C. E. & H. E. BECK.

SUBMARINE.

APPLICATION FILED MAY 8, 1915.

1,166,651.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

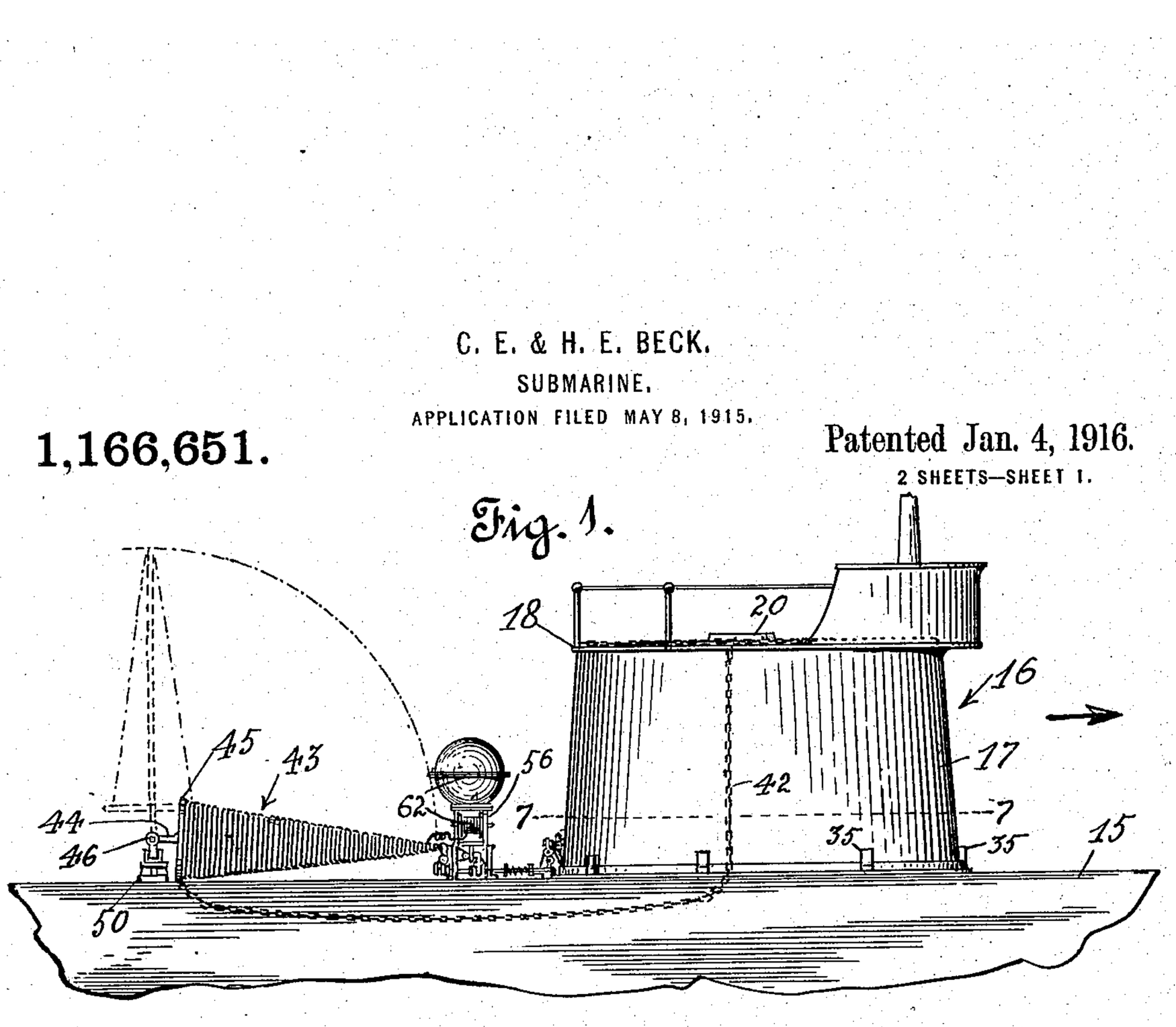


Fig. 2.

