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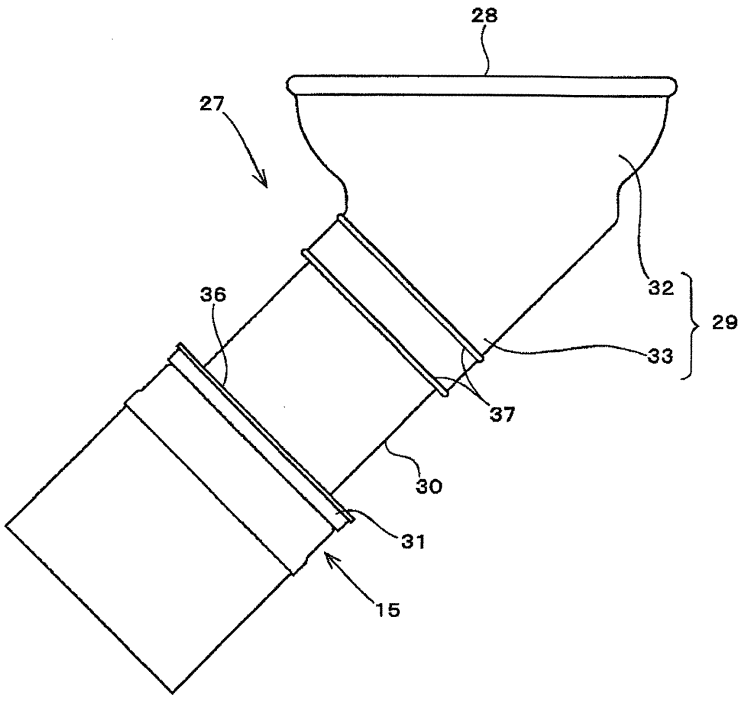
(54) Oil-feeding funnel

(57) An oil-feeding funnel is configured to be retained against rotation by a mounting portion 18 for receiving a tank cap 17 for lidding an oil-feeding inlet 15 and attached to the oil-feeding inlet, and the fuel-input opening 28 is configured to be directed upward relative to the opening direction of the oil-feeding inlet 15 with the funnel being attached to the oil-feeding inlet 15.

Fig.1



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Description

INDUSTRIAL FIELD

[0001] The present invention relates to an oil-feeding funnel used in supplying a tank with oil.

RELATED ART

[0002] A backhoe as an example of conventional running work vehicles includes a fuel tank mounted in a hood housing an engine, a radiator, etc. The fuel tank has an oil-feeding inlet, when formed in a side surface of the hood, by providing a recess in the hood so as not to project from an outer surface of the hood to allow an opening end of the oil-feeding inlet to be positioned within the recess.

[0003] When oil is fed to the fuel tank of the backhoe from a portable fuel container having no oil-feeding nozzle like a jerrycan, an oil-feeding operation would be difficult.

[0004] In the above case, it is considered to use a funnel for feeding liquid from an inlet having a small diameter. Such a funnel has an upper conic funnel body and a lower guide tube connected to the bottom of the funnel body (see Japanese Unexamined Utility Mode Application Publication No. 63-197898).

SUMMARY OF THE INVENTION

[0005] While the oil-feeding inlet, when provided in the side surface of the hood, is inclined to open obliquely upward, the funnel is formed to allow the center line of a fuel-input opening of the funnel body to coincide with the axis of the guide tube. The guide tube is simply inserted into the oil-feeding inlet. With such a funnel, when the guide tube of the funnel is inserted into the oil-feeding inlet opened obliquely upward, the opening direction of the oil-feeding inlet is aligned with the opening direction of the fuel-input opening of the funnel body, which disadvantageously makes it difficult for the operator to feed oil from the fuel-input opening of the funnel if the inclined angle of the oil-feeding inlet is small (45 degrees or less, for example).

[0006] In view of the above, it is proposed that the funnel is formed to allow the fuel-input opening to be directed upward with respect to the opening direction of the oil-feeding inlet with the guide tube of the funnel being inserted into the upwardly inclined oil-feeding inlet. In this, the operator might be forced to lift a heavy portable fuel container to feed fuel to the funnel, which requires a great deal of labor, and thus might place the fuel container on the fuel-input opening of the funnel.

[0007] In the above case, if the guide tube is simply inserted into the inclined oil-feeding inlet, the guide tube might be accidentally rotated to direct the fuel-input opening of the funnel sideways or downward.

[0008] In view of the above-noted disadvantages, one aspect of the present invention provides an oil-feeding funnel taking into consideration facilitation of oil supply when oil is fed from a portable fuel container to an inclined oil-feeding inlet that is open obliquely upward.

[0009] A characteristic feature of the oil-feeding funnel according to the present invention including a fuel-input opening and applicable to an inclined oil-feeding inlet opened obliquely upward lies in that the oil-feeding funnel is configured to be retained against rotation by a mounting portion for receiving a tank cap for lidding the oil-feeding inlet and attached to the oil-feeding inlet, and that the fuel-input opening is configured to be directed upward relative to the opening direction of the oil-feeding inlet with the funnel being attached to the oil-feeding inlet.

[0010] With the above arrangement, the oil-feeding funnels is retained against rotation by a mounting portion for receiving a tank cap for lidding the oil-feeding inlet and attached to the oil-feeding inlet. Thus, even if the fuel container is placed on the funnel, the operator is able to hold the heavy portable fuel container and easily supply the tank with oil. Further, since the fuel-input opening is directed upward with respect to the opening direction of the oil-feeding inlet even when the oil-feeding funnel is attached to the inclined oil-feeding inlet opened obliquely upward, the operator can easily supply oil to the tank even if the portable fuel container has no nozzle.

[0011] It is preferable when the funnel comprises a straight tubular guide tube made of rigid material to be attached to the oil-feeding inlet, and a funnel body having the fuel-input opening and made of elastic material; the funnel body has a tube inserting groove formed therein, into which an upper side portion of the guide tube in the axial direction thereof is inserted, thereby to connect the funnel body to the guide tube; and an inserting margin of the guide tube relative to the tube inserting groove is greater at an upper side of a radial direction than at a lower side of the radial direction.

[0012] With the above arrangement, the inserting margin of the guide tube relative to the tube inserting groove is greater at the upper side of the radial direction than at the lower side of the radial direction. Thus, the guide tube is inserted into the tube inserting groove, thereby to position the funnel body and the guide tube in the circumferential direction. In addition, even when the portable fuel container is placed on the funnel, the load of the fuel container is born at the lower side of the joint portion where the guide tube is inserted into the tube inserting groove, and thus the operator is able to hold the portable fuel container firmly.

[0013] It is preferable when the funnel is attached to the oil-feeding inlet when a lower end portion of the guide tube is inserted into the oil-feeding inlet and rotated in a circumferential direction by a predetermined angle, thereby to retain the guide tube against rotation and allow the fuel-input opening to be directed upward relative to the opening direction of the oil-feeding inlet.

[0014] With the above arrangement, since the funnel is attached to the oil-feeding inlet when a lower end por-

tion of the guide tube is inserted into the oil-feeding inlet and rotated in a circumferential direction by a predetermined angle, thereby to retain the guide tube against rotation and allow the fuel-input opening to be directed upward relative to the opening direction of the oil-feeding inlet, the oil-feeding funnel can be easily attached.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

Fig. 1 is a rear view of an oil-feeding funnel attached to an oil-feeding inlet;
Fig. 2 is a rear view in partial section of the oil-feeding funnel;
Fig. 3 is an exploded perspective view of the oil-feeding funnel;
Fig. 4 is a section taken on line IV of Fig. 2;
Fig. 5 is a section taken on line V-V of Fig. 4;
Fig. 6 is a sectional rear view of the oil-feeding inlet;
Fig. 7 is a section taken on line VII-VII of Fig. 6;
Fig. 8 is a section taken on line VIII-VIII of Fig. 7;
Fig. 9 is a right side view of a backhoe;
Fig. 10A is a rear view of the right side of the backhoe;
Fig. 10B is a perspective view showing an oil-feeding condition; and
Fig. 11 is a front view of a tank cap.

