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(54) Static diving wireless control power model submarine

(57) A static diving wireless control power model submarine, comprising an internal space, for filling and discharging water to change a floating level of said model, an external hull, with artistic and hydrodynamic advantages an internal hull, for containing internal equipments and components, and an air-sealed compartment (11), substantially in a tubular form, and having no opening disposed on lateral surface, but having necessary openings (21-26) disposed at front and rear ends of a flange (12,13).

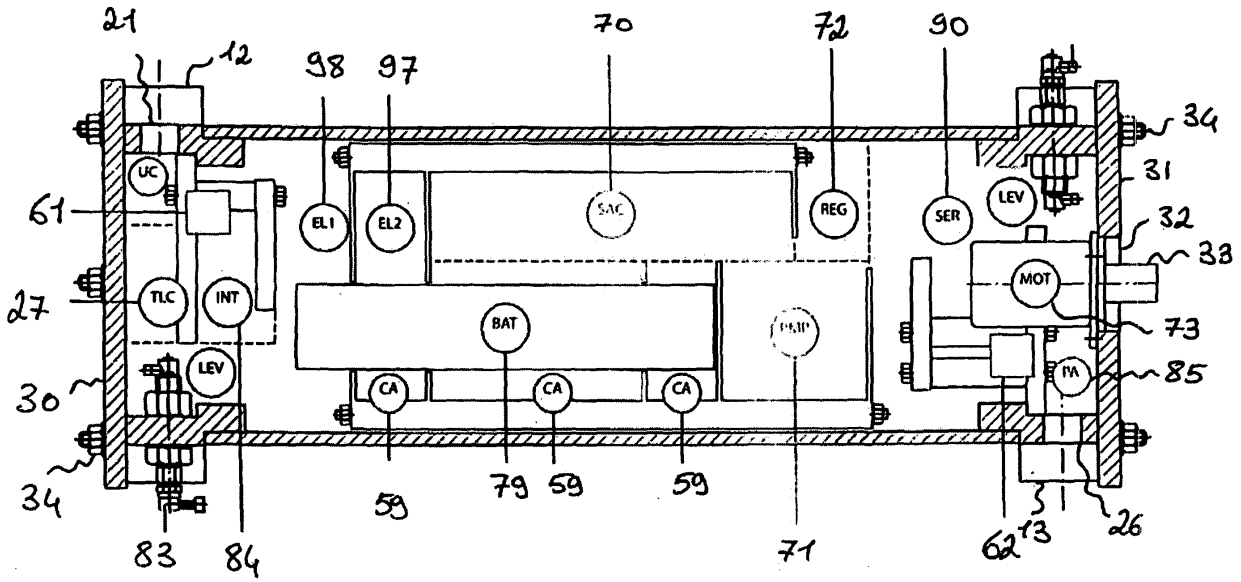

Fig.5

EP 1 731 207 A2

Description

[0001] The present invention relates to a model submarine, and more particularly to a static diving wireless control power model submarine having a double-layer hull and featuring a modular structure and a simplified assembling process.

[0002] In general, a wireless control power system usually has two main features: a model (such as a motor vehicle, a motorcycle, an airplane, a helicopter or a ship with variable retardations) that can be removed and manufactured with an appropriate proportion similar to life scale. The motor vehicle model so produced can move in a fast speed or make turns and brakes quickly; and the airplane model so produced can fly in the air and complete all kinds of motions in the air. The second feature is that the model can be controlled at a remote end through a wireless device.

[0003] The diving power system so produced should have the same functions with the diving machines capable of sailing and diving in the sea, floating above water surface or performing a submarine navigation. In addition, the diving power system should have a wireless control device such as a wireless remote drive to accomplish a non-contact connection between the model and its operator.

[0004] The diving power system has the features of sailing on water surface as well as performing a submarine navigation under water. The major difficulty for diving in water and floating above water surface resides on the requirement for one or more air-sealed compartments equipped with electric devices (including electric machinery and battery) and electronic devices (such as wireless receiver and multi-functional electronic devices).

[0005] In addition, appropriate equipments are needed for diving in the sea or floating above water surface, and these equipments may come with different shapes, and the shape of these equipments is one of the major factors to determine the structural characteristics of the model.

[0006] Like most submarines, this model can have two options: having a single-layer hull or a double-layer hull.

[0007] In a first case, the model has a single-layer hull with a whole air-sealed body to protect the internal components from being submerged into water to minimize the water from entering while taking the hydrodynamic and artistic concept into consideration to give good look for its appearance.

[0008] In a second case, a double-layer external hull model has a double-layer hull, and water can flow freely in the external hull, in addition to having the artistic and hydrodynamic advantages. A second layer of the hull is disposed in a first layer of the hull to define an air-sealed hull, and all components and devices are installed in the hull.

[0009] The structure of the model (with either a single-layer hull or a double-layer hull) is selected in advanced, and all diving models have two different diving ways: a dynamic diving and a static diving.

[0010] In the dynamic diving, the diving goes through a motive power action only, and the surface of its level has a large quantity of water (referring to the level helm). In this case, the model shows a "positive" trim, and thus requires an empty tank and a specific weight, so that the model is lighter than water and floats in water. If the speed is fast enough, the model can dive by the action of the level helm, and the maximum diving depth is equal to several decimeters in normal conditions. To maintain this depth, the model must travel in a certain specific speed. Once the model stops, the dynamic diving submarine model will float above water.

[0011] On the other hand, a static diving model is similar to a real-life submarine having an internal air-sealed compartment which is called a ballast tank and can fill or discharge water by means of its internal equipments, so that the full or empty tank contains a different quantity of water to change the weight of the model, so as to change the floating condition of the model and offset the forces directly to give a "negative" trim.

[0012] If the quantity of water entering the ballast tank is large enough, then the weight of the model will exceed the buoyancy to give a downward thrust, so that the model can dive into water, and such result is not related to the speed of the traveling model.

[0013] Theoretically, there is no upper limit for the diving depth, if the strength of the structure of the air-sealed tank is strong enough.

[0014] Of course, the change of the trim of a static diving model is much more complicated than that of a dynamic diving model, and thus it requires the system to change the trim. The trim is "negative" when the model dives into water and "positive" when the model floats above water.

[0015] The water tank comes with a hard and solid wall for receiving or filling water, and the water tank could be a cylindrical body or a leather bag having a variable volume, and it also can be a water bag or a rubber bag with changeable shape.

[0016] The motive power system could be a gear pump, a compressor pump, an electric machine or other system for storing and compressing air or coal gas.

[0017] The submarine model is described as follows. There are various different models of dynamic diving submarine models in the market, but no finished products of the wireless control static diving submarine model are found yet. The main reason resides on the extreme complexity of such model, and thus experienced model technicians and special tools are required for its manufacture and production.

