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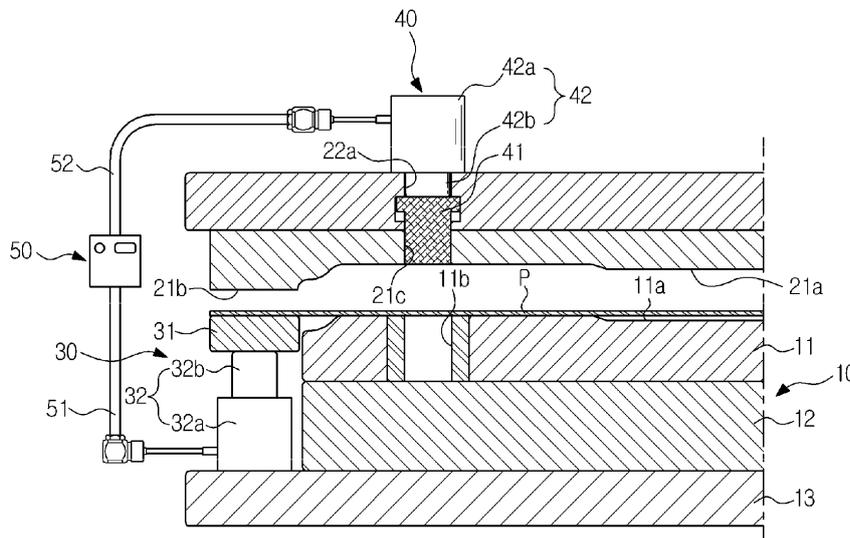
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(54) **Press die**

(57) A press die including a first die (10), a second die (20) disposed opposite to the first die (10) to perform a press work on a panel (P) together with the first die (10), a drawing unit (30) configured to hold the panel (P), a trimming unit (40) configured to cut the panel (P), and a fluid pressure controlling unit (50) configured to selec-

tively deliver fluid pressure to one of the drawing unit (30) and the trimming unit (40), thereby operating both of the drawing unit (30) and the trimming unit (40) even with a small fluid pressure by selectively delivering fluid pressure to one of the drawing unit (30) and the trimming unit (40).

FIG. 1



Description

[0001] The present invention relates to a press die, particularly but not exclusively to a press die capable of simultaneously performing a drawing process and a trimming process.

[0002] In general, a press die includes a first die having a first die surface provided with a shape that corresponds to one side surface of a product to be manufactured, and a second die having a second die surface provided with a shape that corresponds to the other side surface of the product to be manufactured. The press die is an apparatus configured to couple the first die and the second die after a panel is disposed in between the first die and the second die, so that the panel disposed in between the first die and the second die may be deformed into the shape that corresponds to the first die surface and the second die surface.

[0003] The press die as such includes a composition type press die, which is provided with a drawing unit configured to hold a panel to perform a drawing process on the panel and a trimming unit configured to perform a trimming process by cutting the panel to form a hole.

[0004] Therefore, it is an aspect of the present disclosure to provide a press die capable of performing both of a drawing process and a trimming process by only using small fluid pressure.

[0005] Additional aspects of the disclosure will be set forth in part in the description which follows and, in part, will be apparent from the description, or may be learned by practice of the disclosure.

[0006] In accordance with one aspect of the present disclosure, a press die includes a first die, a second die, a drawing unit, a trimming unit and a fluid pressure controlling unit. The second die may be disposed opposite to the first die to perform a press work on a panel together with the first die. The drawing unit may be configured to hold the panel. The trimming unit may be configured to cut the panel. The fluid pressure controlling unit may be configured to selectively deliver fluid pressure to one of the drawing unit and the trimming unit.

[0007] One of the first die and the second die may be moved toward the other one of the first die and the second die.

