

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
31.01.2024 Bulletin 2024/05

(51) International Patent Classification (IPC):
B63H 21/21 ^(2006.01) **G05D 1/02** ^(2020.01)
G05G 9/047 ^(2006.01)

(21) Application number: **22460033.8**

(52) Cooperative Patent Classification (CPC):
B63H 21/213; G05G 9/047; B63H 2025/026

(22) Date of filing: **28.07.2022**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
 GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
 PL PT RO RS SE SI SK SM TR**
 Designated Extension States:
BA ME
 Designated Validation States:
KH MA MD TN

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(54) **VEHICLE PROPULSION CONTROL HANDLE, ESPECIALLY FOR UNDERWATER VEHICLES**

(57) This invention relates to a vehicle propulsion control handle, especially for underwater vehicles, characterised in that: the lower end of its handpiece (9) is connected in a detachable manner to an offset (4) of the upper surface of the base (1) and to a lower inner offset (15), mounted thereon, of the profile lever (14) arranged on a slot (10) of the handpiece (9), wherein the profile lever (14) is provided above the offset (15) with an inner offset (19) with a spring mounted thereon (21) whose other end is adjacent to the inner surface of the handpiece (9), and with an upper offset (17) with magnet M1 fitted loosely to a pin (18) in the slot (12) of the handpiece (9), inside the upper end of said handpiece, there is provided the lower end of the housing (22) with an outer ring-shaped offset (24) and a bottom (25) whose lower surface has two offsets (26, 26') separated by a slot (27) such that an offset (17) for the lever (14) is provided in said slot; in said housing (22), there is set an electronic board (32) permanently connected to an encoder (33) and to at least one Hall sensor (H2, H3), arranged on the upper surface of the board (32), and the Hall sensor (H1) arranged on the lower surface of said board such that electrical wires are led out of said board through a pass-through hole (31) in the offset (26) of the housing (22); next to each of the Hall sensors (H2, H3), in the side surface of the housing (22), there is provided at least one socket (44, 44') for a bistable slide function switch (45, 45') with a magnet (M2, M3), from top side, the electronic board (32) is covered with a sleeve-shaped lid (34) having on its upper face blind holes (35, 35') for springs (36, 36') with metal balls (37, 37') mounted thereon, wherein, on said lid (34), there is mounted a sleeve-shaped knob (38) with an upper bottom (39), connected to the lid in a detachable manner, whose inner surface has an offset for the upper end of the profile en-

coder (33) and blind holes (43) for said metal balls (37, 37') of the springs (36, 36').

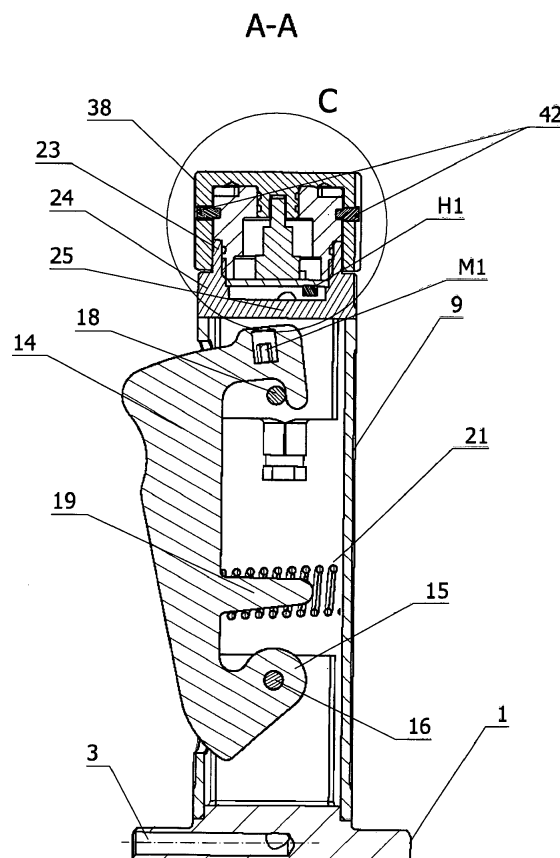


Fig. 5

Description

[0001] This invention relates to a vehicle propulsion control handle, especially for underwater vehicles, which can also be used to start engines of vehicles, change their speed, and to trim vehicles and steer them in various directions.

[0002] Underwater vehicles have a wide range of applications, including: commercial applications that involve seabed exploration, scientific and research applications as well as applications relating to environmental protection that involve mapping the underwater structure of seabeds and inland bodies of water, and special applications that involve defence and location activities to defend and protect national ports and water borders, including to promote water rescue operations that involve both people and property. Currently, manufacturers of underwater vehicles offer a large number of products of various designs that employ a variety of propulsion control methods. However, most of them treat as confidential any information relating to additional equipment of their vehicles, the internal systems and devices used as well as their arrangement or operational connectivity, and do not intend to disclose such information.

[0003] The state of the art for this invention comprises the Polish utility model application W.124239 for KH100 - a self-propelled remotely operated underwater vehicle, powered externally and propelled by several electric drive units, provided with a submersible unit connected by a cable line to the control station fitted with a manually operated movement control console that is equipped with two 2-function lever manipulators, two 4-function slotted push-button manipulators and seven monostable control switches. The manipulators and control switches are both assigned specific functions by their respective manufacturers so that their users can control the horizontal movement of the submersible unit, including by reducing the operating range of the horizontally driven engines, the horizontal movement of the submersible unit as well as the upward and downward movement of the chamber and the brightness level of the lighting system.

[0004] The state of the art for this invention also comprises the US patent application publication US 2007141924A1 for an outboard motor adapted to be mounted on a stem of a boat and having power sources constituted by an internal combustion engine and an electric motor which are connected to a propeller to propel the boat and a bar handle whose free end projects toward a cockpit of the boat so as to be operable for an operator to steer the boat. The bar handle comprises a throttle grip provided at the free end of the bar handle to be pushed-pulled in a longitudinal axis of the bar handle and to be rotated about the axis by the operator and a power source selector provided at the throttle grip which selects one of the two motors to connect to the propeller of said boat. The bar handle also comprises an engine speed controller provided at the throttle grip which controls a speed of the engine by regulating a throttle opening

of the engine in response to the rotational operation of the operator and a motor speed controller provided at the throttle grip which controls a speed of the motor in response to the rotational operation of the operator. To sum up, the outboard motor according to this patent description is provided with a handpiece - the bar handle equipped with a throttle grip enabling push-pull operation and rotate operation by the boat operator and with three motors one of which is connected to the boat propeller in accordance with the push-pull operation of the throttle grip, wherein the speeds of these motors are regulated in accordance with the rotating operation of the throttle grip.

