March 10, 1925.

1,529,254

J. HUMBRECHT

PERISCOPE

Filed Aug. 23, 1921

3 Sheets-Sheet 1

Fig. 1.

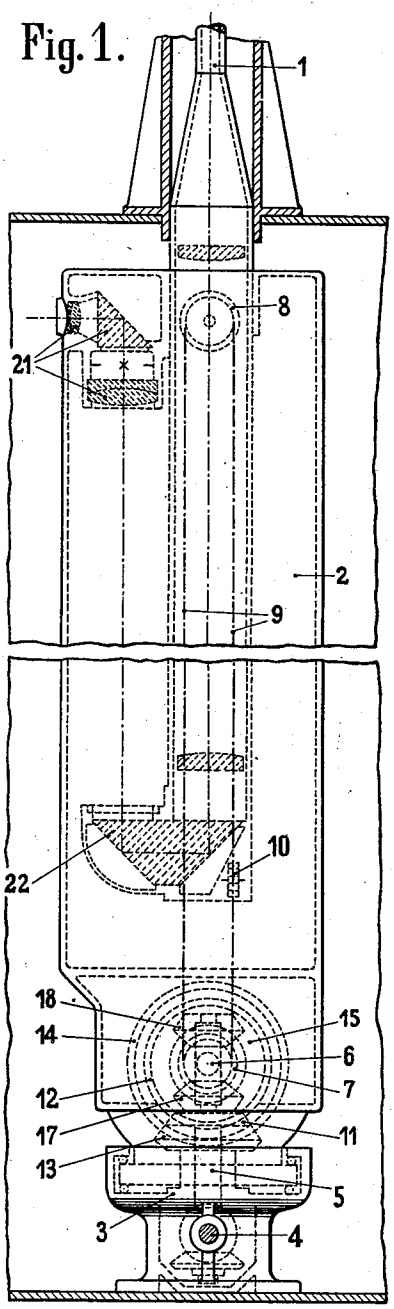
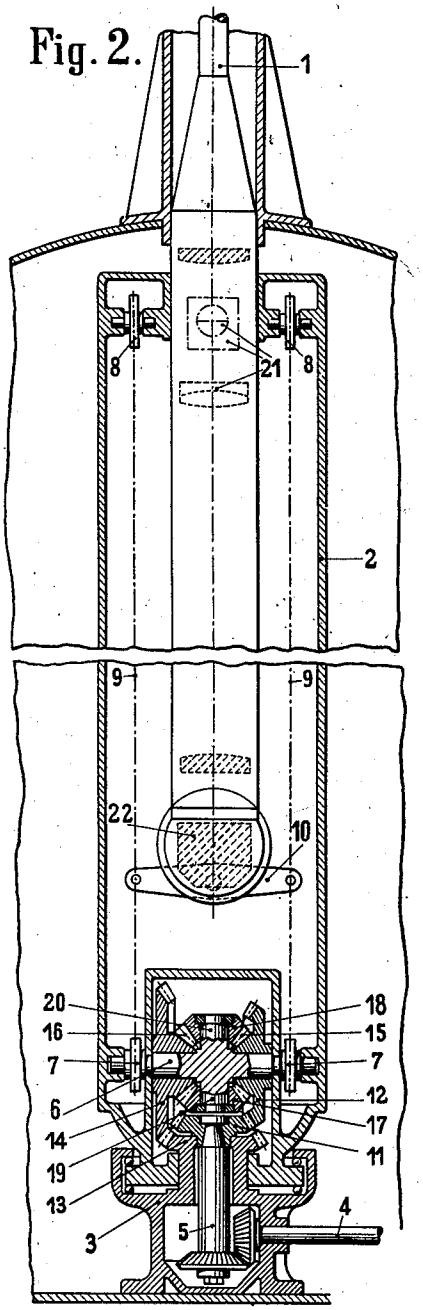


Fig. 2.



Inventor:

Jules Humbrecht

by

Leo J. Matthews Atty.