[0008] The first die may include a first core provided with a first die surface having a shape that corresponds to one side surface of a product to be manufactured. The second die may include a second core provided with a second die surface having a shape that corresponds to the other side surface of the product to be manufactured, the second core provided with a drawing surface to hold the panel. The drawing unit may include a drawing member and a drawing actuator. The drawing member may be disposed opposite to the drawing surface so that the panel is held in between the drawing member and the drawing surface. The drawing actuator may be configured to move the drawing member according to the delivered fluid pressure.

[0009] The drawing actuator may include a drawing cylinder to which fluid pressure is delivered, and a drawing piston movably installed at the drawing cylinder so as to move according to an inside pressure of the drawing cylinder.

[0010] The trimming unit may include a trimming member and a trimming actuator. The trimming member may penetrate through one of the first core and the second core and protrude toward the other one of the first core and the second core. The trimming actuator may be configured to move the trimming member according to the delivered fluid pressure. One of the first core and the second core may include a penetrating hole at which the trimming member is installed. The other one of the first core and the second core may include a trimming hole provided at a position that corresponds to the penetrating hole.

[0011] The trimming actuator may include a trimming cylinder to which fluid pressure is delivered, and a trimming piston movably installed at the trimming cylinder so as to move according to an inside pressure of the trimming cylinder.

[0012] The press die may further include a first delivery tube and a second delivery tube. The first delivery tube may connect the drawing unit to the fluid pressure controlling unit.

[0013] The second delivery tube may connect the trimming unit to the fluid pressure controlling unit.

[0014] The fluid pressure controlling unit may be configured to deliver fluid pressure from one of the drawing unit and the trimming unit to the other one of the drawing unit and the trimming unit.

[0015] As described above, the press die includes the fluid pressure controlling unit configured to selectively deliver fluid pressure to one of the drawing unit and the trimming unit, and both of the drawing unit and the trimming unit may be operated even with a small fluid pressure.

[0016] These and/or other aspects of the disclosure will become apparent and more readily appreciated from the following description of the embodiments, taken in conjunction with the accompanying drawings in which:

FIG. 1 is a schematic view of a press die in accordance with one embodiment of the present disclosure. FIGS. 2, 3 and 4 are schematic views sequentially showing an operation of the press die in accordance with the embodiment of the present disclosure.

[0017] Reference will now be made in detail to the embodiments of the present disclosure, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0018] Referring to FIG. 1, a press die in accordance with one embodiment of the present disclosure includes a first die 10, and a second die 20 disposed opposite to the first die 10, to perform presswork, ie. a pressing operation, on a panel 'P' together with the first die 1. In the

embodiment, the second die 20 is movably installed in a vertical direction at an upper side of the first die 10 disposed at a floor, so that, as the second die 20 moves upward/downward, the second die 20 may be coupled to the first die 10 or may be separated from the first die 10.

[0019] In addition, the press die includes a drawing unit 30 configured to hold the panel 'P' to perform a drawing process on the panel 'P', a trimming unit 40 to cut the panel 'P', and a fluid pressure controlling unit 50 configured to deliver fluid pressure such as hydraulic pressure or pneumatic pressure to the drawing unit 30 and to the trimming unit 40.

[0020] The first die 10 includes a first core 11 provided with a first die surface 11a having the shape that corresponds to one side surface of a product to be manufactured, a first fixing panel 12 fixed to an opposite side surface of the first die surface 11a of the first core 11, and a first base 13 disposed at a lower side of the first fixing panel 12 and supported at a ground level.

[0021] The second die 20 includes a second core 21 provided with a second die surface 21a having the shape that corresponds to the other side surface of the product to be manufactured, and with a drawing surface 21b formed alongside the second die surface 21a to hold the panel 'P'. The second die 20 also includes a second fixing panel 22 fixed to an opposite side surface of the second die surface 21a of the second core 21.

