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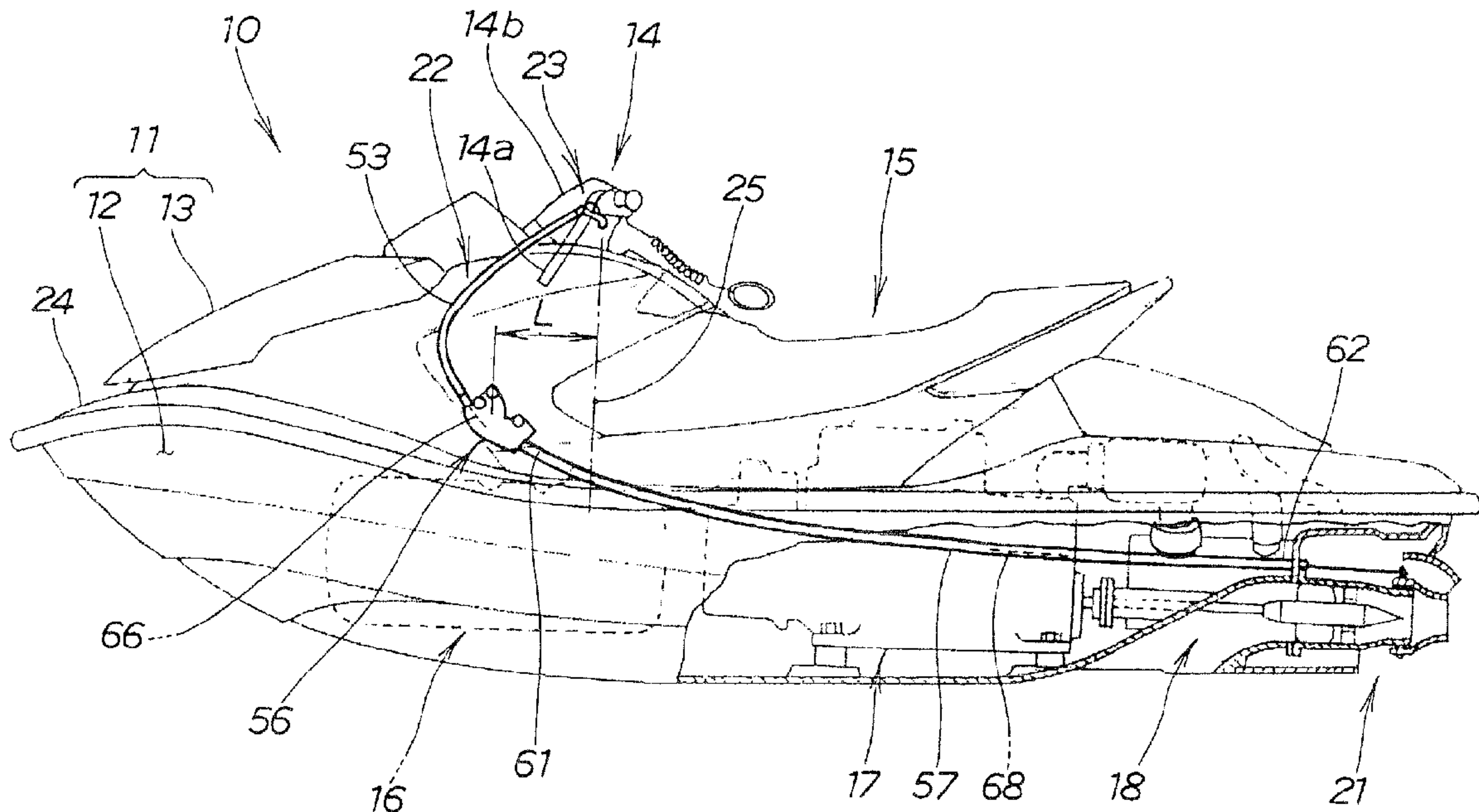
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(54) Titre : STRUCTURE MAILLEE DE MANOEUVRE D'ASSIETTE POUR MOTOMARINE

(54) Title: TRIM OPERATING WIRE STRUCTURE FOR PERSONAL WATERCRAFT



(57) Abrégé/Abstract:

A trim operating wire 22 connected to a trim operating lever which can swing a nozzle, capable of adjusting the jet direction of jet water, downwards from an ordinary direction and can return the nozzle into the ordinary direction when the grip thereon is released has a structure in which one end of a pull wire 53 which is thin and rich in flexibility is connected to the trim operating lever, the other end of the pull wire is connected to one end of a push wire 57 which is thick and poor in flexibility through a push-pull converter 56, the other end of the push wire is connected to a steering nozzle 21, and the push-pull converter is disposed in a craft body at a position directly under or on the bow 24 side of a steering handle 14. The length of the pull wire connecting between the push-pull converter and the trim operating lever can be made short, and the push wire can be made long. As a result, even where the pull wire which is thin and rich in flexibility is disposed in the state of being bent at several portions thereof, the sliding resistance of an inner wire of the pull wire is small, and enhancement of operability can be contrived.

ABSTRACT OF THE DISCLOSURE

A trim operating wire 22 connected to a trim operating lever which can swing a nozzle, capable of adjusting the jet direction of jet water, downwards from an ordinary direction and can return the nozzle into the ordinary direction when the grip thereon is released has a structure in which one end of a pull wire 53 which is thin and rich in flexibility is connected to the trim operating lever, the other end of the pull wire is connected to one end of a push wire 57 which is thick and poor in flexibility through a push-pull converter 56, the other end of the push wire is connected to a steering nozzle 21, and the push-pull converter is disposed in a craft body at a position directly under or on the bow 24 side of a steering handle 14. The length of the pull wire connecting between the push-pull converter and the trim operating lever can be made short, and the push wire can be made long. As a result, even where the pull wire which is thin and rich in flexibility is disposed in the state of being bent at several portions thereof, the sliding resistance of an inner wire of the pull wire is small, and enhancement of operability can be contrived.