[0005] The state of the art for this invention comprises the US patent application publication US2002090866A1 for a remote control device consisting of a front housing, control levers, steering knob, locking mechanisms, selector switch, indicators, emergency stop switch, wherein the locking mechanisms can hold the control levers in a neutral position. The housing of the device is provided with potentiometers which are adapted to deliver electric signal for engine control when the control levers are moved back and forth and a potentiometer adapted to deliver electric signal for driving a steering mechanism when the steering knob is moved from side to side.

[0006] The state of the art for this invention further comprises the US patent application publication US6675733B2 for a remote control device for a small vessel, consisting of: a portable housing capable of being held by a steersman, at least one control lever attached to the housing and rockable back and forth, a displacement sensor (for engine control) set in the housing and adapted to deliver a forward-control signal for an engine when the control lever is rocked forward and to deliver a reverse-control signal for the engine when the control lever is rocked backward, a locking mechanism capable of holding the control lever in a neutral position and an emergency stop switch provided on the housing for stopping operation of the engine in case of emergency. Preferably, the device is provided with a steering knob on the upper surface of the housing.

[0007] The state of the art for this invention comprises the Chinese patent application publication CN113018801A for an underwater propulsion device comprising an underwater power system consisting of a left power system and a right power system which is connected to an infinite position speed regulation device comprising a battery pack, a relay and an infinite position speed regulation component consisting of a knob switch, an encoder, an electronic microswitch and a mainboard. The mainboard is connected to the battery pack, the relay, the infinite position speed regulation component, a handheld control handle and an underwater power system, wherein the relay is connected to the battery pack.

[0008] The object of this invention is to develop a vehicle propulsion control handle, especially for underwater vehicles, that is simple, compact and rigid in structure and can also be used to start engines of vehicles, change

their speed, and to trim vehicles and steer them in various directions, can be manually activated by the operator of the vehicle and is adapted to be mounted in any place convenient to the operator, mainly in the front part of the vehicle hull, and to be hand-held by the operator controlling the vehicle.

[0009] This invention is also intended to design a control handle that is provided with an ergonomically arranged set of operatively connected control elements for starting vehicle engines, controlling their operation, including vehicle trimming for vehicles equipped with such control handles.

[0010] A vehicle propulsion control handle, especially for underwater vehicles, according to the present invention, characterised in that: the lower end of its handpiece is connected in a detachable manner to an offset of the upper surface of the base and to a lower inner offset, mounted thereon, of the profile lever arranged on the handpiece slot, wherein said lever, above its lower inner offset, is provided with an inner offset with a spring mounted thereon, whose other end is adjacent to the inner surface of the handpiece, and with an upper offset with magnet M1 fitted loosely to a pin in the handpiece slot. Inside the upper end of the handpiece, there is provided a lower end of the housing with an outer ring-shaped offset and a bottom whose lower surface has two offsets separated by a slot such that an upper lever offset is provided in said slot, in said housing, there is set an electronic board permanently connected to an encoder and to at least one Hall sensor H2, H3, arranged on the upper surface of said board, and the Hall sensor H1 arranged on the lower surface of said board such that electrical wires are led out of said board through a pass-through hole in the housing offset. Next to each of the Hall sensors H2, H3 arranged on the upper surface of said board, in the side surface of the housing, there is provided at least one socket for a bistable slide function switch with magnet M2, M3. From top side, the electronic board is covered with a sleeve-shaped lid having on its upper face blind holes for springs with metal balls mounted thereon, wherein, on said lid, there is mounted a sleeve-shaped knob with an upper bottom, connected to the lid in a detachable manner, whose inner surface has an offset for the upper end of the profile encoder and blind holes for said metal balls of the springs.

[0011] An offset for the upper surface of the base preferably consists of two segments separated from each other by a rectangular slot for a lower inner offset for the profile lever, said base being provided with mounting holes.

[0012] Preferably, the segments of the offset for the upper surface of the base are provided with two round pass-through holes positioned coaxially and horizontally, the lower end of the handpiece has two pass-through holes positioned coaxially to said holes and also horizontally mounted, and the lower inner offset for the profile lever, diagonally positioned, is provided with a pass-through hole, wherein a pin is mounted in the holes.

[0013] Also preferably, in the front wall of the base, there is provided a horizontally positioned blind hole with its inner end connected to the inner lower end of a vertically positioned blind hole in the upper face of the segment of the offset for the upper surface of the base.

[0014] Also preferably, in the lower part of the side surface of the segment of the offset for the upper surface of the base, there is provided a diagonally oriented blind hole with its inner end connected to the inner ends of the horizontally and vertically positioned blind holes of the base.

[0015] Also preferably, the first offset for the lower surface of the bottom of the electronic board housing has a horizontally arranged round pass-through hole, and its second offset has a blind hole, made from inside and positioned opposite the hole of the first offset, wherein both said holes are arranged along the axis of symmetry of the handpiece slot and have a pin mounted therein that connects said handpiece to the housing.

[0016] Also preferably, the second offset for the lower surface of the bottom of the electronic board housing has a lower cylinder-shaped offset with a hole and a threaded cylinder-shaped recess for an insulated cable gland with a vertically positioned pass-through hole for electric wires.

[0017] Also preferably, on the outer surface of the lid for the electronic board, there is provided a circumferential groove for end points of the screws inserted into the mounting holes in the side surface of the knob, preferably knurled, whereas the handpiece has on its outer sleeve-shaped side surface evenly spaced and vertically arranged trapezoid-shaped grooves.

[0018] Also preferably, the Hall sensors H1, H2, H3 and the encoder are connected by electric wires to the external central electronics system of the vehicle.

[0019] A vehicle propulsion control handle, especially for underwater vehicles, has a rigid base so that it can be mounted at any place in the vehicle convenient to the operator, including in the front part of the vehicle hull. Whereas its rigid handpiece allows the operator to hand hold the control handle to steer the vehicle by altering the position of the operator's centre of gravity, i.e. to control the vehicle trajectory by changing the position of the operator's body relative to the vehicle. Additionally, on the side surface of the handpiece, there are provided grooves so that the control handle can be grasped with ease, especially when the operator is wearing thick protective gloves that reduce the precision and effectiveness of his/her hand movements.

[0020] Moreover, the use of the ergonomically arranged set of operatively connected control elements, such as a knob, bistable switches and a lever, makes it easier for the operator to start the engines, control their operation, including a trimming operation for vehicles equipped with such a control handle. Whereas the control handle is fitted with Hall sensors and an encoder such that control signals are delivered to the central electronics system of the vehicle.