MODE FOR CARRYING OUT THE INVENTION

[0016] An embodiment of the present invention will be described hereinafter in reference to the accompanying drawings.

[0017] In Fig. 9, numeral 1 denotes a backhoe 1 including a lower propelling vehicle body 2 and an upper swivel body 3.

[0018] The propelling vehicle body 2 is a crawler-type propelling device acting as a roller-type propelling device, for example, having a front-side idler 5, a rear-side sprocket 6, roller wheels 7 provided between the front-side idler 5 and the rear-side sprocket 6, and an endless crawler belt 8 wound around those elements.

[0019] The swivel body 3 includes a swivel deck 10 supported to be pivotable about a vertical swiveling axis through a swivel bearing 9, a cabin 11 mounted on the swivel deck 10, an engine mounted rearwardly of the swivel deck 10, a hood 12 for covering a radiator and the like, and an excavating work implement 13 mounted forwardly of the swivel deck.

[0020] A concave portion 14 is formed in a vertical intermediate portion of a side surface (right side surface in the present embodiment) of the hood 12, and an oil-feeding inlet 15 of a fuel tank provided within the hood 12 is positioned within the concave portion 14.

[0021] When oil is supplied to the fuel tank from a portable fuel container 16, it is preferable to provide the oil-feeding inlet in the lowest possible position in order to allow the operator to feed oil without lifting a heavy portable container filled with fuel to a high position.

[0022] As shown in Fig. 6, the oil-feeding inlet 15 is cylindrical and inclined obliquely upward (inclined laterally outward and upward in the present embodiment). The oil-feeding inlet 15 is lidded with a tank cap 17 as shown in Fig. 11.

[0023] A turn-down portion 18 is formed in an opening peripheral edge of the oil-feeding inlet 15, which is folded inside over the entire circumference thereof. As shown in Figs. 7 and 8, a pair of cut-out portions 19 are formed in the turn-down portion 18 at radial opposite positions.

[0024] A contacting portion 20 is provided in an end face of the turn-down portion 18 at the folded side thereof in the vicinity of each of the cut-out portions 19. The contacting portion 20 is formed by projecting a portion of the end face of the turn-down portion 18 at the folded side thereof in the vicinity of each of the cut-out portions 19 inwardly in the direction of an axis X of the oil-feeding inlet 15. A pair of contacting portions 20 are provided at radial opposite positions of the oil-feeding inlet 15.

[0025] More particularly, the contacting portion 20 is provided adjacently to each cut-out portion 19 in one direction F1 of the circumference of the oil-feeding inlet 15. Further, an engaging recess 21 is provided adjacently to each contacting portion 20 in the end face of the turn-down portion 18 at the folded side thereof in the one direction F1 of the circumference of the oil-feeding inlet 15. On the other hand, an inclined guide surface 22 is provided adjacently to each cut-out portion 19 in the end face of the turn-down portion 18 at the folded side thereof in the opposite direction F2 of the circumference of the oil-feeding inlet 15. The inclined guide surface 22 is inclined downward from the cut-out portion 19 toward the opposite direction F2 of the circumference of the oil-feeding inlet 15.

[0026] A flat guide surface 23 is formed in the end face of the turn-down portion 18 at the folded side thereof between the inclined guide surface 22 and the engaging recess 21, which forms a flat surface that is perpendicular to the axis of the oil-feeding inlet 15.

[0027] The contacting portion 20, the engaging recess 21, the flat guide surface 23 and the inclined guide surface 22 are formed between the pair of cut-out portions 19 in the mentioned order.

[0028] An annular filter receiver 24 is provided in an inner part of the oil-feeding inlet 15 for receiving a filter to be inserted into the oil-feeding inlet 15.

[0029] As shown in Fig. 11, a pair of engageable pieces (attachable portions) 26 are formed in the tank cap 17 for being inserted from the cut-out portion 19 of the oil-feeding inlet 15 to engage with the end face of the turn-down portion 18 at the folded side thereof. The pair of engageable pieces 26 are formed in the positions corresponding to the pair of cut-out portions 19 in the radial direction.

[0030] Each engageable piece 26 has a convex arc shape and is urged upward by a spring. Further, the engageable piece 26 is insertible from the cut-out portion

19 when the oil-feeding inlet 15 is lidded with the tank cap 17.

[0031] A cylinder lock is provided within the tank cap 17 to be operable by a key. The engageable piece 26 is rotatable in the circumferential direction of the oil-feeding inlet 15 by operating the key of the cylinder lock.

[0032] Thus, when the oil-feeding inlet 15 is lidded with the tank cap 17, and the engageable piece 26 is inserted into the oil-feeding inlet 15 from the cut-out portion 19 as shown in Fig. 8 and then rotated by operating the key in the direction of Arrow E shown in Figs. 7 and 8, the engageable piece 26 comes into contact with and slides on the inclined guide surface 22, and is pulled down against an urging force of the spring to reach the engaging recess 21 via the flat guide surface 23 to be retained when contacting the contacting portion 20, as a result of which the tank cap 17 is attached to the oil-feeding inlet 15.

[0033] The turn-down portion 18 forms a mounting portion for attaching the tank cap 17 to the oil-feeding inlet 15.

[0034] When the key is pulled out from the cylinder lock in the above-noted state, a grip portion 17a of the tank cap 17 is rotated idle to prevent the engaging piece 26 from being rotated and the tank cap 17 from being removed from the oil-feeding inlet 17.

[0035] As shown in Figs. 1 and 10, for example, numeral 27 denotes an oil-feeding funnel 27 to be attached to the oil-feeding inlet 15 of the fuel tank when oil is supplied to the fuel tank from the portable fuel container 16.

[0036] As described above, since the oil-feeding inlet 15 is positioned within the concave portion 14 of the side surface of the hood 12 and not projected from the side surface of the hood 12, it would be difficult for the operator to supply oil using the portable fuel container 16 having no nozzle. On the other hand, as shown in Fig. 10A, when the oil-feeding funnel 27 is attached to the oil-feeding inlet 15, a fuel-input opening 28 of the oil-feeding funnel 27 projects laterally from the side surface of the hood 12 to allow the operator to supply oil easily using the portable fuel container 16 as shown in Fig. 10B.

[0037] As shown in Fig. 3, the oil-feeding funnel 27 includes an upper funnel body 29, a lower guide tube 30, and a packing 31 fitted on a lower portion of the guide tube 30.

[0038] The funnel body 29 includes an upper funnel portion 32 and a lower tubular portion 33, both of which are integrally formed with each other by elastic material such as rubber.

[0039] The funnel portion 32 has a bowl-like shape with the circular fuel-input opening 28 having a large-diameter (wide-mouthed) opening at an upper end thereof and with a circular opening 34 having a smaller diameter than the fuel-input opening 28 at a bottom portion thereof.

[0040] The tubular portion 33 has a cylindrical shape, and communicates with the bottom opening 34 of the funnel portion 32 at an upper end thereof in the direction of an axis Y and opens at a lower end thereof in the direction of the axis Y.

[0041] The axis Y of the tubular portion 33 intersects a center line Z of the funnel portion 32 (a line connecting the center of the fuel-input opening 28 (center of the opening surface) and the center of the bottom opening 34 (center of the opening surface)) with a predetermined angle.

[0042] Thus, the tubular portion 33 extends obliquely downward from the bottom surface of the funnel portion 32. An opening surface at a lower end opening of the tubular portion 33 is perpendicular to the axis Y of the tubular portion 33. The tubular portion 33 has a lower side with respect to a radial direction W that is longer in the direction of the axis Y than an upper side with respect to a radial direction W.

[0043] The tubular portion 33 has a tube inserting groove 35 formed over the entire circumference thereof to extend upward from a lower end surface in the direction of the axis Y.

