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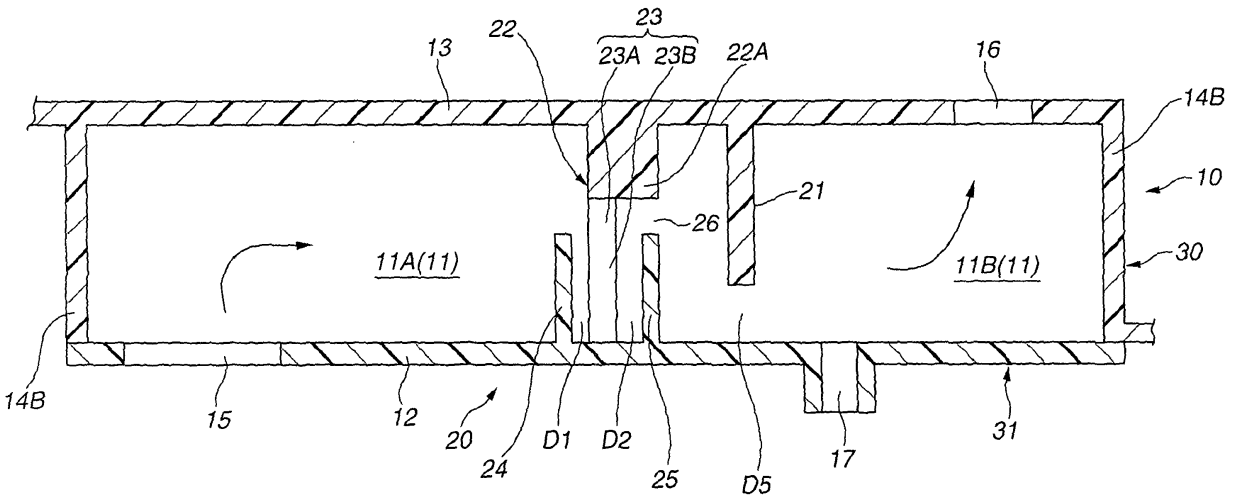
(54) Oil mist separator

(57) An oil mist separator formed inside a cylinder head cover of an engine. The oil mist separator includes a passage wall defining a blow-by gas passage, the passage wall including a passage bottom wall. An impact wall is disposed in the blow-by gas passage. A partition wall is disposed in the blow-by gas passage on an upstream side of the impact wall with respect to flow of blow-by gas to divide the blow-by gas passage, the partition wall being formed with a slit which extends to the passage bottom wall. First and second screening plates are disposed respectively on upstream and downstream sides of the partition wall so as to screen a lower part of the slit from flowing of blow-by gas, an upper part of the slit serving as a restriction passage through which blow-by gas passes to impact against the impact wall.

FIG.1



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Description

BACKGROUND OF THE INVENTION

[0001] This invention relates to an oil mist separator which separates oil mist (oil) from blow-by gas of an internal combustion engine and collects the oil mist therein.

[0002] Hitherto, in an internal combustion engine mounted on an automotive vehicle, blow-by gas leaks into a crank case, for example, through a clearance between a piston ring and the wall of a cylinder, and then is returned through a cylinder head and a head cover into an intake system to be fed back into a combustion chamber together with air-fuel mixture. An oil mist separator is provided to separate oil mist from blow-by gas and collects the oil mist therein to prevent the blow-by gas containing oil mist from being returned to the intake system.

[0003] An example of such an oil mist separator is of a so-called impact type as disclosed in Japanese Patent Provisional Publication No. 9-96209, in which a raised plate raised in a blow-gas passage is formed with a plurality of openings which are formed piercing the raised plate and serve as restriction passages. High speed blow-by gas passing through these restriction passages strike against an impact wall formed on the downstream side of the raised plate, thereby allowing oil mist to adhere onto this impact wall.

[0004] In such an impact type oil mist separator, in order to raise an oil trapping efficiency, it is proposed to raise the flow velocity of gas passing through the restriction passages. An example of the impact type separator provided with such a proposition is shown in Fig. 12 in which a raised plate 2 formed with a restriction passage 4 is raised from the passage bottom wall 3A of a blow-by gas passage 3 and located on the upstream side of an impact wall 1. A clearance is formed between the periphery of the raised plate 2 and the inner wall surface of the blow-by gas passage 3. Ribs 5, 5 are formed respectively before and behind the clearance thereby forming a clearance passage 6 of a labyrinth type. In this impact type separator, if the cross-sectional area of the restriction passage 4 is minimized to raise flow velocity of blow-by gas passing through the restriction passage 4 to improve the oil trapping efficiency, a flow resistance of blow-by gas increases, and therefore the rate of blow-by gas which flows out of the downstream side of the raised plate 2 through the clearance passage 6 at the periphery of the raised plate 2 increases, thereby making it impossible to effectively raise the flow velocity in the restriction passage 4. In view of this, if the clearance between the periphery of the raised plate 2 and the inner wall surface of the blow-by gas passage 3 is completely blocked, the flow velocity of blow-by gas in the restriction passage 4 increases; however, there arises a new problem in which oil is accumulated on the upstream side of the raised plate 2.

[0005] Additionally, although the above-mentioned impact wall 1, the raised plate 2 and the ribs 5, 5 are formed simultaneously with formation of a head cover constituting a passage upper wall and a passage side wall of the blow-by gas passage, the restriction passage 4 piercing cannot be formed simultaneously with formation of the head cover because the restriction passage 4 piercing the raised plate 2 is of a hole-shape. Accordingly, the restriction passage 4 is required to be formed by a separate work thereby raising a problem of increasing the number of processing steps thus increasing a production cost.

SUMMARY OF THE INVENTION

[0006] In view of the above, an object of the present invention is to provide an improved oil mist separator which can effectively overcome drawbacks encountered in conventional oil mist separators.

[0007] Another object of the present invention is to provide an improved oil mist separator which is excellent in oil trapping efficiency while securing an oil discharge passage though it is simple in construction.

[0008] A further object of the present invention is to provide an improved oil mist separator which is formed as a part of a cylinder head cover of an internal combustion engine.

