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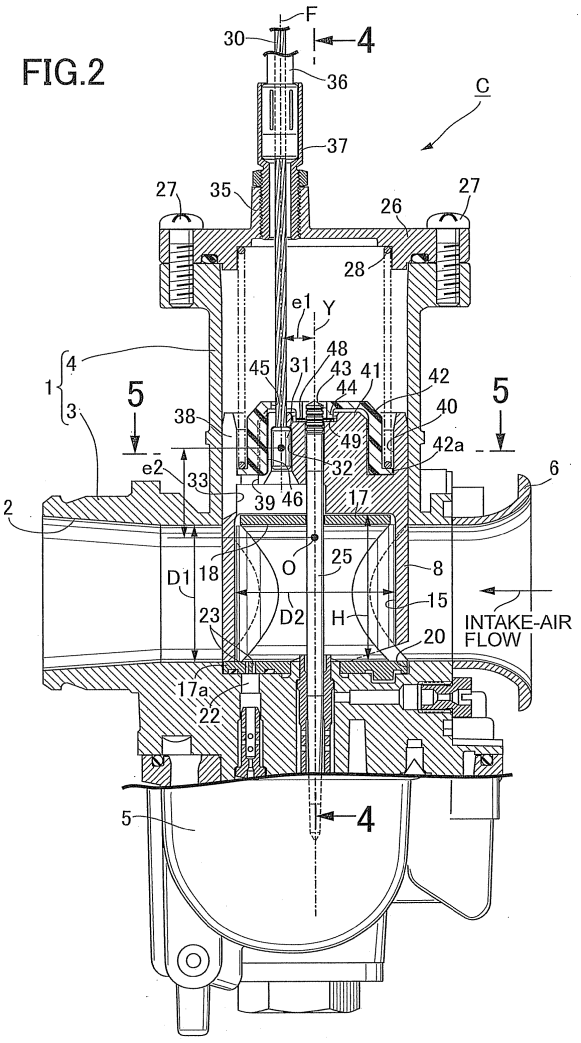
(54) Carburetor

(57) In a carburetor, a housing concave portion (15) opening toward an air intake bore (2) is formed in an end face of a piston-type throttle valve (8), a venturi block (17) that is to be housed in the housing concave portion (15) when the throttle valve (8) is fully closed is fixedly attached to an air intake trunk (3), and a venturi (18) that is made continuous to an upstream side and an downstream side of the air intake bore (2) when the throttle valve (8) is fully opened is formed in the venturi block (17). A connection terminal (31) of an operation wire (30) capable of opening the throttle valve (8) through a pulling operation thereof is connected to the throttle valve (8) in a position above the housing concave portion (15), the operation wire (30) is arranged in parallel to a central axis (Y) of the throttle valve (8) inside the valve cylinder (4), and a return spring (28) that biases the throttle valve (8) in a closing direction is housed inside the valve cylinder (4). Accordingly, it is possible to satisfy a downsizing of a carburetor including a venturi block and a light operability of a throttle valve.

FIG.2



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Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] The present invention relates to an improvement of a carburetor comprising: a carburetor body having an air intake trunk having an air intake bore formed in an inside of the air intake trunk and a valve cylinder intersecting the air intake trunk and projecting from one side of the air intake trunk; and a piston-type throttle valve that is slidably fitted into the valve cylinder and opens and closes the air intake bore, in which a housing concave portion opening toward the air intake bore is formed in an end face of the throttle valve, a venturi block that is to be housed in the housing concave portion when the throttle valve is fully closed is fixedly attached to the air intake trunk, and a venturi that is made continuous to an upstream side and a downstream side of the air intake bore when the throttle valve is fully opened is formed in the venturi block.

DESCRIPTION OF THE RELATED ART

[0002] In such a conventional carburetor, as disclosed in Patent Document 1 mentioned below, an upper end portion of a throttle valve is coupled to a tip end of an operation lever by means of a link, the operation lever being pivotally supported on a valve cylinder and being swingable up and down. The up-and-down swinging of the operation lever forces the throttle valve to open and close.

[0003] Additionally, as disclosed in Patent Document 2 mentioned below, in a carburetor having no venturi block, in which an air intake bore is opened and closed by use of a piston-type throttle valve, an operation wire is connected to the throttle valve, and a pulling operation of this operation wire opens the throttle valve.

[Patent Document 1] Japanese Utility Model Application Laid-open No. 58-14451
[Patent Document 2] Japanese Utility Model Application Laid-open No. 59-86347

[0004] Meanwhile, in a carburetor of the type disclosed in Patent Document 1, when a throttle valve is fully opened, a venturi inside a venturi block is made continuous to an air intake bore located to the front and back sides thereof. This allows a large amount of intake air to be smoothly supplied to the engine through the air intake bore. Accordingly, the carburetor of the type has an advantage that fuel stop power of an engine can be enhanced. However, since the operation lever for opening and closing the throttle valve is pivotally supported on the valve cylinder, the valve cylinder is inevitably swollen to the pivot side of the operation lever. Accordingly, there is a disadvantage that the carburetor of this type is large-sized. Additionally, when the operation lever is swung up and down, a tip end thereof makes arc motions, so that a component force thereof in sideways directions acts on the throttle valve from the operation lever. Accordingly, friction resistance between the throttle valve and the valve cylinder is increased, leading to an increase in operation load of the operation lever.

[0005] On the other hand, in a carburetor of the type disclosed in Patent Document 2, the opening and closing of a throttle valve are achieved only by a simple connection of an operation wire to the throttle valve. Accordingly, there is no need to form a swollen portion in a valve cylinder, and the carburetor can be formed compactly. The connection of the operation wire to the throttle valve, however, requires the throttle valve to be provided with a connection hole into which a connection terminal of the operation wire is fitted, and also with a slit that guides the operation wire from a side face of the throttle valve to the connection hole when the connection terminal is fitted into the connection hole. The slit is provided in a side face, constantly contacting an air intake trunk, of the throttle valve in such a manner as to avoid communication thereof with the air intake bore. For this reason, a fitting portion of the connection hole and the connection terminal, that is, a connecting position of the operation wire and the throttle valve has to be offset from a central axis of the throttle valve toward a lateral side of the air intake bore. As a result, when the operation wire is pulled, the throttle valve inclines more or less, whereby friction resistance between the throttle valve and the valve cylinder is increased.

SUMMARY OF THE INVENTION

[0006] The present invention has been made in consideration of the above described circumferences, and an object thereof is to provide a carburetor that can satisfactorily be made compact and achieve a light operability of a throttle valve while securing the advantage of the carburetor of the type described in Patent Document 1.

[0007] In order to achieve the object, according to a first feature of the present invention, there is provided a carburetor comprising: a carburetor body having an air intake trunk having an air intake bore formed in an inside of the air intake trunk and a valve cylinder intersecting the air intake trunk and projecting from one side of the air intake trunk; and a piston-type throttle valve that is slidably fitted into the valve cylinder and opens and closes the air intake bore, in which a housing concave portion opening toward the air intake bore is formed in an end face of the throttle valve, a venturi block that is to be housed in the housing concave portion when the throttle valve is fully closed is fixedly attached to the air intake trunk, and a venturi that is made continuous to an upstream side and a downstream side of the air intake bore when the throttle valve is fully opened is formed in the venturi block, **characterized in that** a connection termi-

nal of an operation wire capable of opening the throttle valve through a pulling operation thereof is connected to the throttle valve in a position above the housing concave portion, the operation wire is arranged in parallel to a central axis of the throttle valve inside the valve cylinder, and a return spring that biases the throttle valve in a closing direction is housed inside the valve cylinder.