[0044] The tube inserting groove 35 is formed from the lower end to the upper end of the tubular portion 33 in the direction of the axis Y, and has a greater depth in the lower side than in the upper side with respect to the radial direction W. In other words, the depth of the groove is gradually increased from the upper end toward the lower end of the tubular portion 33 in the radial direction W, with the fuel-input opening 28 being directed upward.

[0045] The inner groove surface (groove bottom surface) of the tube inserting groove 35 is formed in a plane perpendicular to the axis Y of the tubular portion 33.

[0046] The guide tube 30 is made of a metal pipe (or rigid material such as a hard resin pipe) and has a straight tubular shape with opposite ends thereof in the direction of the axis Y being opened. The guide tube 30 is coaxially connected to the tubular portion 33 of the funnel portion 32 at an upper end thereof in the direction of the axis Y. To a lower end portion of the guide tube 30 in the direction of the axis Y is fitted and fixed an annular flange 36 at a predetermined distance upward from the lower end portion of the guide tube 30 in the direction of the axis Y.

[0047] As shown in Figs. 2, 3 and 5, the upper end side of the guide tube 30 in the direction of the axis Y is formed to allow the opening surface to intersect the axis Y of the guide tube 30. The lower side of the guide tube 30 with respect to the radial direction W projects upward greater than the upper side with respect to the radial direction W in the direction of the axis Y, with the fuel-input opening 28 being directed upward. Further, the end surface of the upper end side of the guide tube 30 in the direction of the axis Y is formed in the plane perpendicular to the axis Y of the guide tube 30 over the entire circumference thereof.

[0048] The upper end side of the guide tube 30 in the direction of the axis Y is inserted into the tube inserting groove 35 of the tubular 33, thereby to allow the guide tube 30 to be coaxially connected to the tubular portion 33 of the funnel body 29. At the same time, the end face of the guide tube 30 in the upper end side of the direction of the axis Y comes into surface contact with the inner groove surface of the tube inserting groove 35. With the

above arrangement, an inserting margin of the guide tube 30 relative to the tube inserting groove 35 of the funnel body 29 is greater at the upper side of the radial direction W than at the lower side of the radial direction W.

[0049] A pair of ridge portions 37 are formed integrally with an outer surface of the tubular portion 33 of the funnel body 29 in the direction of the axis Y over the entire circumference of the tubular portion 33. A band element may be provided between the pair of ridge portions 37 to fasten and fix the tubular portion 33 and the guide tube 30 together. A pair of cut-out grooves 38 are formed in the radial direction W in the lower end portion of the guide tube 30 in the direction of the axis Y, while an engageable piece 39 (attached portion) is provided to project outward in the radial direction W from each of the cut-out grooves 38.

[0050] The engageable piece 39 has an arc shape in a similar manner to the engageable piece 26 of the tank cap 17. The pair of engageable pieces 39 are connected to each other through a connecting portion 40 having the same cross section. Extending pieces 41 are provided in joint portions between the connecting portion 40 and the engaged piece 39 and fixed to an inner surface of the guide tube 30 by welding. The engageable pieces 39, the connecting portion 40 and the extending pieces 41 are integrally formed as a one piece by a plate member.

[0051] The packing 31 is made of rubber and formed as a ring having a predetermined thickness. The packing 31 is fitted on the guide tube 30 from the lower end thereof in the direction of the axis Y to come into contact with the flange 36. In order to attach the oil-feeding funnel 27 having the above-noted construction to the oil-feeding inlet 15, the engageable pieces 39 are aligned with the cut-out portions 19 in the first place. In the oil-feeding funnel 29 of the present embodiment, the lower end portion of the guide tube 30 in the direction of the axis Y is opposed to the upper end opening of the fuel-input opening 15, and the engaged pieces 39 are aligned with the cut-out portions 19 as shown in imaginary line in Fig. 7, with the fuel-input opening 28 being directed rearward and obliquely downward. When the axial lower end portion of the guide tube 30 is inserted into the oil-feeding inlet 15 in this state, the engageable pieces 39 are inserted into the oil-feeding inlet 15 through the cut-out portions 19 while the packing 31 comes into contact with an upper end face of the oil-feeding inlet 15 in the axial direction.

[0052] In this state, the engageable pieces 39 are positioned outward from the flat guide surfaces 23 in the direction of the axis X of the oil-feeding inlet 15. When the guide tube 30 (oil-feeding funnel 27) is rotated backward (in the direction of Arrow E), the engageable pieces 39 are pulled down by the inclined guide surfaces 22 to deform the packing 31. Then, the guide tube 30 is further rotated in the direction of Arrow E, and each engageable piece 39 slides on the flat guide surface 23 to reach the engaging recess 21 to contact the contacting portion 20, thereby to allow the guide tube 30 (oil-feeding funnel 27) to be retained and attached to the oil-feeding inlet. In this state, the fuel-input opening 28 is directed upward as shown in Fig. 1.

[0053] In this attached state, each engaged piece 39 is not removed from the engaging recess 21 unless the packing 31 is deformed, and thus not easily rotated in the opposite direction to the direction of Arrow E. With the oil-feeding funnel 27 having the above-noted construction, since the oil-feeding funnel 27 is retained and attached to the oil-feeding inlet 15 due to the similar construction for retaining the tank cap 17 relative to the oil-feeding inlet 15, the operator is able to hold the heavy portable fuel container 16 even if the fuel container 16 is placed on the funnel portion 32 of the oil-feeding funnel 27, and easily supply the tank with oil.

[0054] Further, since the fuel-input opening 28 is directed upward even when the oil-feeding funnel 27 is attached to the inclined oil-feeding inlet 15 opened obliquely upward, the operator can easily supply oil to the tank even if the portable fuel container 16 has no nozzle.

[0055] It should be noted that the fuel-input opening 28 may not be directed straight upward with the oil-feeding funnel 27 being attached to the oil-feeding inlet 15 as shown. Instead, the opening surface of the oil-feeding funnel 27 may be slightly inclined relative to a horizontal plane with the oil-feeding funnel 27 being attached to the oil-feeding inlet 15 as long as the fuel-input opening 28 is directed upward relative to the opening direction of the oil-feeding inlet 15 (the center line Z of the funnel portion 32 is directed upward relative to the axis X of the oil-feeding inlet 15) with the oil-feeding funnel 27 being attached to the oil-feeding inlet 15.

[0056] Further, since the lower side of the guide tube 30 in the radial direction W projects upward in the direction of the axis Y to a greater degree than the upper side thereof in the upper end portion of the guide tube 30 in the direction of the axis Y (since the inserting margin of the guide tube 30 relative to the tube inserting groove 35 of the funnel body 29 is greater in the lower side than in the upper side of the guide tube 30 in the radial direction W), relative rotation about the axis between the tubular portion 33 of the funnel body 29 and the guide tube 30 is restricted when the guide tube 30 is inserted into the tube inserting groove 35, thereby to position the funnel body 29 and the guide tube 30 in the circumferential direction.

[0057] In addition, even when the portable fuel container 16 is placed on the funnel, the load of the fuel container 16 is born at the lower side of the joint portion where the guide tube 30 is inserted into the tube inserting groove 35, and thus the operator is able to hold the portable fuel container 16 firmly.

[0058] Since the lower end portion of the guide tube 30 is inserted into the oil-feeding inlet 15 to be rotated in the circumferential direction by a predetermined angle, the guide tube 30 is retained against rotation and attached to the oil-feeding inlet with the fuel-input opening 28 being upward, thereby to facilitate attachment of the

oil-feeding funnel 27.

[0059] Further, since the funnel body 29 is made of rubber, the force applied to the oil-feeding funnel 27 in the rotational direction can be absorbed when the portable fuel container 16 is placed on the funnel body 29.

[0060] It should be note that a spring (flat spring or spring steel) may be employed instead of the rubber packing 31 in the above-described construction. Any other member may be substituted for the rubber packing 31 as long as it is elastically deformable.

[0061] The construction for retaining the tank cap 17 relative to the oil-feeding inlet 15 is not limited to the above-noted arrangement. Instead, a male thread formed on an outer periphery of the inserting portion of the tank cap 17 may be screwed to a female thread formed in an inner periphery of the oil-feeding inlet 15. Thus, in this case, the male thread is formed on the outer periphery of the inserted portion of the guide tube 30 of the oil-feeding funnel 27.