[0009] An aspect of the present invention is resides in an oil mist separator comprising a passage wall defining a blow-by gas passage, the passage wall including a passage bottom wall. An impact wall is disposed in the blow-by gas passage. A partition wall is disposed in the blow-by gas passage and on an upstream side of the impact wall with respect to flow of blow-by gas so as to divide the blow-by gas passage, the partition wall being formed with a slit which extends to the passage bottom wall. Additionally, a member is provided for screening a lower part of the slit from flowing of blow-by gas so as to form a restriction passage through which blow-by gas passes to impact against the impact wall, the restriction passage being located at an upper part of the slit.

[0010] Another aspect of the present invention resides in an oil mist separator comprising a passage wall defining a blow-by gas passage, the passage wall including a passage bottom wall. An impact wall is disposed in the blow-by gas passage. A partition wall is disposed in the blow-by gas passage on an upstream side of the impact wall with respect to flow of blow-by gas to divide the blow-by gas passage, the partition wall being formed with a slit which extends to the passage bottom wall. First and second screening plates are disposed respectively on upstream and downstream sides of the partition wall so as to screen a lower part of the slit from flowing of blow-by gas, an upper part of the slit serving as a restriction passage through which blow-by gas passes to impact against the impact wall.

[0011] With this arrangement, the blow-by gas passage is substantially blocked or closed through its cross-sectional area with the partition wall, thereby largely in-

creasing the flow amount and flow velocity of blow-by gas passing through the restriction passage formed at the upper part of the slit, other than the lower part screened with the first and second (upstream-side and downstream-side) screening plates which are respectively located in front of and behind the partition wall, thus remarkably improving an oil trapping efficiency. Additionally, the slit extends to the passage bottom wall for the blow-by gas passage, and therefore liquid oil accumulated on the passage bottom wall on the upstream side of the partition wall can be discharged through the lower part of the slit to the downstream side. In other words, the upper part of the slit serves as the restriction passage while the lower part of the same serves as an oil discharge passage, by which the oil mist separator can be simplified in construction and decreased in number of processing steps as compared with a case in which the restriction passage and the oil discharge passage are formed separate from each other.

[0012] Particularly by providing a projection section at the upper part of the above-mentioned partition wall which projection section projects to the downstream side, a flow-straightening passage is formed between the bottom surface of this projection section and the upper edge of the downstream-side screening plate so as to be communicated with the downstream side of the restriction passage. Accordingly, although the oil mist separator has a simple construction using the partition wall and the downstream-side screening plate, it is high in flow-straightening effect thereby making it possible to further improving the oil trapping efficiency.

[0013] The above oil mist separator may be constituted of two members molded with a plastic, for example, a cylinder head cover and a baffle plate fixed to the back surface side of the cylinder head cover by means of vibration-welding or the like. Specifically, the passage upper wall and the passage side walls may be formed integral with and extend from the passage upper wall on the back surface side of the head cover constituting the passage upper wall and the passage side walls for the blow-by gas passage while the screening plates may be formed integral with and extends from the baffle plate constituting the passage bottom wall. Additionally, the partition wall is integrally connected to the passage upper wall and the passage side walls, and the bottom end edge of this partition wall is close to the passage bottom wall substantially without a clearance. This securely prevents blow-by gas from flowing out through the periphery of the partition wall thereby further concentrating blow-by gas passing through the partition wall into the restriction passage at the upper part of the slit. Furthermore, by opening the one end of the slit through the lower end edge of the partition wall, the slit can be formed simultaneously with molding of the head cover, thereby further reducing a production cost.

[0014] A further aspect of the present invention resides in an oil mist separator comprising a passage wall defining a blow-by gas passage, the passage wall including a passage bottom wall. An impact wall is disposed in the blow-by gas passage. A partition wall is disposed in the blow-by gas passage and on an upstream side of the impact wall with respect to flow of blow-by gas so as to divide the blow-by gas passage, the partition wall being formed with a slit which extends to the passage bottom wall. A projection extends from the passage bottom wall and fits in a lower part of the slit to form a restriction passage through which blow-by gas passes to impact against the impact wall, the restriction passage being located at an upper part of the slit.

[0015] With this arrangement, the blow-by gas passage is substantially blocked or closed at its cross-sectional area with the partition wall, thereby largely increasing the flow amount and flow velocity of blow-by gas passing through the restriction passage formed at the upper part of the slit, other than the lower part in which the projection is fitted, thus remarkably improving an oil trapping efficiency.

BFIEF DESCRIPTION OF THE DRAWING

[0016] In the drawings, like reference numerals designate like parts and elements throughout all figures, in which:

Fig. 1 is a cross-sectional view of a first embodiment of an oil mist separator according to the present invention;

Fig. 2 is a fragmentary enlarged sectional view showing an oil separating section of the oil mist separator of Fig. 1;

Fig. 3 is a fragmentary enlarged sectional view taken in the direction of the arrows substantially along the line B-B of Fig. 2;

Fig. 4 is a fragmentary enlarged sectional view taken in the direction of the arrows substantially along the line C-C of Fig. 2;

Fig. 5 is a fragmentary perspective view of the oil mist separator of Fig. 1, cut away along the line D-D of Fig. 4;

Fig. 6 is an explanatory fragmentary exploded view of the oil separating section of Fig. 2;

Fig. 7 is a fragmentary enlarged sectional view similar to Fig. 4, but showing a second embodiment of the oil mist separator according to the present invention;

Fig. 8 is a fragmentary enlarged sectional view showing an oil separating section of a third embodiment of the oil mist separator according to the present invention;

Fig. 9 is a fragmentary enlarged sectional view taken in the direction of the arrows substantially along the line E-E of Fig. 8;

Fig. 10 is an explanatory fragmentary exploded view of the oil separating section of Fig. 8;

Fig. 11 is an explanatory fragmentary exploded view of an oil separating section of a fourth embodiment

of the oil mist separator according to the present invention; and

Fig. 12 is a cross-sectional view of an earlier technology oil mist separator which is used for the purpose of explaining the purpose of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Referring now to Figs. 1 to 6, a first embodiment of an oil mist separator 10 according to the present invention is illustrated by the reference numeral 10. The oil mist separator 10 is of a so-called impact type wherein blow-by gas generated in an internal combustion engine is impacted against an impact wall 21 through a restriction passage or orifice 23A thereby separating and collecting oil mist from blow-by gas, the impact wall 21 and the restriction passage 23A are formed in a blow-by gas passage 11 formed in the oil mist separator.

