.

In the above description, the jig 129 or 129' as described above is used for removing the gas venting unit of the first embodiment. However, the jig is also apparently available for the metal mold structures according to the second through fourth embodiments.

The metal mold structure in the injection molding apparatus according to the present invention provides the following advantages:

Firstly, since the insertion segment is separably and detachably provided with respect to the T-shaped opening of the metal mold and since the gas venting unit is provided detachably with respect to the unit insertion recessed portion defined by the T-shaped opening and

the T-shaped grooved portion of the insertion segment, maintenance and inspection such as a removal of the molten metal flash and replacement works are facilitated because of the easy detachment of the gas venting arrangement and the insertion segment from the metal mold. 5

For defining the unit insertion recessed portion, for example, the T-shaped opening and the T-shaped grooved portion are formed in the metal mold and the insertion segment, respectively, and these T-shaped opening and grooved portion are combined together. 10 Thus, the unit insertion recessed portion can be easily formed, to thereby facilitate manufacture of the metal mold structure.

Further, insertion work of the gas venting unit into the unit insertion recessed portion can be easily achieved by forming the slanted surfaces which define the external contour of the gas venting unit, which slanted surface provide a bottom-thin, top-thick arrangement of the gas venting unit and by forming the corresponding slanted surfaces at the unit insertion recessed portion which receives therein the gas venting unit. 15 20

Furthermore, according to the jig for removing the gas venting unit of this invention, the gas venting unit can be easily removed from the unit insertion recessed portion by mere rotation of the nut or by mere manipulation of the lever member. Therefore, even if deformation occurs in the gas venting unit and the stationary or movable metal mold, or even if molten flash is provided at a portion between the gas venting unit and one of the stationary and movable metal molds, the gas venting unit can be easily detached. Accordingly, maintenance, inspection and replacement work to the gas venting unit can further be facilitated to thus improve working efficiency. 25 30 35

While the invention has been described in detail and with reference to specific embodiments thereof, it would be apparent to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the invention. 40

Claims

1. A metal mold structure in an injection molding apparatus, the metal mold structure including a metal mold in which a mold cavity is formed, and a gas venting arrangement in which a gas vent passage is communicated with the mold cavity and the gas vent passage is selectively shut off from an exterior by means of a gas vent valve means; the metal mold structure being characterized by: 45 50

a metal mold (101,101',201) whose one surface defines a parting face and formed with an upper opening (103,203) at a side of the parting face; 55
a gas venting unit (113, 113',213) provided separate from the metal mold and having a

given external contour, the gas vent valve means being disposed in the gas venting unit; an insertion segment (105,105',205) fittingly insertable into a part of the upper opening, a unit insertion recessed portion (111,111',211) being defined by the upper opening and the insertion segment when the insertion segment is inserted therein, the unit insertion recessed portion having an configuration substantially coincident with the external contour of the gas venting unit for receiving the unit into the unit insertion recessed portion; and a fixing means (119) for fixing the gas venting unit in the unit insertion recessed portion.

2. The metal mold structure according to claim 1, wherein the insertion segment (105, 105', 205) is formed with an upper grooved portion (109, 209), a combination of the upper grooved portion and the upper opening defining the unit insertion recessed portion.
3. The metal mold structure according to claim 1 or 2 wherein the gas venting unit has at least two symmetrical abutment surfaces (a,b or c,e or d,f) extending obliquely with respect to a vertical plane so as to provide a top thick bottom thin mass, the symmetrical abutment surfaces defining a part of the external contour of the gas venting unit and wherein the unit insertion recessed portion has at least two symmetrical surfaces (a'b' or c',e' or d',f') each having inclination angle equal to an inclination angle of the corresponding two symmetrical abutment surfaces.
4. The metal mold structure according to claim 1 or 2, wherein the gas venting unit (113, 113') has a cruciform shape in horizontal cross-section, and wherein the unit insertion recessed portion (111, 111') has a corresponding cruciform shape in horizontal cross-section.
5. The metal mold structure according to claim 1 or 2, wherein the gas venting unit (213) has a generally H-shape in horizontal cross-section, and wherein the unit insertion recessed portion (211) has a corresponding H-shape in horizontal cross-section.
6. An injection molding apparatus comprising a metal mold structure, and a jig device, the metal mold structure being characterized by:

a metal mold (101,101',201) whose one surface defines a parting face and formed with an upper opening (103,203) at a side of the parting face, the metal mold being formed with a mold cavity and a gas vent passage in communication therewith;
a gas venting unit (113, 113',213) provided

separate from the metal mold and having a given external contour, the gas venting unit disposing therein a gas vent valve means which selectively shuts off the gas vent passage and having a top portion formed with an exhaust pipe attachment hole (117);