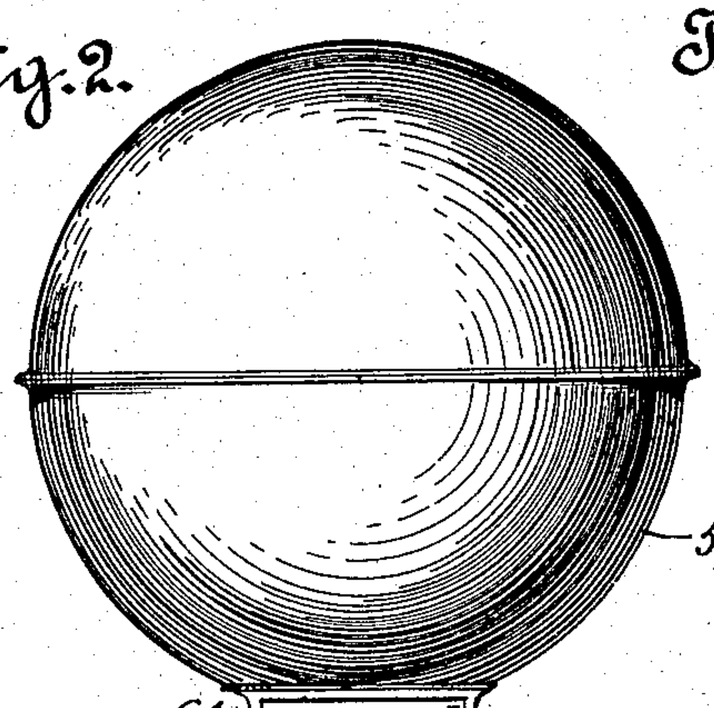
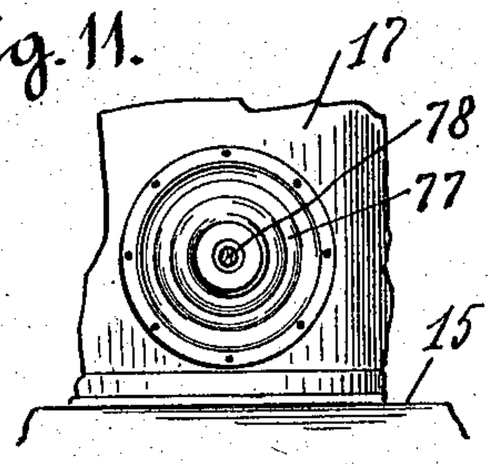


Fig. 11.