TITLE: TRIM OPERATING WIRE STRUCTURE FOR PERSONAL WATERCRAFT

5 FIELD OF THE INVENTION

The present invention relates to a trim operating wire structure for a personal watercraft.

BACKGROUND OF THE INVENTION

10 A conventional trim operating wire structure comprises a pull wire and a push wire connected to each other through a push-pull converter, which is disposed substantially at the center of a personal watercraft (see, for example, Patent Reference 1). Patent Reference
15 1] Japanese Patent Laid-open No. Hei 9-281132 (p. 3; Fig. 1) Patent Reference 1 will be described in detail, referring to a drawing.

Fig. 7 is an illustration of a conventional cable constitution (a copy from Fig. 1 of Patent Reference 1).

20 In the conventional cable constitution, two pull cables connected to the side of a steering handle 8 and a push/pull cable 29 connected to a nozzle deflector 19 are connected through a trim conversion mechanism 25 disposed substantially at the center of the overall length of a
25 hull 2. The pull cable is pulled by turning of a left-side grip of the steering handle 8, and the push/pull cable is pushed or pulled.

In the conventional cable constitution as above, the pull cables each comprise an inner wire passed
30 inside, and are used in the environment in which they are bent. Therefore, when the inner wires are slid, the sliding resistance is liable to be enlarged, whereby the operability is lowered.

In addition, in the case of the inner wires of
35 the pull cables, the sliding resistance of the inner

wires is liable to be enlarged with aging, and it is necessary to exert a large force by the wrist at the time of turning the left-side grip to simultaneously operate the two inner wires so as to pull one of the inner wires
5 and to push the other.

Since the inner wires are elongated with aging, appropriate adjustments are required.

Accordingly, it is an object of the present invention to provide a trim operating wire structure for
10 personal watercraft for contriving enhancement of operability.

SUMMARY OF THE INVENTION

In order to attain the above object, the
15 present invention resides in a trim operating wire structure for a personal watercraft including a jet propeller for ejecting jet water, a nozzle capable of adjusting the jet direction of the jet water, the nozzle being arranged for the jet propeller, and a trim
20 operating lever provided additionally to a steering handle, the nozzle being vertically swingable from an ordinary direction when the trim operating lever is gripped, and the nozzle returning to the ordinary direction when the grip on the trim operating lever is
25 released, wherein one end of a pull wire which is thin and rich in flexibility is connected to the trim operating lever, the other end of the pull wire is connected to one end of a push wire which is thick and poor in flexibility through a push-pull converter, the
30 other end of the push wire is connected to the nozzle, and the push-pull converter is disposed in a craft body at a position directly under or on the bow side of the steering handle.

Since the push-pull converter is disposed in the
35 craft body at the position directly under or on the bow

side of the steering handle, the length of the pull wire connecting between the push-pull converter and the trim operating lever can be made short, and the push wire can be made long. As a result, even where the pull wire
5 which is thin and rich in flexibility is disposed in the state of being bent at several portions thereof, the sliding resistance of an inner wire of the pull wire is small, and enhancement of operability can be contrived.

In addition, since the length of the pull wire
10 which is thin and rich in flexibility is made short, "play" due to bending and delay of response due to elongation of the inner wire can be dissolved, and enhancement of operability can be contrived.

On the other hand, the push wire is made long in
15 a rectilinear form, so that the sliding resistance of the inner wire of the push wire is little changed, and maintenance of operability can be contrived.

An aspect of the invention resides in that a steering shaft for supporting the steering handle is
20 disposed in the craft body in the state of being inclined with its upper portion located on the rear side of its lower portion, a handle cover for covering the steering handle and the steering shaft is provided, and the pull wire is disposed on the inside of the handle cover.

25 Since the pull wire is passed through the inside of the handle cover, appearance is enhanced.

In addition, the pull wire disposed along the steering shaft is extended forwardly downwards from the steering handle, and the push-pull converter is disposed
30 in a place to which the pull wire is extended, so that the pull wire can be made short.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are
35 shown in the drawings, wherein:

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Fig 1 A side view of a personal watercraft using a rear grip structure according to the present invention

[Fig. 2]

5 A sectional view of a steering nozzle according to the present invention

[Fig. 3]

A perspective view of a trim operating lever device according to the present invention

10 [Fig. 4]

A side view of a trim operating wire according to the present invention

[Fig. 5]

15 An exploded view of the trim operating lever device and the trim operating wire according to the present invention

[Fig. 6]

A sectional view of an elongation adjusting means according to the present invention

20 [Fig. 7]

An illustration of a conventional cable constitution

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

25 An embodiment of the present invention will be described below based on the accompanying drawings. The drawings are to be looked at according to the posture of symbols.

30 Fig. 1 is a side view of a personal watercraft using a rear grip structure according to the present invention. The personal watercraft 10 comprises a craft body 11 composed of a hull 12 and a deck 13 jointed to the upper side of the hull 12, a steering handle 14 disposed roughly at the center of the deck 13, a seat 15
35 provided on the rear side of the steering handle 14 and

mounted on the deck 13, a fuel tank 16 and an engine 17 mounted on the center of the hull 12, a water jet propeller 18 as a jet propeller connected to the engine 17, a steering nozzle 21 as a nozzle provided on the rear side of the water jet propeller 18, a trim operating wire 22 connected to the steering nozzle 21, and a trim operating lever device 23 provided additionally to the steering handle 14 for connection of the trim operating wire 22. Symbol 24 denotes a bow, and 25 denotes an axis located directly under the steering handle 14.

A steering shaft 14a for supporting the steering handle 14 is disposed in the craft body 11 in the state of being inclined with its upper portion located on the rear side of its lower portion, a handle cover 14b for covering the steering handle 14 and the steering shaft 14a is provided, and a pull wire 53 is disposed on the inside of the handle cover 14b.

Fig. 2 is a sectional view of the steering nozzle according to the present invention, and shows the condition where the steering nozzle 21 is directed in an ordinary direction.