[0008] With the first feature of the present invention, when the throttle valve is in a fully opened state, the throttle valve is housed in whole inside the valve cylinder with the venturi block being left in the middle portion of the air intake bore, and thereby the venturi of the venturi block is made continuous to the upstream side and the downstream side of the air intake bore without any interference from the throttle valve. This enables a large amount of intake air to pass through the air intake bore smoothly, and thereby fuel stop power of the engine can be effectively enhanced.

[0009] Moreover, since the use of the operation wire extending upward from the valve cylinder and the return spring arranged inside the valve cylinder for opening and closing the throttle valve eliminates the need of forming a sideways projecting portion in the valve cylinder, the valve cylinder can be formed into the most compact cylindrical shape, and downsizing of the carburetor can be achieved.

[0010] In addition, the operation wire capable of opening the throttle valve through the pulling operation thereof is connected to the throttle valve, and also, this operation wire is arranged in parallel to the central axis of the throttle valve inside the valve cylinder. Thereby, when the operation wire is pulled, since, a pulling force thereof acts on the throttle valve along a line of pulling action that is parallel to the central axis of the throttle valve, the throttle valve can be lightly opened without being caused to incline. Accordingly, reduction of an operation load on the throttle valve can be achieved. Additionally, since the need of forming a sideways projecting portion in the valve cylinder is eliminated, the valve cylinder can be formed into the most compact cylindrical shape, and downsizing of the compact carburetor can be achieved.

[0011] Further, according to a second feature of the present invention, in addition to the first feature, a connecting position of the connection terminal to the throttle valve is offset from the central axis of the throttle valve toward the downstream side of the air intake bore.

[0012] With the second feature of the present invention, the connecting position of the connection terminal to the throttle valve is set so as to be offset from the central axis of the throttle valve toward the downstream side of the air intake bore. Accordingly, even though, - when the throttle valve is at an idle opening degree or middle opening degree while an engine is in operation, an air intake negative pressure of the engine acts on the throttle valve, which is exposed to the air intake bore, from the downstream side of the air intake bore, and a load that attracts the throttle valve to the downstream side of the air intake bore is generated, a pulling force of the operation wire generated in pulling action acts on the throttle valve along a line of pulling action offset from the central axis of the throttle valve to the downstream side of the air intake bore, and the throttle valve can be lightly opened without being caused to incline. Thus, further reduction in operation load on the throttle valve can be achieved.

[0013] Furthermore, according to a third feature of the present invention, in addition to the second feature, the connecting position of the connection terminal to the throttle valve is offset from an axially middle point of the throttle valve in a pulling direction of the operation wire.

[0014] With the third feature of the present invention, since the connecting position of the connection terminal to the throttle valve is set so as to be offset from the axially middle point of the throttle valve in a pulling direction of the operation wire, a point of application of a pulling force of the operation wire is brought to the above-described offset position. This contributes to prevention of inclination of the throttle valve, whereby further reduction of the operation load on the throttle valve can be achieved.

[0015] Furthermore, according to a fourth feature of the present invention, in addition to the first feature, an inner diameter of the venturi is set to 22 mm or smaller, and an outer diameter of the throttle valve is set to be 1.2 to 1.4 times as large as the inner diameter of the venturi.

[0016] With the fourth feature of the present invention, since the inner diameter of the venturi is set to 22 mm or smaller, and the outer diameter of the throttle valve is set to be 1.2 to 1.4 times as large as the inner diameter of the venturi, the outer diameter of the throttle valve is 26.4 mm when: the inner diameter of the venturi is set to 22 mm; and the smallest allowable multiplying factor 1.2 is selected. Accordingly, if the thickness of portions, of the throttle valve and the venturi block, which are fitted to each other are set substantially equal to each other, the respective thicknesses thereof are approximately 1.1 mm. If the fitting clearance between the throttle valve and the venturi block is taken into consideration, a value thereof is further slightly smaller. The value of this thickness is a lower limit in securing practical strength of the throttle valve and the venturi block. This can effectively achieve weight reduction and downsizing of the carburetor. By contrast, when the largest allowable multiplying factor 1.4 is employed, the outer diameter of the throttle valve is 30.8 mm. Accordingly, if the thickness of portions, of the throttle valve and the venturi block, which are fitted to each other are set substantially equal to each other, the respective thicknesses of the throttle valve and the venturi block are approximately 2.2 mm. Thus, if the outer diameter of the throttle valve exceeds 30.8 mm, downsizing of the carburetor is impaired, and, moreover, if the respective thicknesses of the throttle valve and the venturi block exceed approximately 2.2 mm, weight reduction and downsizing of the carburetor is not satisfied. These are not preferable.

[0017] Furthermore, according to a fifth feature of the

present invention, in addition to the first to third features, a small concave portion is provided in a ceiling face of the housing concave portion, and a connection hole into which the connection terminal is fitted is opened in a small ceiling face of the small concave portion.

[0018] With the fifth feature of the present invention, when the operation wire is abruptly returned in a direction closing the throttle valve for abrupt slowdown operation of the engine, the connection terminal can be accepted into the small concave portion in the ceiling face of the housing concave portion even when the connection terminal escapes from the connection hole. Accordingly, when the throttle valve returns to an idle position with some delay, the connection terminal is prevented from entering an interstice between the ceiling face of the housing concave portion and an upper face of the venturi block, whereby it is ensured that the throttle valve returns to the idle position.

[0019] Furthermore, according to a sixth feature of the present invention, in addition to the fifth feature, a slit is provided in the throttle valve, the slit starting from a side face of the throttle valve in the downstream side of the air intake bore and then reaching the connection hole, starting from an upper end of the throttle valve and then ending before reaching the air intake bore, and having a groove width smaller than an inner diameter of the connection hole, thereby allowing the operation wire to pass therethrough, and a through-hole that allows the connection terminal to pass therethrough is provided in a middle of the slit.

[0020] With the sixth feature of the present invention, the connection terminal of the operation wire can be easily fitted into the connection hole of the throttle valve by use of the through hole and the slit in the throttle valve. Moreover, the slit is provided to a side face of the throttle valve in the downstream side of the air intake bore since the connection hole and the connection terminal are arranged so as to be offset from the central axis of the throttle valve toward the downstream side of the air intake bore. However, when the throttle valve is in a fully-closed state, a lower end of the slit ends before reaching the air intake bore, whereby the slit never communicates with the air intake bore, and does not impair an intake airflow controlling function of the throttle valve.

[0021] The above description, other objects, characteristics and advantages of the present invention will be clear from detailed descriptions which will be provided for the preferred embodiment referring to the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 is an elevation view of a compact carburetor according to an embodiment of the present invention;

FIG. 2 is a cross-sectional view taken along line 2-2 in FIG. 1 (showing a fully-closed state of a throttle valve);

FIG. 3 is a view showing a fully-opened state of the throttle valve and corresponding to FIG. 2;

FIG. 4 is a cross-sectional view taken along line 4-4 in FIG. 2;

FIG. 5 is a cross-sectional view taken along line 5-5 in FIG. 2;

FIG. 6 is a longitudinal cross-sectional view of a single throttle valve of the compact carburetor;

FIG. 7 is a view seen from an arrow 7 in FIG. 6; and

FIG. 8 is an exploded perspective view of a part of the compact carburetor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] A preferred embodiment of the present invention will be described below with reference to the attached drawings.