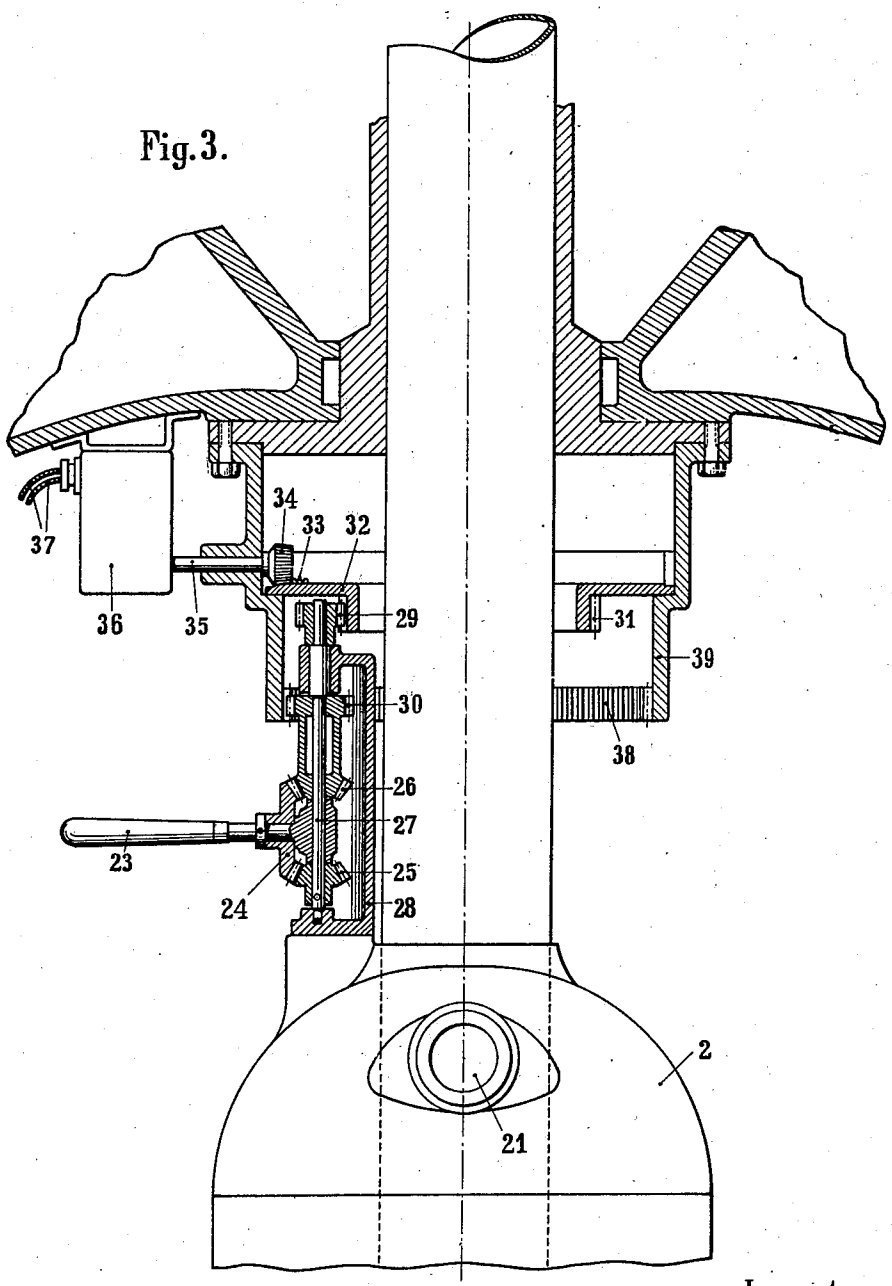
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Filed Aug. 23, 1921 3 Sheets-Sheet 2

Fig.3.



Inventor:

Jules Humbrecht

by

Louis J. Matthy

Atty.