[0018] The oil mist separator 10 includes a cylinder head cover or rocker cover 30 for covering the upper part of a cylinder head (not shown) of the engine. A baffle plate 31 is joined and fixed to the back surface side of the head cover 30 by vibration-welding or the like. The head cover 30 and the baffle plate 31 constitute the oil mist separator 10 and are formed of plastic or synthetic resin under molding. The head cover 30 includes a passage upper wall 13 which extends axially or laterally in Fig. 1. Two passage side walls 14A, 14A and two passage end walls 14B, 14B extend downward from the passage upper wall 13 and are formed integral with the passage upper wall 13. The baffle plate 31 is fixed to the lower end of each passage side wall 14A, serving as a passage bottom wall 12. Thus, the passage upper wall 13, the passage side walls 14A, the passage end walls 14B and the passage bottom wall 12 define the blow-by gas passage 11.

[0019] The passage upper wall 13 of the head cover 30 is formed with a blow-by gas outlet 16 which is located on the downstream side of an oil separating section 20 (discussed after) provided in the blow-by gas passage 11 with respect to flow of blow-by gas. The passage bottom wall 12 is formed with a blow-by gas inlet 15 and a cylindrical oil discharge port 17 which are located respectively on the upstream and downstream sides of the oil separating section 20 in the blow-by gas passage 11 with respect to flow of blow-by gas.

[0020] As shown in Fig. 2, the oil separating section 20 includes the impact wall 21 which is rectangular plate-shaped and integral with the passage upper wall 13 and extends downward from the passage upper wall 13 in Fig. 2. A generally rectangular plate-shaped partition wall 22 is integral with the passage upper wall 13 and extends downward from the passage upper wall 13 in Fig. 2. The partition wall 22 is located on the upstream side (left side in Fig. 1) of the impact wall 21 with respect to flow of blow-by gas in the blow-by gas passage 11. This partition wall 22 divides the blow-by gas passage 11 into an upstream side chamber 11A with the blow-by gas inlet 15 and a downstream side chamber 11B with the blow-by gas outlet 16. The partition wall 22 substantially blocks the blow-by gas passage 11 through a cross-sectional area in such a manner as to partition the blow-by gas passage 11 into the two chambers 11A, 11B. Specifically, the partition wall 22 is molded integral with the head cover 30, in which the upper periphery and the opposite side peripheries are respectively integral with the passage upper wall 13, passage side walls 14A, 14A and passage end walls 14B, 14B. Additionally, the position of the lower periphery of the partition wall 22 is set to be equal with or slightly higher than the lower end edge of the passage side walls 14A, 14A and the passage end walls 14B, 14B so that the lower periphery of the partition wall 22 approaches the passage bottom wall 12 substantially without a clearance or contacts to the passage bottom wall 12. In other words, the partition wall 22 is connected at its whole periphery with or disposed close at its whole periphery to the inner wall surface defining the blow-by gas passage 11.

[0021] This partition wall 22 is formed with two slits 23 each of which passes through the partition wall 22. These slits 23 have the same length and vertically straight extend. The upper part of these slits 23 serves as the above-mentioned restriction passage 23A in connection with two screening plates 24, 25 which will be discussed after. The lower end of the slits 23 is opened through the lower end edge of the partition wall 22 which edge is close to the passage bottom wall 12 substantially without a clearance. In other words, the slits 23 extends from an upper position (not identified) to the passage bottom wall 12 in an assembled state of the oil mist separator 10 as shown in Figs. 1 and 2, in which the upper part serving as the restriction passage 23A reaches the upper position.

[0022] The two screening plates i.e., the upstream-side screening plate 24 and the downstream-side screening plate 25 are formed vertically extending and located respectively on the upstream and downstream sides of the partition wall 22 in such a manner to screen a lower part of the partition wall 22 formed with the slits 23. These screening plates 24, 25 are rectangular plate-shaped and the same in height, width and thickness. These screening plates 24, 25 are disposed parallel with the lower part of the thin plate-shaped partition wall 22 formed with the slits 23, respectively through predetermined distances D1 and D2 each of which is between the screening plate and the partition wall 22. These screening plates 24, 25 have a width or lateral size sufficient to exceed a lateral range where the slits 23 are formed so as to screen or cover the lower part 23B (excepting the restriction passage 23A) of the slits 23 as viewed from the axial direction of the blow-by gas passage 11 or a direction in which blow-by gas flows. In other words, the upper end edge of each screening plate 24, 25 is set lower than the upper end of each slit 23. The slit upper part exposed above the upper end edge of the screening plate 24, 25 functions as the restriction passage 23A.

[0023] As shown in Fig. 3, each screening plate 24, 25 has a width smaller than the inner width (the lateral distance between the passage side walls 14A, 14A) of the blow-by gas passage 11 so that a predetermined clearance D3, D4 is formed between the side edge of the screening plate 24, 25 and the passage side wall 14A, 14A.

[0024] The partition wall 22 is formed thick at its upper part in such a manner as projecting to the downstream side with respect to flow of blow-by gas so as to form a projection section 22A which is integral with the main body of the partition wall 22 and has a flat bottom surface facing the passage bottom wall 12. Accordingly, the upper part of the partition wall 22 is thicker than the thin plate-shaped lower part of the partition wall 22. The upper end edge of the downstream-side screening plate 25 located below and near the flat bottom surface of the projection section 22A, so that a flow-straightening passage 26 communicated with the downstream side of the restriction passage 23A is formed between the upper end edge of the downstream-side screening plate 25 and the flat bottom surface of the projection section 22A. Although impact wall 21 extends downward or toward the passage bottom wall 12 in a manner to face the restriction passage 26, a sufficient clearance D5 is formed between the lower end edge of the impact wall 21 and the passage bottom wall 12 so as to prevent oil from being accumulated.

[0025] In operation of the oil mist separator 10, blow-by gas within the cylinder head is introduced through the blow-by gas inlet 15 into blow-by gas passage 11, and then is subjected to oil mist separation by the oil separating section 20 so that oil mist is separated from blow-by gas. In this oil mist separating section 20, blow-by gas flows through the upper part or restriction passage 23A under the effect of the upstream-side screening plate 24 and then passes through the flow-straightening passage 26 formed between the upper end edge of the downstream side screening plate 24 and the projection section 22A of the partition wall 22 thereby being straightened in flow direction. Thereafter, blow-by gas strikes at a high speed against the impact plate 21, thus separating oil mist from blow-by gas. The separated oil mist is returned through the oil discharge port 17 into the cylinder head, while clean blow-by gas containing no oil mist is supplied through the blow-by gas outlet 16 into the intake system of the engine.