[0024] First of all, in FIGS. 1 to 4, a compact carburetor C according to the embodiment of the present invention is used for an engine of a two-wheeled motor vehicle. A carburetor main body 1 of the compact carburetor C comprises an air intake trunk 3 and a valve cylinder 4, and a float chamber 5 is attached to a lower surface of the air intake trunk 3, the air intake trunk 3 having an air intake bore 2 formed in an inside of the air intake trunk, the valve cylinder 4 intersecting the air intake trunk 3 at a longitudinally middle portion thereof and projecting upward from the air intake trunk 3. This float chamber 5 constantly stores therein a certain amount of fuel. In FIG. 2, a right end side of the air intake bore 2 is an upstream side, a left end side thereof is a downstream side continuing into an air intake port of the engine, and a funnel 6 used for taking air is connected to the upstream side thereof.

[0025] On the other hand, a piston-type throttle valve 8 that has an outer diameter larger than an inner diameter of the air intake bore 2 and opens and closes the air intake bore 2 is provided to the valve cylinder 4 so as to be slidable and not to be rotatable. In order to prevent the throttle valve 8 from rotating, while a key groove 9 extending in a direction in which the throttle valve 8 slides is provided in a side face of the throttle valve 8, a key 10 that slidably engages with the key groove 9 is fixedly provided to the valve cylinder 4 as shown in FIG. 4. Additionally, a positioning key 11 having the same phase as the key 10 is provided in the neighborhood of an upper end of the valve cylinder 4, and, when the throttle valve 8 is inserted into the valve cylinder 4, this positioning key 11 engages with the key groove 9 before the key 10 engages, thereby regulating a position where the throttle valve 8 is fitted.

[0026] As shown in FIG. 4 as well, the throttle valve 8 has a downward slope face 13 formed on a side face thereof in the side opposite to the side having the key groove 9. An idle adjusting bolt 14 is attached to the valve cylinder 4 by being screwed so that advancement and retraction of the idle adjusting bolt 14 may be controllable.

The idle adjusting bolt 14 determines a degree of idle opening by abutting on the downward slope face 13.

[0027] As shown in FIGS. 2, 4 and 6, a cylindrical housing concave portion 15 opening toward the air intake bore 2 is further provided in the throttle valve 8.

[0028] As shown in FIGS. 2 to 4 and 8, a venturi block 17, which is fitted into and housed in the housing concave portion 15 when the throttle valve 8 is fully closed, and whose basic shape is a cylindrical shape, is fixedly attached to the air intake trunk 3. This venturi block 17 includes a venturi 18, and has a circumferentially projecting flange portion 17a formed on a lower end portion of the venture block 17, the venturi 18 being able to be continuous to the upstream side and the downstream side of the air intake bore 2 by penetrating the venturi block 17 in a direction orthogonal to an axis of the venturi block 17.

[0029] The lower end portion of the venturi block 17 is fitted into a relatively shallow convex portion 20 formed in a lower face of a middle portion of the air intake bore 2, and then, is fitted to the air intake trunk 3 by means of plural screws 24.

[0030] In the above, as is apparent from FIG. 4, an inner diameter D1 of the venturi 18 is set to 22 mm or smaller, and an outer diameter D3 of the throttle valve 8 is set to be 1.2 to 1.4 times as large as the inner diameter D1 of the venturi 18. Additionally, an inner diameter D2 of the housing concave portion 15 is set to a diameter slightly larger than an outer diameter of the venturi block 17 for the purpose of obtaining a minute clearance between an inner peripheral face of the housing concave portion 15 and an outer peripheral face of the venturi block 17.

[0031] The air intake trunk 3 has a main nozzle 21 attached to the air intake trunk 3 on a central axis of the valve cylinder 4 (equal to a central axis Y of the throttle valve 8) so as to penetrate a bottom wall of the venturi block 17, the main nozzle 21 being capable of injecting, into an interior portion of the venturi 18, the fuel existing inside the float chamber 5. Additionally, a fuel well 22 which stores the fuel supplied from the float chamber 5 is provided to a bottom face of the relatively shallow concave portion 20 of the air intake trunk 3, and one or plural slow ports 23 capable of injecting fuel existing inside the fuel well 22 into a portion of the venturi 18 on a downstream of the main nozzle 21 is provided in the bottom wall of the venturi block 17.

[0032] A needle valve 25 that is inserted into the main nozzle 21 by penetrating the venturi block 17 is attached to the throttle valve 8. The throttle valve 8 and the venturi block 17 are inserted from an upper opening portion of the valve cylinder 4, and a lid plate 26 that shuts the opening portion is fixedly attached to the valve cylinder 4 in a predetermined position in an upper end thereof by means of plural screws 27. The throttle valve 8 is configured to be movable in an up-and-down direction inside the valve cylinder 4 between a fully closed position (refer to FIGS. 2 and 4) having a lower end portion, of the throttle valve 8, abutting on the flange portion 17a of the venturi block 17 and a fully opened position (refer to FIG. 3) having an upper end portion, of the throttle valve 8, abutting on the lid plate 26. A coil-shaped return spring 28 that biases the throttle valve 8 in a direction closing the throttle valve 8 is housed inside the valve cylinder 4, and an operation wire 30 subjected to a pulling operation using an accelerator grip of the two-wheeled motor vehicle is connected to the throttle valve 8.

[0033] Thus, the throttle valve 8 can be opened when the operation wire 30 is pulled against a biasing force of the return spring 28. In particular, as shown in FIG. 3, when the throttle valve 8 is in a fully opened state, the throttle valve 8 is completely housed inside the valve cylinder 4 with the venturi block 17 being left in the middle portion of the air intake bore 2, and thereby the venturi 18 of the venturi block 17 is made continuous to the upstream side and the downstream side of the air intake bore 2 without any interference from the throttle valve 8. This enables a large amount of intake air to pass through the air intake bore 2 smoothly, and thereby fuel stop power of the engine can be effectively enhanced. Accordingly, this compact carburetor C can exert a large effect particularly when being used for an engine of a racing two-wheeled motor vehicle.

[0034] Meanwhile, since the inner diameter D1 of the venturi 18 is set to 22 mm or smaller, and the outer diameter D3 of the throttle valve 8 is set to be 1.2 to 1.4 times as large as the inner diameter of the venturi 18, the outer diameter D3 of the throttle valve 8 is $22 \times 1.2 = 26.4$ mm when: the inner diameter D1 of the venturi 18 is set to the largest possible 22 mm; and the smallest allowable multiplying factor 1.2 is selected. Accordingly, the overall thickness of portions, of the throttle valve 8 and the venturi block 17, which are fitted to each other is $(26.4 - 22)/2 = 2.2$ mm, and, if the thicknesses of the throttle valve 8 and the venturi block 17 are set substantially equal to each other without a fitting clearance therebetween being taken into consideration, the respective thicknesses thereof are approximately 1.1 mm. If the fitting clearance between the throttle valve 8 and the venturi block 17 is taken into consideration, a value thereof is further slightly smaller. The value of this thickness is a lower limit in securing practical strength of the throttle valve 8 and the venturi block 17. This can effectively achieve weight reduction of the compact carburetor C. By contrast, when the largest allowable multiplying factor 1.4 is employed, the outer diameter D3 of the throttle valve 8 is $22 \times 1.4 = 30.8$ mm. Accordingly, by the similar calculation as above, the respective thicknesses of the throttle valve 8 and the venturi block 17 are approximately 2.2 mm. If the outer diameter D3 of the throttle valve 8 exceeds 30.8 mm, originally intended downsizing of the compact carburetor C is impaired, and, moreover, if the respective thicknesses of the throttle valve 8 and the venturi block 17 exceed approximately 2.2 mm, weight reduction of the compact carburetor C is not satisfied. These are not preferable.