[0018] The major difficulty resides on the production of an air-sealed structure, and some require waterproof openings, and some require outlets for installing an axle of a propeller, withdrawing a rudder, and installing an ignition switch. The dynamic diving system should have a plug and a tube and a tube connector for connecting a ballast tank and a pump (or an exhaust system).

[0019] To prevent leakages that may cause damages

to the model, the manufacturing process requires extreme cares.

[0020] Opening the air-sealed structure for routine maintenance and operation, charging the battery, and other internal operation of the model are basic operations.

[0021] In general, the wireless control static diving submarine model is usually made by a model technician, and the processes from material selection to manufacture (such as the plastic tube) must be in compliance with the desired requirements.

[0022] Some manufacturers pack semi-finished products of the models into a carton, but these materials are basic materials only, and model technicians have to adjust the components, punch holes (if needed), solder metal components, add air-sealed ring and apply oil, etc.

[0023] The manufacturing process is predictable most situations, but a successful manufacture surely depends on the experience of the model technicians.

[0024] The sealed portion of the air-sealed compartment requires a plug (a plug causes a certain pressure when the plug is inserted, and thus the plug is applicable for the O-ring or other detachable portions) connected to a distal end of the tube or the screw bolt connector and the air-sealed O-ring are installed at the prow or poop.

[0025] In some models, portions immerged in water, doors for the inlets of air-sealed compartments, or panels are fixed by screw bolts, and the strength of the screw bolts depends on the manufacturing process, the material preparation and the skill of related tools.

[0026] In general, a dynamic diving submarine model is relatively simpler than a static diving submarine model, and the manufacture requires simpler tools such as a polishing emery wheel, and thus providing better safety. The dynamic diving submarine model requires a constant position trim, so that the submarine model can float above water after the trim is changed.

[0027] The diving depth of the static diving submarine model can be at most 2 meters and the average length of the static diving submarine falls in the range from 100 cm to 150 cm.

[0028] There are many different models of dynamic diving submarine models available in the market, but no finish products of the wireless control static diving submarine model are found yet.

[0029] In view of the shortcomings of the prior art, the inventor of the invention based on years of experience in the related industry to conduct extensive researches and experiments, and finally invented a static diving wireless control power model submarine in accordance with the present invention.

[0030] Therefore, it is a primary objective of the present invention to provide a feasible solution and overcome the foregoing problems by providing a diving wireless control submarine model that can be manufactured more easily. Even inexperience model technicians can produce the model easily without requiring the use of complicated tools and mechanical components.

[0031] Further, the present invention provides a static diving wireless control submarine model that has an air-sealed structure with some openings, and the implementation is much easier and can pass the water permeation test.

[0032] Further, the invention produces a series of finished goods of the static diving wireless control submarine models.

[0033] Further, the invention makes the maintenance of a static diving wireless control submarine model more convenient.

[0034] To achieve the foregoing objective, the present invention provides a static diving wireless control submarine model as described below.

[0035] The objective, shape, structure, characteristic and effect of the present invention will now be described in more detail with reference to the accompanying drawings that show various embodiments of the invention, in which:

FIG. 1 is a side view of a static diving wireless control submarine model of the present invention;

FIG. 2 is a front view of a submarine model of the present invention;

FIG. 3 is a cross-sectional side view of a submarine model of the present invention;

FIG. 4 is a cross-sectional front view of a submarine model of the present invention;

FIG. 5 is a cross-sectional view of a longitudinal portion of a submarine model and the layout of an internal management area, internal electric components and hydraulic pressure components according to the present invention;

FIG. 6 is a cross-sectional view of a longitudinal portion of a submarine model according to the present invention;

FIG. 7 is a longitudinal cross-sectional view of an internal hull of a submarine model showing the change from Section A-A to Section Q-Q according to the present invention; and

FIGS. 8 to 22 are cross-sectional view of an internal hull of a submarine model showing the change from Section A-A to Section Q-Q as depicted in FIG. 7.

[0036] The static diving wireless control submarine model is illustrated by the following preferred embodiment.

[0037] In an internal hull, the air-sealed compartment uses plastic tubes with a length of 340 mm, an internal diameter of 123 mm, and an external diameter of 133 mm (and the dimensions are provided for illustration pur-

pose only), and both ends of the air-sealed compartment includes openings.

[0038] The tube is an integral tube without any opening on the sidewall of the tube.

[0039] With these features, openings are drilled manually on the hull and used for transmitting the rudder or other functions, and thus causing troubles to the model manufacturers. In addition to the skillful boring techniques, it is also very difficult to create the air-sealed openings. On the other hand, the present invention omits all openings on the lateral surface of the hull, and simply requires an integral tube, and thus its installation is very simple, easy and cost-effective, and the invention is suitable for industrial productions.

[0040] Further, the materials for making the tube and plug are transparent, so as to make the inspection of the overall operating conditions and the operating conditions of each component very easy.

[0041] All openings required for the hull and other necessary functional components are installed on both ends of the flanges (such as the flange 12 and flange 13 installed respectively on both ends of the tubular air-sealed compartment 11).

[0042] In this embodiment, the flange has a thickness of 50 mm, an internal diameter of 100 mm, and an external diameter of 170 mm. A certain taper exists along the lengthwise diameter that facilitates its installation on both ends of the tube, and there are two air-sealed rings 48, 49 as well.

[0043] To facilitate the manufacture, the flanges 12, 13 are identical.

[0044] To assure the air-sealed connection of the air-sealed rings 48, 49 between the flanges 12, 13 and the tubular air-sealed compartment 11, the air-sealed ring includes four screw rods 14, and an appropriate tension screw nut installed at the front end of the flange, and the four screw rods 14 are disposed outside the tubular air-sealed compartment 11 for supporting an external component 15, and the external component 15 is fixed to an external hull 17 and a ballast tank 16 as shown in FIG. 3.

[0045] As described above, all openings are centralized at the flanges 12, 13, and the flange 12 has three holes 21, 22, 23, and the other flange 13 also has three holes 24, 25, 26.

[0046] More particularly, the hole 21 is an air-sealed outlet used for the electric cable of a camera 27; the holes 22, 23 are used for the control rod to open or close the air-sealed tank 84 (which is a primary air-sealed tank and the other one is an auxiliary air-sealed tank). Further, the holes 24, 25 are used for the control of the level helms 80, 81 and the rudder 82, and the hole 26 is used for a water intake device 85.

[0047] All of the foregoing holes come with an axis disposed on a plane perpendicular to the external hull and will not be protruded from the flanges 12, 13, and thus facilitating the die-casing and shaping.

[0048] The channels of the switch axle and rudder axle pass through the O-ring, and the water intake device 85 and the camera electric cable are connectors (which can be tuned according to the type of the camera connector).

[0049] Two holes are disposed on an internal surface of the flange and the air-sealed compartment 11 for fixing a second structure, and the hull is an independent hull for installing all necessary mechanical and electronic equipments.