The steering nozzle 21 comprises a ring member 26 mounted onto the water jet propeller 18 so as to be oscillatable in the downward direction (the direction of arrow ①), and a nozzle main body 27 mounted onto the ring member 26 so as to be oscillatable in the left-right direction (the directions of arrows ②), and has the function of adjusting the jet direction of jet water.

The ring member 26 has a structure in which first receiving portions 31, 31 (not shown) are provided on the left and right sides (the face and back sides of the figure) of the ring main body 28 so as to be in connection with the water jet propeller 18, and second receiving portions 32 and 33 are provided on the upper and lower sides so as to be in connection with the nozzle

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main body 27. Symbol 34 denotes a push wire 57 connected to the second receiving portion 32, and θ denotes the trim swing angle at the time when the nozzle main body 27 is swung downwards from the ordinary direction together with the ring member 26.

Fig. 3 is a perspective view of the trim operating lever device according to the present invention, and shows the condition where the trim operating lever device 23 is not being operated. The ring member 26 (see Fig. 2) and the nozzle main body 27 (see Fig. 2) of the water jet propeller with the trim operating wire 22 connected thereto are directed in the ordinary direction indicated by solid line.

Fig. 3 also shows the condition where the handle cover 14b for covering the steering handle 14 and the steering shaft is provided, and a pull wire 53 is disposed on the inside of the handle cover 14b. Here, only the handle cover 14b is shown in perspective, for easy understanding.

The trim operating lever device 23 is comprised of a support member 42 attached to the steering handle 14, a trim lever main body 43 as a trim operating lever oscillatably mounted onto the support member 42, and a lever lock means 44 for locking the trim lever main body 43.

The lever lock means 44 is for locking the trim lever main body 43 in a grip position, and is comprised of a lock lever 47 oscillatably mounted onto the trim lever main body 43, a spring plate 48 fixed to the trim lever main body 43 so as to latch the lock lever 47 therewith, an origin stopper 49 formed on the trim lever main body 43, and an latch projected portion 51 formed on the support member 42.

Fig. 4 is a side view of the trim operating wire according to the present invention. The trim operating

wire 22 has a structure in which one end 54 of the pull wire 53 which is thin and rich in flexibility is connected to the trim operating lever device 23 (see Fig. 3), the other end 55 of the pull wire 53 is connected to one end 61 of a push wire 57 which is thick and poor in flexibility through a push-pull converter 56, and the other end 62 (see Fig. 2) of the push wire 57 is connected to the steering nozzle 21 (see Fig. 2) as the nozzle, and has the function of transmitting a force for operating the steering nozzle.

The pull wire 53 is comprised of a wire cable outer 65 and an inner wire 66. The diameter of the inner wire 66 has been set to be D_f .

As the material of the inner wire 66, for example, stainless steel is used.

The push wire 57 is comprised of a wire cable outer 67 and an inner wire 68. The diameter of the inner wire 68 has been set to be D_r . The diameter D_r satisfies the relation $D_r > D_f$.

As the material of the inner wire 68, for example, stainless steel is used.

The push-pull converter 56 has a structure in which a conversion link lever 72 is oscillatably mounted in a box 71, a tension spring 73 is hooked on the conversion link lever 72, the inner wire 66 of the pull wire 53 is connected to one end of the conversion link lever 72, and the inner wire 68 of the push wire 57 is connected to the other end of the conversion link lever 72, whereby a pulling force of the pull wire 53 is converted into a pushing force acting on the push wire 57. Incidentally, the wire cable outer 65 of the pull wire 53 is fixed to one side of the box 71, whereas the wire cable outer 67 of the push wire 57 is connected to the other side of the box 71, and the respective inner wires 66 and 68 are slid.

As shown in Fig. 1, the push-pull converter 56 is disposed in the craft body on the bow 24 side of the axis 25 located directly under the steering handle 14 of the personal watercraft 10, at a position spaced from the axis 25 by a distance L. Incidentally, the position of arrangement of the push-pull converter 56 may be directly under the steering handle 14, namely, on the axis 25.

Fig. 5 is an exploded view of the trim operating lever device and the trim operating wire according to the present invention, shows the support member 42 of the trim operating lever device 23, and the trim lever main body 43 oscillatably mounted onto the support member 42, and also shows the lock lever 47, the spring plate 48, and the origin stopper 49 formed on the trim lever main body 43, of the lever lock means 44.

The trim lever main body 43 is provided with a female screw 75 for a small screw 74 for mounting the lock lever 47, and is provided with a female screw 77 for a small screw 76 for mounting the spring plate 48.

The lock lever 47 is provided on its one side with a finger hook portion 78 for hooking of a finger, is provided at its center with a projected portion 79, and is provided on its other side with a latch end portion 81 to be latched on the latch projected portion 51 (see Fig. 3).

Fig. 5 further shows the pull wire 53 of the trim operating wire 22, the push-pull converter 56 (the box 71, the conversion link lever 72, and the tension spring 73), the push wire 57, and an elongation adjusting means 82 provided at the center of the pull wire 53.

Fig. 6 is a sectional view of the elongation adjusting means according to the present invention. The elongation adjusting means 82 has a structure in which the wire cable outer 65 of the pull wire 53 is divided into two portions, an adjusting nut 84 is attached to a

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first wire cable outer 83 located on the side of the trim operating lever device 23 (see Fig. 5), an adjusting bolt 86 is attached to a second wire cable outer 85 located on the side of the push-pull converter 56 (see Fig. 5), and
5 a jam nut 87 is used. Symbol S denotes an adjustment margin.

The jam nut 87, when tightened, functions to prevent the adjusting bolt 86 from being turned idly. The jam nut 87 is comprised of a spanner hook portion 87a
10 and a finger hook portion 87b, and can be turned by hooking fingers on the finger hook portion 87b when there is no tool such as spanner.

The functions of the trim operating wire structure for the personal watercraft as described above
15 will be described below.