[0035] Next, a connection structure of the operation wire 30 to the throttle valve 8 will be described with reference to FIGS. 2 and 5 to 8.

[0036] A cylindrical connection terminal 31 is fixedly provided to a lower end portion of the operation wire 30. Meanwhile, a connection hole 32 into which the connection terminal 31 fit is provided in the throttle valve 8 with reference to a position above the housing concave portion 15, the position offset by a predetermined distance e1 from the central axis Y of the throttle valve 8 toward the downstream side of the air intake bore 2, and offset upward by a predetermined distance e2 from an axially middle point O of the throttle valve 8. Additionally, the connection hole 32 opens to a small ceiling face of a small concave portion 33 opening to a ceiling face of the housing convex portion 15 of the throttle valve 8.

[0037] A guide boss 35 coaxially aligned with the connection hole 32 is provided on the lid plate 26 so as to project upward. In other words, an attachment position where the lid plate 26 is attached to the valve cylinder 4 is defined so that the guide boss 35 and the connection hole 32 may be coaxially aligned with each other. The guide boss 35 is formed so as to have an inner diameter large enough to enable connection terminal 31 to pass through the guide boss 35. The operation wire 30 is connected to the accelerator grip of the two-wheeled motor vehicle while penetrating the guide boss 35 and being pulled out to the outside of the valve cylinder 4. This operation wire 30 is configured so that reciprocating motion thereof may be guided by an outer wire 36 outside the valve cylinder 4, and an outer support cylinder 37, which supports an end portion of the outer wire 36, is attached to the guide boss 35 by being screwed so that advancement and retraction of the outer support cylinder 37 may be controllable. Thus, in the inside of the valve cylinder 4, the operation wire 30 is arranged in a position, as in the case of the connection terminal 31, being offset by a predetermined distance e1 from the central axis Y of the throttle valve 8 toward the downstream side of the air intake bore 2, the operation wire 30 being parallel to the central axis Y of the throttle valve 8. Accordingly, when the operation wire 30 is pulled, a line F of pulling action with respect to the throttle valve 8 becomes parallel to the central axis Y of the throttle valve 8 at a position offset by a predetermined distance e1 from the central axis Y of the throttle valve 8 toward the downstream side of the air intake bore 2.

[0038] Meanwhile, on condition that the engine is in operation, when the throttle valve 8 is at an idle opening degree or middle opening degree, an air intake negative pressure of the engine acts on the throttle valve 8, which is exposed to the air intake bore 2, from the downstream side of the air intake bore 2, a load that attracts the throttle valve 8 toward the downstream side of the air intake bore 2 is generated, and the load increases friction resistance between the valve cylinder 4 and the throttle valve 8 on the downstream side of the air intake bore 2. This increases an operation load on the throttle valve 8. Whereas, as has been described above, when the operation wire 30 is pulled, the throttle valve 8 can be lightly opened upward without being caused to incline, that is, reduction of the operation load on the throttle valve 8 can be achieved, since a pulling force of the operation wire 30 acts on the throttle valve 8 along the line F of pulling action, the line F being: at a position offset by the predetermined distance e1 from the central axis Y of the throttle valve 8 toward the downstream side of the air intake bore 2; and parallel to the central axis Y of the throttle valve 8.

[0039] Additionally, by having a connecting point of the operation wire 30 to the throttle valve 8, namely, the connection hole 32 of the throttle valve 8, set in a position above the axially central point of the throttle valve 8, a point of application of the pulling force of the operation wire 30 is brought to that position, which contributes to prevention of inclination of the throttle valve 8, whereby further reduction of the operation load on the throttle valve 8 can be achieved. Furthermore, setting a length L (refer to FIG. 4) of the throttle valve 8 in an axial direction thereof so as to sufficiently longer than the outer diameter D3 thereof makes it possible to further prevent the throttle valve 8 from inclining, and contributes to further reduction of the operation load on the throttle valve 8.

[0040] Moreover, since the need of forming a sideways projecting portion in the valve cylinder 4 is eliminated by using, for opening and closing the throttle valve 8, the operation wire 30 extending upward from the valve cylinder 4 and the return spring 28 being arranged in the valve cylinder 4, the valve cylinder 4 can be formed into the most compact cylindrical shape. In addition, because the inner diameter D1 of the venturi 18 is set to 22 mm, downsizing of the compact carburetor C can be effectively achieved.

[0041] As clearly shown in FIGS. 2, 6 and 7, a slit 38 is provided in the throttle valve 8, the slit 38 starting from a side face of the throttle valve 8 in the downstream side of the air intake bore 2 and reaching the connection hole 32. Additionally, this slit 38 starts from an upper end of the throttle valve 8 and ends before reaching the air intake bore 2, and has a groove width smaller than an inner diameter of the connection hole 32, and the slit 38 allowing the operation wire 30 to pass therethrough. This slit 38 is formed through a cutting process from an outer side portion of the throttle valve 8 by means of a rotary cutter. In the middle of this slit 38, a through-hole 39 that allows the connection terminal 31 to pass to a side having the small concave portion 33 is provided.

[0042] Thus, in order to connect the operation wire 30 to the throttle valve 8, the operation wire 30 is temporarily moved to the small concave portion 33 by causing the connection terminal 31 to pass through the through-hole 39 prior to insertion of the throttle valve 8 into the valve cylinder 4. Thereafter, the operation wire 30 is moved to the connection hole 32 side along the slit 38. Thereby, the connection terminal 31 is brought to a position directly under the connection hole 32. Then, by pulling up the operation wire 30, the connection terminal 31 can be fitted

into the connection hole 32. On a lower end portion of the connection hole 32, a tapered face that makes acceptance of the connection terminal 31 easier is formed.

[0043] The following measures are taken for the purpose of preventing the connection terminal 31 from escaping from the connection hole 32.

[0044] That is, as shown in FIGS. 2, 5, 6 and 8, while, on an upper end face of the throttle valve 8, an annular groove 40 concentric thereto and passing outside the connection hole 32 is formed, a hat-shaped regulation member 42 having an annular flange 42a in a lower end portion thereof is fitted to a cylindrical central land portion 41 surrounded by this annular groove 40. On that occasion, the flange 42a is disposed so as to abut on a bottom face of the annular groove 40, and a lower end of the return spring 28 is supported by this flange 42a. As a result, the flange 42a is sandwiched between the return spring 28 and the throttle valve 8.

[0045] In this regulation member 42, there are formed: a boss 44 having a through-hole 43 that allows the connection terminal 31 to pass through a central portion of the regulation member 42 and facing downward; a long hole 45 that extends from the through-hole 43 in a radial direction and allows the operation wire 30 to pass through the regulation member 42; and a positioning protrusion 46 engaging with the slit 38 on the central land portion 41 side so that an end portion of this long hole 45 may be positioned directly above the connection hole 32, the end portion opposite to the through-hole 39.

[0046] Thus, in order to fit the regulation member 42 to the central land portion 41, the connection terminal 31 is caused to penetrate the through-hole 39 of the regulation member 42 prior to fitting of the connection terminal 31 into the connection hole 32 of the throttle valve 8, thereafter the connection terminal 31 in this state is fitted into the connection hole 32, and then the regulation member 42 is fitted to the central land portion 41. At that time, by engaging with the slit 38 in the central land portion 41, the positioning protrusion 46 of the regulation member 42 positions the regulation member 42 so that the end portion of the long hole 45 may be positioned directly above the connection hole 32, whereby outward movement of the operation wire 30 in the slit 38 is restricted by the end portion of the long hole 45.