[0022] The drawing unit 30 includes a drawing member 31 disposed alongside the first core 11 at a side of the first core 11 while disposed opposite to the drawing surface 21b of the second core 21, and a drawing actuator 32 being delivered with fluid pressure from the fluid pressure controlling unit 50 to move the drawing member 31. In the embodiment, the drawing actuator 32 includes a drawing cylinder 32a to which fluid pressure is delivered, and a drawing piston 32b configured to move the drawing member 31 while moving according to the inside pressure of the drawing cylinder 32a.

[0023] The trimming unit 40 includes a trimming member 41 protruded toward the first core 11 after penetrating through the second core 21, and a trimming actuator 42 being delivered with fluid pressure from the fluid pressure controlling unit 50 to move the trimming member 41. In the embodiment, the trimming actuator 42 includes a trimming cylinder 42a to which fluid pressure is delivered, and a trimming piston 42b configured to move the trimming member 41 while moving according to the inside pressure of the trimming cylinder 42a.

[0024] The first core 11 has a trimming hole 11b provided with the position and the shape that correspond to the trimming member 41 so that a front end of the trimming member 41 protruded from the second core 21 is entered through the trimming hole 11b. The second core 21 and the second fixing panel 22 are provided with penetrating holes 21c and 22a, respectively, at which the trimming member 41 is penetratively installed.

[0025] The fluid pressure controlling unit 50 includes a hydraulic pump that generates fluid pressure, and is

configured in a way to be connected to the drawing unit 30 and the trimming unit 40 through delivering tubes 51 and 52, so that fluid pressure may selectively be delivered to one of the drawing unit 30 and the trimming unit 40.

5 The delivering tubes 51 and 52 include the first delivering tube 51 connecting in between the drawing unit 30 and the fluid pressure controlling unit 50, and the second delivering tube 52 connecting in between the trimming unit 40 and the fluid pressure controlling unit 50. In addition, 10 in the embodiment, the fluid pressure controlling unit 50 is configured to deliver fluid pressure from one of the drawing unit 30 and the trimming unit 40 to the other one of the drawing unit 30 and the trimming unit 40.

[0026] Next, the operation of the press die composed as such is as follows:

15 First, in a state that the second die 20 is spaced apart from the first die 10 and in a state that the panel 'P' is placed on the first die 10 and the drawing member 31, the second die 20 is moved toward the first die 10.

[0027] As illustrated in FIG. 2, when the drawing surface 21b of the second die 20 is arrived at the panel 'P' according to the movement of the second die 20, the fluid 20 pressure controlling unit 50 delivers fluid pressure to the drawing actuator 32. According to such, the panel 'P' is being held in between the drawing surface 21b and the drawing member 31.

[0028] As illustrated in FIG. 3, in a state when the holding is completed, the second die 20 is continuously 25 moved toward the first die 10 so that the second die 20 and the first die 10 are coupled to each other. As described above, the panel 'P' is in the state of being held in between the drawing surface 21b and the drawing member 31, and thus the panel 'P' is deformed into the shape that corresponds to the first die surface 11a and the second die surface 21a. That is, the panel 'P' is subject to a drawing process.

[0029] After the drawing processing is completed, the fluid pressure controlling unit 50 delivers fluid pressure 30 from the drawing actuator 32 to the trimming actuator 42. By the fluid pressure delivered to the trimming actuator 42, the trimming member 41, as illustrated in FIG. 4, is protruded toward the second core 21 and is entered through the trimming hole 11b provided at the second die 20. However, since the panel 'P' having been subjected to the drawing process is interpositioned in between the first core 11 and the second core 21, the panel 'P' is cut into the shape that corresponds to the trimming member 41 and the trimming hole 11b. That is, the panel 'P', after being subjected to the drawing process, is subjected to the trimming process.

[0030] As described above, the fluid pressure controlling unit 50 is configured to selectively deliver fluid pressure 35 to one of the drawing unit 30 and the trimming unit 40, and as such if the fluid pressure being delivered to the drawing unit 30 and the trimming unit 40 is made to be controlled by the fluid pressure controlling unit 50, the

drawing unit 30 and the trimming unit 40 are operated while being interlocked to each other, and thus both of the drawing process and the trimming process may be performed on the panel 'P' even by only using small fluid pressure.