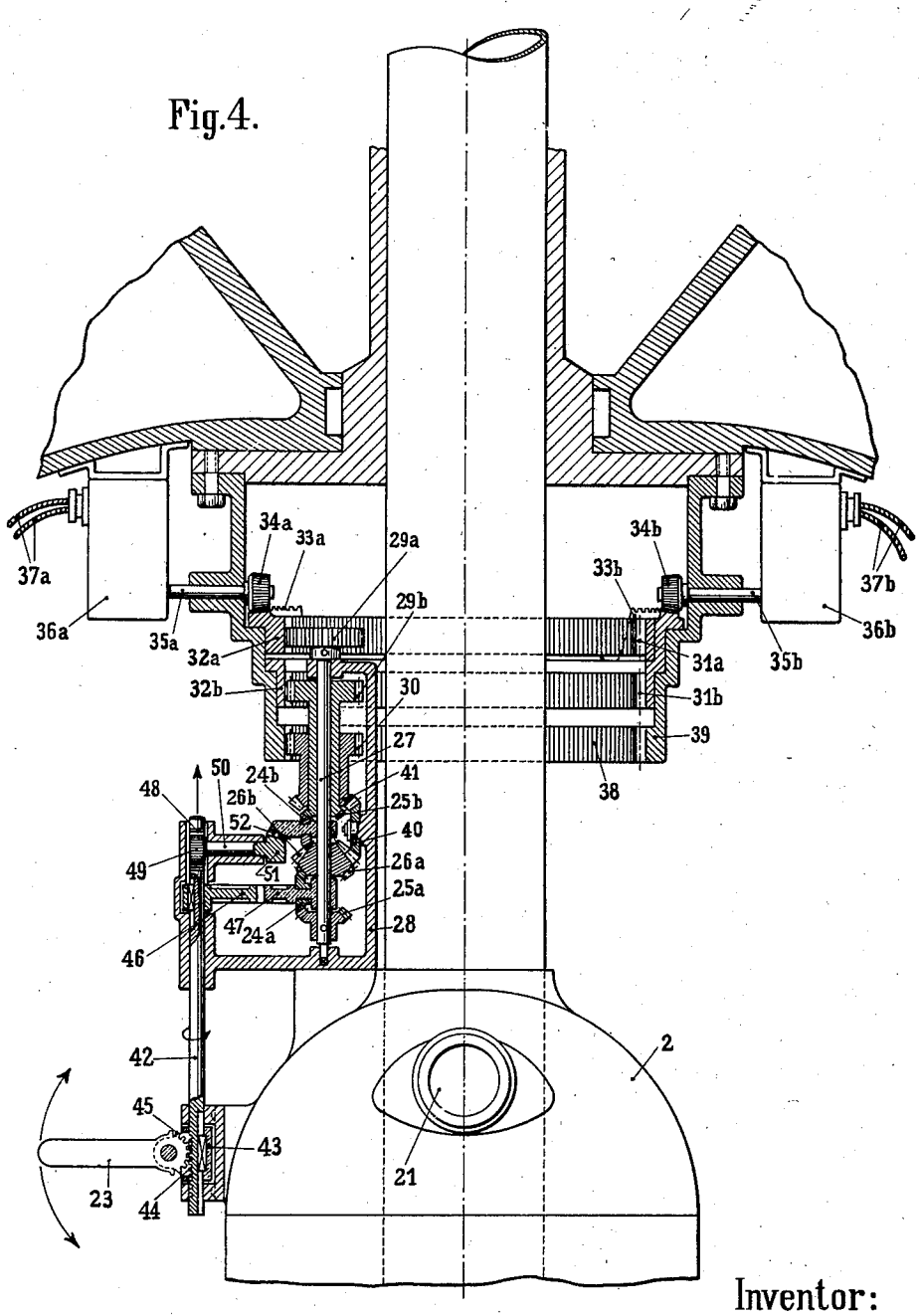
March 10, 1925. 1,529,254

J. HUMBRECHT

PERISCOPE

Filed Aug. 23, 1921 3 Sheets-Sheet 3

Fig.4.



Inventor:

Jules Humbrecht

by Geo. J. Matthews atty

Patented Mar. 10, 1925. 1,529,254

UNITED STATES PATENT OFFICE.

JULES HUMBRECHT, OF FRIEDENAU, NEAR BERLIN, GERMANY, ASSIGNOR TO THE FIRM OF OPTISCHE ANSTALT C. P. GOERZ AKTIENGESELLSCHAFT, OF FRIEDENAU, NEAR BERLIN, GERMANY.

PERISCOPE.

Application filed August 23, 1921. Serial No. 494,495.

(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

To all whom it may concern:

Be it known that I, JULES HUMBRECHT, a citizen of the German Republic, and resident of Friedenau, near Berlin, Germany, have invented certain new and useful Improvements in and Relating to Periscopes (for which I have filed patent applications in Germany, filed September 11, 1916; Germany, filed March 28, 1919; Hungary, filed June 4, 1917; Austria, filed February 9, 1918; France, filed June 17, 1920; Holland, filed June 28, 1920; Great Britain, filed July 2, 1920; Great Britain, filed July 10, 1920; Italy, filed July 3, 1920; Japan, filed December 29, 1920), of which the following is a specification.

This invention relates to periscopes of the kind which pull-out and at the same time rotate and in which the eye-piece which does not participate in the pull-out movement is mounted in a casing enclosing the periscope and is rotatable with the same.

The invention has for its object to design the instrument in such a manner that the periscope can be moved in the longitudinal direction by means of a motor mounted in a fixed manner in the boat outside the rotatable casing, and that at the same time the casing can be turned with the periscope, without disconnecting it from the motor, and without the pull-out movement and the rotary movement affecting each other. This construction of the instrument is of importance, because the arrangement of the motor in the rotary instrument casing itself is attended by great difficulties, more particularly on account of unreliable supply of current to the motor, and the difficulty of adapting the motor dimensions to the casing space available.

According to the invention, independence of the pull-out movement from the rotary movement of the instrument is ensured by a special construction of the gearing coupled to the driving shaft of the motor. The condition for the independence of the two kinds of motion to be given to the instrument is that the coupling of the driving shaft to the elevating member should be effected by means of gear wheels loosely mounted on the latter, and that the proper drive should be obtained only from the said gear wheels mounted loose on the elevating member controlling the pull-out movement of the periscope, the said gear wheels transmitting their motion to other gear wheels mounted on the elevating member.