[0050] Two circular plugs are disposed on an external surface of the flanges 12, 13, and the plugs 30, 31 have a wall thickness of 8 mm and the plugs are made of a transparent material (such as polycarbonate), and the plug 30 is disposed at the prow and the plug 31 is disposed at the poop.

[0051] The plug 31 at the poop has a central hole 32 for passing an axle of a propeller 33 and the plug 30 at the prow is very smooth and flat for facilitating the installation of the camera 27 without hindering its vision.

[0052] Two plugs 30, 31 are fixed onto the flanges 12, 13 by six M6 screw bolts 34 and the screw bolts 34 are sealed by an O-ring, and the head of the screw bolt 34 is embedded into the groove of the flange to secure a screw nut.

[0053] The air-sealed system guarantees a safety seal within the depth of 5 meters, but the diving depth should not exceed 5 meters in any case, since the radio signals cannot be received at the depth beyond 5 meters. Further, it is not necessary to apply grease, silicone or other materials.

[0054] In general maintenance and operations, six screw nuts 34 on a prow plug 30 of the air-sealed compartment can be unscrewed easily to show the connectors of a primary battery 79, a fuse 98, a camera 27, and an ignition switch, and an LED abnormal signal alarm is included for observing this signal through the transparent plug.

[0055] Generally speaking, the prow plug 30 can be removed without removing other components. Most importantly, the removal and installation are very simple and easy; and all operations are reversible because no adhesive has been used for the installation process.

[0056] All components including the tube, plug, flange, and screw rod are finished goods made according to industrial standards and easy accessible manufacturing processes.

[0057] As to the support structure of the internal components, the present invention adopts a modular design, so that the hull and internal components get separate supports, and both installation and removal are very simple, and all components can be produced according to industrial standards more easily.

[0058] Six vertical ribs 41, 42, 43, 44, 45, 46 are provided for mounting the internal structure on the tubular air-sealed compartment 11 and four M4 screw rods 50, 51, 52 are provided for maintaining a constant interval by isolating members 53, 54, 55, 56.

[0059] The aforementioned features make the manufacture of all components with industrial standards and their installation much easier. Before the final assembling

process is carried out, all mechanical components and electronic components (such as a current loop, a pump, a wireless receiver servo controller and an electronic component) are installed on the rib.

[0060] After the final assembling process is completed, the partitions are opened for passing the electric cable 59 and fluid tubes and fixing the 12-volt battery 79 onto a rectangular plane.

[0061] To further simplify the installation, some components are moved to two separate stands 61, 62, so that the components 63, 64, 54, 65 are grouped integrally and fixed onto the flange by screw bolts, and thus they can be removed without removing the whole air-sealed hull. Such arrangement is very helpful for maintenance and repair.

[0062] A battery charger connector, a certain electric cable, a camera 27 and a fuse are fixed at the front end of the stand 61.

[0063] A servo control 90 of the rudder 82 and a servo control of the level helms 80, 81 are fixed to the rear end of the stand 62.

[0064] As to the internal components, a bag 70 is filled with air by a pump 71 which is controlled by an automatic failure-resisting relay circuit (to check whether or not there is no radio signal, whether or not there is water, whether or not the diving bag is over pressurized, and whether or not the battery is too low).

[0065] The control circuit of an electric machinery of the propeller 73 utilizes an electronic speed modulator 72, and two circuits and the servo control of two rudders are connected to a wireless receiver 97.

[0066] The internal components also include a color battery with a chargeable battery, an electric connector and a water pipe connector, etc.

[0067] The design of the external hull definitely has the artistic and hydrodynamic advantages, and the external hull can be divided into five portions and made of a plastic material. The prow is comprised of a transparent circular top 91, a right lateral side 92, a left lateral side 93, and a poop cone 94 having a small tower 95 at the top, and each portion does not come with any complicated protrusions for facilitating the die-casing and shaping. The transparent ABS material used allows users to freely paint the model according to their personal preference, so that a front top and a porthole 96 can be transparent, and the porthole is disposed at an appropriate position convenient for users to view from the outside to the inside and check whether or not the internal components in the air-sealed compartment are operated normally.

[0068] The external hull 17 is fixed onto the flange and the middle cabinet wall of the internal hull by screw bolts to form a cylindrical body with a diameter of 170 m along the lengthwise direction, and such diameter is large enough to precisely cover the internal hull.

[0069] Each part of the external hull can be removed or installed easily, and particularly the conical portion of the prow can be removed and installed very easily, so that it can pass through the front end of the plug more easily.

In summation, the present invention has the following features and advantages:

[0070] The structure of the static diving wireless control power model submarine and the double-layer hull are designed according to industrial standards for an easy installation, and thus even inexperienced model manufacturers can complete the assembling process.

[0071] The major features are listed below:

A. The static diving wireless control power model submarine is equipped with a ballast bag and an air pump.

B. In the structure of the double-layer hull, water can flow freely in the external hull, and thus having the artistic and hydrodynamic advantages.

C. All components of the air-sealed compartment can be removed and installed easily, and all components can be produced easily, since they are designed according to the industrial design and assembling standards.

D. The modular structure in the air-sealed compartment supports and fixes the mechanical components and electric components according to standard layouts and thus it is convenient to install the model.

E. In the whole assembling process, it is not necessary to go through the boring process, cutting process and adhering process, so as to avoid the shattered pieces that may damage the sealed portion.

F. All seals have a rubber washer (or O-ring) and some screw bolts and screw nuts, and such arrangement requires no skillful professional personnel to accomplish (but any adhering method or painting process requires skillful profession people to finish the job).

G. The model having a level helm can be used for the dynamic diving model, and the trim is "positive" when the diving model starts diving.

H. The model adopts electric machinery and forward propeller.

I. The camera is installed at the prow and connected to a display device on the ground through an air-sealed electric cable.
In Italy/European Union, the signal transmission of a mini camera allows users to use a radio frequency that will not penetrate water, and thus an electric cable is used for the connection instead, and the electric cable can be removed.

L. The total length is approximately 70 cm.

M. The weight is 6750 g above water surface and 7000 g in the water.

[0072] In the aforementioned Points A, C, D, E and F, modifications are needed, since they no longer comply with the current development trend and market requirements of the submarine model anymore.

[0073] It is also necessary to modify Point I, and the mechanical parts (such as the support base and transparent plug) are connected with a power supply in an air-sealed manner, so that the electric cable can be installed to the exterior of the power supply easily.

[0074] The design concept of the model completely follows the assembling standards, and it applies for all processes from selecting components to using the model, and thus no special installation skill or complicated tool is needed for the installation.

[0075] The general tools used for the installation include a hexagonal wrench, a brugola and a screwdriver.