[0021] The object of the present invention according to an embodiment is shown in Figs. 1-10, in which: Fig. 1 - shows an isometric view of the vehicle propulsion control handle, especially for underwater vehicles, Fig. 2 - shows a side view of the control handle, Fig. 3 - shows a top view of the control handle, Fig. 4 - shows an isometric view of the control handle disassembled into components, Fig. 5 - shows a vertical cross-section of the control handle taken along line A-A, Fig. 6 - shows a vertical cross-section of the control handle taken along line B-B, Fig. 7 - shows an enlarged view of fragmentary portion C of the upper part of the control handle as shown in the cross-section represented in Fig. 5, Fig. 8 - shows an enlarged view of fragmentary portion D of the upper part of the control handle as shown in the cross-section represented in Fig. 6, Fig. 9 - shows an exemplary embodiment of two such control handles in an underwater vehicle, Fig. 10 - provides an enlarged view of fragmentary portion E that shows how one of the control handles is mounted to the hull of the underwater vehicle.

[0022] A vehicle propulsion control handle, especially for underwater vehicles, according to the present invention, has a metal cuboid-shaped base 1 with pass-through mounting holes 2 arranged in its corners and with a longitudinal, horizontally oriented blind hole 3 in its front wall, wherein an upper surface of said base has a cylinder-shaped two-segment offset 4 along its axis of symmetry with a rectangular slot 5 along the symmetry axis of the offset 4 whose both segments 6 and 6' are provided at their upper ends with round pass-through holes 7 and 7', positioned coaxially and horizontally, wherein the segment 6 has in its upper face a vertically positioned round pass-through hole 8 with its lower inner end connected to the inner end of the hole 3 and to the inner end of a diagonally positioned blind hole 8' in the lower side surface of said segment 6 such that said blind hole facilitates the installation of electric wires.

[0023] On the cylinder-shaped two-segment offset 4 for the base 1, there is mounted the lower end of a metal sleeve-shaped handpiece 9 having on its side surface a vertically positioned rectangular pass-through slot 10 and coaxially and horizontally positioned mounting holes 11 and 11', with a pass-through hole 12 arranged above the hole 11', whereas the handpiece 9 between the holes 11, 11' and 12 has on its outer sleeve-shaped side surface evenly spaced and vertically arranged trapezoid-shaped grooves 13 so that the control handle can be easily held by hand. In the vertically positioned slot 10 for the handpiece 9, there is mounted a profile plate-shaped lever 14 having a triangle-like profile in the side view, the lower end of said lever being fitted with an inwardly facing, diagonally arranged, rectangular lower offset 15 with its rounded end and a pass-through mounting hole 16 made therein, whereas the upper end of the lever 14 is also provided with an inwardly facing upper U-shaped offset 17 with magnet M1 mounted therein, wherein the offset 17 is fitted loosely to a pin 18 push fitted into an upper hole 12 of the handpiece 9, whereas,

above the lower offset 15, the lever 14 is also provided with an inwardly facing cylinder-shaped offset 19. The lower offset 15 for the lever 14 is pivotally connected to the sleeve-shaped handpiece 9 and connected to the two-segment offset 4 using a pin 20 mounted in the hole 16 of the offset 15 for said lever and partially in the holes 7 and 7' of both segments 6 and 6' of the offset 4, wherein, onto the threaded ends of the pin 20, there are screwed mounting nuts 20' that are also partially mounted in the holes 7 and 7' of both segments 6 and 6' of the offset 4 and in the holes 11, 11' of the handpiece 9. Whereas the offset 19 for the lever 14 is fitted with a cylinder-shaped spring 21 with its end adjacent to the inner surface of the sleeve-shaped handpiece 9.

[0024] Inside the upper end of the sleeve-shaped handpiece 9, there is mounted the lower end of a housing 22 of the electronics system constituted by a sleeve-shaped upper part 23 with an outer ring-shaped offset 24 and a bottom 25 with its lower surface having two identical offsets 26 and 26' with a circular segment profile, positioned vertically and opposite one another, separated by a rectangular slot 27 for the offset 17 for the lever 14, wherein the offset 26' has a horizontally arranged round pass-through hole 28 and the offset 26 has a blind hole 29, made from inside (on the side of the slot 27) and positioned opposite the hole 28 and along the axis of symmetry of the hole 12 for the sleeve-shaped handpiece 9, whereas the face of the offset 26 has a lower cylinder-shaped offset 30 with a vertically arranged pass-through hole 31 in both said offsets 26 and 30, said hole having in its lower part a threaded cylinder-shaped recess 31' for an insulated cable gland 30' with a vertically arranged pass-through hole 31" along its symmetry axis for electric wires (not shown in the drawing) to protect the housing 22 against water ingress, wherein the wires in the hole 30" are potted with epoxy resin to provide additional sealing.

[0025] Both said offsets 26 and 26' of the housing 22 are mounted inside the upper end of the sleeve-shaped handpiece 9 so that the lower face of the ring-shaped offset 24 is adjacent to the upper face of said handpiece; and in the pass-through hole 28 of the offset 26' and in the blind hole 29 of the offset 26, there is mounted the pin 18 that connects said handpiece to the housing 22. Whereas, above the bottom 25 and in the circumferential recess 25' of the sleeve-shaped housing 22, there is mounted an electronic board 32 with a microprocessor (not shown in the drawing), said board 32 having a profile encoder 33 and three Hall sensors H1, H2 and H3 soldered thereto, wherein the Hall sensors H2 and H3 are arranged on the upper surface of said board 32 on both sides of the encoder 33 in its front part, and the third Hall sensor H1 is soldered to the lower surface of said board in its back part and detects the magnetic field generated by magnet M1 of the inner offset 17 for the lever 14 when the control handle operator presses said lever 14. The board 32, together with electronic elements arranged thereon, is covered from the top by a two-stage sleeve-

shaped lid 34 fitted in the upper part of its side surface with a circumferential groove 34' (larger in diameter). In the upper face of the lid 34, there are positioned two opposing round pass-through holes 35 and 35' having cylinder-shaped compression springs 36 and 36' mounted thereon with metal balls 37 and 37' mounted on their upper faces. On the lid 34, there is provided a sleeve-shaped knurled knob 38 with an upper bottom 39 whose inner surface has a vertically positioned coaxial sleeve-shaped offset 40 with an upper end of the profile encoder 33 fitted therein, whereas the side surface of said knob 38 has along its perimeter and every 90° four threaded mounting holes 41 for screws 42 with their inner ends mounted in the groove 34' of the lid 34, thereby stabilising the position of the knob 38.