The invention is preferably applicable to periscopes of large dimensions which have the seat for the observer fixed to the casing of the instrument. In order to allow the observer to control the movements of the instrument from his seat without being troubled in observation, the handles for controlling the motor for driving the periscope must be within the reach of the observer and must be movable with his seat whereas the motor or a plurality of motors and the switch for same must be firmly mounted in the boat. Therefore, for the coupling of the controlling handles with the switches exists the same difficulty as for the coupling of the fixed motor with the movable periscope. In accordance with a further part of this invention this difficulty is overcome by a driving gear similar to that which is applied for coupling the motor with the periscope.

In order that the invention may be understood, a detailed arrangement of gearing according thereto is shown in the accompanying drawing, by way of example, and will now be described.

Figure 1 illustrates the coupling of a motor shaft with the periscope in side elevation. Figure 2 is a view similar to Figure 1 showing an axial section partly in elevation. Figure 3 shows in axial section a gearing for actuating a switch for an electric device, for rotating the periscopes or shifting its telescopic tube from a seat of the observer firmly mounted on the rotatable periscope casing, a portion of the periscope being shown in side elevation. Figure 4 shows likewise in axial section another form of gearing for switches for two actuating devices, one for axial shifting of the telescopic tube and the other for rotation of the rotatable casing with the telescopic tube, a portion of the periscope being shown in side elevation.

The pull-out periscope tube is marked 1 in Figs. 1 and 2 of the drawings. It is mounted in a rotatable casing 2 which does not participate in the pull-out movement and is supported by a fixed bed 3 in the body of the boat. The motor shaft 4 enters from the side into the interior of the bed 3 and has coupled thereto a driving shaft 5, which, according to the drawing, is constituted by

a vertical pin. At right angles to the driving shaft 5 is the elevating shaft 6 carrying sprocket wheels 7 which, by means of endless chains 9 passing over sprocket wheels 8 and a balance beam 10, transmit their motion to the periscope 1. To the journal of the driving shaft 5 is secured a gear wheel 11 meshing with a gear wheel 12 mounted loosely on the elevating shaft 6. The bed 3 is provided with a toothed rim 13, with which engages a second gear wheel 14 mounted loosely on the elevating spindle 6, at the opposite side of the driving shaft 5 to that of the gear wheel 12. The gear wheels 12, 14 in addition to the teeth engaging with the teeth 11, 13, are provided with a further toothed rim 15 and 16, each of which engages with two gear wheels 17, 18 mounted on the journals or pins 19 and 20 made in one piece with the elevating spindle 6 and intersecting the same. 21 is the stationary angular eye-piece of the instrument, and 22 a deflecting prism participating in the pull-out movement.

The use of the instrument and the working of its device is as follows:—

When a pull-out movement is to be effected, the driving shaft 5 is rotated. The gear wheel 11 mounted on the said driving shaft, transmits then its motion to the gear wheel 12 so that the latter rotates about the elevating spindle 6. During this rotation, the gear wheel 12 has the tendency to impart a rotary motion to the gear wheels 17, 18, which however is prevented by the resistance of the gear wheel 14 which engages the fixed teeth 13 of the bed 3. It is important that the engagement of the gear wheel 14 with the teeth 13 should be exactly opposite to that of the gear wheel 12 with the gear wheel 11, owing to which any rotary effect on the casing 2 is avoided. In the condition described, the rotation of the gear wheel 12 results, in a manner usual in differential gears, in a rotation of the elevating spindle 6 with the axle journals 19, 20 carrying the gear wheels 17, 18. A vertical movement of the periscope is therefore produced by means of the chains 9 and of the balance beam 10.

When, with the driving shaft 5 standing still, it is desired to turn the casing, the working of the gearing will be as follows:

During the rotation of the casing 2, the wheel 14 rolls on the toothed rim 13 of the bed 3. At the same time, the wheel 12 rolls on the teeth of the gear wheel 11, this rolling taking place in the reverse direction owing to the points of engagement of the teeth being opposite each other. If the numbers of teeth of the wheels 11, 12 or 13, 14 are suitably calculated, the gear wheels 17, 18 could be made to rotate on their journals 19, 20 without the latter moving in space. The proportion between the numbers of teeth to be used is such that the number of teeth of the gear wheel 12 must be in the same proportion to that of the gear wheel 11, as the number of teeth of the gear wheel 14 to that of the toothed rim 13, provided that the toothed rims 15, 16 have the same number of teeth, for which care must be taken. Provided that the numbers of teeth of the gear wheels in engagement have been calculated in accordance with the above rule, the rotation of the casing 2 does not affect, therefore, in any way the elevating spindle 6. It follows therefrom that in the same way the casing can be rotated, whilst a vertical movement of the instrument is being brought about by the rotation of the motor shaft 4.