[0076] In summation of the description above, the object, shape, structure of the present invention are novel and the invention improves over the prior art and thus is duly submitted for the patent application. While the invention has been described by means of specific embodiments, modifications and variations could be made by those skilled in the art without departing from the scope and spirit of the invention set forth in the claims.

Claims

1. A static diving wireless control power model submarine, comprising:

   an internal space, for filling and discharging water to change a floating level of said model;
   an external hull, with artistic and hydrodynamic advantages;
   an internal hull, for containing internal equipments and components; and
   an air-sealed compartment, substantially in a tubular form, and having no opening disposed on lateral surface, but having necessary openings disposed at front and rear ends of a flange.

2. The static diving wireless control power model submarine of claim 1, wherein said openings disposed on said flange have an axis on a plane perpendicular to an axis of said hull, and said flange does not come with a complicated protruding shape.

3. The static diving wireless control power model submarine of claims 1 or 2, wherein said two flanges are identical.

4. The static diving wireless control power model submarine of claim 2 or 3, further comprising a screw rod and a tension crew nut, such that said tension screw nut is embedded into a flange, and said screw rod and said air-sealed compartment support a rib at the middle rib and fix said external hull and said ballast tank.

5. The static diving wireless control power model submarine of the foregoing claims, wherein said internal hull is an independent structure, and all mechanical components and electronic components on said equipments are coupled to an internal structure and said flange.

6. The static diving wireless control power model submarine of claim 5, wherein said internal structure is comprised of a plurality of vertical ribs coupled with each other through a screw rod and maintains a fixed interval by an isolating component.

7. The static diving wireless control power model submarine of the foregoing claims, wherein said flange includes two circular plugs disposed on an external surface of said flange and made of a transparent material, and said plug at a poop has a central hole for passing an axle of a propeller, and said plug at a prow is very smooth and flat for installing a camera without hindering its visual sight.

8. The static diving wireless control power model submarine of claim 7, wherein said two plugs are fixed separately by a screw bolt, and the head of each screw bolt is embedded into said flange for securing said screw nut and facilitating the maintenance of equipments and the installation and removal of said screw nuts at said plug of said prow.

9. The static diving wireless control power model submarine of the foregoing claims, wherein said components on said stand are mounted onto said flange and can be removed without requiring a removal the whole of said air-sealed compartment.

10. The static diving wireless control power model submarine of claim 9, wherein said stand has a battery charger, an electric cable connector, a camera connector and a, fuse connector disposed at the front of said stand and a rudder and a servo control of a level helm disposed at the rear of said stand.

11. The static diving wireless control power model submarine of the foregoing claims, wherein said flange includes an outlet used for said electric cable of said camera, a hole used for an ignition switch, a hole used for the control of said level helm and said rudder, and a hole used for the intake of water.

12. The static diving wireless control power model sub-

marine of the foregoing claims, wherein said external hull is comprised of five portions, each portion being cast and shaped easily with artistic and hydrodynamic advantages.

13. The static diving wireless control power model submarine of claim 12, wherein said external hull is fixed with a middle partition panel by said crew bolt and said flange.