[0062] The funnel body 29 and the guide tube 30 may be integrally formed as one piece by using rigid material such as metal or hard resin, for example.

Claims

1. An oil-feeding funnel including a fuel-input opening (28) and applicable to an inclined oil-feeding inlet (15) opened obliquely upward, **characterized in that**
   the oil-feeding funnel is configured to be retained against rotation by a mounting portion (18) for receiving a tank cap (17) for lidding the oil-feeding inlet (15) and attached to the oil-feeding inlet, and
   that the fuel-input opening (28) is configured to be directed upward relative to the opening direction of the oil-feeding inlet (15) with the funnel being attached to the oil-feeding inlet (15).

2. The oil-feeding funnel as claimed in claim 1, **characterized in that** the funnel comprises a straight tubular guide tube (30) made of rigid material to be attached to the oil-feeding inlet (15), and a funnel body (29) having the fuel-input opening (28) and made of elastic material,
   that the funnel body (29) has a tube inserting groove (35) formed therein, into which an upper side portion of the guide tube (30) in the axial direction thereof is inserted, thereby to connect the funnel body (29) to the guide tube (30), and
   that an inserting margin of the guide tube (30) relative to the tube inserting groove (35) is greater at an upper side of a radial direction (W) than at a lower side of the radial direction (W).

3. The oil-feeding funnel as claimed in claim 1 or 2, **characterized in that** the funnel is attached to the oil-feeding inlet (15) when a lower end portion of the guide tube (30) is inserted into the oil-feeding inlet (15) and rotated in a circumferential direction by a predetermined angle, thereby to retain the guide tube (30) against rotation and allow the fuel-input opening (28) to be directed upward relative to the opening direction of the oil-feeding inlet (15).