an insertion segment (105,105',205) fittingly insertable into a part of the upper opening, a unit insertion recessed portion (111,111',211) being defined by the upper opening and the insertion segment when the insertion segment is inserted thereinto, the unit insertion recessed portion having a configuration substantially coincident with the external contour of the gas venting unit for receiving the unit into the unit insertion recessed portion; and a fixing means (119) for fixing the gas venting unit in the unit insertion recessed portion of a metal mold structure, and comprising:

a jig body (131) mounted on the metal mold at a position in confrontation with the exhaust pipe attachment hole (117), the jig body being formed with a through hole (131d) alignable with the exhaust pipe attachment hole;

a bolt-like moving means (137, 137') comprising a head portion (137a, 137a') and a shaft portion (137b, 137b') integral therewith and formed with a threaded portion at least at a tip end portion thereof, the shaft portion being passable through the through hole (131d) and the threaded portion being threadingly engageable with the exhaust pipe attachment hole; and

means (135,140) for driving the bolt-like moving means, the driving means being positioned between the bolt-like moving means and the jig body and being driven for upwardly moving the bolt-like moving means, to thereby lift the gas venting unit engaged with the bolt-like moving means for removing the gas venting unit from the unit insertion recessed portion.

7. The apparatus according to claim 6, wherein the shaft portion (137b) of the bolt-like moving means is formed with thread along its length, and wherein the driving means comprises a nut (135) rotatable about its axis and unmovable in an axial direction thereof, the nut being threadingly engageable with the thread portion for upwardly lifting the bolt-like moving means together with the gas venting unit by the rotation of the nut.

8. The apparatus according to claim 6, wherein the driving means comprises a L-shaped lever member (140) having an acting arm (140a) engageable with the shaft portion (137b') and abutable on the head

portion (137a'), a power applied portion (140b) and a fulcrum portion (140c) mounted on the jig body (131), the acting arm (140a) urging the head portion upwardly upon power application to the power-applied portion (140b).

9. The apparatus according to claim 6, wherein the jig body (131) comprises;

a pair of post portions (131b, 131c) upstandingly mounted on the metal mold and positioned offset from the gas venting unit inserted in the unit insertion recessed portion; and a beam portion (131a) bridging between the pair of post portions, the through hole being formed in the bridge portion and the driving means being mounted on the beam portion.

Patentansprüche

1. Eine Metall-Gußform-Anordnung in einer Spritzguß-Vorrichtung, wobei die Metall-Gußform-Anordnung eine Metall-Gußform, in der ein Formhohlraum gebildet ist, und eine Gasentlüftungsanordnung umfaßt, in der ein Gasentlüftungsdurchgang mit dem Formhohlraum in Verbindung steht und der Gasentlüftungsdurchgang selektiv vom Äußeren mittels eines Gasentlüftungsventilmittels abgeschlossen ist; wobei die Metall-Gußform-Anordnung gekennzeichnet ist durch:

Eine Metall-Gußform (101,101',201), deren eine Oberfläche eine Trennfläche bildet und mit einer oberen Öffnung (103,203) an einer Seite der Trennfläche ausgebildet ist;

eine Gasentlüftungseinheit (113,113',213), die separat von der Metall-Gußform vorgesehen ist und eine vorgegebene äußere Kontur aufweist, wobei die Gasentlüftungsventilmittel in der Gasentlüftungseinheit angeordnet sind;

ein Einsatzsegment (105,105',205), das passend in einen Teil der oberen Öffnung einsetzbar ist, wobei ein Ausnehmungsabschnitt (111, 111',211) zum Einsetzen der Einheit durch die obere Öffnung und das Einsatzsegment gebildet wird, wenn das Einsatzsegment dort eingesetzt wird, und wobei der Ausnehmungsabschnitt zum Einsetzen der Einheit eine Konfiguration aufweist, die im wesentlichen mit der äußeren Kontur der Gasentlüftungseinheit zur Aufnahme der Einheit in den Ausnehmungsabschnitt zum Einsetzen der Einheit übereinstimmt; und

ein Befestigungsmittel (119) zur Befestigung der Gasentlüftungseinheit in den Ausnehmungsabschnitt zum Einsetzen der Einheit.

2. Die Metall-Gußform-Anordnung nach Anspruch 1, bei der das Einsatzsegment (105, 105', 205) mit

einem oberen Nutenabschnitt (109, 209) gebildet ist, wobei eine Kombination des oberen Nutenabschnitts und der oberen Öffnung den Ausnehmungsabschnitt zum Einsetzen der Einheit bilden.