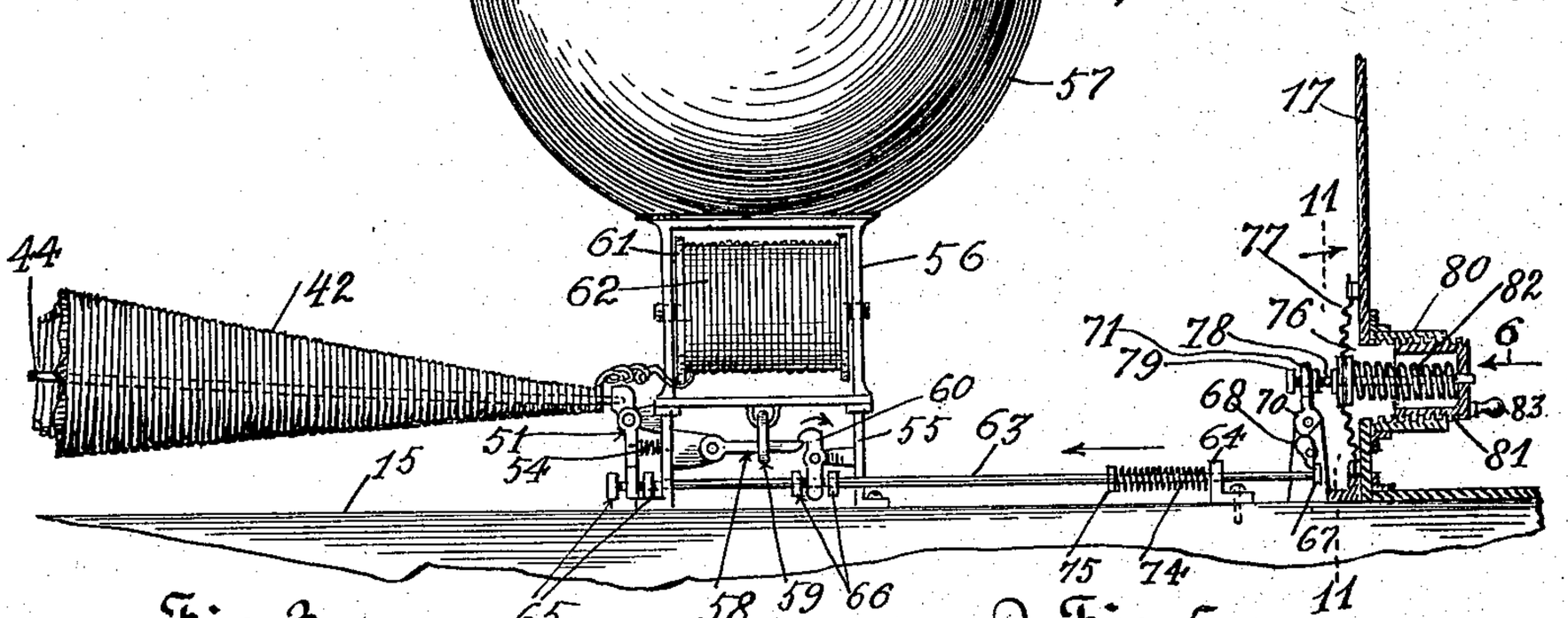


Fig. 3.

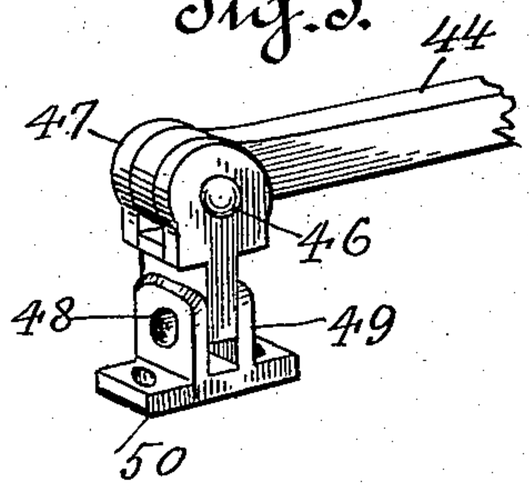


Fig. 4.

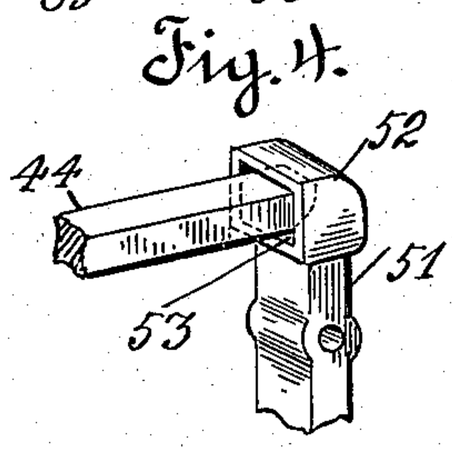


Fig. 5.

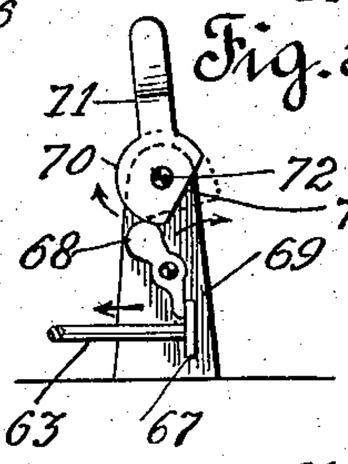
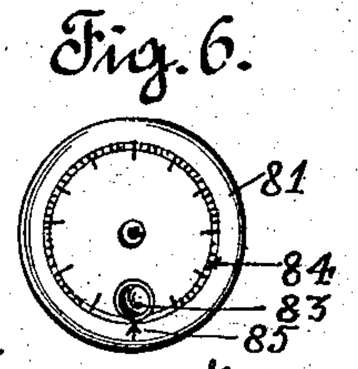


Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 7.