[0026] As discussed above, according to this embodiment, no substantial clearance is formed between the periphery of the partition wall 22 and the inner surface of the blow-by gas passage 11, and therefore the partition wall 22 generally completely blocks and closes the blow-by gas passage 11. Additionally, the screening plates 24, 25 are disposed respectively in front of and behind the slits 23 so that blow-by gas passing through the partition wall 22 can be concentrated particularly at the restriction passages 23A (the upper parts of the slits 23). As a result, the flow amount and flow velocity of blow-by gas flowing through the restriction passage 23A can be largely increased thereby remarkably improving the oil trapping efficiency.

[0027] Further, the slits 23 extend to the passage bottom wall 12 while the clearances D3, D4 are formed at the opposite sides of each of the screening plates 24, 25. Accordingly, oil on the passage bottom wall 12 can be effectively carried to the downstream side at which the oil discharge port 17 is formed, through the slits 23, the clearances D3, D4 and the clearance D5, so that oil can be prevented from being accumulated on the passage bottom wall 12. In other word, the slits 23 function as the restriction passages 23A and as oil discharge passages for causing oil to flow to the downstream side. Thus, it is unnecessary to separately form both the restriction passages 23A and the oil discharge passages.

[0028] Furthermore, the oil mist separator 10 can be constituted of two parts, i.e., the head cover 30 and the baffle plate 31. Additionally, simultaneously with molding of the plastic head cover 30, the passage upper wall 13, the passage side walls 14A, the passage end walls 14B, the partition wall 22 and the impact wall 21 extending from the passage upper wall 13, the blow-by gas discharge port 16 and the vertically extending slits 23 can the formed. Particularly, each of slits 23 is formed as a cutout having a certain width and of the shape wherein its one end opens through the lower end edge of the partition wall 22, and therefore it can be formed simultaneously with molding of the plastic head cover 30. Similarly, simultaneously with the plastic baffle plate 31, the screening plates 24, 25, the blow-by gas inlet 15 and the oil discharge port 17 can be formed together with the passage bottom wall 12. As a result, the number of processing steps can be reduced thereby suppressing a production cost at a lower level.

[0029] Moreover, the flow-straightening passage 26 is formed of a simple structure using the downstream-side screening plate 25 and the projection section at the upper part of the partition wall 22. When blow-by gas containing oil mist passes through the flow-straitening passage 26, blow-by gas is subjected to flow-straightening while being raised in flow velocity. Under the effect of this flow-straightening, a large inertial force is applied to oil mist, so that oil mist can be impacted against the impact wall 21 at right angles or at an angle near the right angles thereby further improving an oil trapping efficiency.

[0030] Next, other embodiments of the oil mist separator according to the present invention will be discussed, in which like reference numerals designate like elements or parts in the above-mentioned embodiment.

[0031] Fig. 7 illustrates a second embodiment of the oil mist separator similar to the first embodiment, in which the passage bottom wall 12 is inclined relative to a horizontal plane, for example, in a vehicle-mounted state in a V-type internal combustion engine. In this embodiment, the partition wall 22 is formed with an oil discharge opening 40 located at its lower corner section facing a corner part formed between the passage bottom wall 12 and the

passage side wall 14A. With this arrangement, oil on the passage bottom wall 12 can be effectively discharged from the upstream side to the downstream side of the partition wall 22 through the oil discharge opening 40. This oil discharge opening 40 can be formed simultaneously with molding of the head cover 30, like the above-mentioned slits 23.

[0032] Figs. 8 to 10 illustrate a third embodiment of the oil mist separator according to the present invention, similar to the first embodiment with the exception that two projections 42 are formed integral and upwardly extends from the passage bottom wall 12 for the blow-by gas passage 11, the two projections 42 being to fit in the slit lower parts 23B. The projections 42 are the same in height like the screening plates 24, 25 and plate-shaped, in which the projections 42 have respectively their upstream-side parts (at the left side in Fig. 9) which are inserted into and fitted in the slit lower parts 23B with substantially no clearance to fill the spaces of the slit lower parts 23B. The upstream-side end faces of the projections 42 generally flush with the upstream-side end face of the partition wall 22. Additionally, the upstream-side parts of the projections 42 are integrally connected to the downstream-side screen plate 25. In other words, the downstream-side screening plate 25 and the projections 42 form a generally II-shape in cross-section as shown in Fig. 9.

[0033] With the thus arranged third embodiment, the spaces of the slit lower parts 23B are respectively filled with the projections 42, so that blow-by gas can be securely prevented from passing through the slit lower parts 23B. By this, blow-by gas passing through the partition wall 22 can be further concentrated to the restriction passage 23A formed at the slit upper part, thereby further improving an oil trapping efficiency.

[0034] Fig. 11 illustrates a fourth embodiment of the oil mist separator according to the present invention, similar to the third embodiment. In this embodiment, two projections 43 are formed integral with and extend from the passage bottom wall 12 for the blow-by gas passage 11. However, no screening plates (24, 25) are formed in front of and behind the partition wall 22. In other words, the oil mist separator 10 of this embodiment takes a simple structure in which screening plates (24, 25) are omitted. The projections 43 are generally the same in length or thickness as the partition wall 22 in a direction in which blow-by gas flows and are respectively the same in width as the slits 23, so that the projections 43 are respectively fitted into the slit lower parts 23B with substantially no clearance thereby filling the spaces of the slit lower parts 23B with the respective projections 43 without overs and shorts.

[0035] With the thus arranged fourth embodiment, similarly to in the third embodiment, the spaces of the slit lower parts 23B are respectively filled with the projections 43 without overs and shorts, so that blow-by gas can be securely prevented from passing through the slit lower parts 23B. By this, blow-by gas passing through the partition wall 22 can be further concentrated to the restriction passage 23A formed at the slit upper part 23A, thereby further improving an oil trapping efficiency.

[0036] Additionally, in the third and fourth embodiments, similarly to the second embodiment, the partition wall 22 is formed with the oil discharge opening 40 located at its lower corner section facing a corner part formed between the passage bottom wall 12 and the passage side wall 14A. With this arrangement, oil on the passage bottom wall 12 can be effectively discharged from the upstream side to the downstream side of the partition wall 22 through the oil discharge opening 40. This oil discharge opening 40 can be formed simultaneously with molding of the head cover 30, like the above-mentioned slits 23. Although the oil discharge opening 40 has been shown and described to be formed at only one position or one lower corner section of the partition wall 22, it will be understood that the oil discharge opening 40 may be formed at two positions or both lower corner sections of the partition wall 22 including the above lower corner section and an opposite lower corner section, if necessary. By this, in the third and fourth embodiments, the slit lower parts 23B are respectively filled with the projections 42 or 43, so that an oil discharge opening or passage along flow of blow-by gas can be secured though the function of the slits 23 as the oil discharge passage like in the second embodiment is lost.