[0031] In the embodiment, the fluid pressure controlling unit 50, as described above, is configured to deliver fluid pressure from one of the drawing unit 30 and the trimming unit 40 to the other one of the drawing unit 30 and the trimming unit 40, and thus both of the drawing unit 30 and the trimming unit 40 may be operated even through small amount of fluid pressure.

[0032] In the embodiment, the trimming unit 40 is disposed at the second die 20, but the present disclosure is not limited hereto, and having the trimming unit 40 disposed at the first die 10 may also be possible.

[0033] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles of the invention, the scope of which is defined in the claims.

Claims

1. A press die, comprising:

a first die;
 a second die disposed opposite to the first die to perform presswork on a panel together with the first die;
 a drawing unit configured to hold the panel;
 a trimming unit configured to cut the panel; and
 a fluid pressure controlling unit configured to selectively deliver fluid pressure to one of the drawing unit and the trimming unit.

2. The press die of claim 1, wherein one of the first die and the second die is moved towards the other one of the first die and the second die.

3. The press die of claim 1 or 2, wherein:

the first die comprises a first core provided with a first die surface having a shape that corresponds to one side surface of a product to be manufactured;
 the second die comprises a second core provided with a second die surface having a shape that corresponds to other side surface of the product to be manufactured, the second core provided with a drawing surface to hold the panel; and
 the drawing unit comprises a drawing member disposed opposite to the drawing surface so that the panel is held in between the drawing member and the drawing surface, and a drawing ac-

tuator configured to move the drawing member according to the delivered fluid pressure.

4. The press die of claim 3, wherein the drawing actuator comprises a drawing cylinder to which fluid pressure is delivered, and a drawing piston movably installed at the drawing cylinder so as to move according to an inside pressure of the drawing cylinder.

5. The press die of claims 3 or 4, wherein:

the trimming unit comprises a trimming member penetrating through one of the first core and the second core and protruding toward the other one of the first core and the second core, and a trimming actuator configured to move the trimming member according to the delivered fluid pressure, one of the first core and the second core comprises a penetrating hole at which the trimming member is installed, and the other one of the first core and the second core comprises a trimming hole provided at a position that corresponds to the penetrating hole.

6. The press die of claim 5, wherein the trimming actuator comprises a trimming cylinder to which fluid pressure is delivered, and a trimming piston movably installed at the trimming cylinder so as to move according to an inside pressure of the trimming cylinder.

7. The press die of any one of the preceding claims, further comprising:

a first delivery tube connecting the drawing unit to the fluid pressure controlling unit; and
 a second delivery tube connecting the trimming unit to the fluid pressure controlling unit.

8. The press die of any one of the preceding claims, wherein the fluid pressure controlling unit is configured to deliver fluid pressure from one of the drawing unit and the trimming unit to the other one of the drawing unit and the trimming unit.

9. The press die of claim 1, wherein the second die includes a drawing surface to hold the panel, and the drawing unit comprises a drawing member disposed opposite to the drawing surface so that the panel is held in between the drawing member and the drawing surface, and a drawing actuator to move the drawing member according to the delivered fluid pressure.

10. The press die of claim 9, wherein the drawing actuator comprises:

a drawing cylinder to which fluid pressure is delivered; and
a drawing piston movably installed at the drawing cylinder so as to move according to an inside pressure of the drawing cylinder.

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11. The press die of claim 1, wherein the trimming unit comprises a trimming member penetrating through one of the first and second dies and protruding toward the other one of the first and second dies, and a trimming actuator to move the trimming member according to the delivered fluid pressure, one of the first and second dies includes a penetrating hole at which the trimming member is installed, and
the other one of the first and second dies includes a trimming hole provided at a position that corresponds to the penetrating hole.