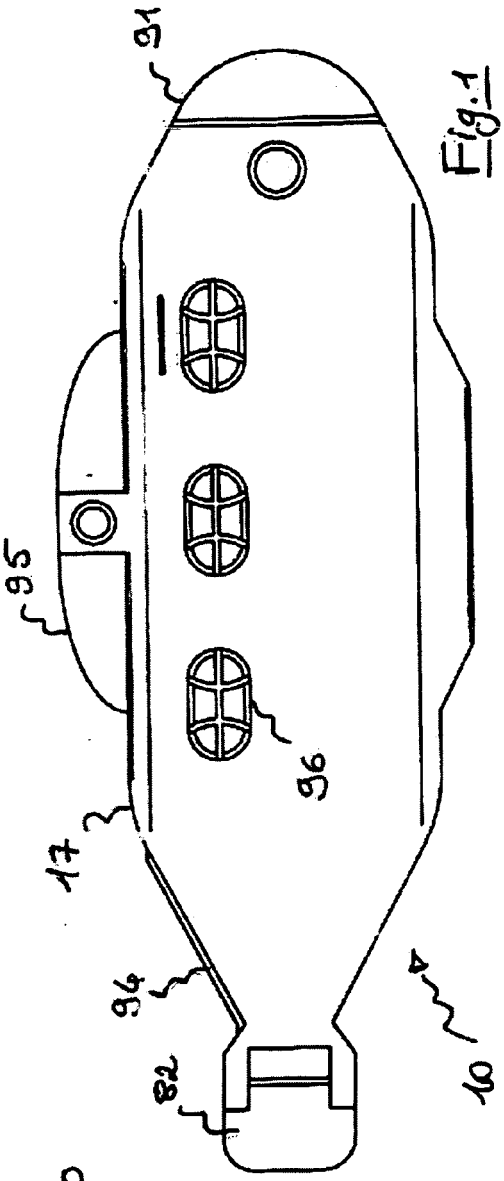

Fig.1

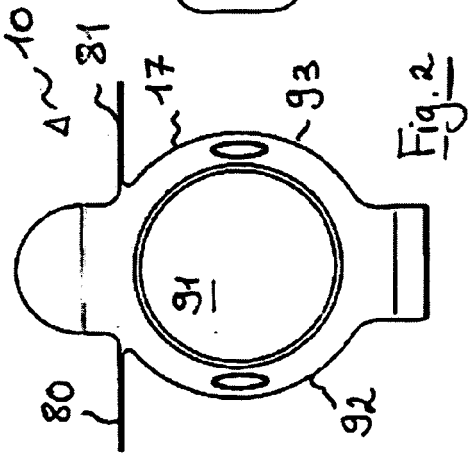

Fig.2

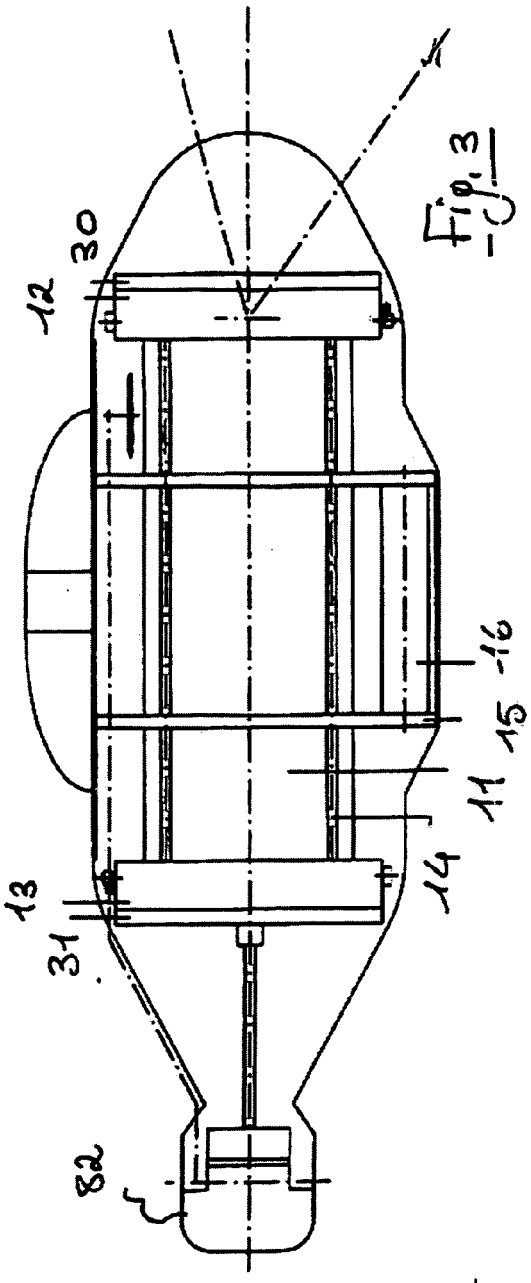

Fig.3

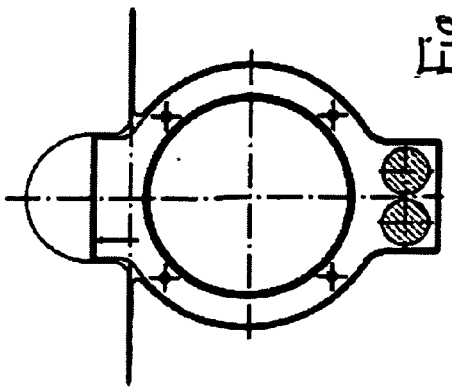

Fig.4

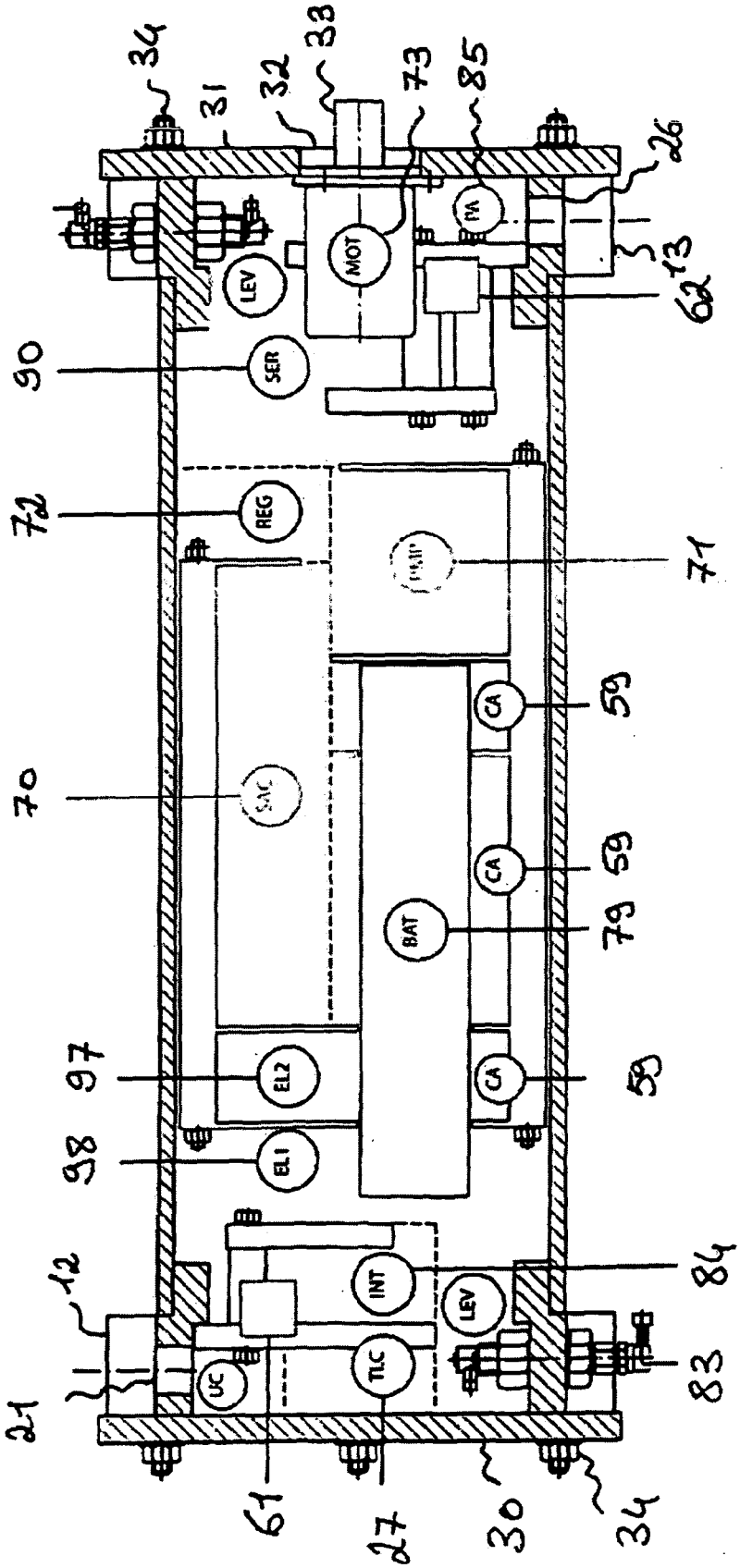
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Fig.5