[0037] Although the invention has been described in its preferred embodiments, it is understood that the invention is not limited to the specific embodiments and that various changes and modifications may be made in the invention without departing from the spirit and scope of the invention.

[0038] The entire contents of Japanese Patent Application No. 2006-173385, filed June 23, 2006, are incorporated herein by reference.

Claims

1. An oil mist separator comprising:

a passage wall defining a blow-by gas passage, the passage wall including a passage bottom wall;

an impact wall disposed in the blow-by gas passage;

a partition wall disposed in the blow-by gas passage and on an upstream side of the impact wall with respect to flow of blow-by gas so as to divide the blow-by gas passage, the partition wall being formed with a slit which extends to the passage bottom wall; and

a member for screening a lower part of the slit from flowing of blow-by gas so as to form a restriction passage through which blow-by gas passes to impact against the impact wall, the restriction passage being located at an upper

part of the slit.

2. An oil mist separator comprising:

a passage wall defining a blow-by gas passage, the passage wall including a passage bottom wall;
an impact wall disposed in the blow-by gas passage;
a partition wall disposed in the blow-by gas passage on an upstream side of the impact wall with respect to flow of blow-by gas to divide the blow-by gas passage, the partition wall being formed with a slit which extends to the passage bottom wall; and
first and second screening plates disposed respectively on upstream and downstream sides of the partition wall so as to screen a lower part of the slit from flowing of blow-by gas, an upper part of the slit serving as a restriction passage through which blow-by gas passes to impact against the impact wall.

3. An oil mist separator as claimed in Claim 2, wherein the partition wall includes a projection section located at an upper part of the partition wall and projecting to the downstream side of the partition wall, the projection section having a bottom surface which faces an upper edge of the second screening plate to form a flow-straightening passage communicating with the restriction passage.

4. An oil mist separator as claimed in Claim 2 or 3, wherein the passage wall further includes a passage upper wall, passage side walls integrally connecting the passage upper wall to the passage bottom wall to define the blow-by gas passage, the passage wall forming part of a head cover formed of a plastic, the partition wall and impact wall extending from the passage upper wall,
wherein the partition wall is integral with the passage upper wall and the passage side walls,
wherein an end of the slit opens to a lower end edge of the partition wall which edge is close to the passage bottom wall substantially without a clearance.

5. An oil mist separator as claimed in any of Claims 2 to 4, wherein the first and second screening plates are parallel with each other and separate from the partition wall.

6. An oil mist separator comprising:

a passage wall defining a blow-by gas passage, the passage wall including a passage bottom wall;
an impact wall disposed in the blow-by gas passage;
a partition wall disposed in the blow-by gas passage and on an upstream side of the impact wall with respect to flow of blow-by gas so as to divide the blow-by gas passage, the partition wall being formed with a slit which extends to the passage bottom wall; and
a projection extending from the passage bottom wall and fitting in a lower part of the slit to form a restriction passage through which blow-by gas passes to impact against the impact wall, the restriction passage being located at an upper part of the slit.

7. An oil mist separator as claimed in Claim 6, wherein the partition wall is formed with an oil discharge opening through which oil flows from upstream side to downstream side of the partition wall, the oil discharge opening reaching the passage bottom wall.

FIG.1

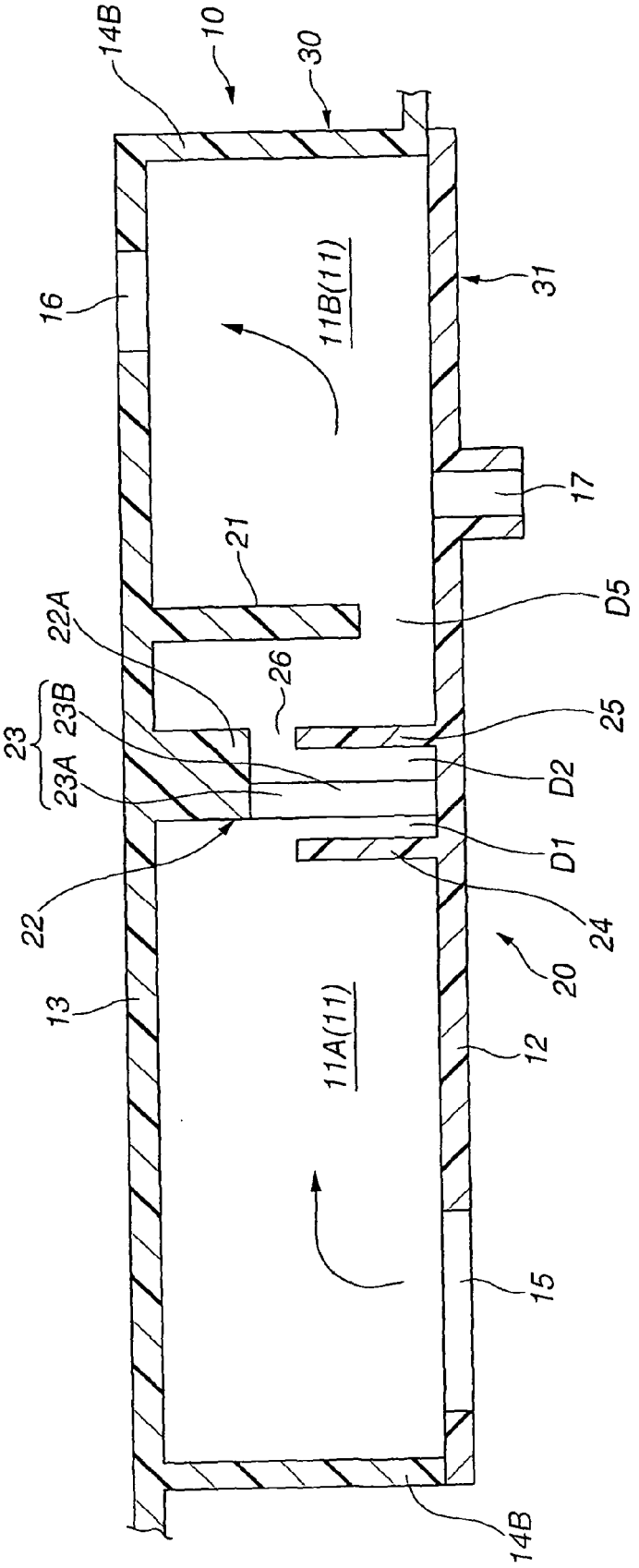
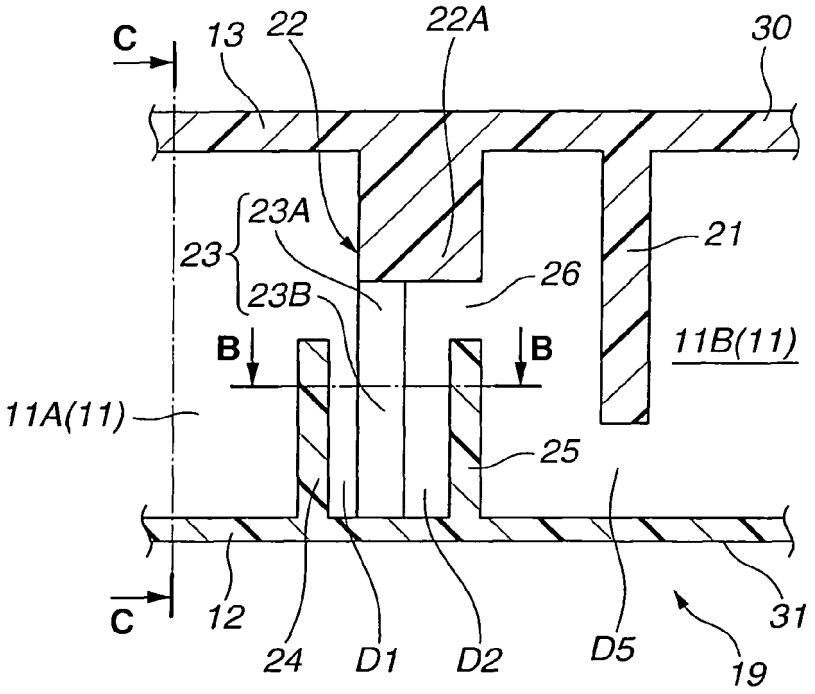