3. Die Metall-Gußform-Anordnung nach Anspruch 1 oder 2, bei der die Gasentlüftungseinheit wenigstens zwei symmetrische Anschlag- bzw. Anlageoberflächen (a,b oder c,e oder d,f) aufweist, die sich in Bezug auf eine vertikale Ebene schräg erstrecken und eine oben starke, unten schmale bzw. dünne Masse vorsehen, wobei die symmetrischen Anlageoberflächen einen Teil der äußeren Kontur der Gasentlüftungseinheit bilden, und bei der der Ausnehmungsabschnitt zum Einsetzen der Einheit wenigstens zwei symmetrische Oberflächen (a'b' oder c'e' oder d'f') aufweist, die jeweils Neigungswinkel aufweisen, die den Neigungswinkeln der entsprechenden beiden symmetrischen Anlageoberflächen entsprechen.
4. Die Metall-Gußform-Anordnung nach Anspruch 1 oder 2, bei der die Gasentlüftungseinheit (113, 113') im Horizontalschnitt Kreuzform aufweist und bei der der Ausnehmungsabschnitt zum Einsetzen der Einheit (111, 111') im Horizontalschnitt eine entsprechende Kreuzform aufweist.
5. Die Metall-Gußform-Anordnung nach Anspruch 1 oder 2, bei der die Gasentlüftungseinheit (213) im Horizontalschnitt im wesentlichen H-Form aufweist und bei der der Ausnehmungsabschnitt zum Einsetzen der Einheit (211) im Horizontalschnitt eine entsprechende H-Form aufweist.
6. Eine Spritzgußvorrichtung, umfassend eine Metall-Gußform-Anordnung und eine Spann- bzw. Setzeinrichtung, wobei die Metall-Gußform-Anordnung gekennzeichnet ist durch:

Eine Metall-Gußform (101,101',201), deren eine Oberfläche eine Trennfläche bildet und mit einer oberen Öffnung (103, 203) an einer Seite der Trennfläche ausgebildet ist, wobei die Metall-Gußform mit einem Formenhohlraum und einer Gasentlüftungseinheit in Verbindung damit ausgebildet ist;
eine Gasentlüftungseinheit (113,113',213), die separat von der Metall-Gußform vorgesehen ist und eine vorgegebene äußere Kontur aufweist, wobei die Gasentlüftungsventilmittel in sich ein Gasentlüftungsdurchgang selektiv verschließt und einen oberen Abschnitt aufweist, der mit einem Abluftleitungsbefestigungsloch (117) ausgebildet ist;
ein Einsatzsegment (105,105',205), das passend in einen Teil der oberen Öffnung einsetzbar ist, wobei ein Ausnehmungsabschnitt (111,

111',211) zum Einsetzen der Einheit durch die obere Öffnung und das Einsatzsegment gebildet wird, wenn das Einsatzsegment dort eingesetzt wird, und wobei der Ausnehmungsabschnitt zum Einsetzen der Einheit eine Konfiguration aufweist, die im wesentlichen mit der äußeren Kontur der Gasentlüftungseinheit zur Aufnahme der Einheit in den Ausnehmungsabschnitt zum Einsetzen der Einheit übereinstimmt; und

ein Befestigungsmittel (119) zur Befestigung der Gasentlüftungseinheit in dem Ausnehmungsabschnitt zum Einsetzen der Einheit; und

wobei die Setzeinrichtung ausgebildet ist, um eine Gasentlüftungseinheit aus dem Ausnehmungsabschnitt zum Einsetzen der Einheit einer Metall-Gußform-Anordnung zu entfernen, und umfaßt:

einen Spann- oder Setzkörper (131), der auf der Metall-Gußform gegenüber dem Abluftleitungsbefestigungsloch (117) angebracht ist, wobei der Setzkörper mit einem Durchgangsloch (131d), das mit dem Abluftleitungsbefestigungsloch ausgerichtet werden kann, ausgebildet ist;

ein bolzenartiges Bewegungsmittel (137, 137'), umfassend einen Kopfabschnitt (137a, 137a') und einen damit integral ausgebildeten und wenigstens am Endabschnitt als Gewindeabschnitt ausgebildeten Schaftabschnitt (137b, 137b'), wobei der Schaftabschnitt durch das Durchgangsloch (131d) hindurchführbar ist und der Gewindeabschnitt schraubbar mit dem Abluftleitungsbefestigungsloch verbindbar ist; und

Mittel (135,140) zum Antreiben der bolzenartigen Bewegungsmittel, wobei die Antriebsmittel zwischen den bolzenartigen Bewegungsmitteln und dem Setzkörper angeordnet sind und zum Aufwärtsbewegen der bolzenartigen Bewegungsmittel angetrieben werden, um dadurch die Gasentlüftungseinheit anzuheben, die mit den bolzenartigen Bewegungsmitteln zum Entfernen der Gasentlüftungseinheit von dem Ausnehmungsabschnitt zum Einsetzen der Einheit in Eingriff steht.

7. Die Vorrichtung nach Anspruch 6, bei der der Schaftabschnitt (137b) der bolzenartigen Bewegungsmittel mit Gewinde entlang seiner Länge ausgebildet ist und bei der das Antriebsmittel eine Mutter (135) umfaßt, die drehbar um ihre Achse und unbeweglich in einer dazu axialen Richtung ist, wobei die Mutter schraubbar mit dem Gewindeabschnitt in Eingriff zu bringen ist, um die bolzenartigen Bewegungsmittel zusammen mit der Gasentlüftungseinheit durch Drehung der Mutter nach oben zu heben.