Instead of utilizing the spindle carrying the gear wheels 12, 14 direct as the elevating spindle on which are mounted the sprocket wheels 7, the elevating spindle with the sprocket wheels could also be mounted outside the gear body, and the toothed wheels 17, 18 in a ring surrounding it, which being formed into a gear wheel, is utilized for driving the elevating spindle.

In Figs. 3 and 4 the numeral 2 designates again a part of a rotatable periscope casing provided with a fixed eye-piece 21. A little above the eye-piece 21 is mounted laterally of the reduced periscope body the clutch gear, the lever 23 of which is within reach of the observer. The clutch lever 23 forms the spindle of the planetary wheel 24 of a planetary wheel gear, the two wheels of which, rotating in opposite directions, are marked 25, 26. The wheel 25 is secured to the spindle 27 rotatably supported in a casing projection 28. To the spindle 27 is secured a spur wheel 29, whilst another spur wheel 30 is made in one piece with the toothed wheel 26 rotatable about the spindle 27.

The spur wheel 29 engages with outer teeth 31 of a rotatable toothed rim 32 arranged round the periscope and meshing, by means of a toothed quadrant 33, with a pinion 34 on the spindle 35 of the motor switch 36. Electric cables for the motor are marked 37, the motor itself not being shown in the drawing.

The spur wheel 30 engages with inner teeth 38 of a fixed casing part 39 enclosing the periscope.

The working of the device is as follows: Assuming that the observer at the eye-piece 21 wishes to turn the periscope in order to change his direction of sight. He seizes the clutch lever 23 and gives it, and therefore at the same time the planetary wheel 24, a swinging movement about the spindle 27 of the planetary wheel gear. During this movement, the planetary wheel 24 engages with the teeth of the bevel wheel 26 which is positively connected to the toothed rim 38 of the fixed casing part 39. As the fixed arrangement of the toothed rim 38 does not

allow of the toothed wheel 30 being turned, the planetary wheel 24 must execute a turning movement about its axis, that is to say about the lever 23. This rotation is transmitted to the bevel wheel 25 and, through the same, by means of the spindle 27, to the spur wheel 29 which engages with the teeth 31 of the rotatable toothed rim 32 and therefore imparts to it a rotation which results in a turning of the switch spindle 35. This turning of the switch spindle produces a switching in of the motor which engages in a suitable manner with the periscope casing and rotates it. As soon as the hand lever 23 has stopped, the toothed rim 32 will also stop, but the motor will remain switched in, and the periscope will continue its rotating movement. The action of the fixed toothed rims 31 and 38, and of the revolving movement of the gear spindle 27 about the axis of the periscope, will produce a rotation of the spur wheels 29 and 30 which, owing to their engagement at opposite sides with the toothed rims, will take place in opposite directions. The result of this will be that the bevel wheels 25, 26 will tend to rotate the planetary wheel 24 in the same direction. The ratio of transmission among the various toothed wheels of the gear is so calculated that the wheels 25, 26 impart the same rotary impulse to the wheel 24, so that no planetary movement of the said wheel will then take place. According to the extent of turning over of the lever 23, a more or less quick rotation of the periscope will be produced, the switch being so constructed that depending from the degree of rotation of the shaft 35 the motor is supplied with more or less electric energy and consequently rotates the instrument with more or less rapidity. When the periscope is to be stopped, the handle 23 is returned to its position of rest.

The switch 36 must be assumed to be so arranged that the direction of rotation of the periscope is reversed, when the lever 23 is turned over to the opposite side.

The same arrangement as that described in the foregoing for producing a rotation of the periscope, could also be used for a pull-out movement.

In a periscope which is to be simultaneously rotatable and pull out, the device shown in Fig. 3 of the drawing on the left hand side of the periscope, is arranged also on the right hand side of the same, so that the observer has both on his left and on his right a clutch lever 23 for operating a motor drive. The fixed teeth 38 could also be utilized at the same time for the gear on the right hand side of the periscope, whilst the switch 36 and the rotatable toothed rim 31 have to be provided separately for each of the two drives.

In the case a periscope which should be at the same time rotatable and pull-out, the two planetary wheel control gears could also be combined, so that a single lever would be sufficient for both kinds of controls, the lever for throwing into gear the two kinds of drives being moved in directions crossing each other.