14B
10
30
16
11B(11)
31
17
21
D5
22A
26
25
23
23B
23A
D2
D1
22
24
20
13
11A(11)
12
15
14B

FIG.2


C
13
22
22A
30
23A
23
23B
21
26
B
B
11B(11)
11A(11)
25
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D1
D2
D5
31
19

FIG.3

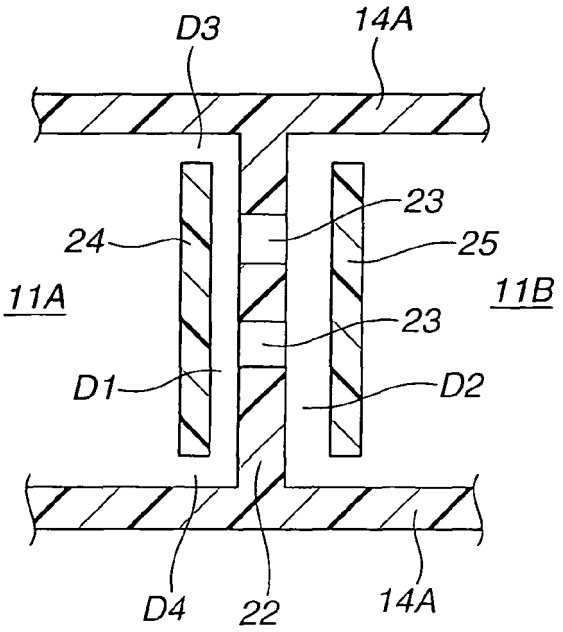

D3
14A
23
24
25
11A
11B
23
D1
D2
D4
22
14A

FIG.4

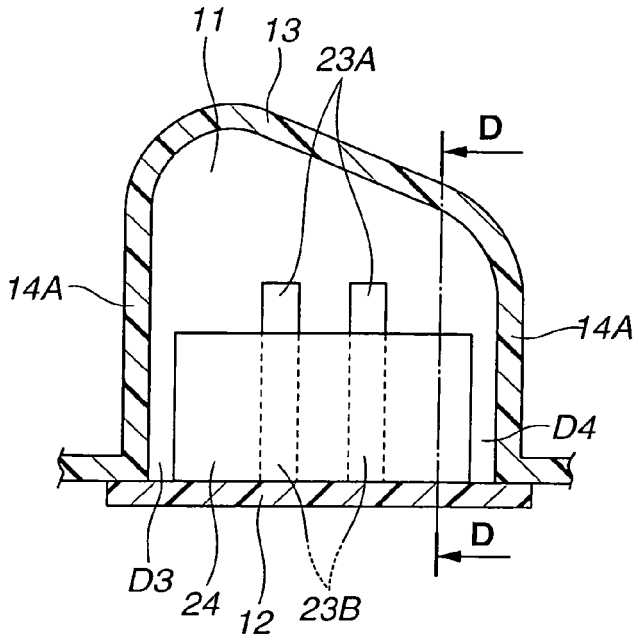