Fig.1

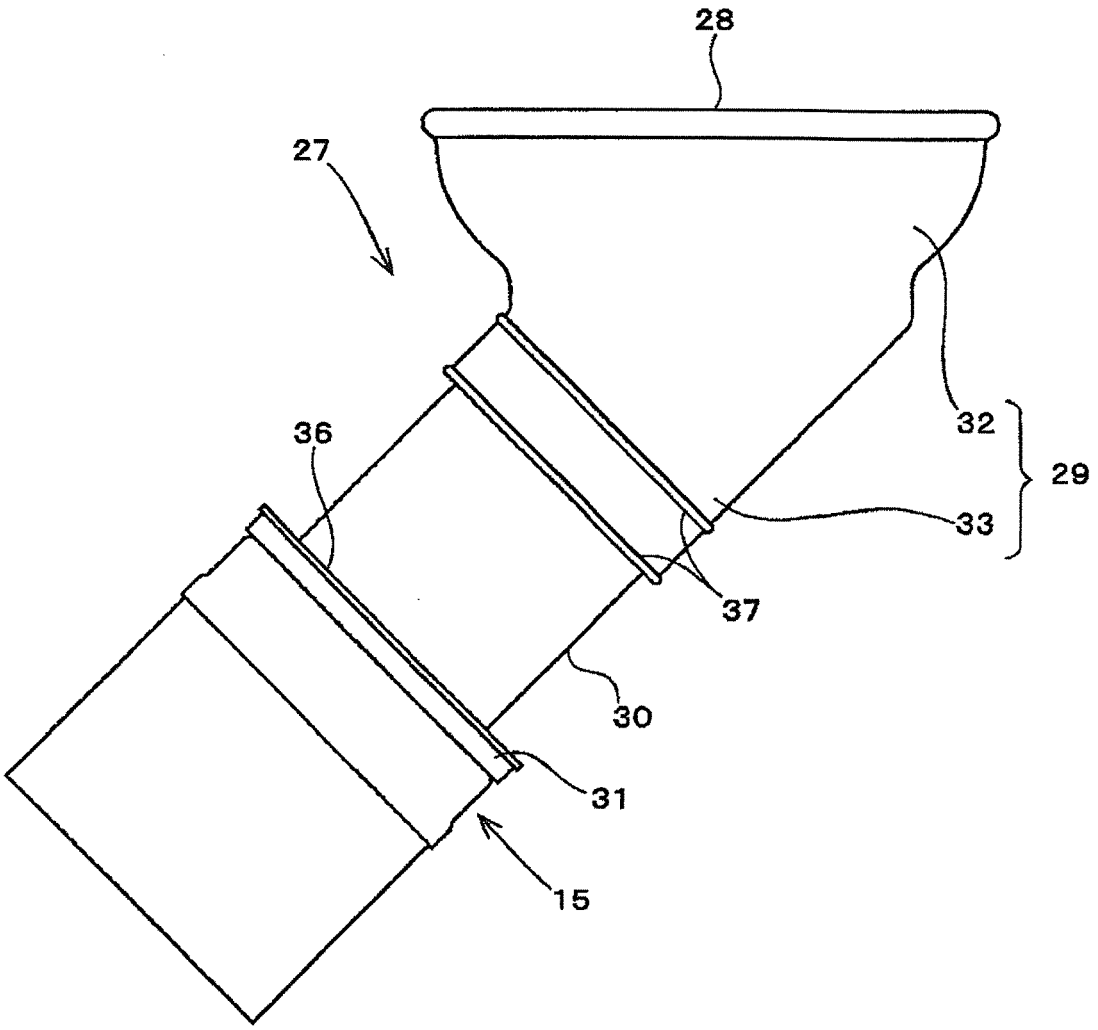


Fig.2

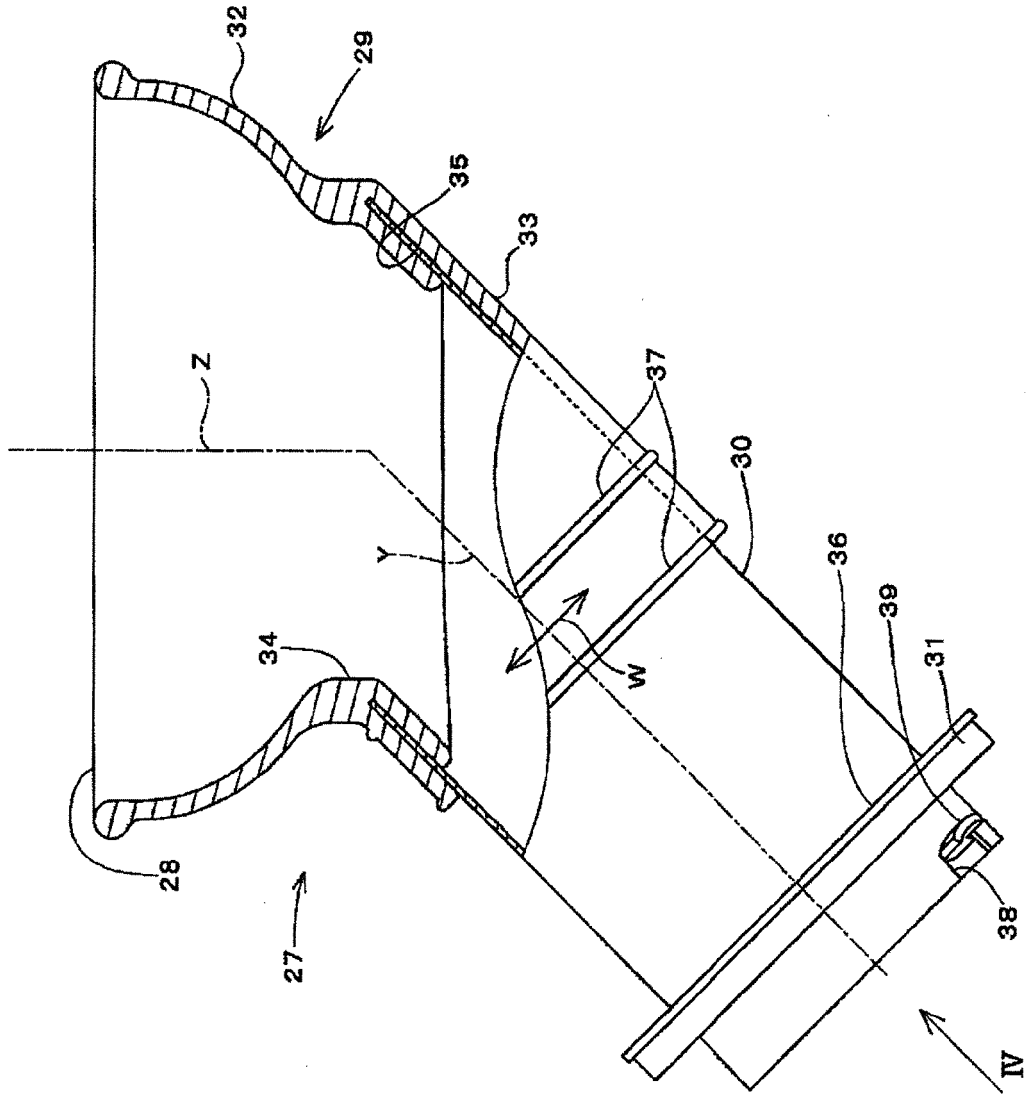


Fig.3

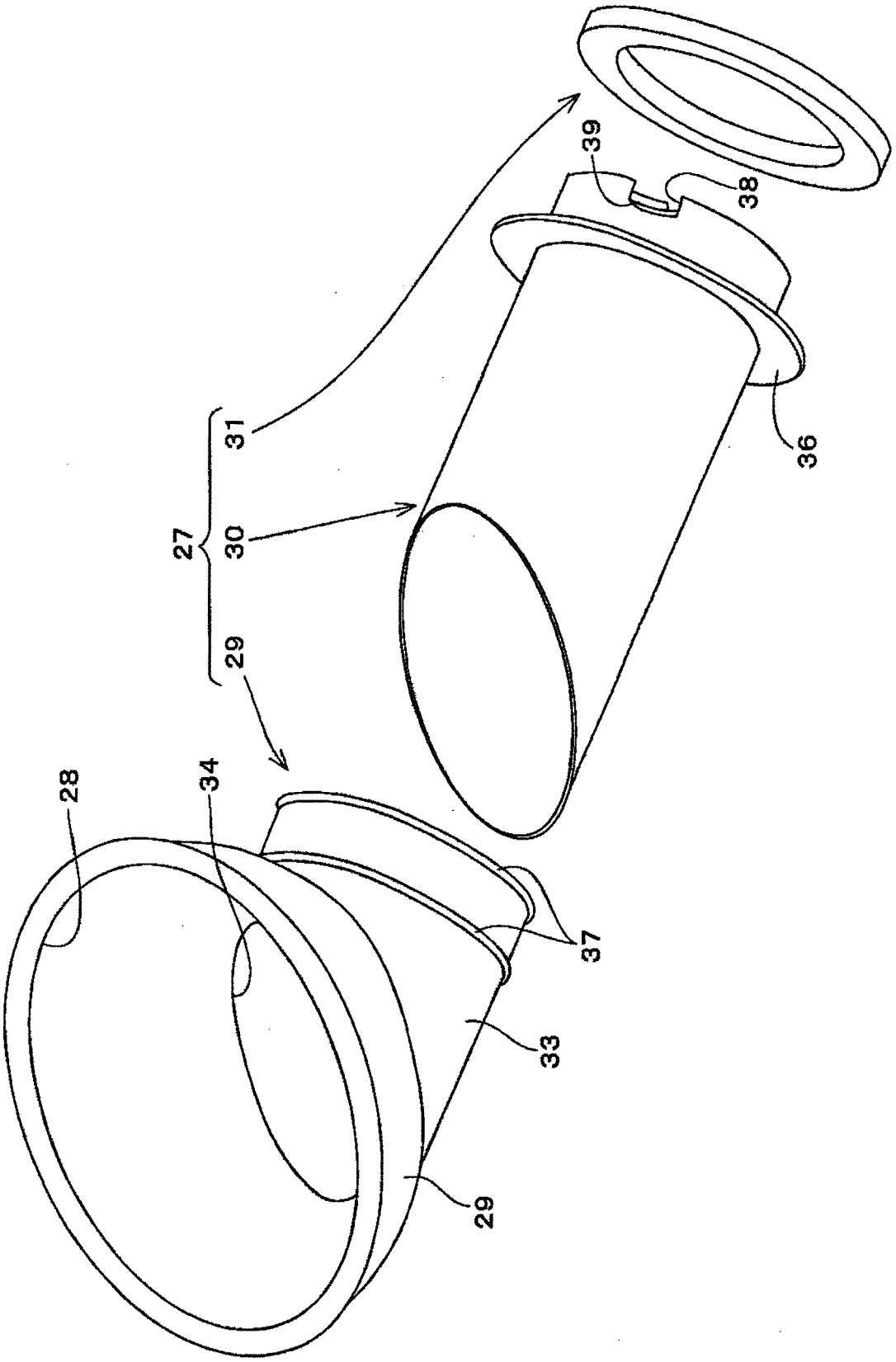


Fig.4