[0026] Moreover, thirty-two blind holes 43 are arranged on the inner surface of the bottom 39 of the knurled knob 38, evenly spaced on a circle with a diameter adjusted to the spacing of the holes 35 and 35' of the lid 34, for the metal balls 37 and 37' of the springs 36 and 36', thereby enabling step changes in the position of the knob 38.

[0027] Whereas, in the side surface of the ring-shaped offset 24 of the housing 22, there are provided, next to the Hall sensors H2 and H3 of the board 32, two rectangular sockets 44 and 44' with bistable slide function switches 45 and 45' with an inner channel 46 mounted thereon, said channel 46 being fitted with magnets M2 and M3 whose magnetic field is detected by said sensors when the operator of the control handle changes the position of the function switches 45 and 45'.

[0028] Electric wires (not shown in the drawing) for electronic elements of the board 32 are led out of said board 32 and led out of the control handle through the holes 31, 31', 8 and 3, said wires being connected to the central electronics system of the vehicle (not shown in the drawing) that receives and processes control signals, including the signal from the electronics system of the control handle.

[0029] In another exemplary embodiment (not shown in the drawing), in the bottom 39 of the knurled knob 38, there were provided eight or sixteen blind holes 43 for the metal balls 37 and 37' of the springs 36 and 36', wherein the number of said holes 43 was adapted to the type of the encoder 33'; moreover, the control handle had only one socket 44 with the function switch 45 fitted with M2 magnet and its board 32 was equipped with only one Hall sensor H2; whereas in the holes 7 and 7' of both segments 6, 6' of the offset 4 for the base 1, in the holes 11 and 11' of the lower end of the handpiece 9 and in the hole 16 of the inner offset 15 for the lever 14, there is push fitted the longitudinal pin 20.

[0030] The plate-shaped base 1 of the control handle according to the present invention is fastened to a hull 48 of an underwater vehicle 49 by means of screws 47 arranged in the corner holes 2 of said base, wherein, in the front part of the hull, two control handles are preferably mounted symmetrically to the longitudinal axis of

the underwater vehicle 49 (as shown in Fig. 9), whereupon the electric wires (not shown in the drawing) are connected to the central electronics system of the underwater vehicle 49.

[0031] In order to start engines 50 of the underwater vehicle 49, the lever 14 of the control lever is pressed such that its magnet M1 is moved into the area covered by the Hall sensor H1 that sends a signal to the central electronics system of the underwater vehicle 49, whereupon the knurled knob 38 of said control handle that controls both engines 50 of the underwater vehicle 49 is turned to select the appropriate gear (from 0 to 9) of the engines 50, and, if the gear is set to 0 (neutral), the engines 50 do not start independently of the signals from any other systems that control and support the operation of said engines 50. The position of the knurled knob 38 is read by the encoder 33 that transmits the signal to the central electronics system of the underwater vehicle 49. Whereas, when one of the bistable function switches 45 or 45' of the housing 22 is moved, magnet M2 or M3 is moved into the area covered by the Hall sensor H2 or H3 that transmits the signal to the central electronics system of the underwater vehicle 49 to stop the vehicle and engage the reverse gear. When the bistable function switches 45 and 45' are moved again, the engines 50 accelerate until the preset speed of the knurled knob 38 is reached.

[0032] In the case where the vehicle is equipped with two control handles, the knurled knob 38 of the second control handle is used for vehicle trimming, i.e. weight distribution (vehicle balancing), such that the vehicle can be appropriately positioned on the water surface and controlled by changing its trimming angle. Whereas the second bistable function switches 45 or 45' can be freely programmed as appropriate, e.g. so as to maintain a constant speed of the underwater vehicle 49.

Claims

1. A vehicle propulsion control handle, especially for underwater vehicles, fitted with a handpiece having a lever and a knob and with a board having a micro-processor and an encoder, **characterized in that:** the lower end of its handpiece (9) is connected in a detachable manner to an offset (4) of the upper surface of the base (1) and to a lower inner offset (15), mounted thereon, of the profile lever (14) arranged on a slot (10) of the handpiece (9), wherein the profile lever (14) is provided above the offset (15) with an inner offset (19) with a spring mounted thereon (21) whose other end is adjacent to the inner surface of the handpiece (9), and with an upper offset (17) with magnet M1 fitted loosely to a pin (18) in the slot (12) of the handpiece (9), inside the upper end of said handpiece, there is provided the lower end of the housing (22) with an outer ring-shaped offset (24) and a bottom (25) whose lower surface has two off-

- sets (26, 26') separated by a slot (27) such that an upper offset (17) for the lever (14) is provided in said slot; in said housing (22), there is set an electronic board (32) permanently connected to an encoder (33) and to at least one Hall sensor (H2, H3), arranged on the upper surface of the board (32), and the Hall sensor (H1) arranged on the lower surface of said board such that electrical wires are led out of said board through a pass-through hole (31) in the offset (26) of the housing (22); next to each of the Hall sensors (H2, H3), in the side surface of the housing (22), there is provided at least one socket (44, 44') for a bistable slide function switch (45, 45') with a magnet (M2, M3), from top side, the electronic board (32) is covered with a sleeve-shaped lid (34) having on its upper face blind holes (35, 35') for springs (36, 36') with metal balls (37, 37') mounted thereon, wherein, on said lid (34), there is mounted a sleeve-shaped knob (38) with an upper bottom (39), connected to the lid in a detachable manner, whose inner surface has an offset for the upper end of the profile encoder (33) and blind holes (43) for said metal balls (37, 37') of the springs (36, 36').
2. A control handle according to claim 1, **characterised in that:** the offset (4) of the base (1) consists of two segments (6, 6') separated from each other by a rectangular slot (5) for the offset (15) of the profile lever (14), with the base (1) further comprising mounting holes (2).
 3. A control handle according to claims 1 or 2, **characterised in that:** the segments (6, 6') of the offset (4) for the base (1) are provided with coaxially and horizontally positioned round pass-through holes (7, 7'), the lower end of the handpiece (9) has two pass-through holes (11 and 11') positioned coaxially to said holes and also horizontally mounted, and the lower inner offset (15) for the profile lever (14), diagonally positioned, is provided with a pass-through hole (16), wherein a pin (20) is mounted in the holes (7, 7', 11, 11', 16).
 4. A control handle according to claims 1 or 2 or 3, **characterised in that:** in the front wall of the base (1), there is provided a horizontally positioned blind hole (3) with its inner end connected to the inner lower end of a vertically positioned blind hole (8) in the upper face of the segment (6) of the offset (4) for the base (1).
 5. A control handle according to claim 4, **characterised in that:** in the lower side surface of the segment (6) of the offset (4) for the base (1), there is provided a diagonally oriented blind hole (8') with its inner end connected to the inner ends of the holes (3, 8) of the base (1).
 6. A control handle according to one of claims 1 to 5, **characterised in that:** the offset (26') of the housing (22) has a horizontally arranged round pass-through hole (28), and the offset (26) has a blind hole (29), made from inside and positioned opposite the hole (28), wherein both said holes (28, 29) are arranged along the axis of symmetry of the slot (12) of the handpiece (9) and have a pin (18) mounted therein.
 7. A control handle according to one of claims 1 to 6, **characterised in that:** the offset (26) has a lower cylinder-shaped offset (30) with a hole (31) and a threaded cylinder-shaped recess (31') for an insulated cable gland (30') with a vertically positioned pass-through hole (31") for electric wires.
 8. A control handle according to one of claims 1 to 7, **characterised in that:** on the outer surface of the lid (34), there is provided a circumferential groove (34') for end points of the screws (42) inserted into mounting holes (41) in the side surface of the knob (38).
 9. A control handle according to one of claims 1 to 8, **characterised in that:** the knob (38) is knurled, whereas the handpiece (9) is provided on its outer sleeve-shaped side surface with evenly spaced and vertically arranged trapezoid-shaped grooves (13).
 10. A control handle according to one of claims 1 to 9, **characterised in that:** the Hall sensors (H1, H2, H3) and the encoder (33) are connected by electric wires to the external central electronics system of the vehicle.