Such an arrangement is illustrated in Fig. 4 of the drawing. Those parts of the device which are to be found also in the construction shown in Fig. 3, are marked with the same reference numbers as in Fig. 3, eventually with the addition of an index. 2 is accordingly the periscope, 21 the eye-piece, 23 the clutch lever, 24^a and 24^b the planetary wheels for throwing into gear the rotary and the pull-out drive, each of these two planetary wheels 24^a and 24^b is in mesh with the wheels 25^a, 26^a, 25^b, 26^b, respectively. The wheels 25^a, 26^a, 25^b, 26^b are all mounted on one spindle 27. 28 is again a casing projection of the periscope, in which is mounted the spindle 27. 29^a and 29^b are two spur wheels mounted on the spindle 27 and engaging with the two sets of teeth 31^a or 31^b of movable toothed rims 32^a or 32^b. 30 is also a spur wheel mounted on the spindle 27 and engaging with the inner teeth 38 of the fixed casing part 39. 33^a and 33^b are two toothed quadrants of the movable toothed rims 32^a and 32^b. 34^a and 34^b are pinions engaging with the toothed quadrants 33^a or 33^b and mounted on the spindle 35^a or 35^b, the rotation of which operates the switches 36^a or 36^b, the wires from which to the motors driving the periscope, are marked 37^a or 37^b. 40 is an intermediate wheel in the planetary wheel gear, and 41 a toothed wheel rim secured to the spur wheel 30 and meshing with the intermediate wheel 40.

As the lever 23 must make it possible to bring about both a rotation of the toothed rim 32^a, and a rotation of the toothed rim 32^b through the intermediary of the toothed wheels 25^a or 25^b, it is necessary to provide in addition to the arrangement shown in Fig. 3, another device for enabling either the toothed wheel 25^a or the toothed wheel 25^b to be operated at will by means of the lever 23. This device consists of a rotatable and longitudinally adjustable spindle 42 coupled to the lever 23; the said spindle is adjustably mounted in a rotatable bearing part 43 of the lever 23 and provided with a longitudinal set of teeth 44 with which engages a toothed quadrant 45 secured to the lever 23. According as the lever 23 is turned to the side, or moved upwards or downwards, the spindle 42 will be rotated or moved longitudinally. The rotation of the spindle 42 is transmitted to a toothed quadrant 46, through the hub of which passes the spindle in question which can move in it in the longitudinal direc-

tion. The toothed quadrant 46 meshes with a toothed quadrant 47 mounted loose on the spindle 27 and carrying the planetary wheel 24^a rotatable on a pin or journal. The spindle 42 is provided at its upper end with round teeth 48 which engage with a spur wheel 49 mounted on a pin 50 which carries a pinion 51 meshing with a toothed quadrant 52 which, like the toothed quadrant 47, is loose on the spindle 27 and carries the planetary wheel 24^b.

It is accordingly possible, by operating the lever 23, to operate at will both the planetary wheel 24^a and the planetary wheel 24^b, and through the same, in the same way as explained with reference to Figure 3, the movable toothed rims 32^a and 32^b, and through the latter, the motor switches 36^a and 36^b.

From the constructive point of view, the only difference from Figure 3 is that the movable toothed rims 32^a, 32^b, unlike the toothed rim 32 of Figure 3, are provided with inner teeth instead of outer ones. As the fixed toothed rim 39, in the same way as in the construction in Figure 3, has retained inner teeth, a device is required for ensuring rotation in the opposite direction of the wheel pairs of the planetary wheel gear, mounted on the spindle 27. This object is attained by inserting the toothed wheel 40 and the toothed rim 21 secured to the spur wheel 30. It must be also pointed out, that the toothed wheels 26^a, 26^b of the two planetary wheel gears are combined to a single toothed body.

What I claim is:

1. A periscope structure particularly for submarines comprising a bed secured to the periscope carrier such as a submarine a casing rotatably mounted on said bed about a vertical axis and provided with the eye-piece of the instrument, a driving shaft mouted rotatably within said bed, a tube like member provided with a light admission opening and telescoping within said eye-piece carrying casing, a gear connecting said driving shaft with said rotatable casing and with said telescopic tube said gear comprising toothed wheels loosely mounted on their axles and adapted to freely rotate thereon on turning of said rotatable casing.

2. A periscope structure particularly for submarines comprising a bed provided with a toothed rim the bed secured to the periscope carrier or boat, a casing carrying the eye-piece of the instrument rotatably mounted on said bed about a vertical axis a tube provided with the light admission opening axially shiftable within said casing, a driving shaft mounted rotatably within said bed and carrying a toothed gear concentric to the toothed rim of the bed and to the axis of rotation of the casing, an elevating shaft member rotatably mounted within said rotatable casing at right angles to the driving shaft and in operative connection with the telescopic tube the elevating shaft member carrying sets of gears loosely mounted on shafts crossing each other at right angles and constituting gear connection with each other and with the toothed gear on the driving shaft and the toothed rim on the bed said sets of gears adapted to transmit movement from the driving shaft to the telescopic tube.