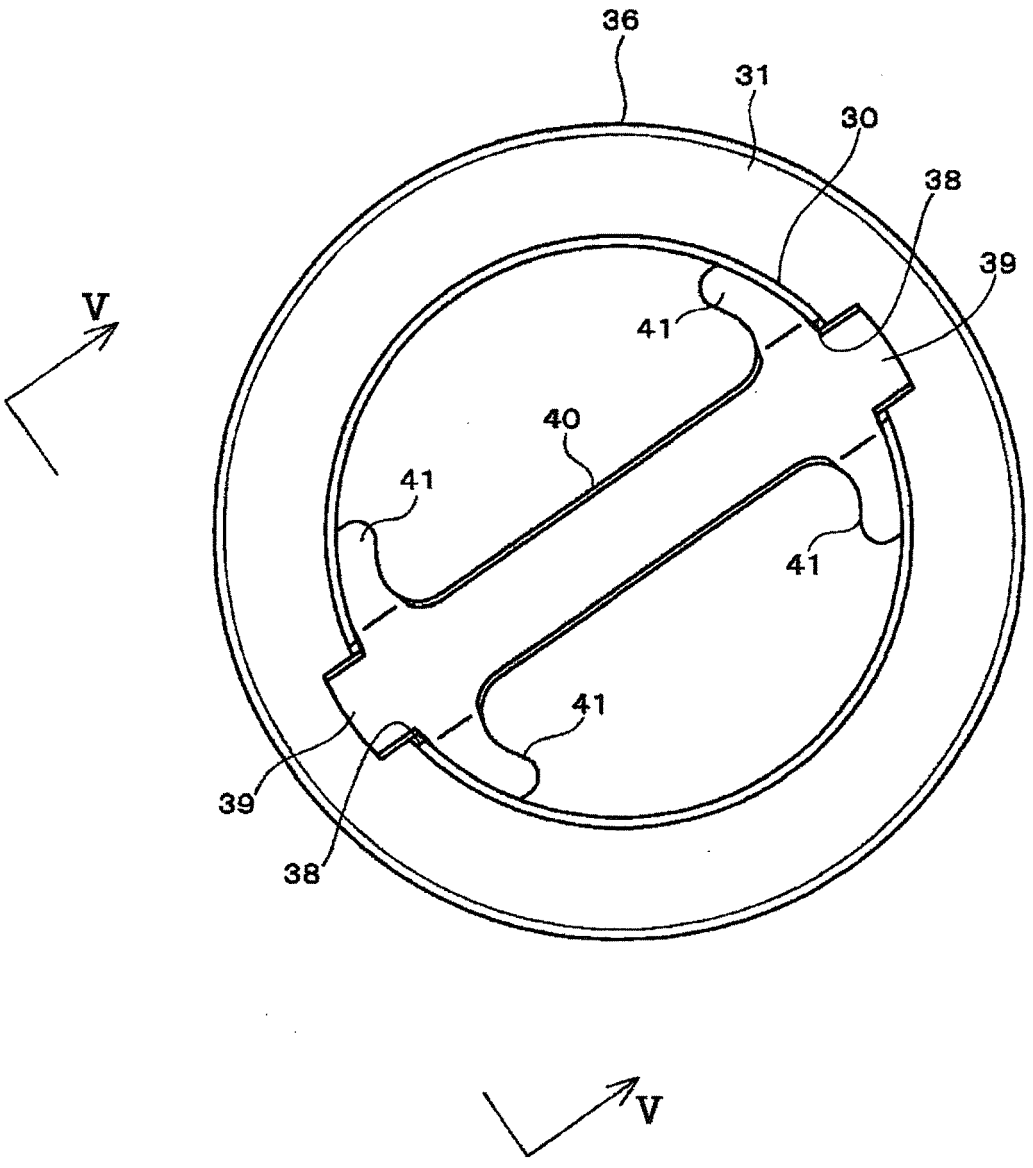


Fig.5

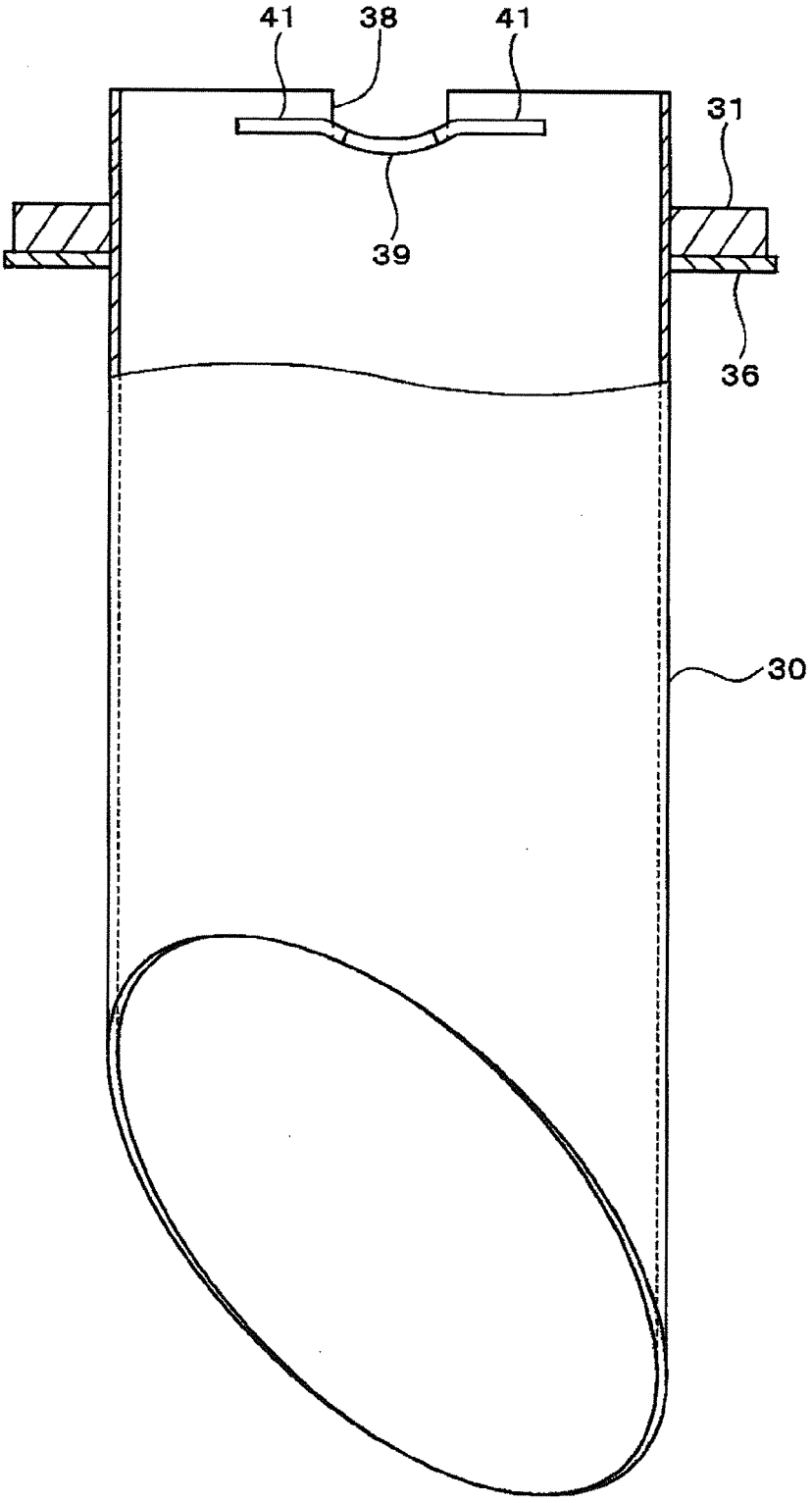


Fig.6

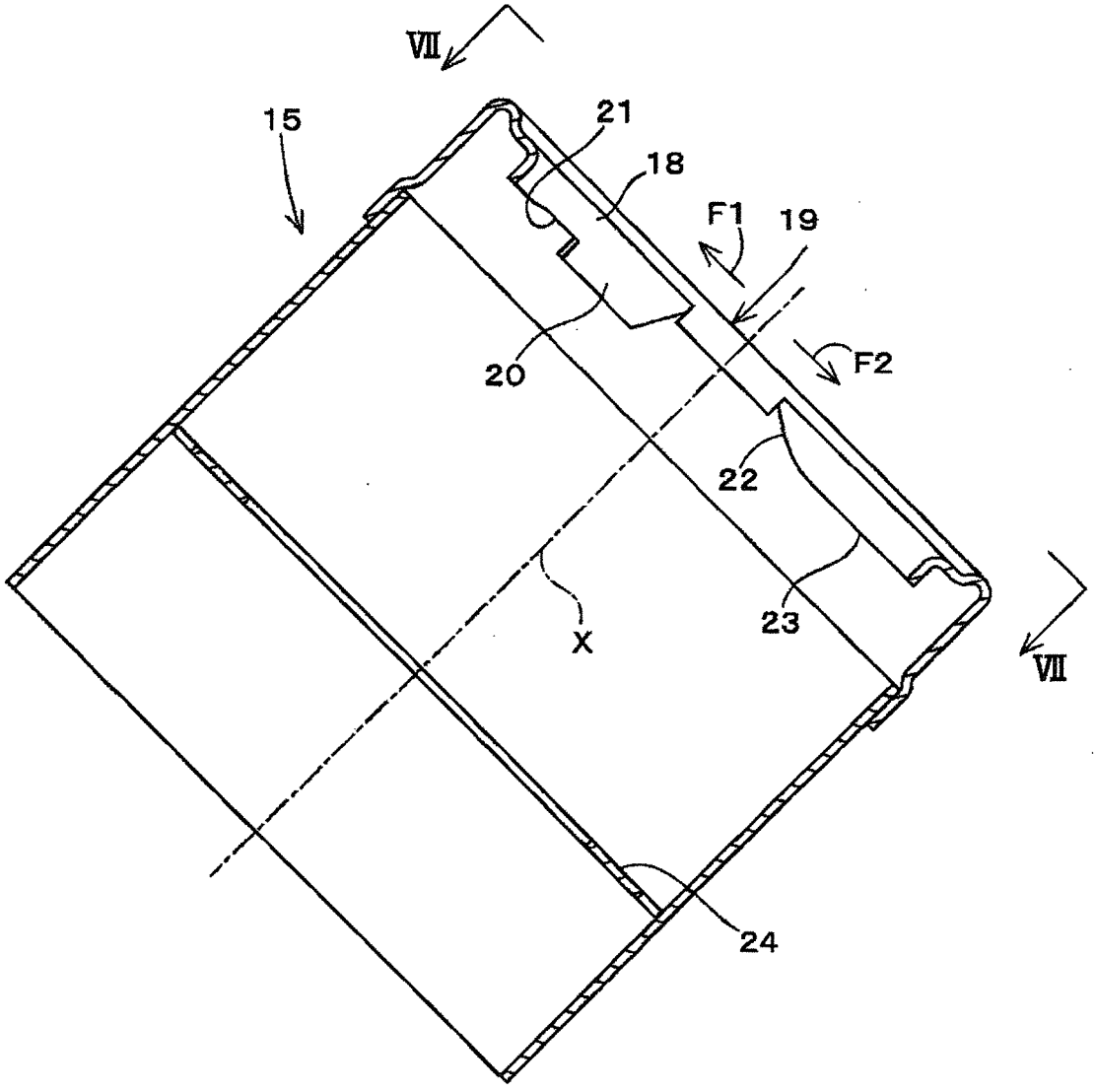


Fig.7

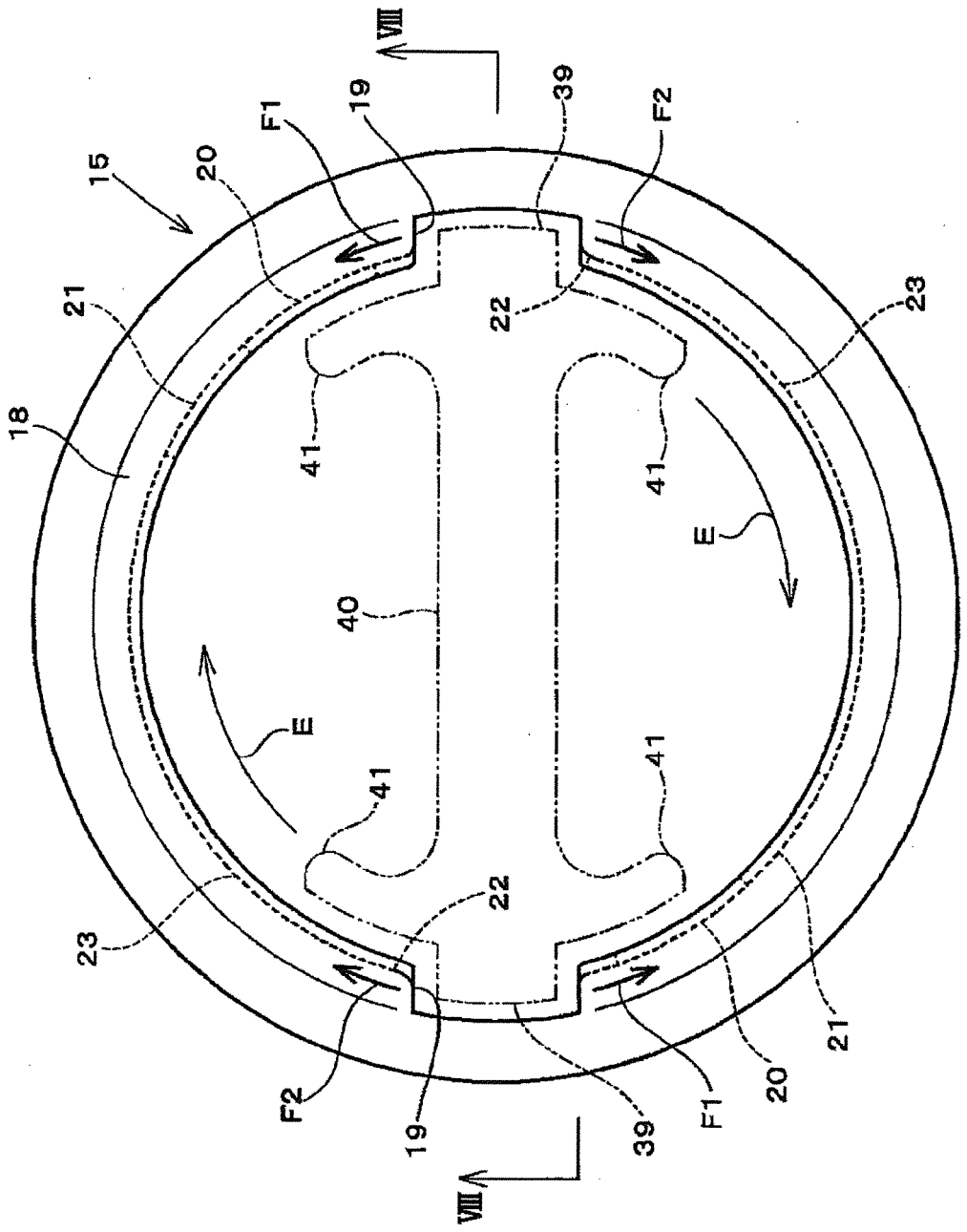


Fig.8