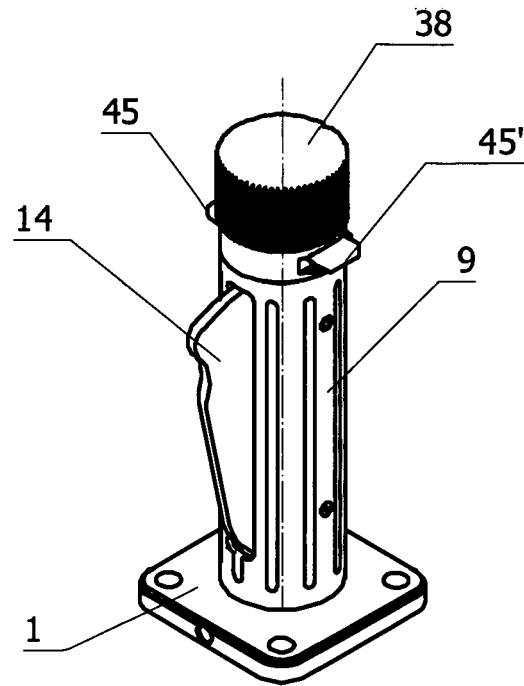


Fig. 1

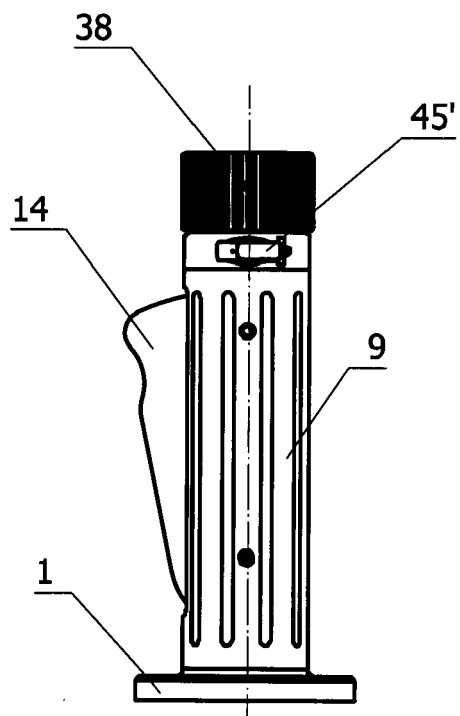


Fig. 2

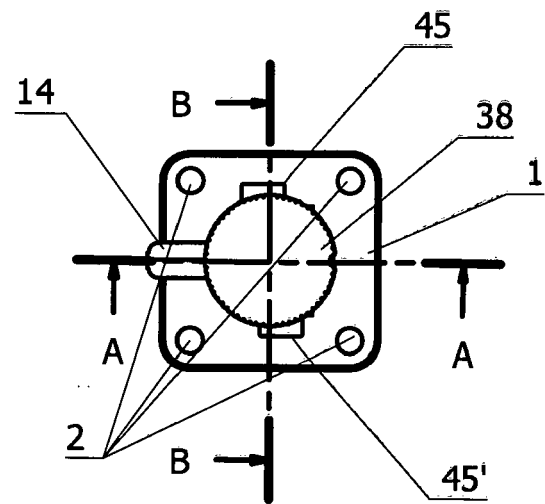


Fig. 3

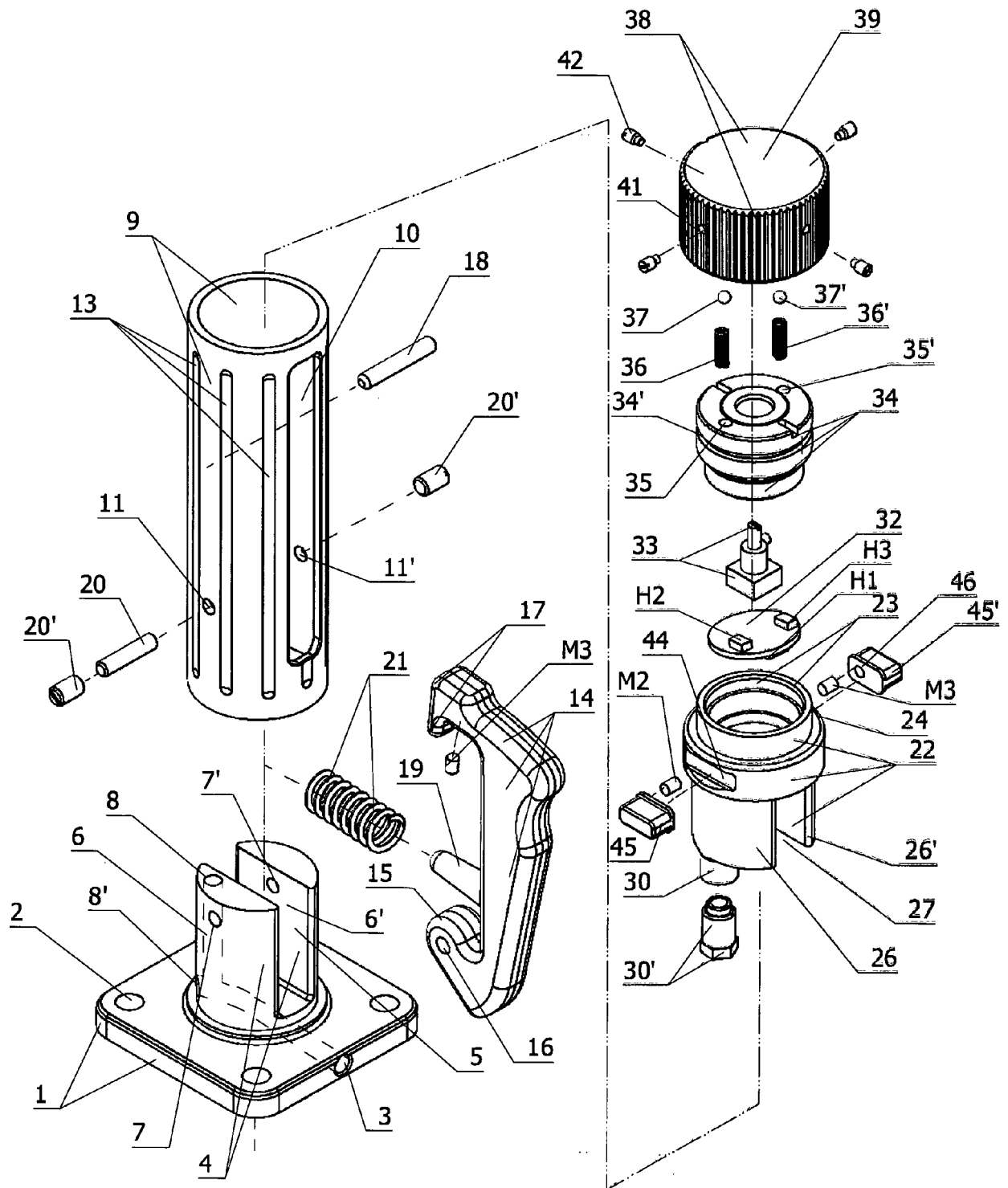


Fig. 4

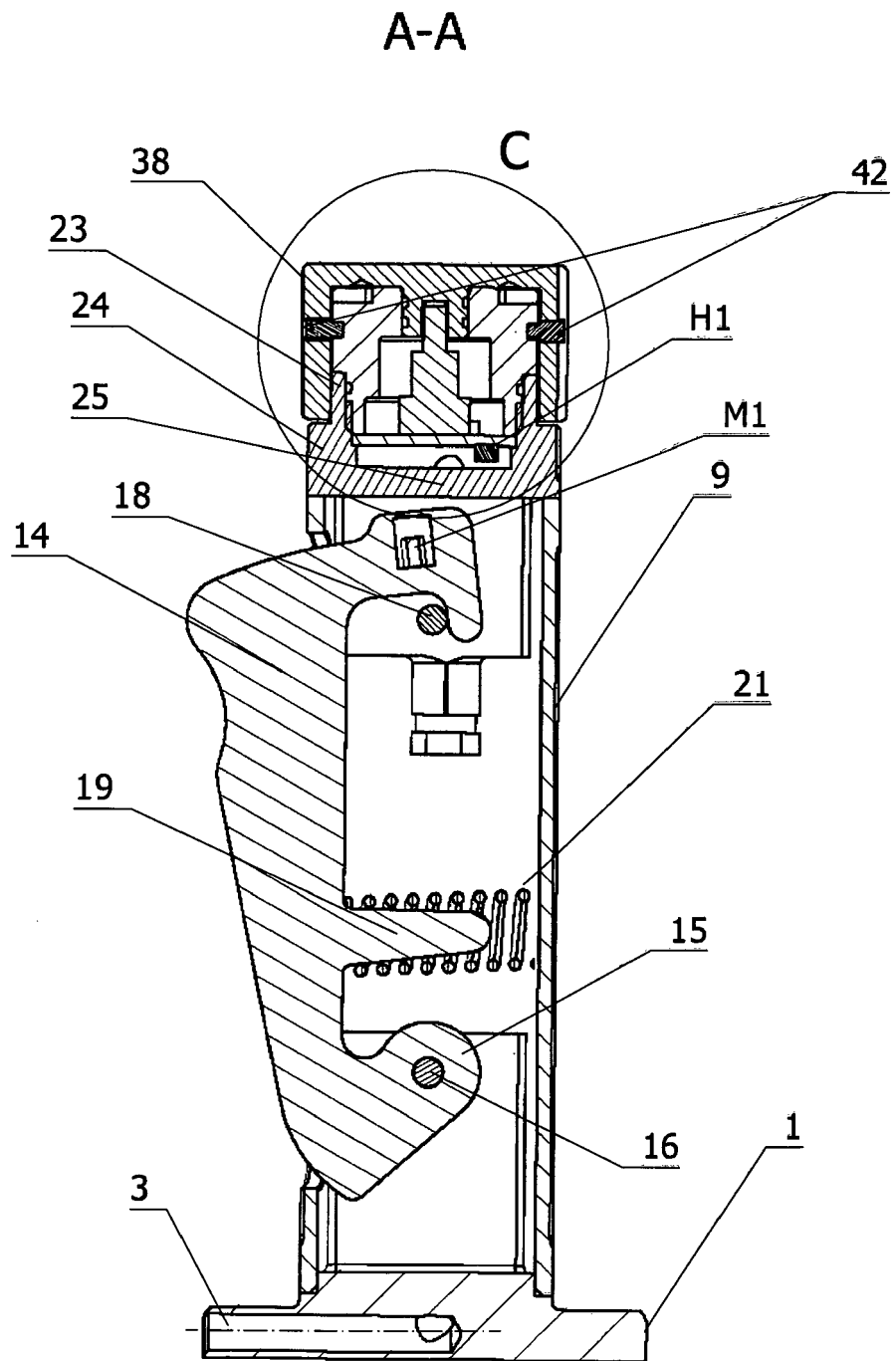


Fig. 5

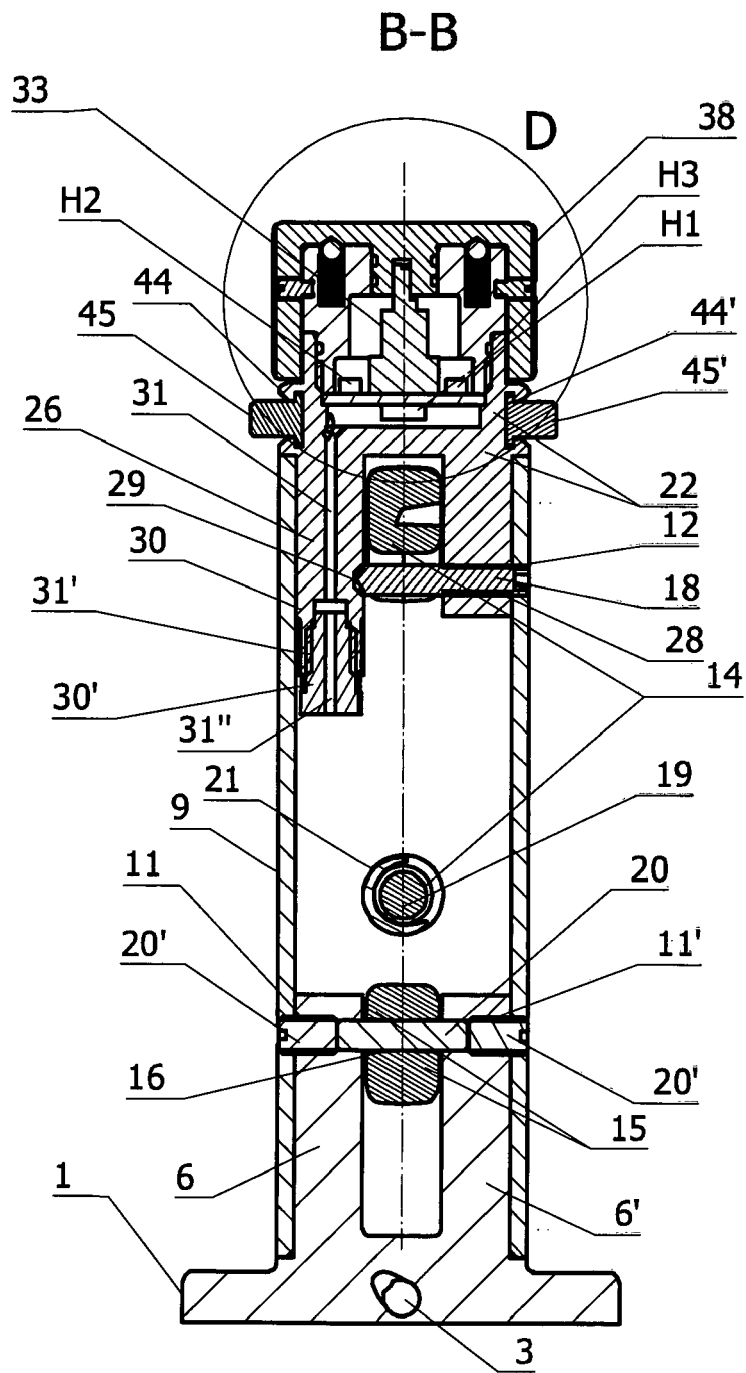


Fig. 6