8. Die Vorrichtung nach Anspruch 6, bei der das Antriebsmittel ein L-förmiges Hebelelement (140), das einen Arbeitsarm (140a) aufweist, der mit dem Schaftabschnitt (137b') in Eingriff zu bringen ist und gegen den Kopfabschnitt (137a') zur Anlage gelangen kann, einen Abschnitt (140b), auf den Kraft ausgeübt wird, und einen Drehabschnitt (140c) umfaßt, der auf dem Setzkörper (131) angeordnet ist, wobei der wirksame Arm (140a) den Kopfabschnitt bei Kraftanwendung auf den kraftbeaufschlagten Abschnitt (140b) nach oben gedrängt wird.

9. Die Vorrichtung nach Anspruch 6, bei der der Spann- oder Setzkörper (131) umfaßt:

ein Paar Pfostenabschnitte (131b, 131c), die aufrecht auf der Metall-Gußform angeordnet und versetzt von der Gasentlüftungseinheit angeordnet sind, die in den Ausnehmungsabschnitt zum Einsetzen der Einheit eingeführt ist; und

einen das Pfostenabschnittspaar überbrückenden Balkenabschnitt (131a), wobei das Durchgangsloch in dem Balkenabschnitt gebildet ist und die Antriebsmittel auf dem Balkenabschnitt angebracht sind.

Revendications

1. Structure de moule pour métaux dans un appareil de moulage par injection, la structure de moule pour métaux comprenant un moule pour métaux dans lequel une cavité de moulage est formée, et un dispositif de dégazage dans lequel un passage de purge de gaz est mis en communication avec la cavité de moulage, et dans lequel le passage de purge de gaz est fermé, de manière sélective, de l'extérieur au moyen d'un moyen de soupape de dégazage ; la structure de moule pour métaux étant caractérisée par :

un moule pour métaux (101, 101', 201) dont une surface définit une face de séparation et comporte une ouverture supérieure (103, 203) sur un côté de la face de séparation ;

une unité de dégazage (113, 113', 213) réalisée de façon distincte par rapport au moule pour métaux et ayant un profil externe donné, le moyen de soupape de dégazage étant disposé dans l'unité de dégazage ;

un segment d'insertion (105, 105', 205) pouvant être inséré, par assemblage, dans une partie de l'ouverture supérieure, une partie évidée d'insertion d'unité (111, 111', 211) étant définie par l'ouverture supérieure et par le segment d'insertion lorsque le segment d'insertion est inséré dans cette dernière, la partie évidée d'insertion d'unité ayant une conformation sen-

siblement coïncidente avec le profil externe de l'unité de dégazage pour recevoir l'unité dans la partie évidée d'insertion d'unité ; et

un moyen de fixation (119) pour fixer l'unité de dégazage dans la partie évidée d'insertion d'unité.

2. Structure de moule pour métaux selon la revendication 1, dans laquelle le segment d'insertion (105, 105', 205) comporte une partie rainurée supérieure (109, 209), la combinaison de la partie rainurée supérieure et de l'ouverture supérieure définissant la partie évidée d'insertion d'unité.

3. Structure de moule pour métaux selon l'une des revendications 1 ou 2, dans laquelle l'unité de dégazage a au moins deux surfaces de butée symétriques (a, b ou c, e ou d, f) s'étendant en oblique par rapport à un plan vertical, de façon à réaliser une masse fine en bas et épaisse en haut, les surfaces de butée symétriques définissant une partie du profil externe de l'unité de dégazage, et dans laquelle la partie évidée d'insertion d'unité possède au moins deux surfaces symétriques (a', b' ou c', e' ou d', f'), chacune ayant un angle d'inclinaison égal à l'angle d'inclinaison des deux surfaces de butée symétriques correspondantes.

4. Structure de moule pour métaux selon l'une des revendications 1 ou 2, dans laquelle l'unité de dégazage (113, 113') a une forme cruciforme en coupe transversale horizontale, et dans laquelle la partie évidée d'insertion d'unité (111, 111') a une forme cruciforme correspondante en coupe transversale horizontale.

5. Structure de moule pour métaux selon l'une des revendications 1 ou 2, dans laquelle l'unité de dégazage (213) a une forme globalement en H en coupe transversale horizontale, et dans laquelle la partie évidée d'insertion d'unité (211) a une forme correspondante globalement en H en coupe transversale horizontale.