[0047] The regulation member 42 not only plays, as has been mentioned above, roles as a spring seat that supports the lower end of the return spring 28 and a preventer that prevents the connection terminal 31 from escaping, but also contributes to support of the needle valve 25.

[0048] That is, a flange member 48 formed of, for example, a C ring is latched with an upper end portion of the needle valve 25, a concave portion 49 that accepts this flange member 48 is provided in an upper face of the central land portion 41, and the boss 44 of the regulation member 42 is arranged so as to press the flange member 48 against a bottom face of this concave portion 49. Accordingly, the flange member 48 is sandwiched between the throttle valve 8 and the regulation member 42.

[0049] Thus, the regulation member 42 plays three roles as a spring seat that supports the lower end of the return spring 28, a preventer that prevents the connection terminal 31 from escaping, and support of the needle valve 25, thereby being able to contribute to simplification of the structure.

[0050] Meanwhile, since the connection hole 32 and the connection terminal 31 are arranged at positions offset from the central axis Y of the throttle valve 8 toward the downstream side of the air intake bore 2, the slit 38 to be used for connection of the operation wire 30 to the throttle valve 8 has to be provided in the side face of the throttle valve 8 in the downstream side of the air intake bore 2. Whereas, the lower end of the slit 38 ends before reaching the air intake bore 2 as shown in FIG. 2, even when the throttle valve 8 is in the fully-closed state. Whereby, the slit 38 never communicates with the air intake bore, and does not impair an intake airflow controlling function of the throttle valve 8.

[0051] Additionally, if the operation wire 30 is returned in a direction closing the throttle valve 8 for abrupt slowdown operation of the engine, the throttle valve 8 can be closed by the biasing force of the return spring 28. In this case, if the returning operation of the operation wire 30 is so abrupt that closing motion, of the throttle valve 8, performed by the return spring 28 is delayed, the connection terminal 31 of the operation wire 30 escapes downward from the connection hole 32 of the throttle valve 8. Whereas, since outward-sideward movement of the operation wire 30 is regulated by the regulation member 42, the connection terminal 31 can be fitted again into the connection hole 32 by the start of the motion closing the throttle valve 8.

[0052] Additionally, when escaping from the connection hole 32, the connection terminal 31 can be accepted into the small concave portion 33 in the ceiling face of the housing concave portion 15. Accordingly, when the throttle valve 8 subsequently returns to an idle position with some delay, the connection terminal 31 is prevented from entering between the ceiling face of the housing concave portion 15 and an upper face of the venturi block 17. Whereby it is ensured that the throttle valve 8 returns to the idle position or the fully-closed position.

[0053] The present invention is not limited to the above embodiment, and various design changes can be made without departing from the gist of the present invention. For example, the through-hole 39 through which the connection terminal 31 passes is provided so as to open to the small concave portion 33 in a part of the slit 38 that passes through the bottom wall of the annular groove 40 in the above embodiment. However, this may be provided so as to open to the small concave portion 33 in a part of the slit 38 that passes through a side wall of the throttle valve 8.

[0054] In a carburetor, a housing concave portion 15 opening toward an air intake bore 2, is formed in an end face of a piston-type throttle valve 8, a venturi block 17,

that is to be housed in the housing concave portion 15 when the throttle valve 8 is fully closed is fixedly attached to an air intake trunk 3, and a venturi 18 that is made continuous to an upstream side and an downstream side of the air intake bore 2 when the throttle valve 8 is fully opened is formed in the venturi block 17. A connection terminal (31) of an operation wire 30 capable of opening the throttle valve 8 through a pulling operation thereof is connected to the throttle valve 8 in a position above the housing concave portion 15 , the operation wire 30 is arranged in parallel to a central axis Y of the throttle valve 8 inside the valve cylinder 4, and a return spring 28 that biases the throttle valve 8 in a closing direction is housed inside the valve cylinder 4. Accordingly, it is possible to satisfy a downsizing of a carburetor including a venturi block and a light operability of a throttle valve.

Claims

1. A carburetor comprising:

a carburetor body (1) having an air intake trunk (3) having an air intake bore (2) formed in an inside of the air intake trunk and a valve cylinder (4) intersecting the air intake trunk (3) and projecting from one side of the air intake trunk (3); and

a piston-type throttle valve (8) that is slidably fitted into the valve cylinder (4) and opens and closes the air intake bore (2), in which

a housing concave portion (15) opening toward the air intake bore (2) is formed in an end face of the throttle valve (8),

a venturi block (17) that is to be housed in the housing concave portion (15) when the throttle valve (8) is fully closed is fixedly attached to the air intake trunk (3), and a venturi (18) that is made continuous to an upstream side and a downstream side of the air intake bore (2) when the throttle valve (8) is fully opened is formed in the venturi block (17),

characterized in that

a connection terminal (31) of an operation wire (30) capable of opening the throttle valve (8) through a pulling operation thereof is connected to the throttle valve (8) in a position above the housing concave portion (15),

the operation wire (30) is arranged in parallel to a central axis (Y) of the throttle valve (8) inside the valve cylinder (4), and

a return spring (28) that biases the throttle valve (8) in a closing direction is housed inside the valve cylinder (4).

2. The carburetor according to claim 1, wherein
a connecting position of the connection terminal (31) to the throttle valve (8) is offset (e1) from the central axis (Y) of the throttle valve (8) toward the downstream side of the air intake bore (2).

3. The carburetor according to claim 2, wherein
the connecting position of the connection terminal (31) to the throttle valve (8) is offset (e2) from an axially middle point (O) of the throttle valve (8) in a pulling direction of the operation wire (30)

4. The carburetor according to claim 1, wherein
an inner diameter (D1) of the venturi (18) is set to 22 mm or smaller, and
an outer diameter (D3) of the throttle valve (8) is set to be 1.2 to 1.4 times as large as the inner diameter (D1) of the venturi (18).

5. The carburetor according to any one of claims 1 to 3, wherein
a small concave portion (33) is provided in a ceiling face of the housing concave portion (15), and
a connection hole (32) into which the connection terminal (31) is fitted is opened in a small ceiling face of the small concave portion (33).

6. The carburetor according to claim 5, wherein
a slit (38) is provided in the throttle valve (8), the slit (38) starting from a side face of the throttle valve (8) in the downstream side of the air intake bore (2) and then reaching the connection hole (32), starting from an upper end of the throttle valve (8) and then ending before reaching the air intake bore (2), and having a groove width smaller than an inner diameter of the connection hole (32), thereby allowing the operation wire (30) to pass therethrough, and
a through-hole (39) that allows the connection terminal (31) to pass therethrough is provided in a middle of the slit (38).