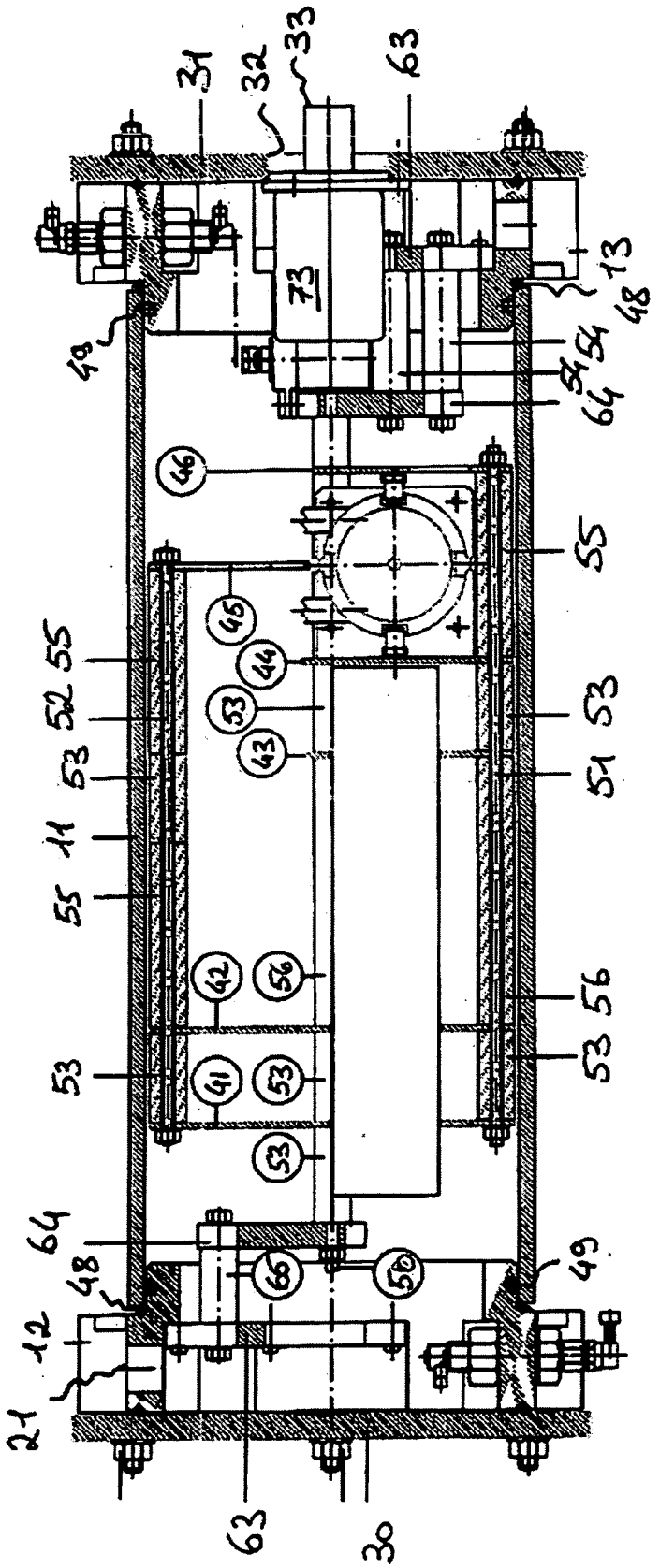
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Fig.6