6. Appareil de moulage par injection comprenant une structure de moule pour métaux et un dispositif de montage, la structure de moule pour métaux étant caractérisée par :

un moule pour métaux (101, 101', 201) dont une surface définit une face de séparation et comporte une ouverture supérieure (103, 203) sur un côté de la face de séparation, le moule pour métaux comportant une cavité de moulage et un passage de purge de gaz en communication avec cette dernière ;

une unité de dégazage (113, 113', 213) prévue de façon distincte par rapport au moule pour métaux et ayant un profil externe donné, l'unité

de dégazage comportant, en son sein, un moyen de soupape de dégazage qui ferme, de manière sélective, le passage de purge de gaz et ayant une partie supérieure comportant un trou de fixation de conduit d'évacuation (117) ;
 un segment d'insertion (105, 105', 205) pouvant être inséré, par assemblage, dans une partie de l'ouverture supérieure, une partie évidée d'insertion d'unité (111, 111', 211) étant définie par l'ouverture supérieure et par le segment d'insertion lorsque le segment d'insertion est inséré dans cette dernière, la partie évidée d'insertion d'unité ayant une conformation sensiblement coïncidente avec le profil externe de l'unité de dégazage pour recevoir l'unité dans la partie évidée d'insertion d'unité ; et
 un moyen de fixation (119) pour fixer l'unité de dégazage dans la partie évidée d'insertion d'unité ; et
 le dispositif de montage étant susceptible de retirer une unité de dégazage de la partie évidée d'insertion d'unité d'une structure de moule pour métaux, et comprenant :
 un corps de montage (131) monté sur le moule pour métaux à une position faisant face au trou de fixation de conduit d'évacuation (117), le corps de montage comportant un trou traversant (131d) pouvant être aligné avec le trou de fixation de conduit d'évacuation ;
 un moyen mobile semblable à un boulon (137, 137') comprenant une partie de tête (137a, 137a') et une partie de tige (137b, 137b') d'un seul tenant avec cette dernière et comportant une partie filetée, au moins au niveau d'une partie d'extrémité de bout de cette dernière, la partie de tige pouvant être passée à travers le trou traversant (131d) et la partie filetée pouvant être mise en prise, par vissage, avec le trou de fixation de conduit d'évacuation ; et
 un moyen (135, 140) pour entraîner le moyen mobile semblable à un boulon, le moyen d'entraînement étant positionné entre le moyen mobile semblable à un boulon et le corps de montage et étant entraîné pour déplacer vers le haut le moyen mobile semblable à un boulon, pour soulever, de ce fait, l'unité de dégazage en prise avec le moyen mobile semblable à un boulon, pour retirer l'unité de dégazage de la partie évidée d'insertion d'unité.

7. Appareil selon la revendication 6, dans lequel la partie de tige (137b) du moyen mobile semblable à un boulon comporte un filetage le long de sa longueur, et dans lequel le moyen d'entraînement comprend un écrou (135) pouvant tourner autour de son axe et non déplaçable dans la direction axiale de ce dernier, l'écrou pouvant être mis en prise, par vissage, avec la partie filetée pour soulever vers le haut le moyen mobile semblable à un

boulon en même temps que l'unité de dégazage par la rotation de l'écrou.

8. Appareil selon la revendication 6, dans lequel le moyen d'entraînement comprend un élément de levier en forme de L (140) ayant un bras de mise en oeuvre (140a) pouvant venir en prise avec la partie de tige (137b') et pouvant venir en butée contre la partie de tête (137a'), une partie d'application de puissance (140b) et une partie de point d'appui (140c) montée sur le corps de montage (131), le bras de mise en oeuvre (140a) poussant la partie de tête vers le haut lors de l'application de puissance au niveau de la partie d'application de puissance (140b).
9. Appareil selon la revendication 6, dans lequel le corps de montage (131) comprend :

une paire de parties de montant (131b, 131c) montée verticalement sur le moule pour métaux et positionnée en décalage par rapport à l'unité de dégazage insérée dans la partie évidée d'insertion d'unité ; et
 une partie de poutre (131a) établissant un pont entre la paire de parties de montant, le trou traversant étant réalisé dans la partie en pont et le moyen d'entraînement étant monté sur la partie de poutre.