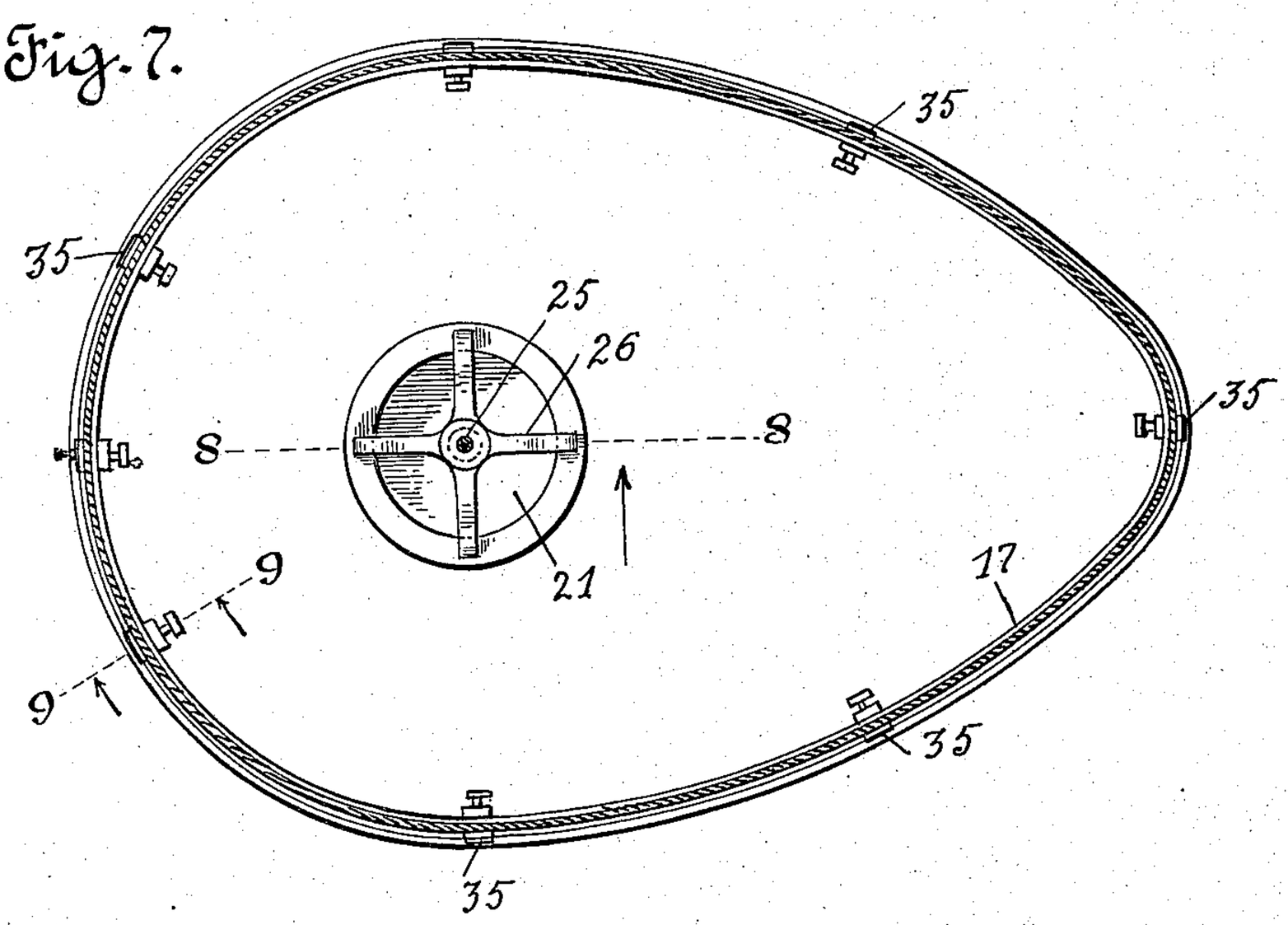


Fig. 8.