FIG.1

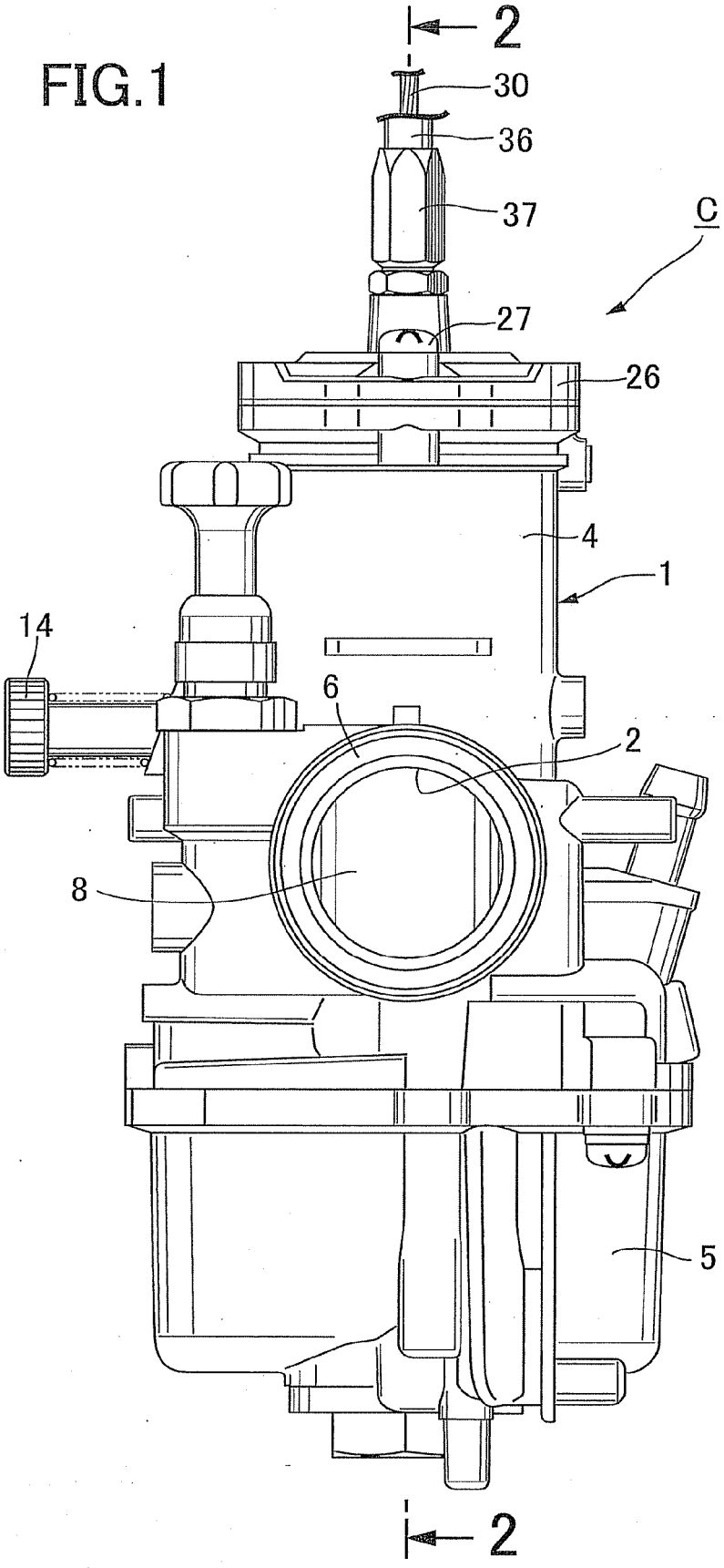
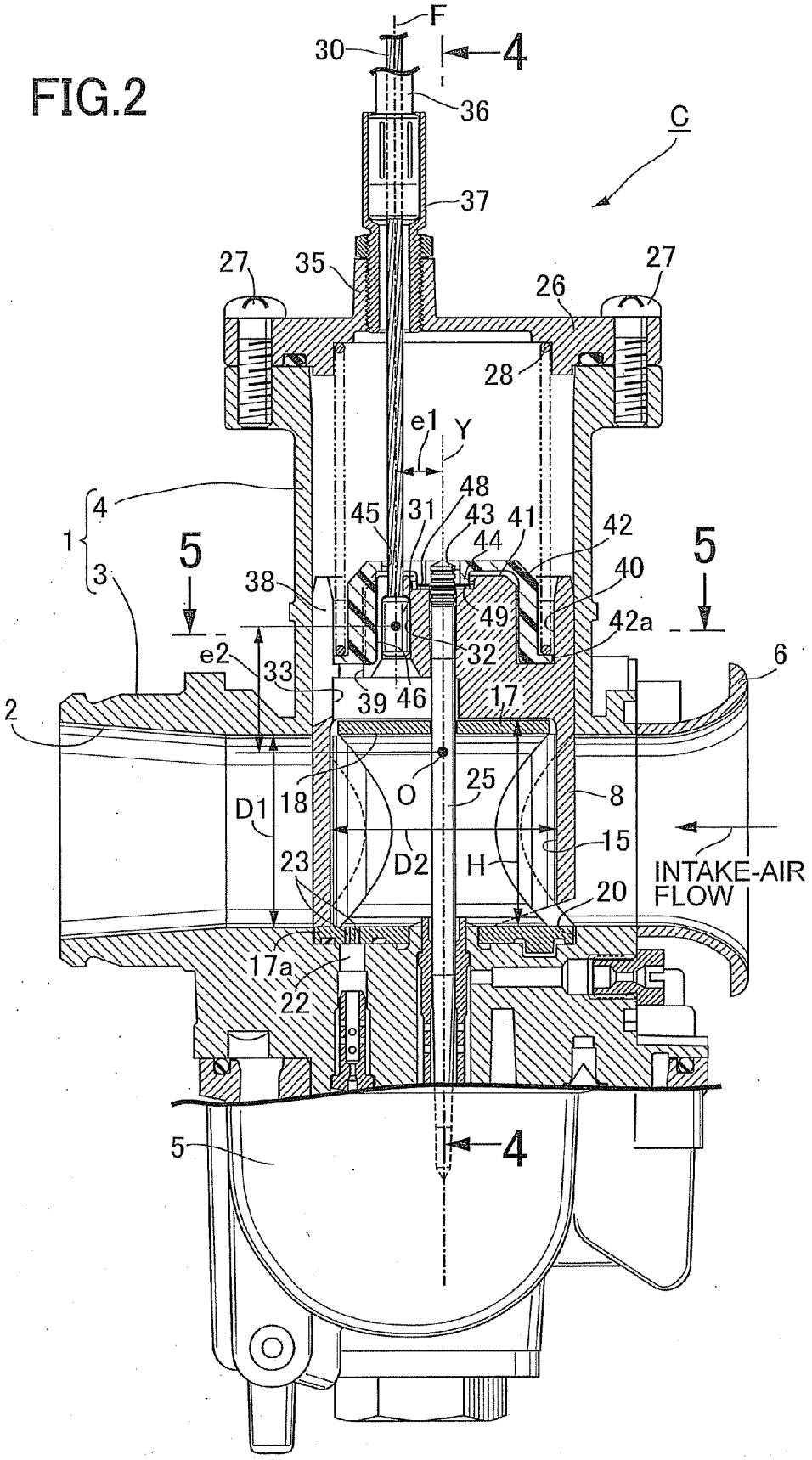