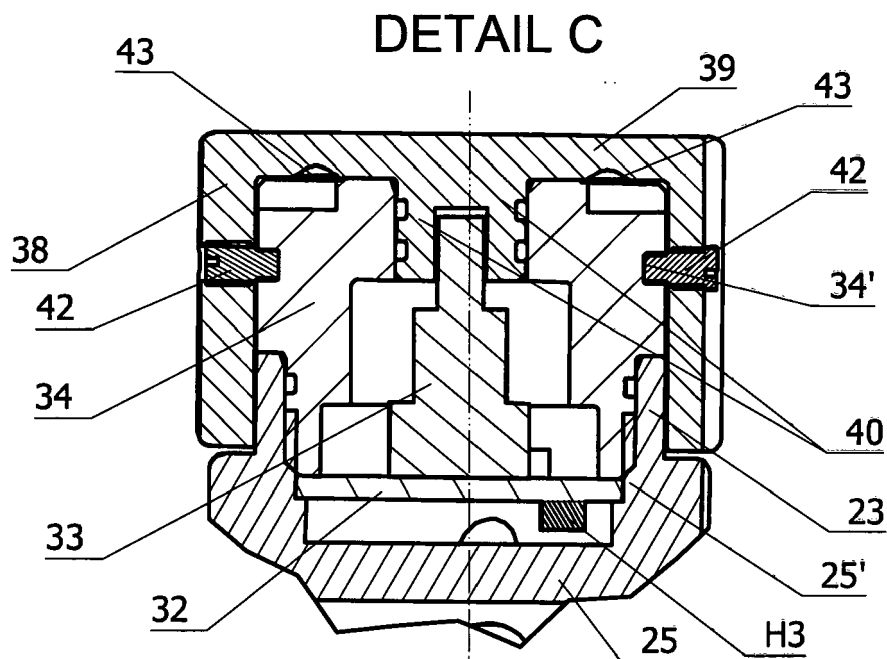


Fig. 7

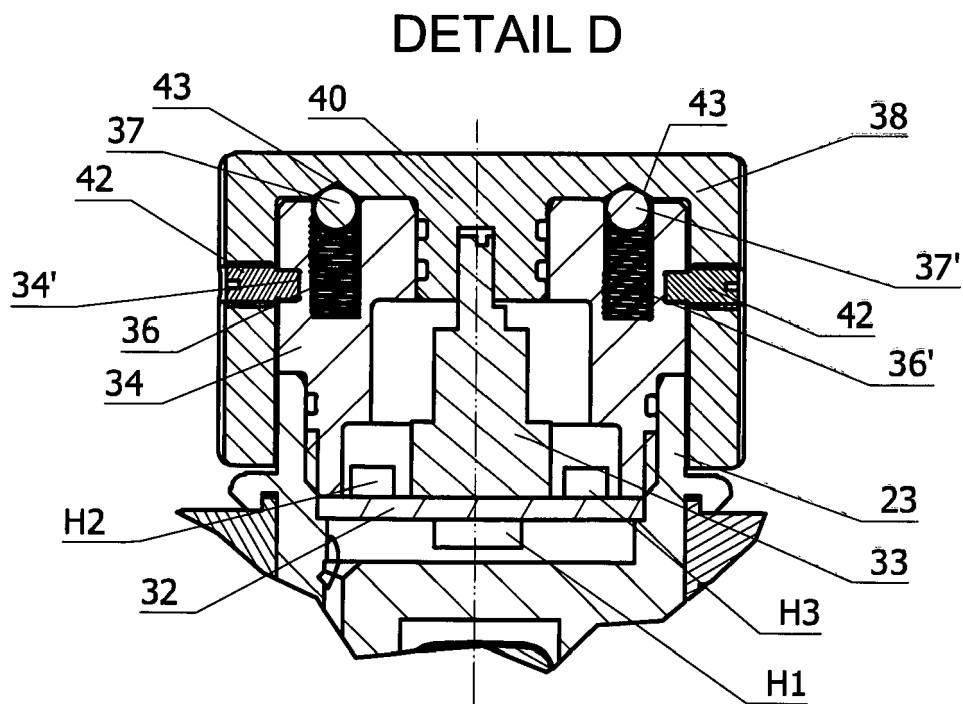


Fig. 8

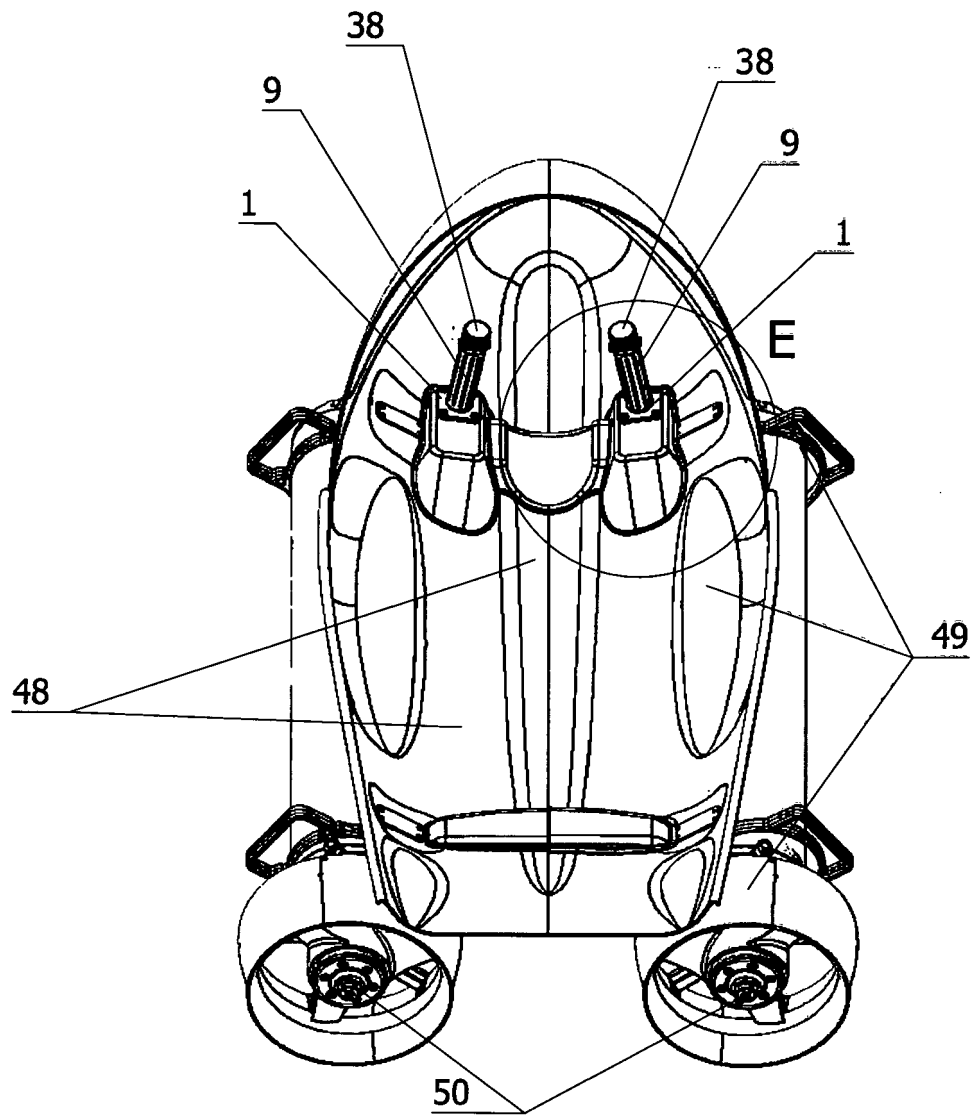


Fig. 9

DETAIL E

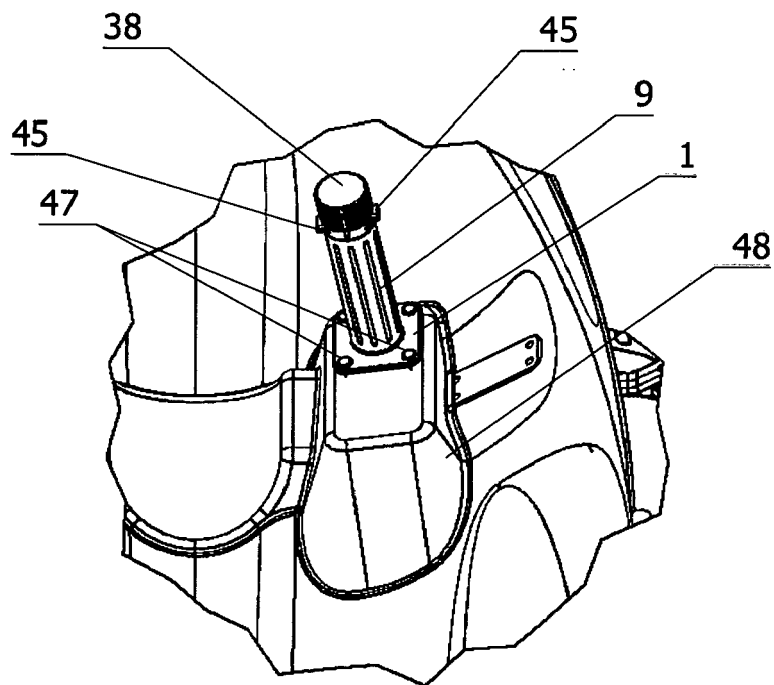


Fig. 10



EUROPEAN SEARCH REPORT

Application Number

EP 22 46 0033

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EPO FORM 1503 03.82 (P04C01)

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 2018/356907 A1 (PARAZYNSKI SCOTT EDWARD [US] ET AL) 13 December 2018 (2018-12-13) * paragraph [0088] - paragraph [0091] * * paragraph [0093]; figures * -----	1-10	
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			B63H G05D G05G
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 20 January 2023	Examiner Barré, Vincent
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

**ANNEX TO THE EUROPEAN SEARCH REPORT
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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