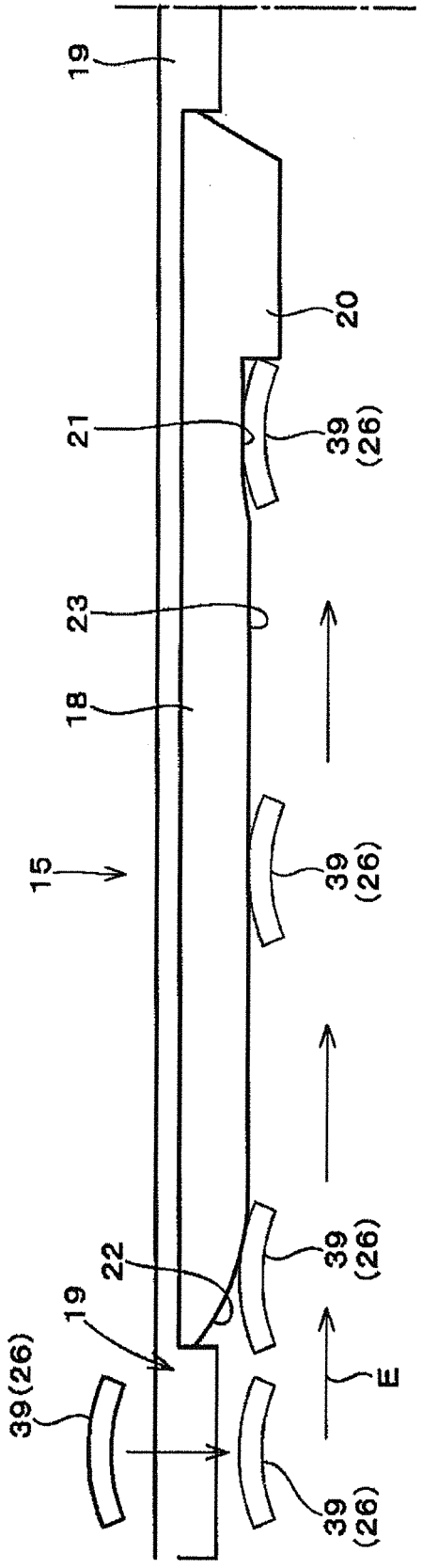


Fig.9

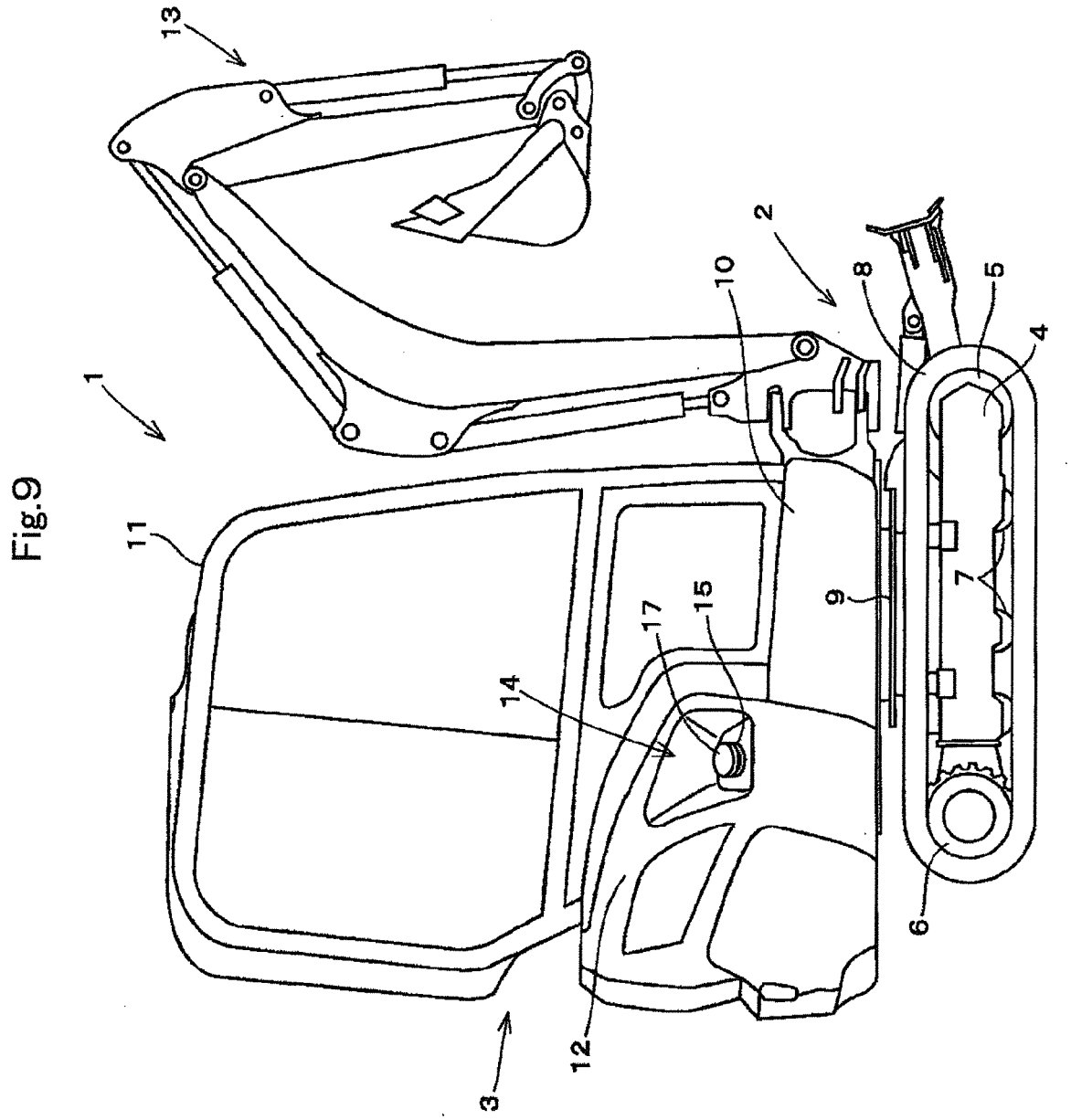


Fig.10B

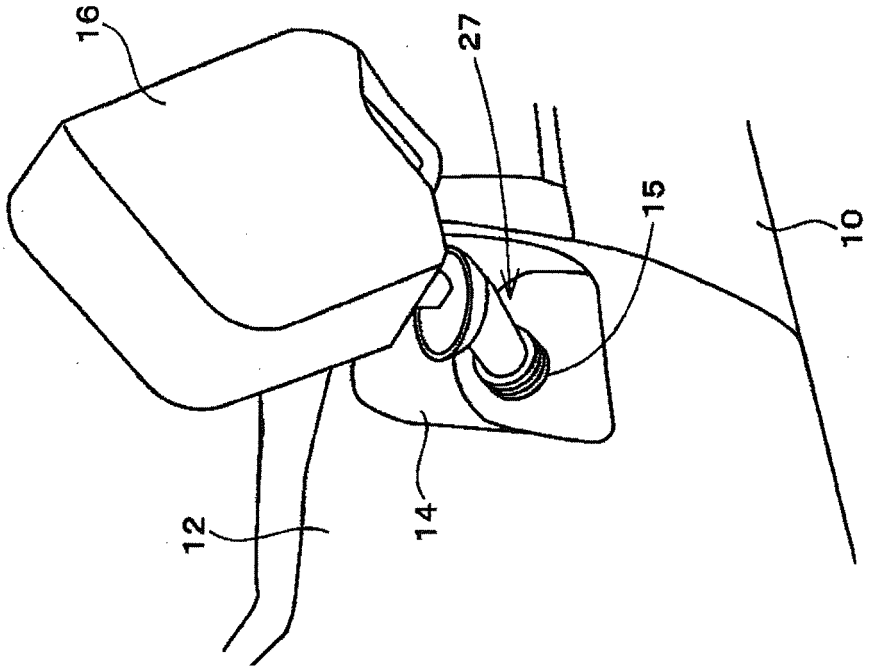


Fig.10A

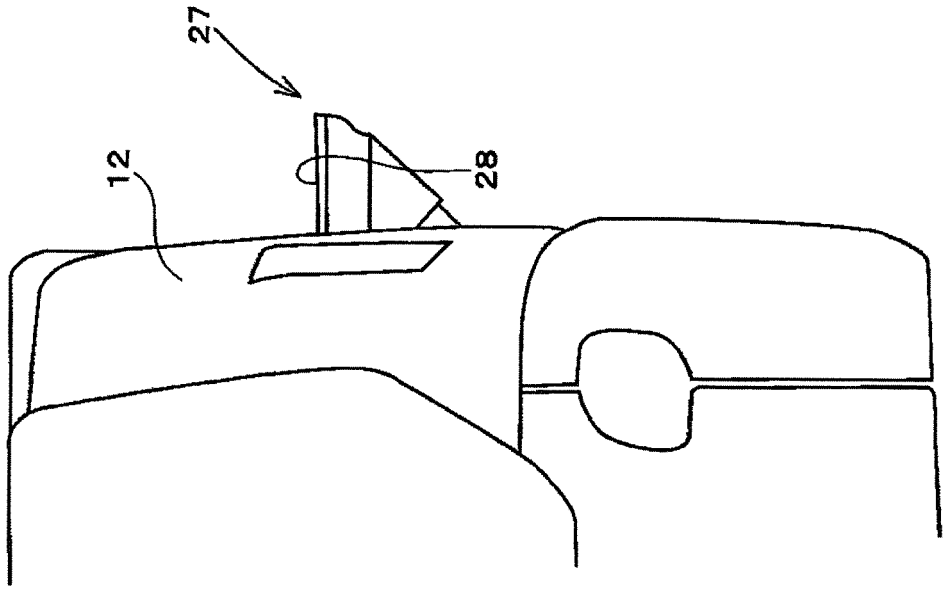