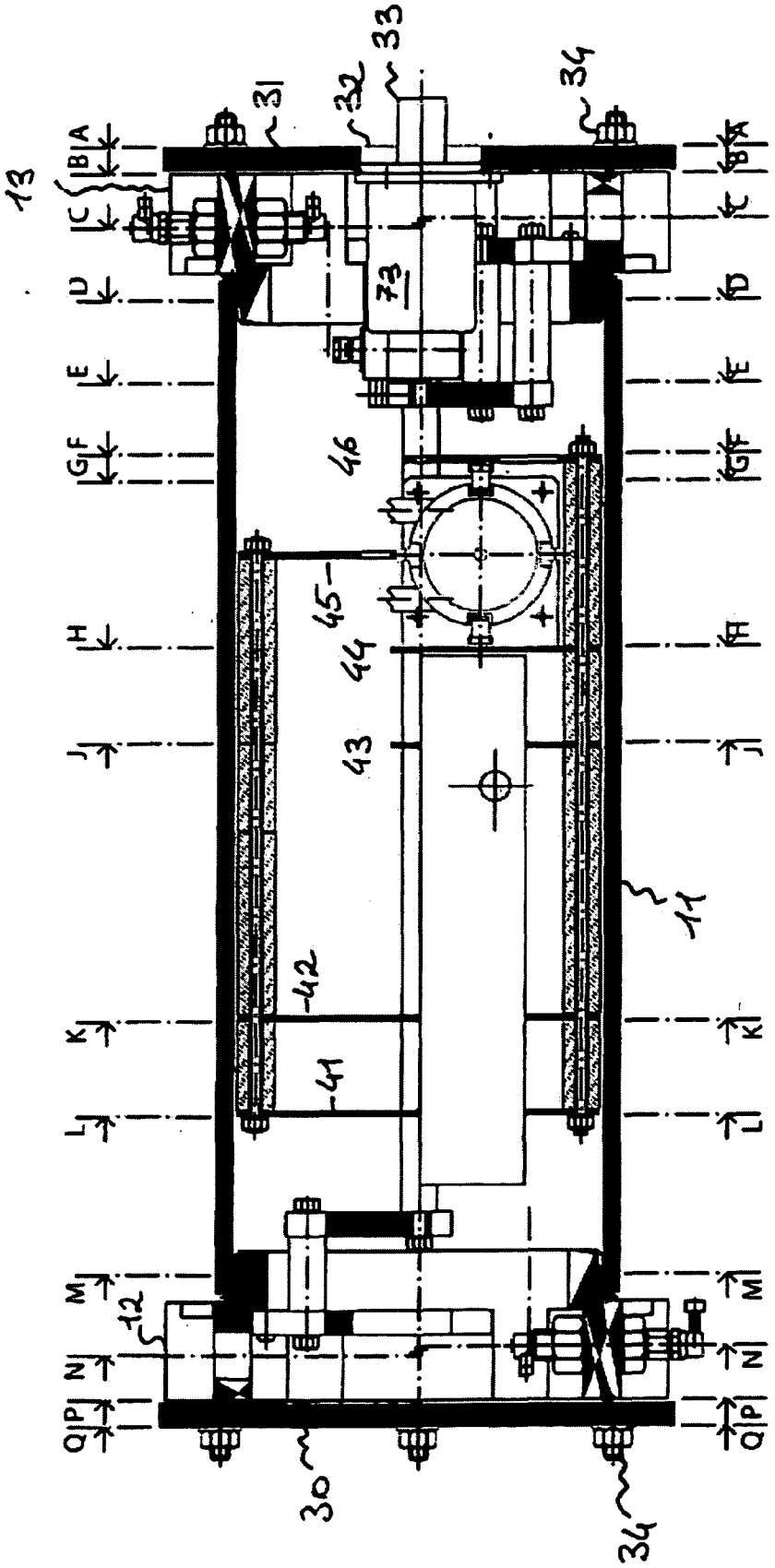

Fig. 7

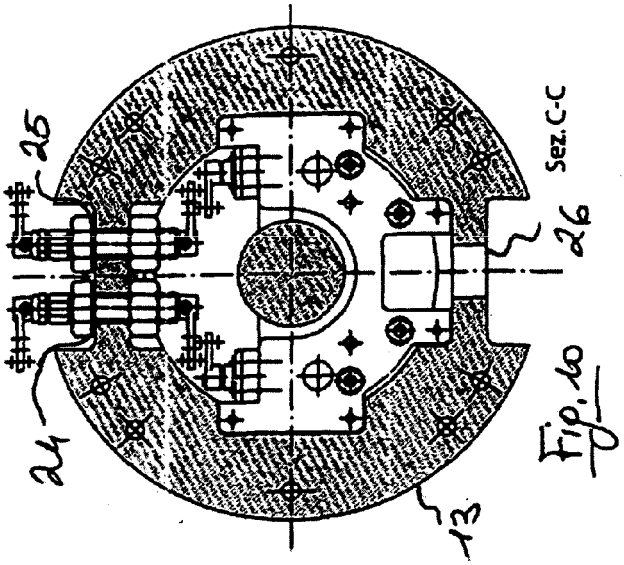

Fig.10

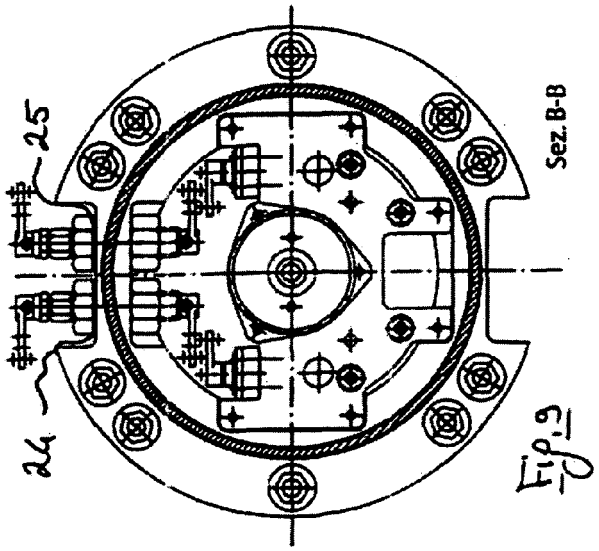

Fig.9

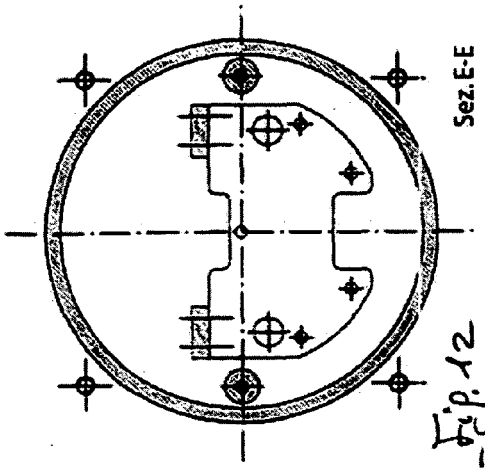

Fig.12

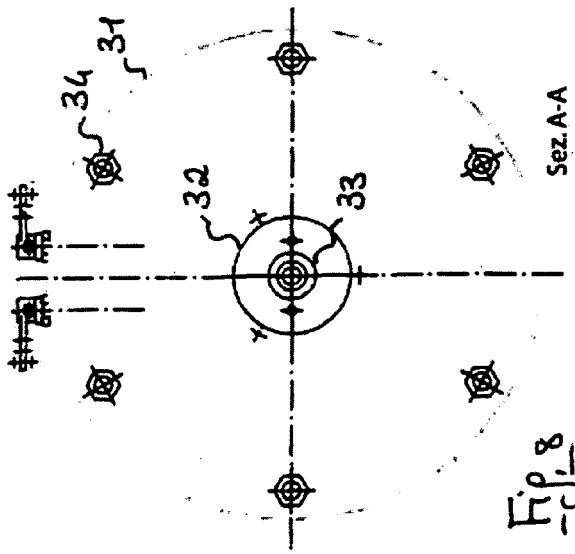

Fig.8

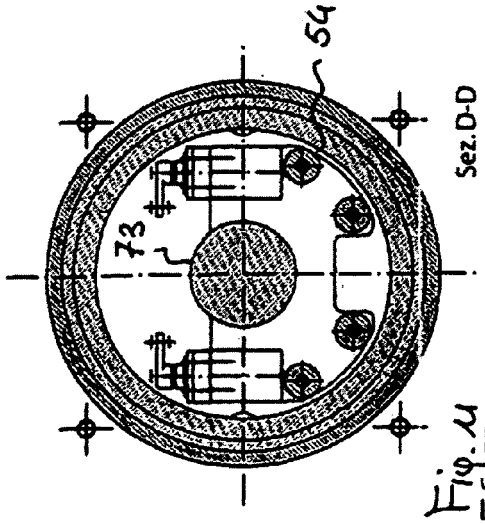

Fig.11

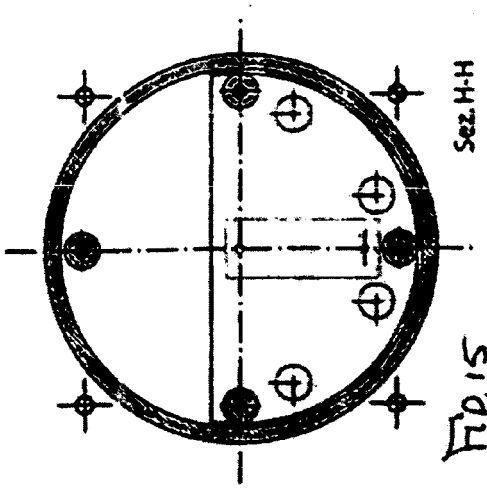

Fig.15

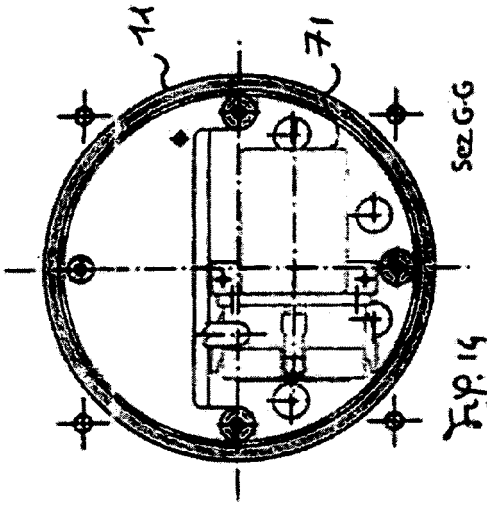

Fig.14