FIG. 1

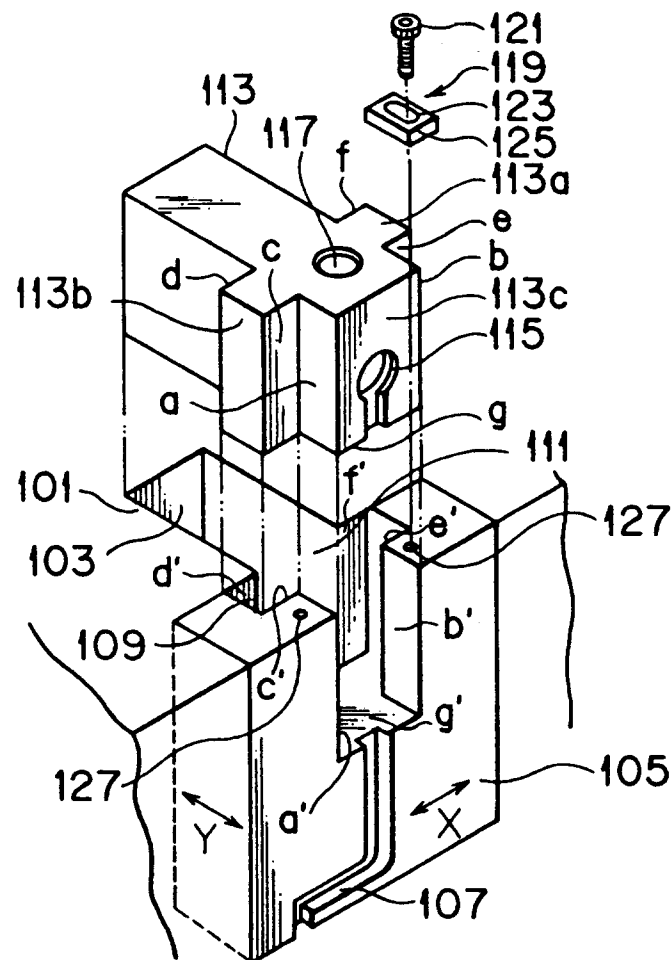


FIG. 2

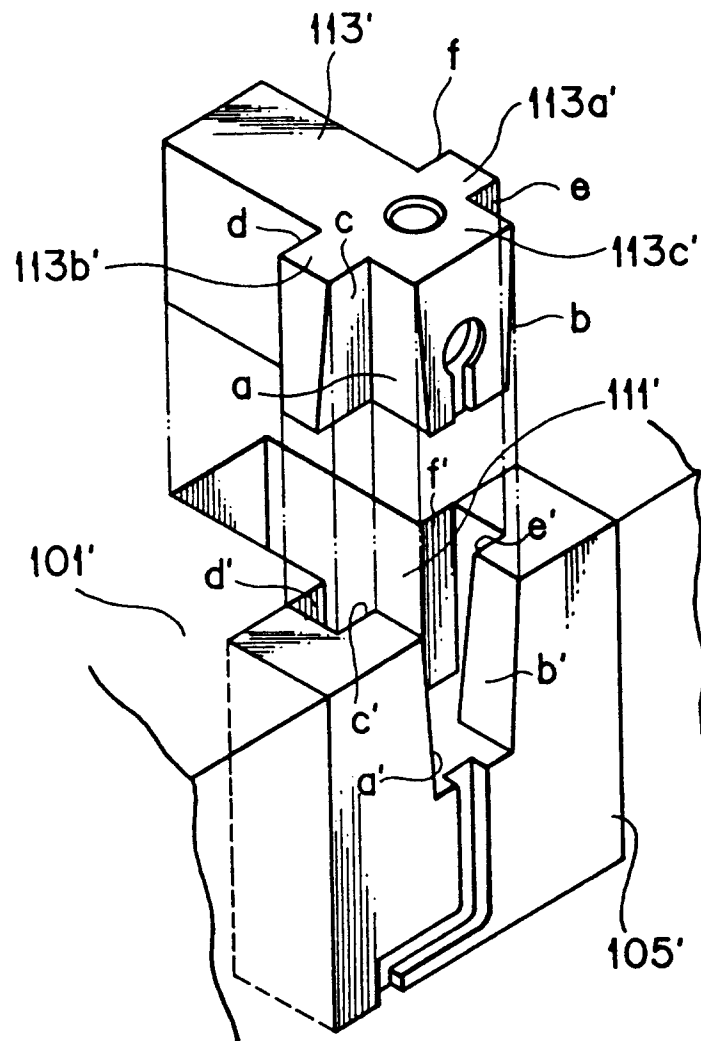


FIG. 3