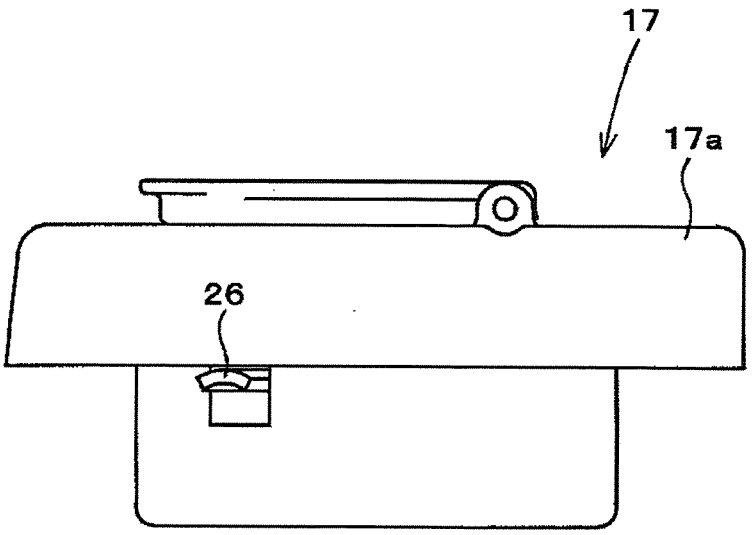


Fig.11



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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