11
13
23A
D
14A
14A
D4
D
D3
24
12
23B

FIG.5

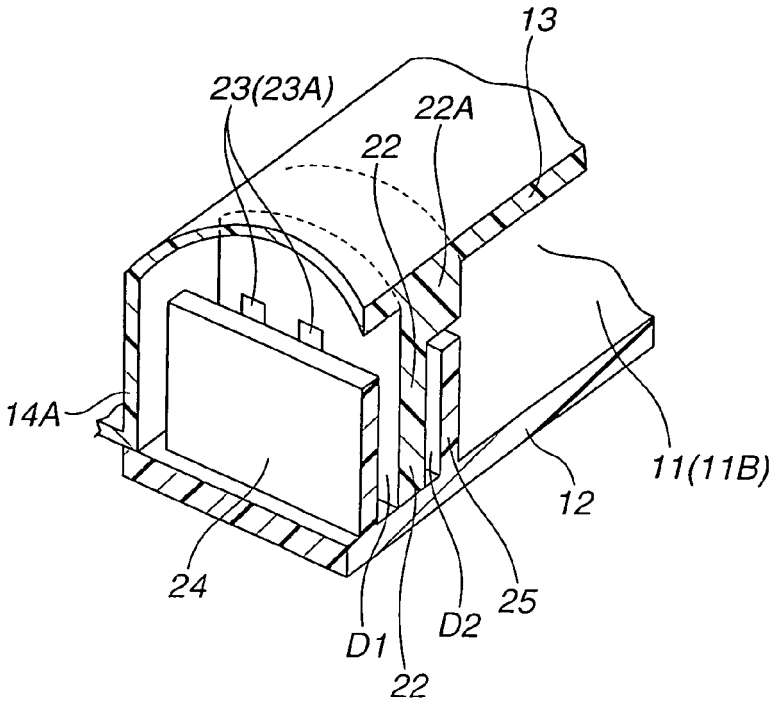

13
23(23A)
22A
22
14A
11(11B)
12
24
25
D2
D1
22

FIG.6

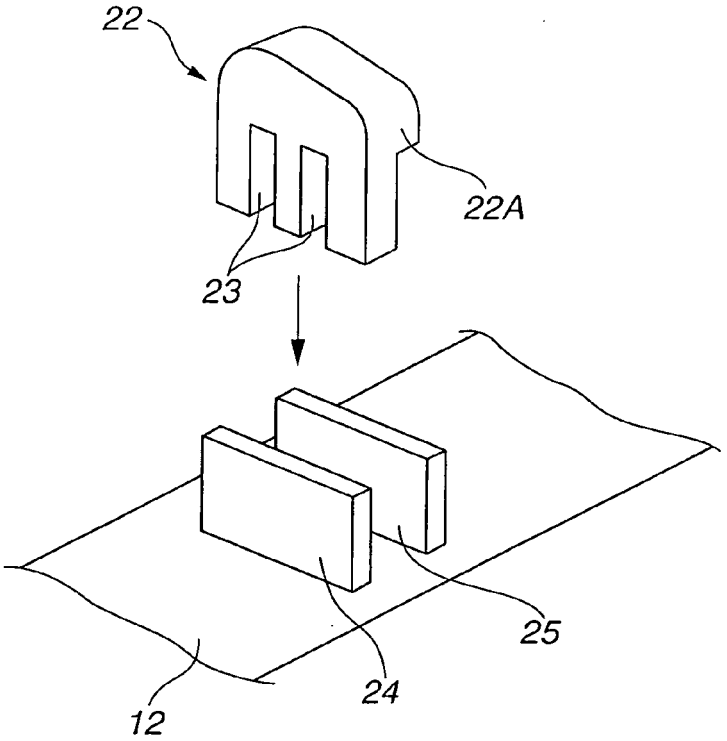


FIG.7

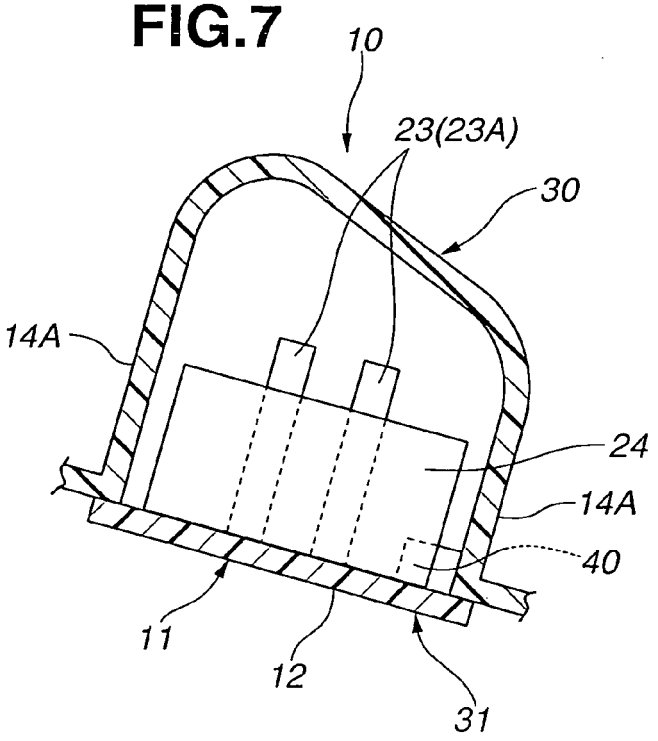


FIG.8

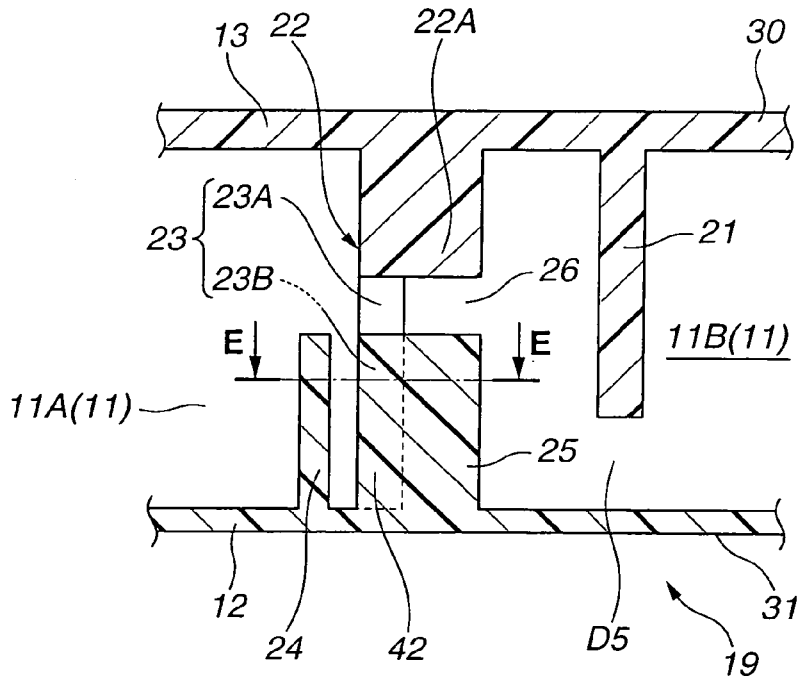

13
22
22A
30
23A
23
23B
21
26
E
E
11B(11)
11A(11)
25