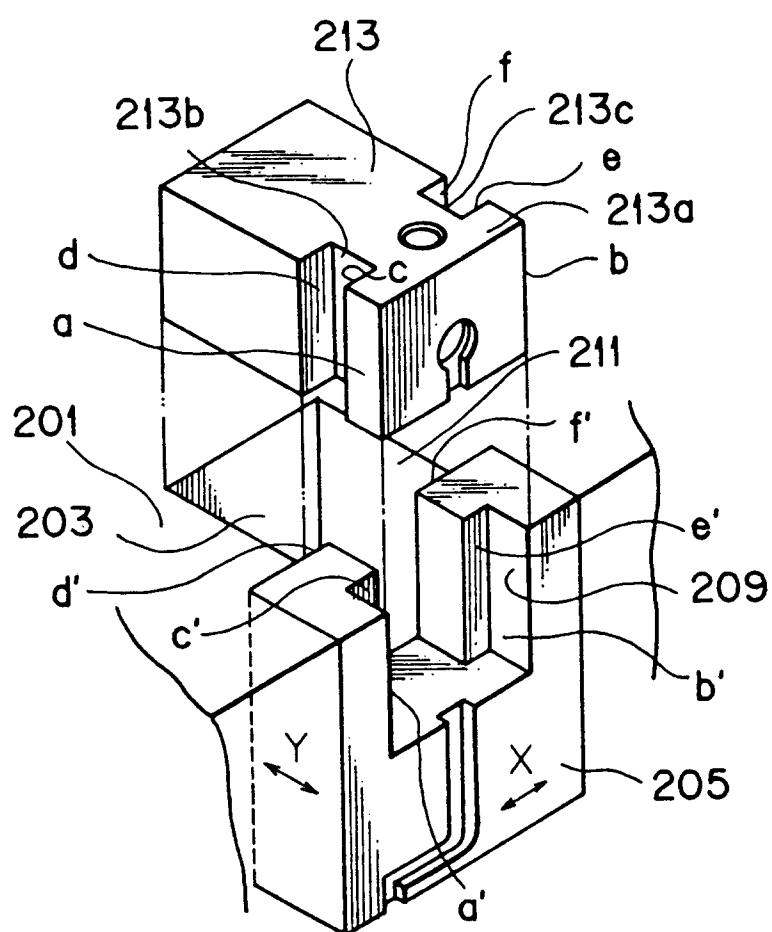


FIG. 4

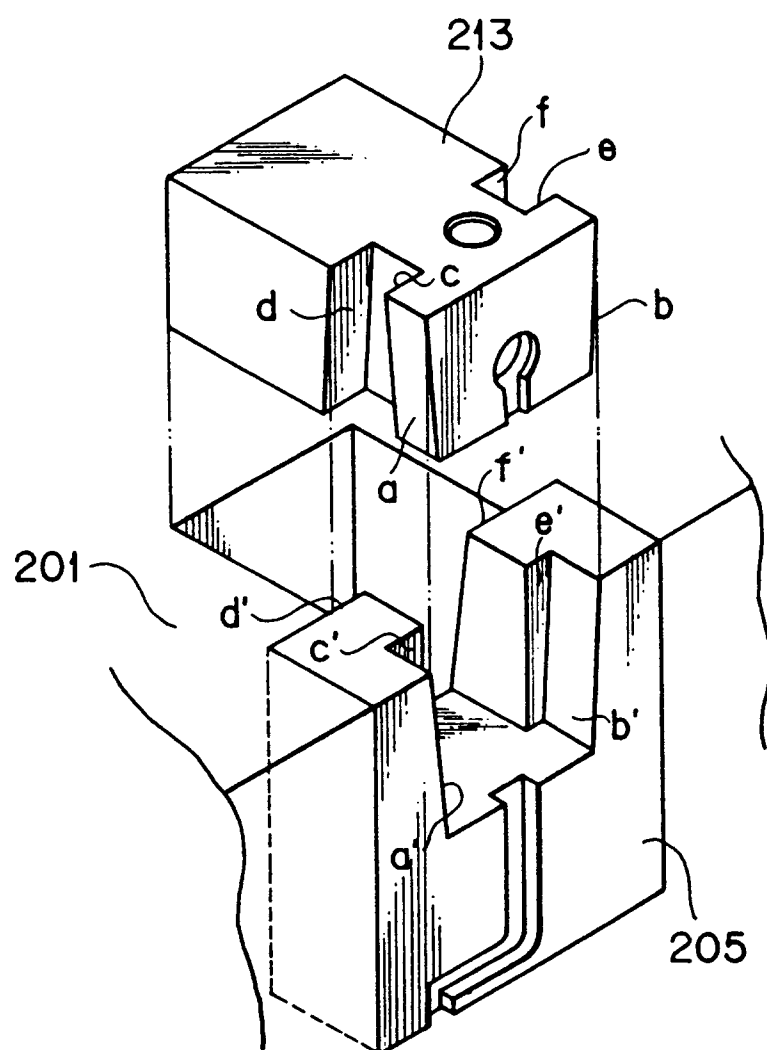


FIG. 5

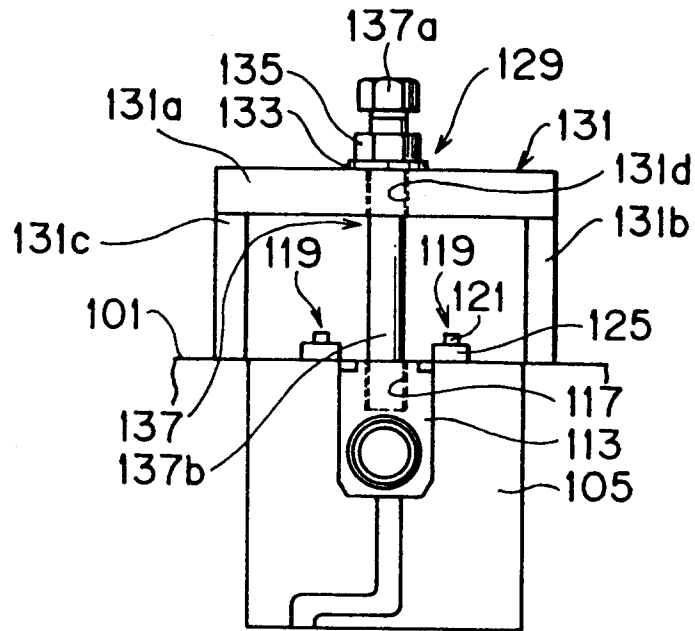