FIG.2


F
30
4
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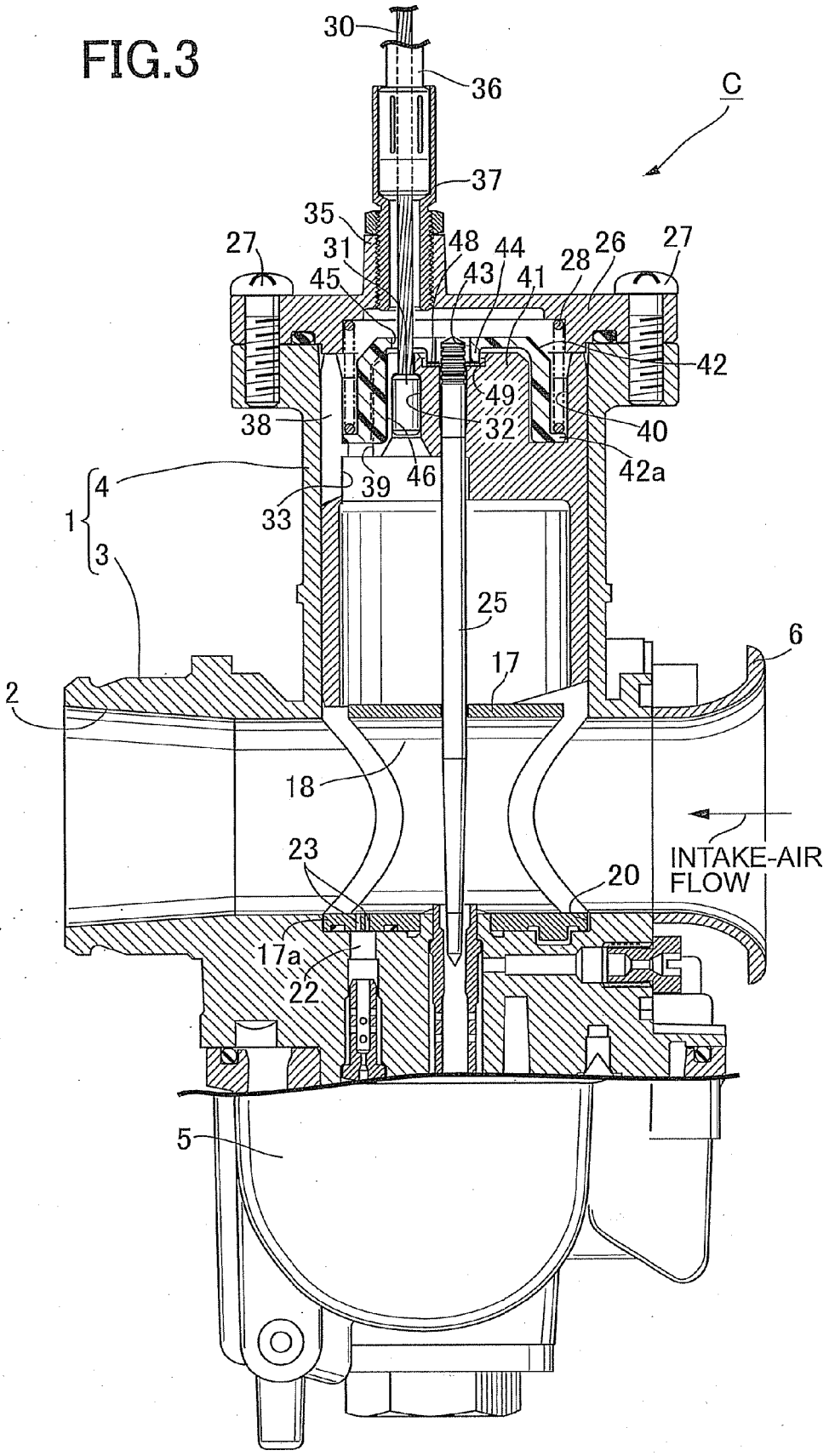
C
37
27
35
27
26
28
e1
Y
48
4
45
31
43
41
42
1
3
5
44
40
5
38
49
42a
e2
32
6
33
39
46
17
2
D1
18
O
25
8
15
23
D2
H
INTAKE-AIR
FLOW
20
17a
22
5
4

FIG.3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C
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35
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31
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44
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26
27
45
42
49
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32
40
42a
39
46
4
1
3
33
25
6
17
2
18
23
20
INTAKE-AIR
FLOW
17a
22
5

FIG.4

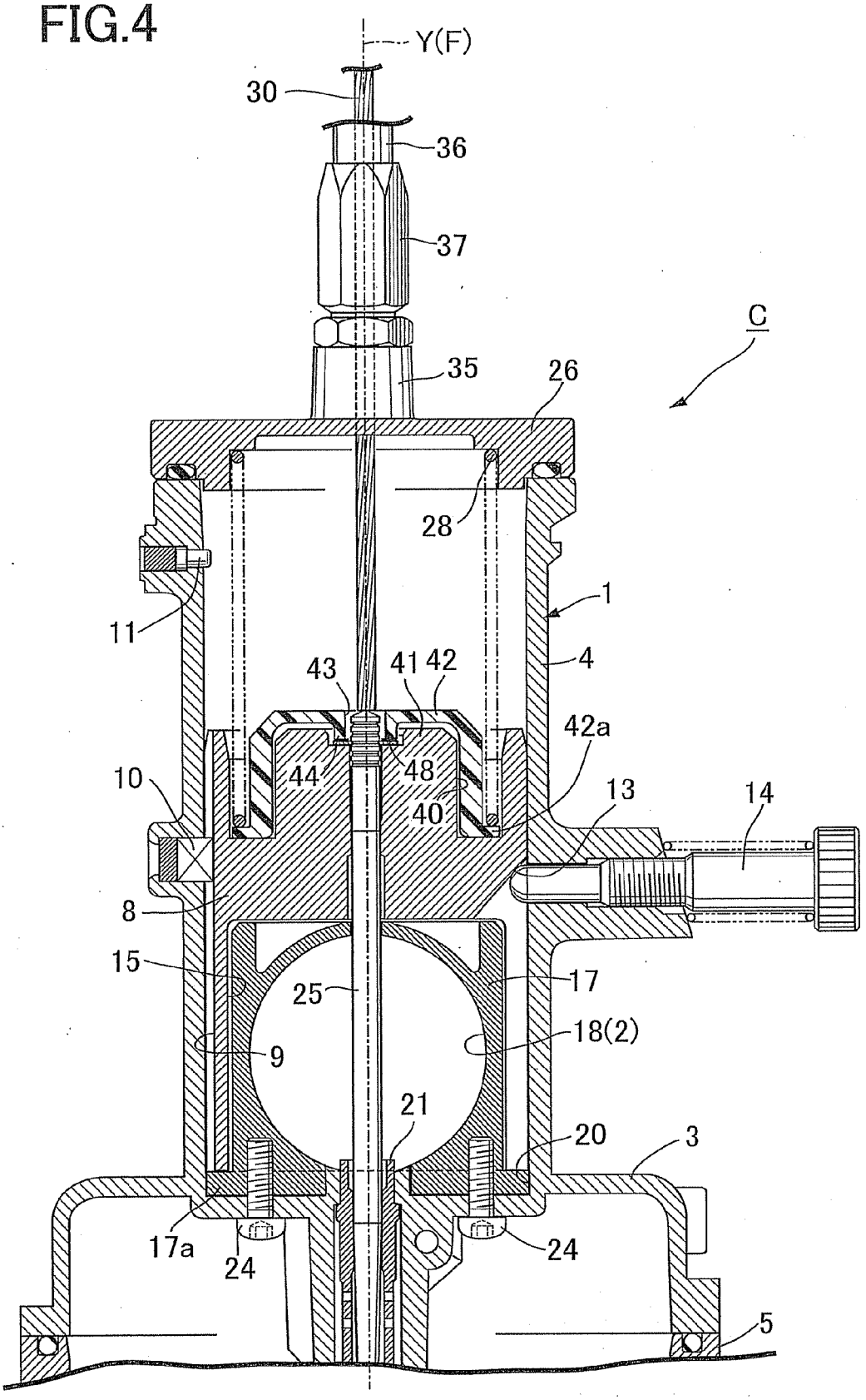

Y(F)
30
36
37
C
35
26
28
1
11
4
43
41
42
42a
44
48
40
10
13
14
8
15
25
17
18(2)
9
21
20
3
17a
24
24
5