3. A periscope structure particularly for submarines comprising a bed provided with a toothed rim the bed secured to the periscope carrier or boat, a casing carrying the eye-piece of the instrument rotatably mounted on said bed about a vertical axis a tube provided with the light admission opening axially shiftable a driving shaft mounted rotatably within said bed and carrying a toothed gear concentric to the toothed rim of the bed and to the axis of rotation of the casing, an elevating shaft member rotatably mounted within said rotatable casing at right angles to the driving shaft and in operative connection with the telescopic tube the elevating shaft member provided with two axle journals intersecting the elevating shaft at right angles, each of the two axle journals carrying a gear wheel, the gears being of identical structure the elevating shaft carrying two gear members, each provided with two toothed rims, one rim of each gear member in mesh with the two gear wheels on the axle journals of the elevating shaft and the other rim of the one gear member with the gear wheel on the driving shaft and that of the second gear member with the toothed rim on the bed, the numbers of teeth of the gear wheel on the driving shaft and on the rim of the instrument bed being so calculated that the ratios of these teeth numbers to the numbers of the teeth of the gears engaging therewith are the same for each meshing pair of gears.

4. A periscope structure particularly for submarines comprising a bed secured to the boat, an ocular casing rotatably mounted on said bed about a vertical axis, a drive shaft mounted rotatably within said bed concentric to the axis of rotation of said ocular casing, a telescopic tube provided with the light admission opening shiftable within said ocular casing along an axis coinciding with the axis of rotation of the casing, a gear connecting said driving shaft with said rotatable casing and telescopic tube allowing shifting of the telescopic tube independently from rotary movement of the rotary casing and vice versa an electric switch firmly mounted on the boat adapted to start and to stop actuation of said driving shaft, an actuating mechanism for said switch comprising a hand operable shaft

carrying two toothed wheels a toothed rim firmly mounted on the boat and a further toothed rim rotatably mounted on the boat said two toothed rims meshing each with one of said toothed wheels and concentric to the axis of rotation of the ocular casing the rotatable toothed rim coupled with the switch, a gear connecting the two toothed rims comprising the two toothed wheels on said operable shaft allowing rotation of said ocular casing without rotation of the rotatable toothed rim, said last named toothed rim operable only by said hand operable shaft.

5. A periscope structure particularly for submarines comprising a bed secured to the boat, an ocular casing rotatably counted on said bed about a vertical axis, a drive shaft mounted rotatably within said bed concentric to the axis of rotation of said ocular casing, a telescopic tube provided with the light admission opening shiftable within said ocular casing along an axis coinciding with the axis of rotation of the casing, a gear connecting said driving shaft with said rotatable casing and telescopic tube an electric switch firmly mounted on the boat adapted to control current supply to a motor for rotating said rotatable casing an actuating mechanism for said switch comprising a hand operable shaft carrying two toothed wheels a toothed rim firmly mounted on the boat and a further toothed rim rotatably mounted on the boat, the two toothed rims meshing each with one of said toothed wheels and concentric to the axis of rotation of the ocular casing the rotatable toothed rim coupled with the switch a gear connecting the two toothed rims comprising the two toothed wheels on said hand operable shaft allowing rotation of said ocular casing without rotation of the rotatable toothed rim said last named toothed rim operable only by said hand operable shaft.

6. A periscope structure particularly for submarines comprising a bed secured to the boat, an ocular casing rotatably mounted on said bed about a vertical axis, a drive shaft mounted rotatably within said bed concentric to the axis of rotation of said ocular casing, a telescopic tube provided with the light admission opening shiftable within said ocular casing along an axis coinciding with the axis of rotation of the casing, a gear connecting said driving shaft with said rotatable casing and telescopic tube allowing shifting of the telescopic tube independently from rotary movement of the rotary casing and vice versa an electric switch firmly mounted on the boat adapted to start and to stop actuation of said driving shaft, an actuating mechanism for said switch comprising a hand operable shaft carrying two toothed wheels a toothed rim firmly mounted on the boat and a further toothed rim rotatably mounted on the boat said two toothed rims meshing each with one of said toothed wheels and concentric to the axis of rotation of the ocular casing, the rotatable toothed rim coupled with the switch the wheel meshing with the rotatable toothed rim firmly mounted on the hand operable shaft and the wheel meshing with the fixed rim loosely mounted thereon, a planetary gear comprising two bevel wheels one firmly and one loosely mounted on said hand operable shaft the loosely mounted bevel wheel firmly connected with that gear wheel meshing with the said fixed rim and a planetary wheel meshing with said two bevel wheels and loosely mounted on the operating handle for said shaft mounted for being oscillated about said shaft.