FIG. 6

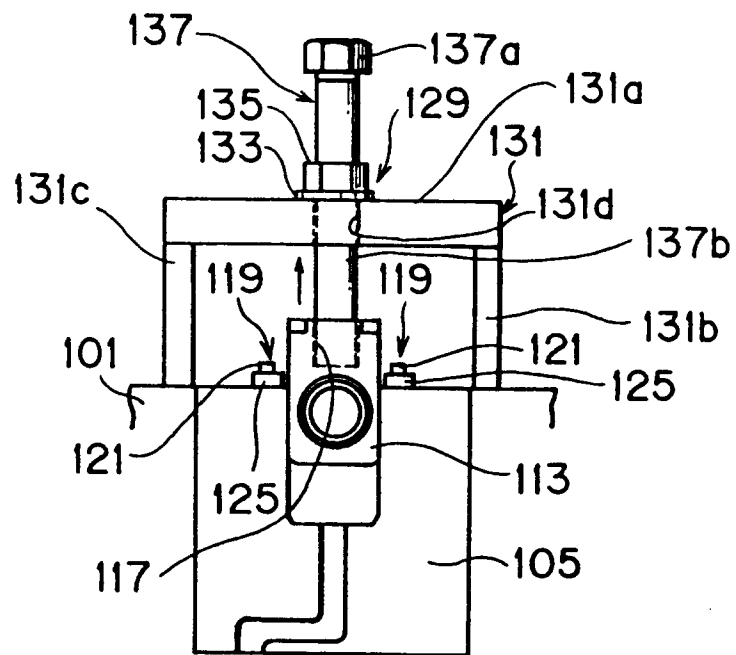


FIG. 7

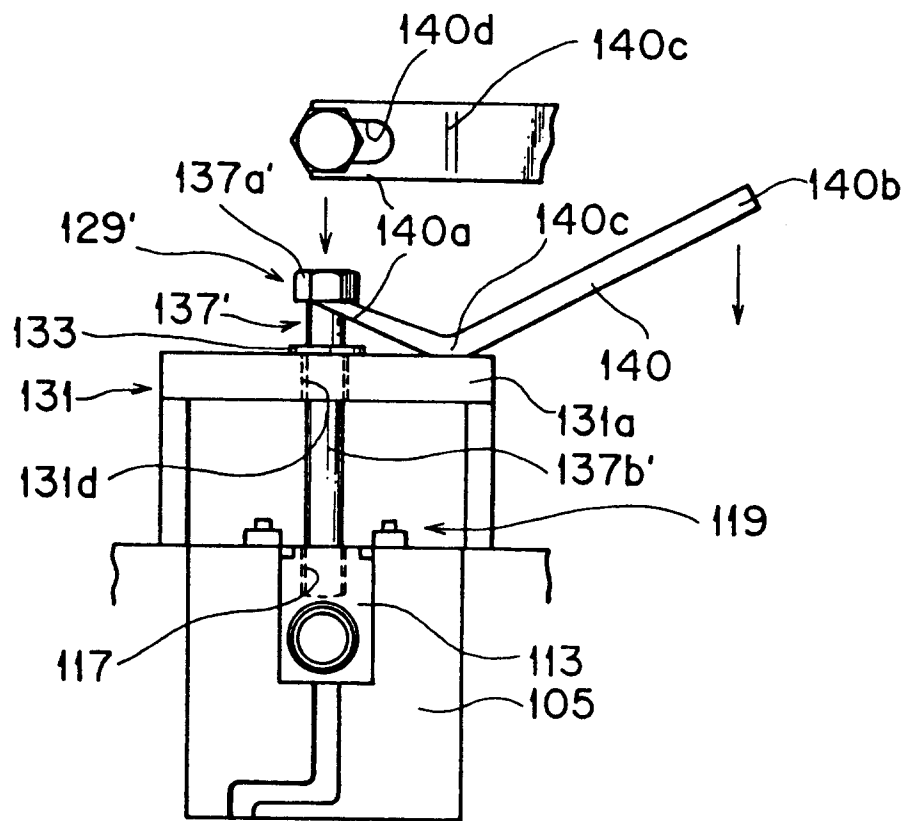


FIG. 8
PRIOR ART