Since the push-pull converter 56 is disposed in the craft body on the bow 24 side with regard to the position directly under the steering handle 14 (the position of the axis 25) as shown in Fig. 1, the length
20 of the pull wire 53 connecting between the push-pull converter 56 and the trim operating lever device 23 can be made short, and the push wire 57 can be made long. As a result, even where the pull wire 53 which is thin and rich in flexibility is disposed in the state of being
25 bent at several portions thereof, the sliding resistance of the inner wire 66 (see Fig. 4) of the pull wire 53 is small, and enhancement of operability can be contrived.

In addition, since the length of the wire 53 which is thin and rich in flexibility is made short,
30 "play" due to bending and delay of response due to elongation of the inner wire 66 are dissolved, and enhancement of operability can be contrived.

On the other hand, the push wire 57 is made long in a rectilinear form, so that the sliding resistance of

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the inner wire 68 (see Fig. 4) is little changed, and operability can be maintained.

The steering shaft 14a for supporting the steering handle 14 as shown in Fig. 1 is disposed in the craft body 11 in the state of being inclined with its upper portion located on the rear side of its lower portion, the handle cover 14b for covering the steering handle 14 and the steering shaft 14a is provided, and the pull wire 53 is disposed on the inside of the handle cover 14b. Therefore, the pull wire 53 is passed through the inside of the handle cover 14b (see Fig. 3), so that enhancement of appearance can be contrived.

In addition, the pull wire 53 disposed along the steering shaft 14a is extended forwardly downwards from the steering handle 14, and the push-pull converter 56 is disposed in the place to which the pull wire 53 is extended, so that the pull wire 53 can be made short.

Incidentally, the constitution of the push-pull converter 56 shown in the embodiment of the present invention is arbitrary.

The constitutions of the pull wire 53 and the push wire 57 are arbitrary.

The present invention, constituted as described above, displays the following effects.

According to the present invention, the trim operating wire structure connected to the trim operating lever which can swing the nozzle, capable of adjusting the jet direction of jet water, downwards from an ordinary direction and which can return the nozzle into the ordinary direction when the grip thereon is released is a structure in which one end of the pull wire which is thin and rich in flexibility is connected to the trim operating lever, the other end of the pull wire is connected to one end of the push wire which is thick and poor in flexibility through the push-pull converter, the

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other end of the push wire is connected to the nozzle,
and the push-pull converter is disposed in the craft body
at a position directly under or on the bow side of the
steering handle. Therefore, the length of the pull wire
5 connecting between the push-pull converter and the trim
operating lever can be made short, and the push wire can
be made long. As a result, even where the pull wire
which is thin and rich in flexibility is disposed in the
state of being bent at several portions thereof, the
10 sliding resistance of the inner wire of the pull wire is
small, and enhancement of operability can be contrived.

In addition, since the length of the pull wire
which is thin and rich in flexibility is made short,
"play" due to bending and delay of response due to
15 elongation of the inner wire are dissolved, and
enhancement of operability can be contrived.

On the other hand, the push wire is made long in
a rectilinear form, so that the sliding resistance of the
inner wire of the push wire is little changed, and
20 operability can be maintained.

According to an embodiment of the invention, the
steering shaft for supporting the steering handle is
disposed in the craft body in the state of being inclined
with its upper portion located on the rear side of its
25 lower portion, the handle cover for covering the steering
handle and the steering shaft is provided, and the pull
wire is disposed on the inside of the handle cover.
Therefore, the pull wire is passed through the inside of
the handle cover, so that enhancement of appearance can
30 be contrived.

In addition, the pull wire disposed along the
steering shaft is extended forwardly downwards from the
steering handle, and the push-pull converter is present
at the place to which the pull wire is extended, so that
35 the pull wire can be made short.

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Although various preferred embodiments of the present invention have been described herein in detail, it will be appreciated by those skilled in the art, that variations may be made thereto without departing from the
5 spirit of the invention or the scope of the appended claims.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A trim operating wire structure for a personal watercraft comprising a jet propeller for ejecting jet water, a nozzle capable of adjusting the jet direction of said jet water, said nozzle being arranged for said jet propeller, and a trim operating lever provided additionally to a steering handle, said nozzle being vertically swingable from an ordinary direction when said trim operating lever is gripped, and said nozzle returning to said ordinary direction when said grip on said trim operating lever is released, wherein

one end of a pull wire which is thin and flexible is connected to said trim operating lever with an opposite end of said pull wire connected to one end of a push wire by a push-pull converter, an opposite end of said push wire is connected to said nozzle, said push wire being of increased thickness and rigidly relative to said pull wire; and said push-pull converter is disposed in a watercraft body at a position directly under or on a bow side of said steering handle.

2. A trim operating wire structure for a personal watercraft as set forth in claim 1, wherein a steering shaft for supporting said steering handle is disposed in said watercraft body in a rearwardly inclined orientation; and a handle cover is provided to cover said steering handle and said steering shaft with said pull wire disposed on an inside of said handle cover.

3. A trim operating wire structure for a personal watercraft comprising:

a jet propeller for ejecting jet water;
a nozzle, in position to adjust and capable of adjusting the direction of the jet water,

a trim operating level operably connected to a steering handle,

the nozzle being vertically rotatable from a first ordinary direction when the trim operating lever is gripped, and returning to the first ordinary direction when the grip on the trim operating lever is released,

a pull wire,

a push wire, the push wire long in a rectilinear form, and

a push-pull converter,

wherein a first end of the pull wire is connected to the trim operating lever and a second end of the pull wire is connected to a first end of the push wire through the push-pull converter, wherein a second end of the push wire is connected to the nozzle, wherein the pull wire has a smaller diameter and is more flexible than the push wire.

4. The trim operating wire structure for a personal watercraft of claim 3, further comprising:

a steering shaft for supporting the steering handle, disposed in the personal watercraft in an inclined position with the upper portion of the steering shaft located to the rear of the lower portion of the steering shaft, and

a handle cover for covering the steering handle and the steering shaft, wherein the pull wire is disposed on the inside of the handle cover.