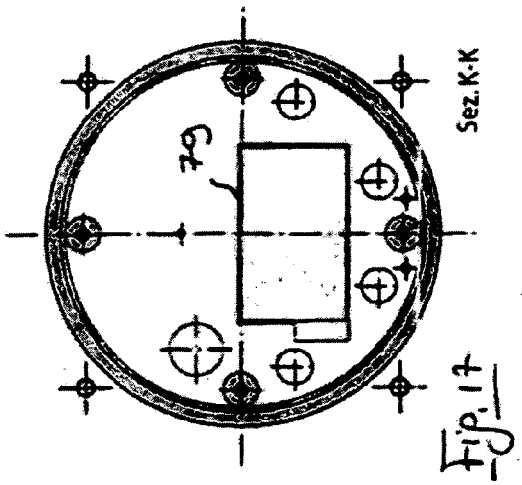

Fig.17

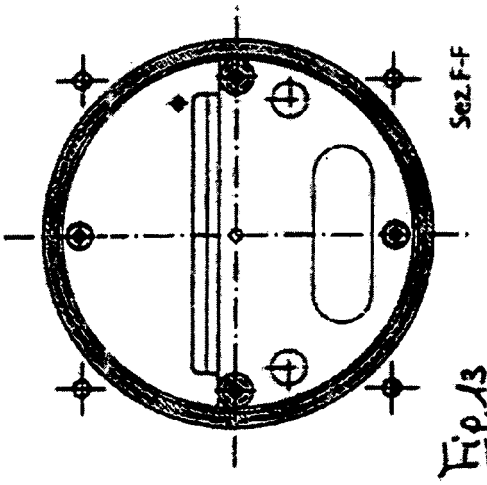

Fig.13

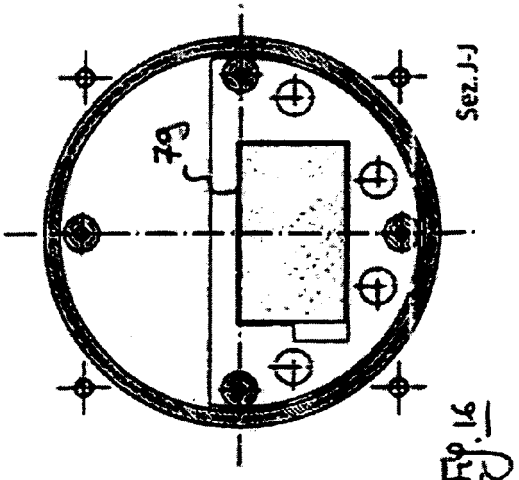

Fig.16

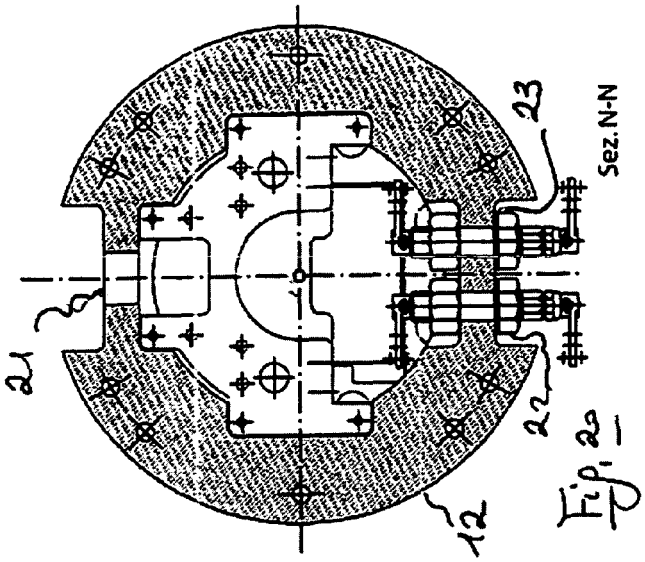

Fig. 20

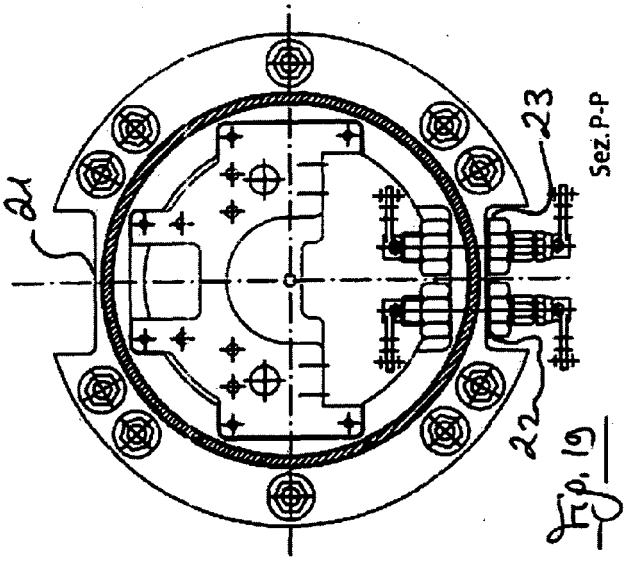

Fig. 19

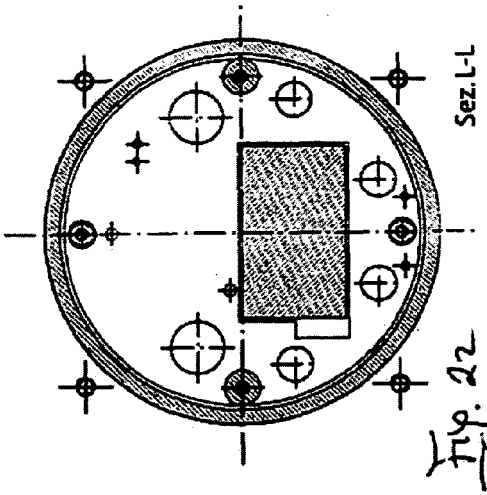

Fig. 22

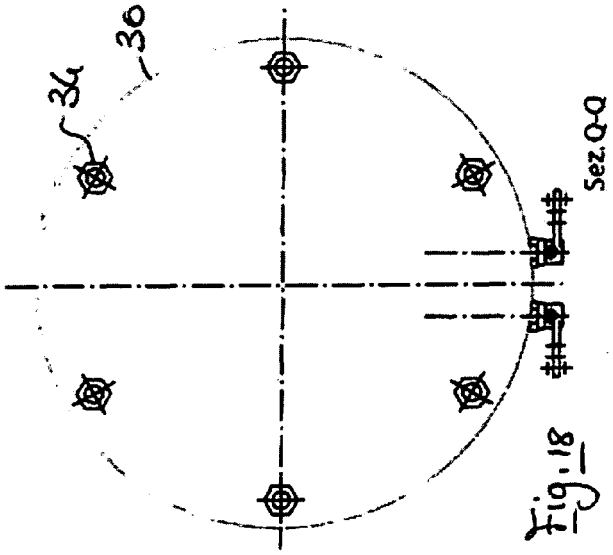

Fig. 18

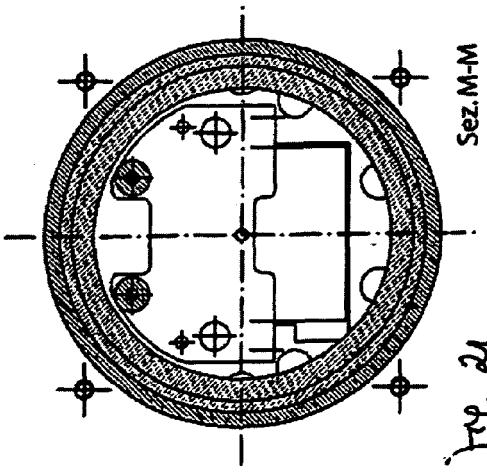

Fig. 21