FIG.5

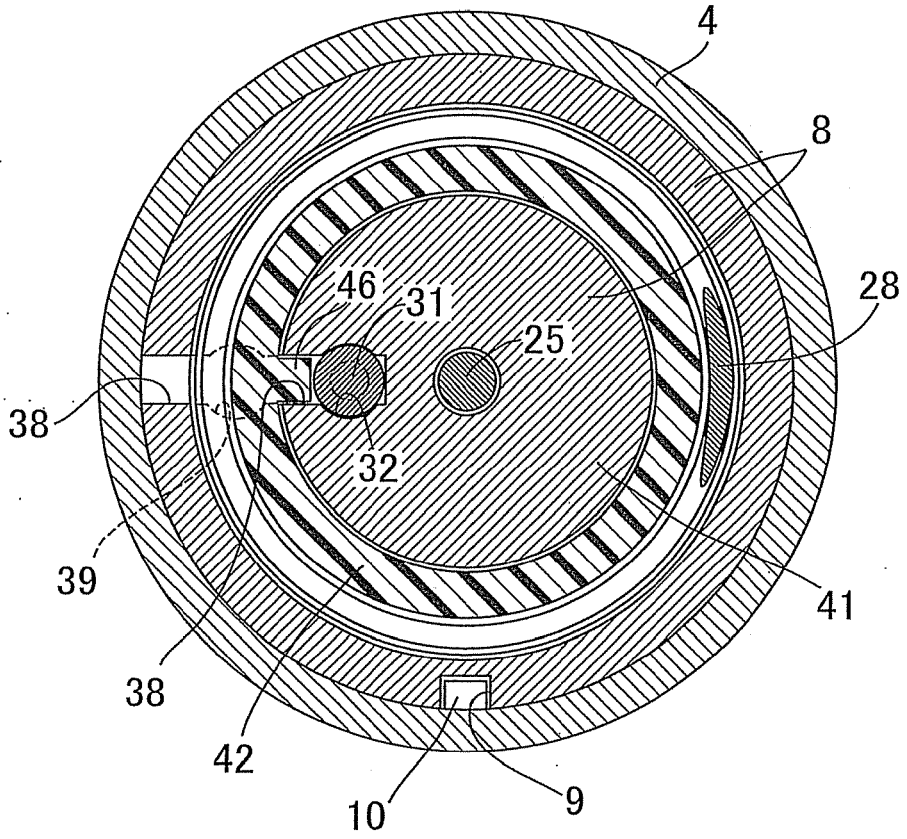


FIG.6

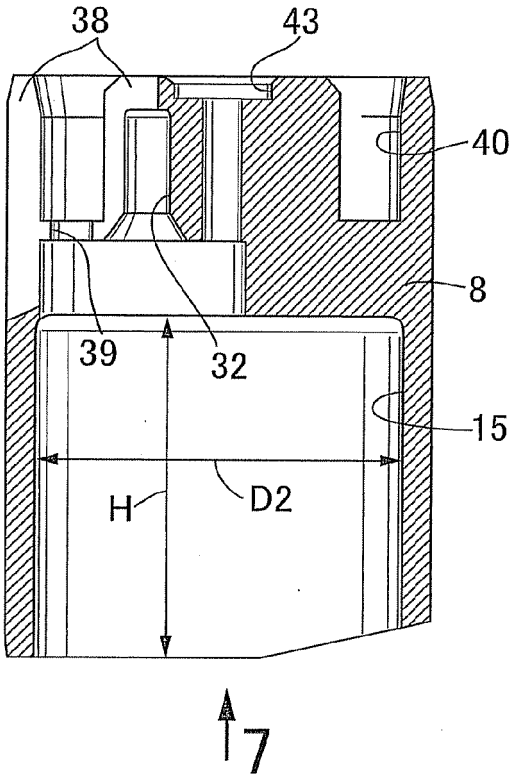


FIG.7

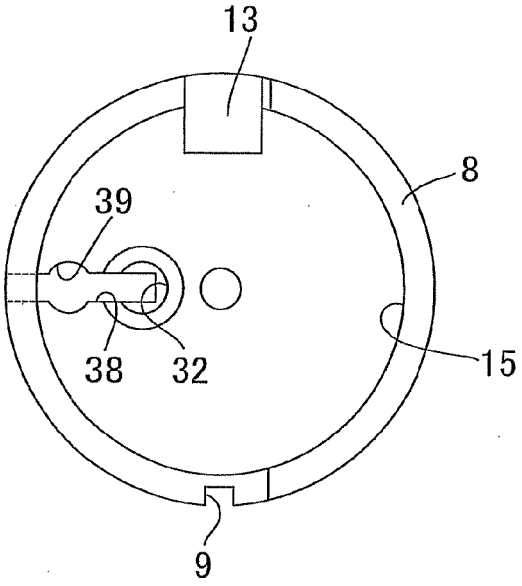
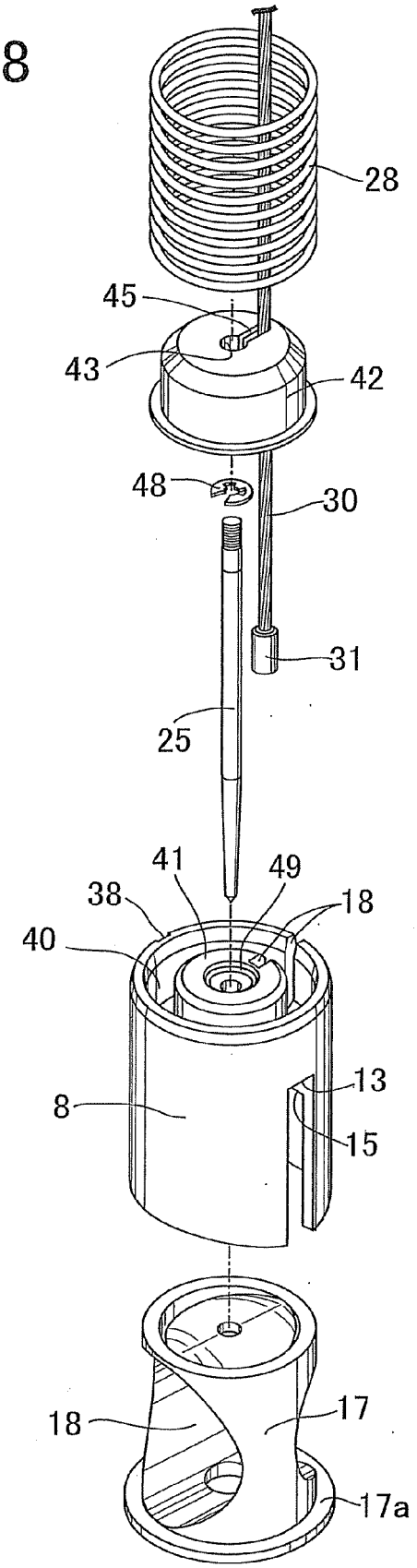


FIG.8



REFERENCES CITED IN THE DESCRIPTION

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- JP 59086347 A **[0003]**