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12. The press die of claim 11, wherein the trimming actuator comprises:

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a trimming cylinder to which fluid pressure is delivered; and
a trimming piston movably installed at the trimming cylinder so as to move according to an inside pressure of the trimming cylinder.

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FIG. 1

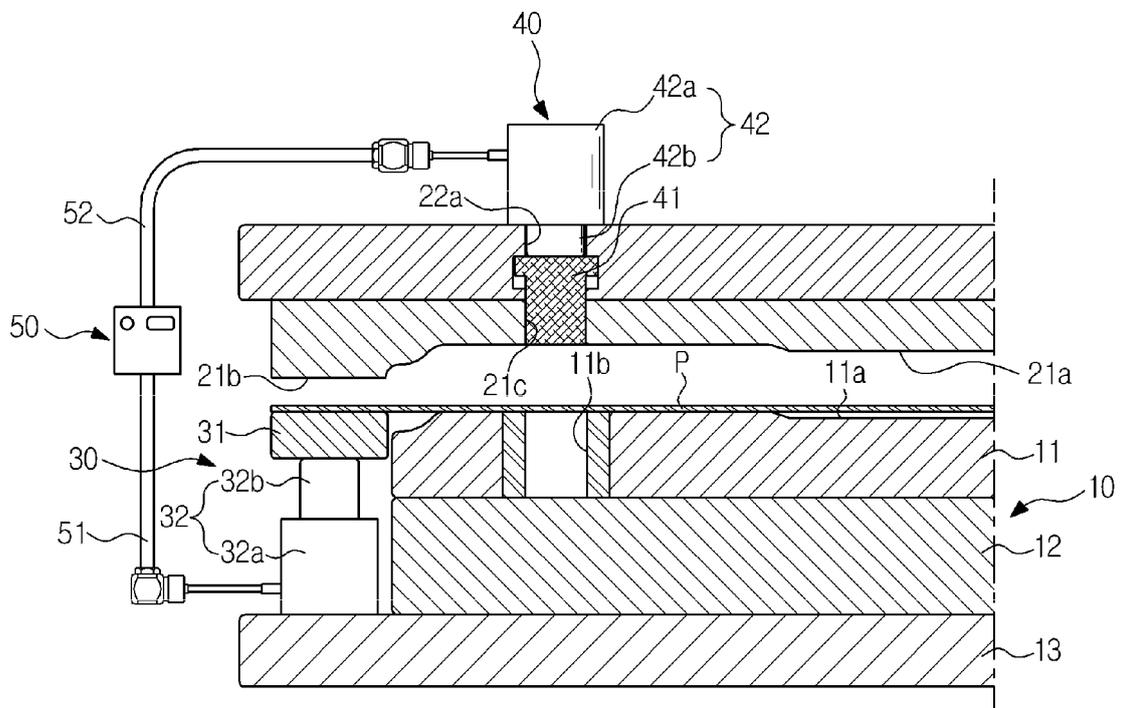


FIG. 2

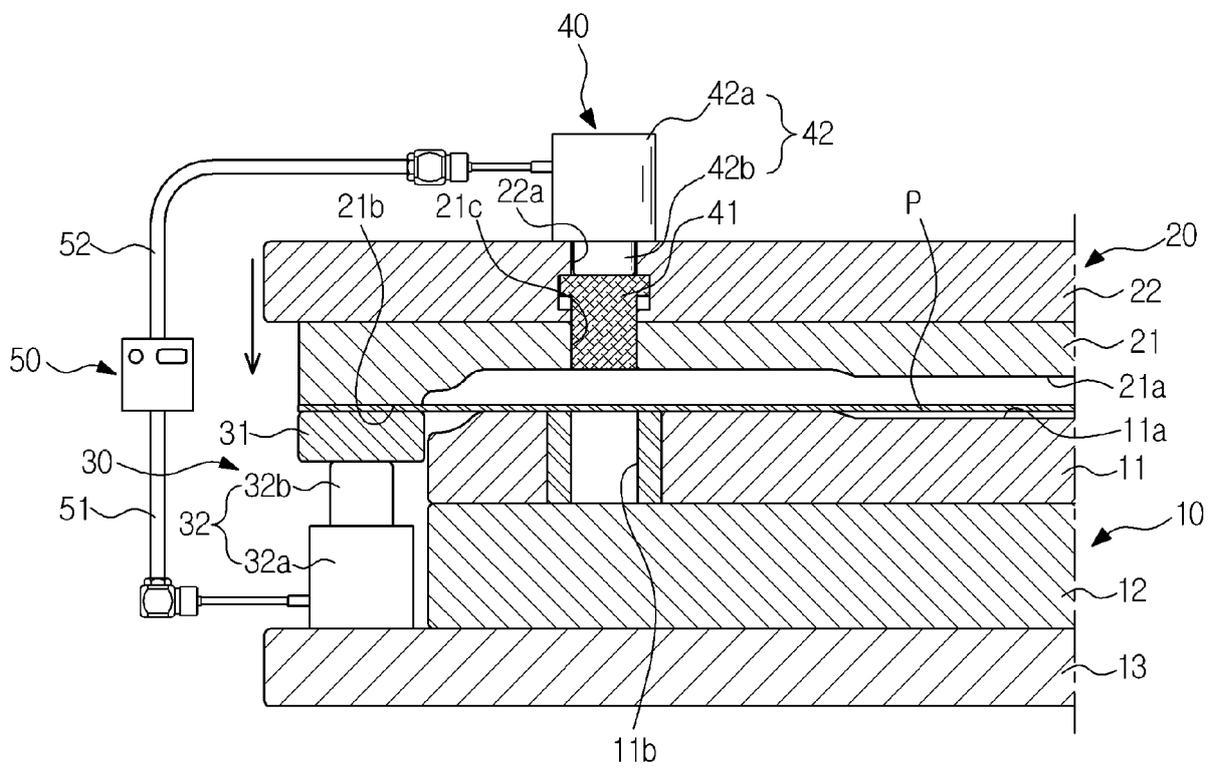


FIG. 3

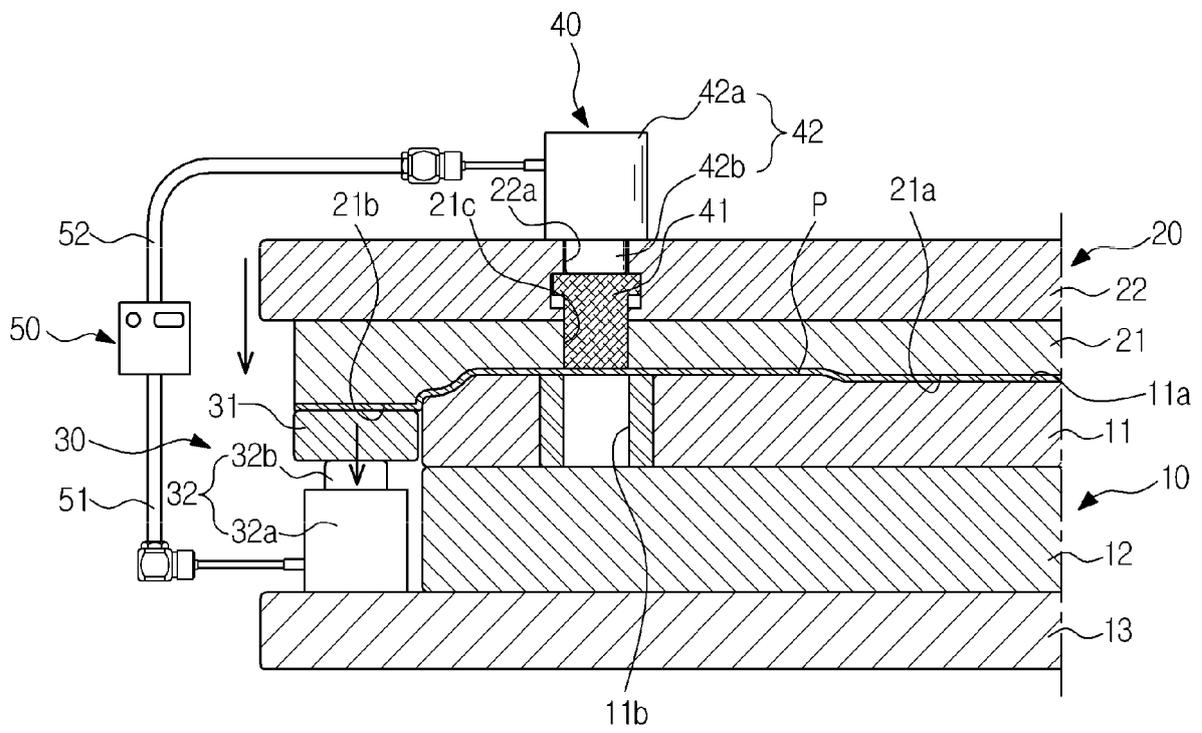