5. The trim operating wire structure for a personal watercraft of claim 3 wherein the pull wire is shorter than the push wire.

6. The trim operating wire structure for a personal watercraft of claim 3, wherein the pull wire and the push wire are stainless steel.

7. The trim operating wire structure for a personal watercraft of claim 3, wherein the pull wire is extended forwardly downwards from the steering handle, such that the push-pull converter is disposed at a position where the pull wire is extended.

FIG. 1

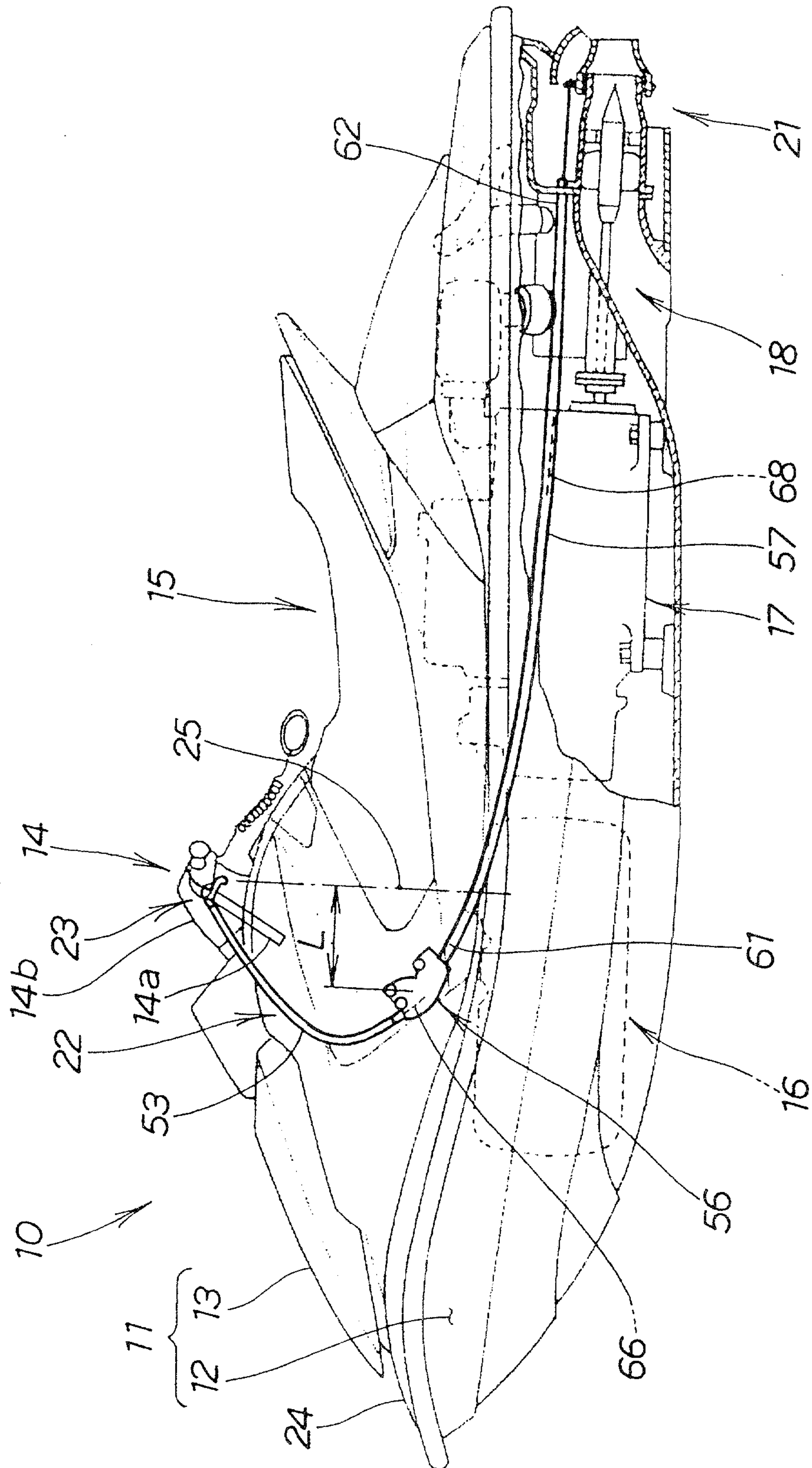


FIG. 2

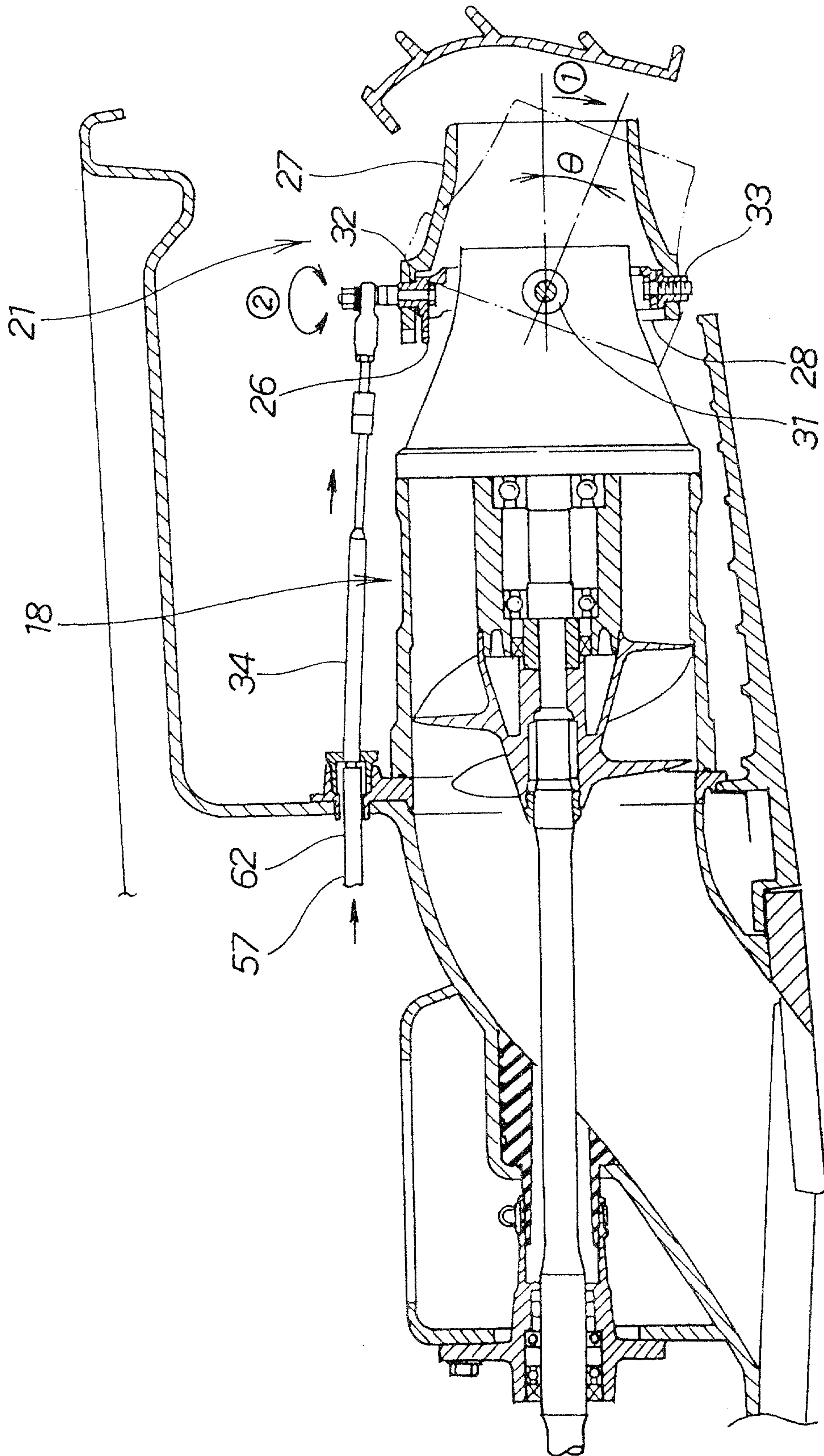


FIG. 3