7. A periscope structure particularly for submarines comprising a bed secured to the boat, an ocular casing rotatably mounted on said bed about a vertical axis, a drive shaft mounted rotatably within said bed concentric to the axis of rotation of said ocular casing, a telescopic tube provided with the light admission opening shiftable within said ocular casing along an axis coinciding with the axis of rotation of the casing, a gear connecting said driving shaft with said rotatable casing and telescopic tube allowing shifting of the telescopic tube independently from rotary movement of the rotary casing and vice versa two electric switches firmly mounted on the boat the one adapted to start and to stop actuation of said driving shaft for axially shifting the telescopic tube of the instruments and the other to control current supply to a device for rotating the ocular casing one fixed and two rotatable toothed rims concentric to the axis of rotation of the rotatable casing the rotatable toothed rims each coupled with a separate switch a shaft carrying three toothed wheels each in mesh with one of said three toothed rims a hand operable train of gears between the toothed wheel meshing with the fixed toothed rim and each toothed wheel meshing with the rotatable toothed rims, the gearings allowing rotation of the ocular casing without rotation of the rotatable toothed rims.

8. A periscope structure particularly for submarines comprising a bed secured to the boat, an ocular casing rotatably mounted on said bed about a vertical axis, a drive shaft monnted rotatably within said bed concentric to the axis of rotation of said ocular casing, a telescopic tube provided with the light admission opening shiftable within said ocular casing along an axis coinciding with the axis of rotation of the casing, a gear connecting said driving shaft with said rotatable casing and telescopic tube allowing shifting of the telescopic tube independently from rotary movement of the rotary

casing and vice versa two electric switches firmly mounted on the boat the one adapted to start and to stop actuation of said driving shaft for axially shifting the telescopic tube of the instrument and the other to control current supply to a device for rotating the ocular casing one fixed and two rotatable toothed rims concentric to the axis of rotation of the rotatable casing the rotatable toothed rims each coupled with a separate switch, a shaft carrying three toothed wheels each in mesh with one of said three toothed rims, trains of gears between the toothed wheel meshing with the fixed toothed rim and each of the two toothed wheels meshing with the two rotatable toothed rims a handle operable in different paths of movement adapted to actuate at will depending on its path of movement the one or the other train of gearing, the gearings allowing rotation of the ocular casing without rotation of the rotatable toothed rims.

9. A periscope structure particularly for submarines comprising a bed secured to the boat, an ocular casing rotatably mounted on said bed about a vertical axis, a drive shaft mounted rotatably within said bed concentric to the axis of rotation of said ocular casing, a telescopic tube provided with the light admission opening shiftable within said ocular casing along an axis coinciding with the axis of rotation of the casing and telescopic tube allowing shifting of the telescopic tube independently from rotary movement of the rotary casing and vice versa two electric switches firmly mounted on the boat the one adapted to start and to stop actuation of said driving shaft for axially shifting the telescopic tube of the instrument and the other to control current supply to a device for rotating the ocular casing one fixed and two rotatable toothed rims concentric to the axis of rotation of the rotatable casing the rotatable toothed rims each coupled with a separate switch, a shaft carrying three toothed wheels each in mesh with one of said three toothed rims, trains of gears between the toothed wheel meshing with the fixed toothed rim and each of the two toothed wheels meshing with the two rotatable toothed rims the trains of gear between the said two sets of toothed wheels having a common element formed by an axially shiftable and rotatable rod provided with a toothed rack and with a toothed segment forming connection with the separated portions of the trains of gearing an actuating device for said rod comprising a handle adapted to be manually operated to axially shift it or to rotate it about its axis.

10. A periscope structure particularly for submarines comprising a bed secured to the boat, an ocular casing rotatably mounted on said bed about a vertical axis, a drive shaft mounted rotatably within said bed concentric to the axis of rotation of said ocular casing, a telescopic tube provided with the light admission opening shiftable within said ocular casing along an axis coinciding with the axis of rotation of the casing, a gear connecting said driving shaft with said rotatable casing and telescopic tube allowing shifting of the telescopic tube independently from rotary movement of the rotary casing and vice versa two electric switches firmly mounted on the boat the one adapted to start and to stop actuation of said driving shaft for axially shifting the telescopic tube of the instrument and the other to control current supply to a device for rotating the ocular casing one fixed and two rotatable toothed rims concentric to the axis of rotation of the rotatable casing the rotatable toothed rims each coupled with a separate switch, a shaft carrying three toothed wheels each in mesh with one of said three toothed rims, trains of gears between the toothed wheel meshing with the fixed toothed rim and each of the two toothed wheels meshing with the two rotatable toothed rims, the trains of gears comprising two planetary gears connected in series containing three bevel wheels mounted co-axially to the shaft carrying the said three toothed wheels and two planetary wheels each rotatable on a separate carrier oscillatably mounted on said shaft each connecting two of said three bevel wheels the middle bevel wheel being compound and in operative connection with both the planetary wheels and each of the two outer bevel wheels firmly connected with one of the two toothed wheels meshing with the two rotatable rims a handle operable in different paths of movement adapted to actuate at will depending on its path of movement the one or the other train of gearing, the gearings allowing rotation of the ocular casing without rotation of the rotatable toothed rims.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JULES HUMBRECHT.

Witnesses:
HERMANN REISING,
JOHANN BOYKON.