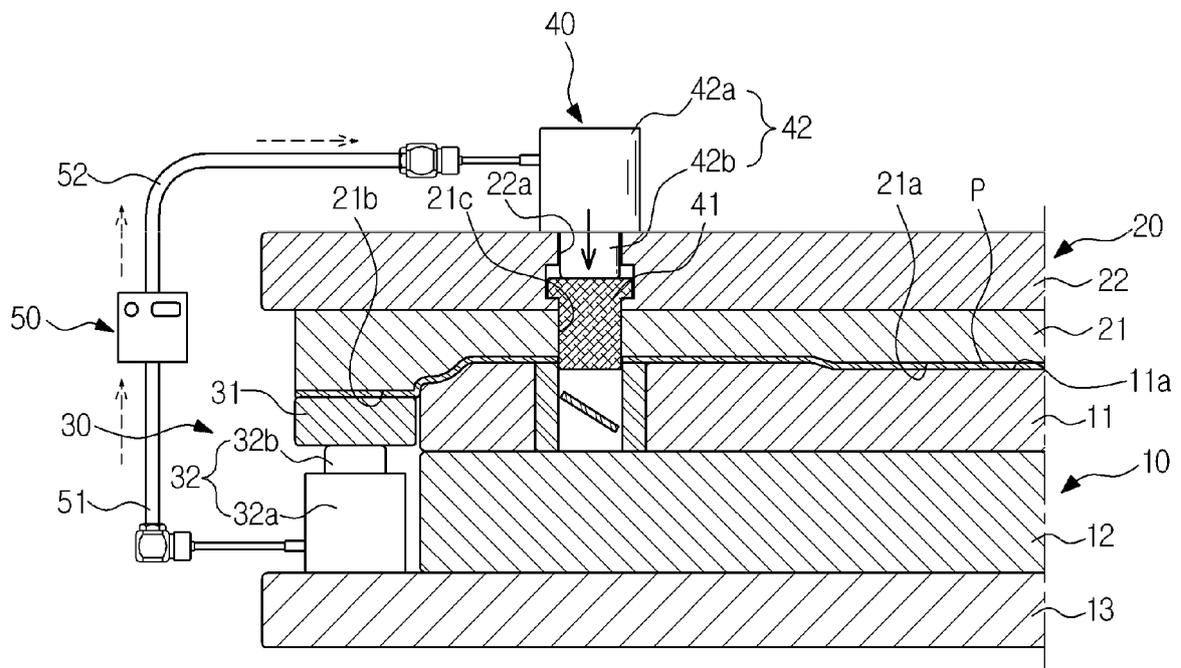


FIG. 4





EUROPEAN SEARCH REPORT

Application Number
EP 12 19 7319

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 25 February 2013	Examiner Cano Palmero, A
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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