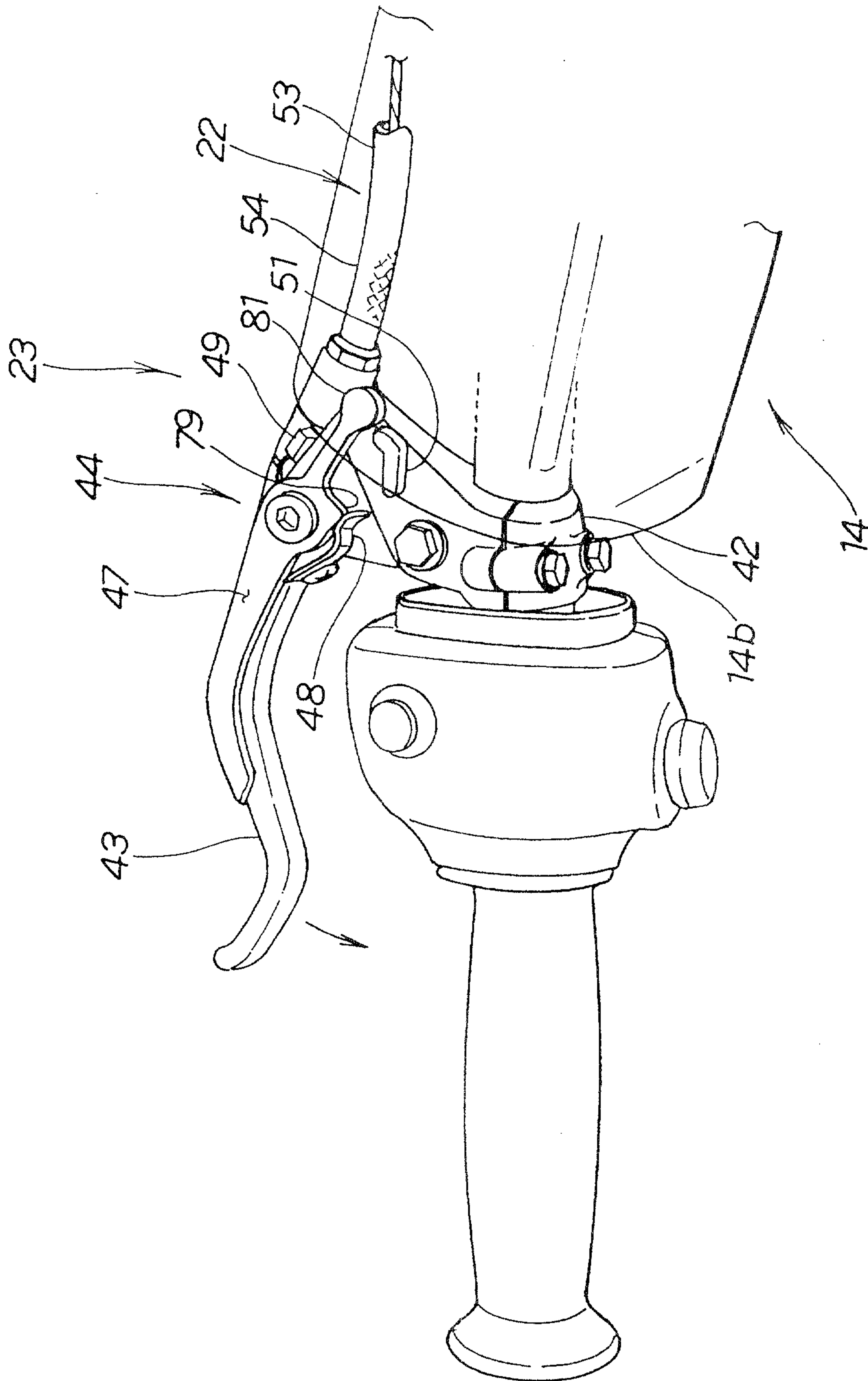


FIG. 4

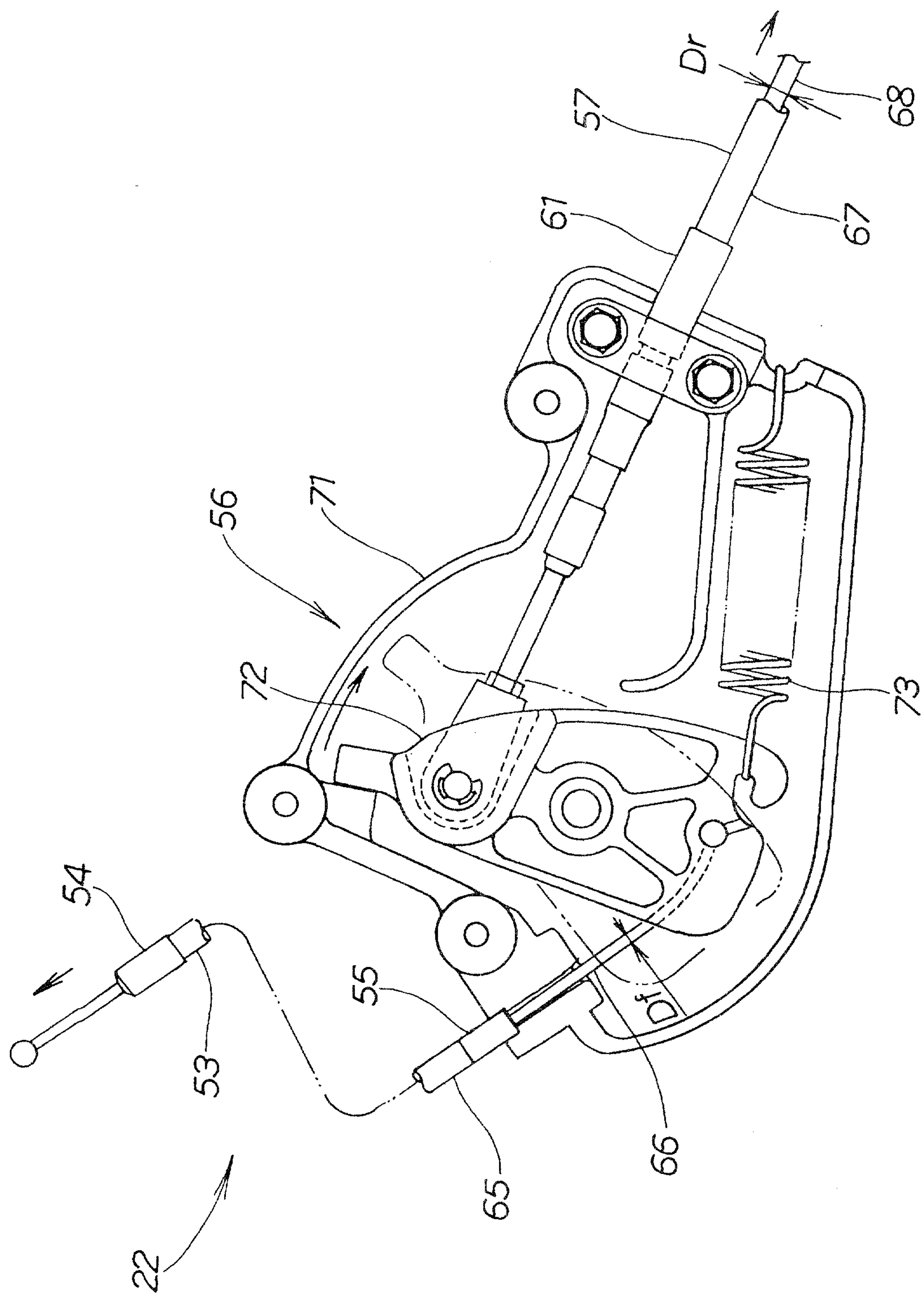


FIG. 5

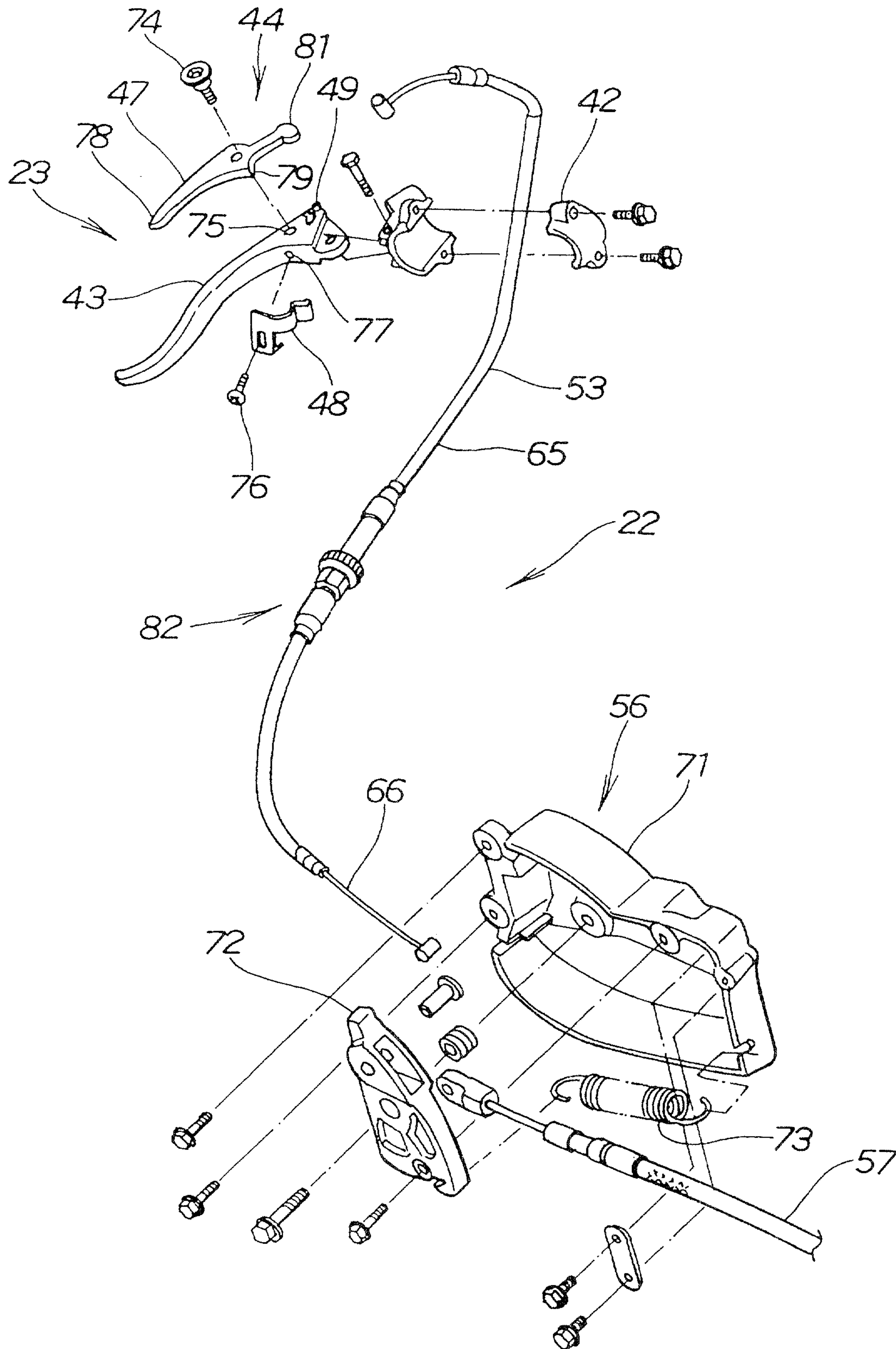


FIG. 6

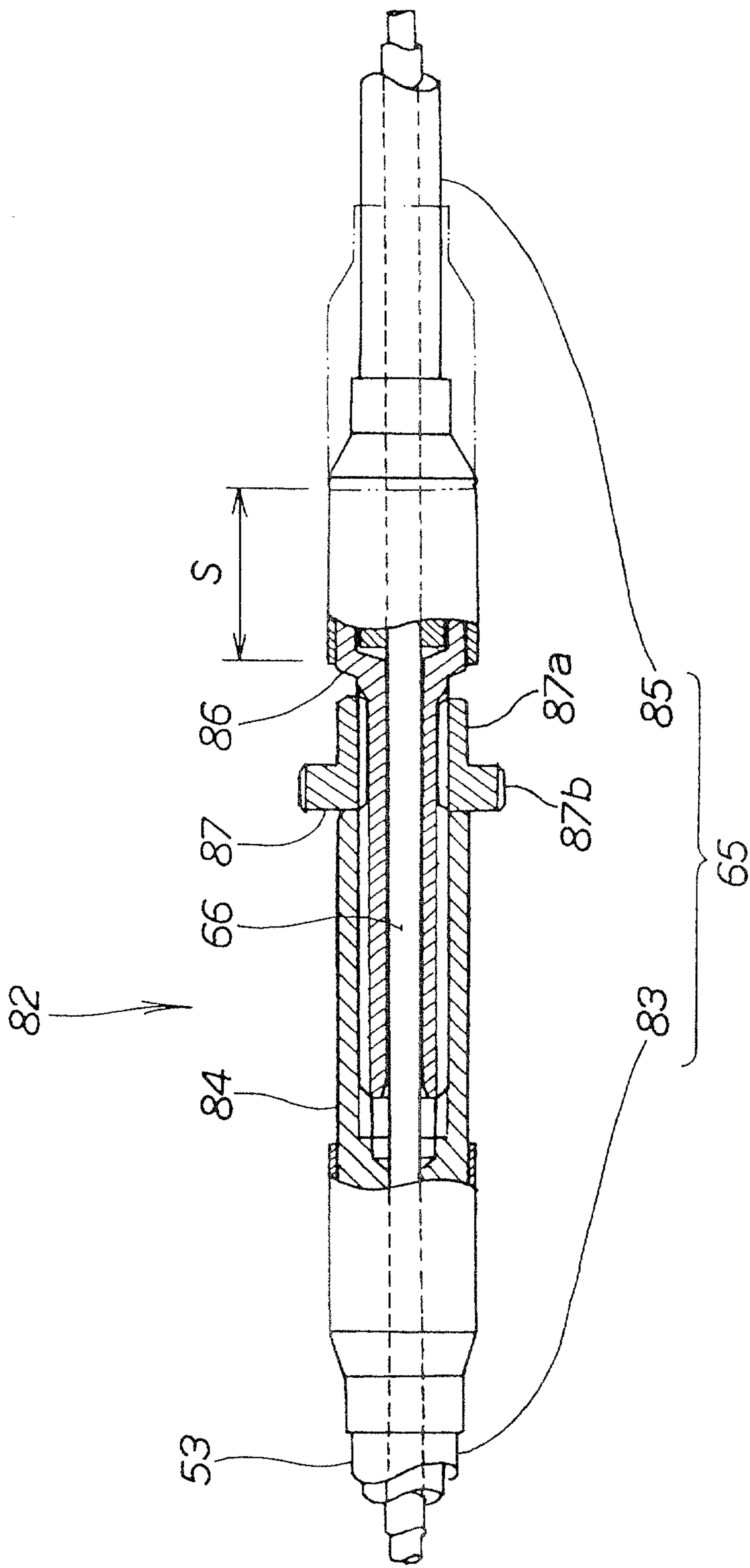


FIG. 7