12
24
42
D5
31
19

FIG.9

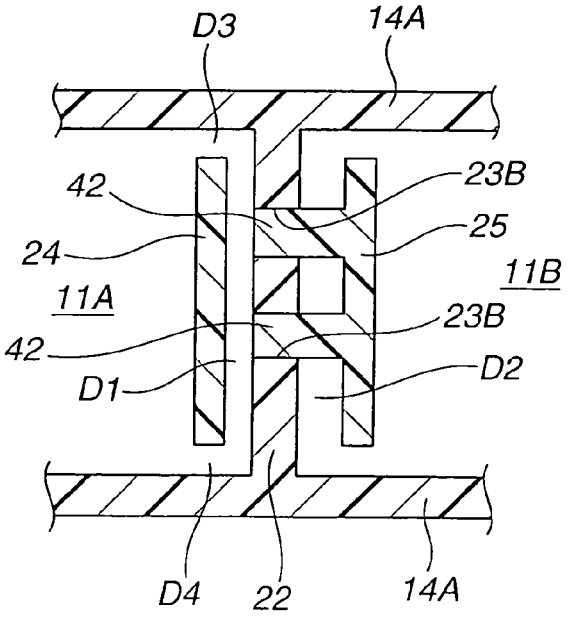

D3
14A
42
23B
25
24
11B
11A
23B
42
D1
D2
D4
22
14A

FIG.10

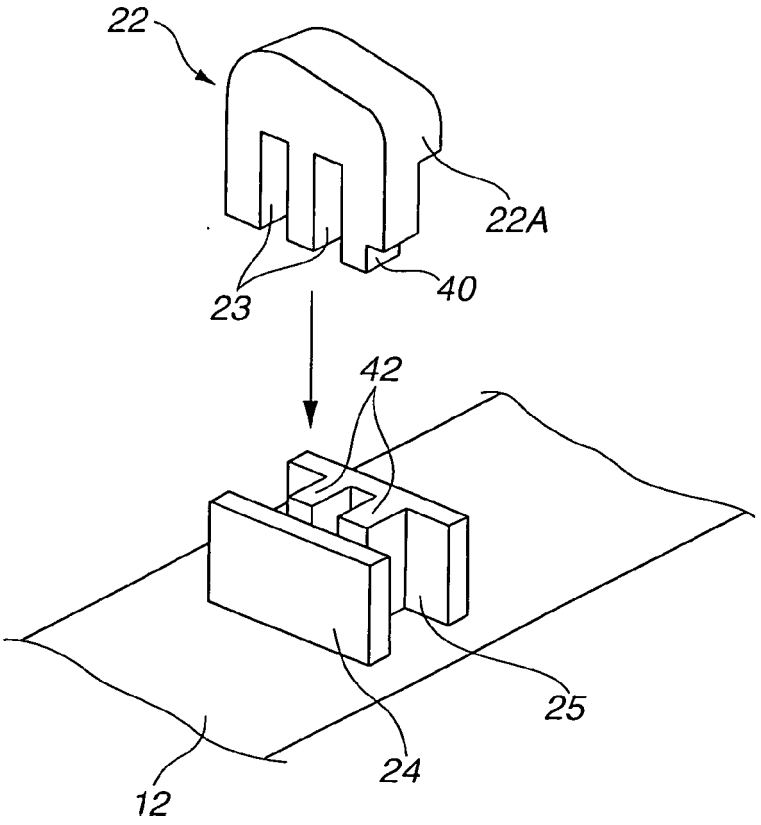


FIG.11

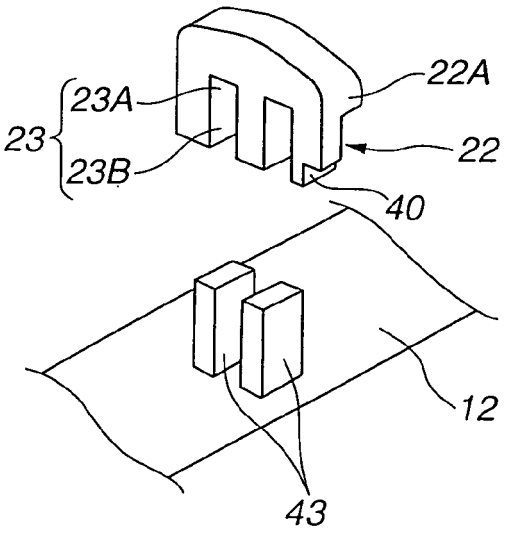
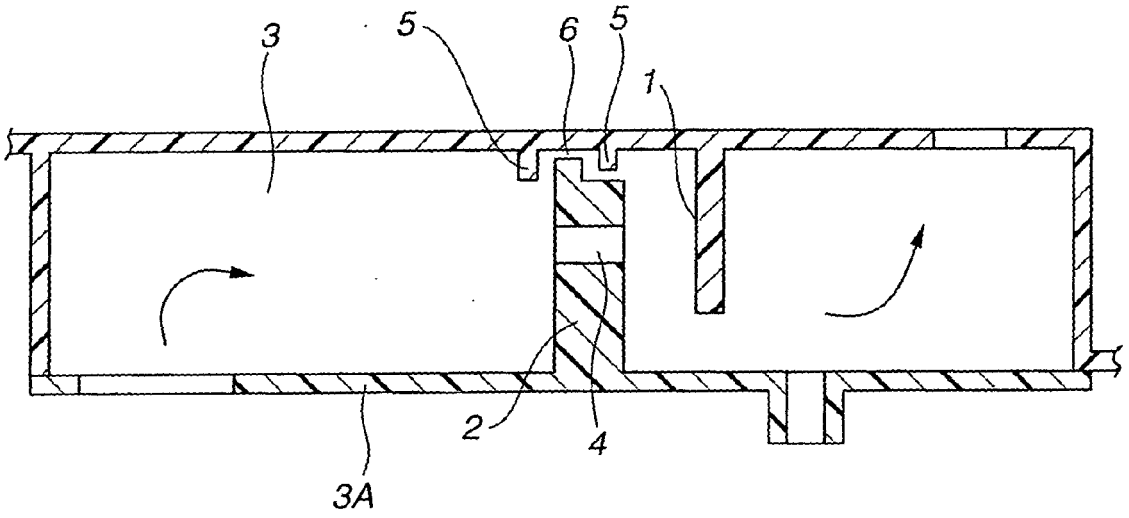


FIG.12



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- JP 2006173385 A **[0038]**