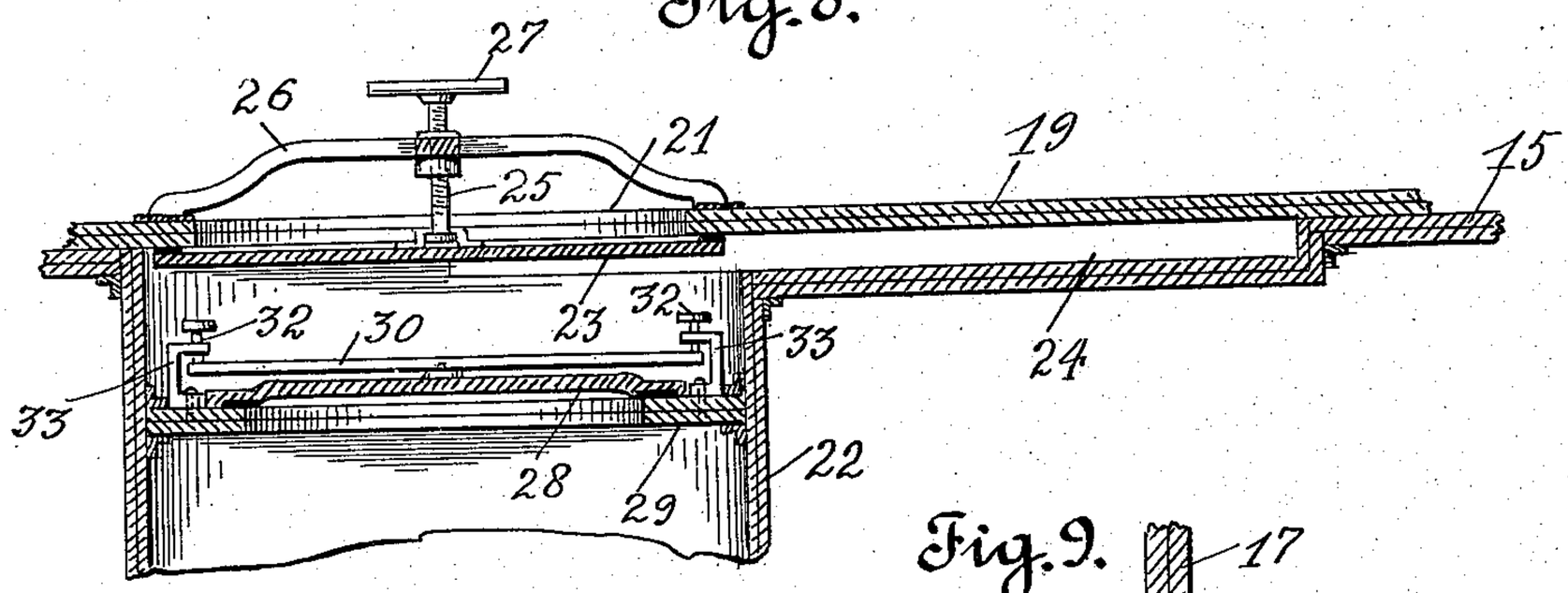
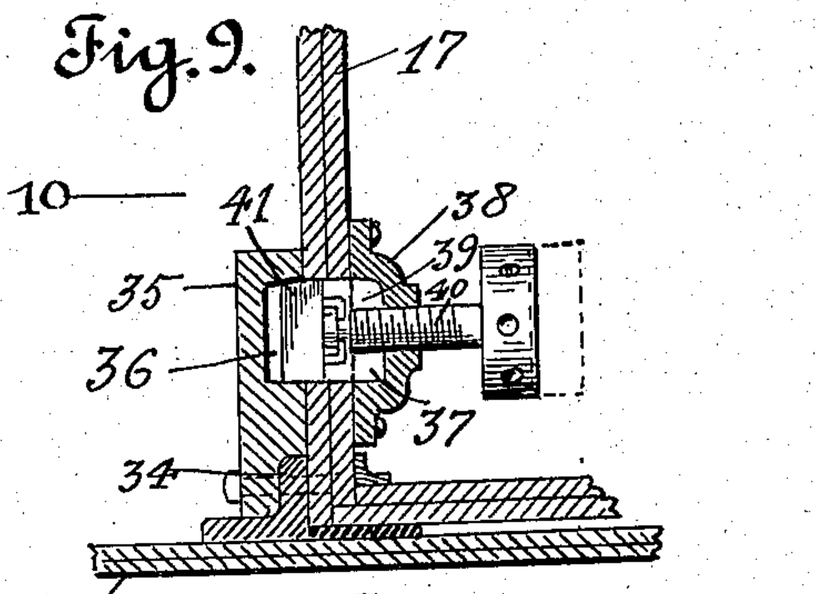


Fig. 9.



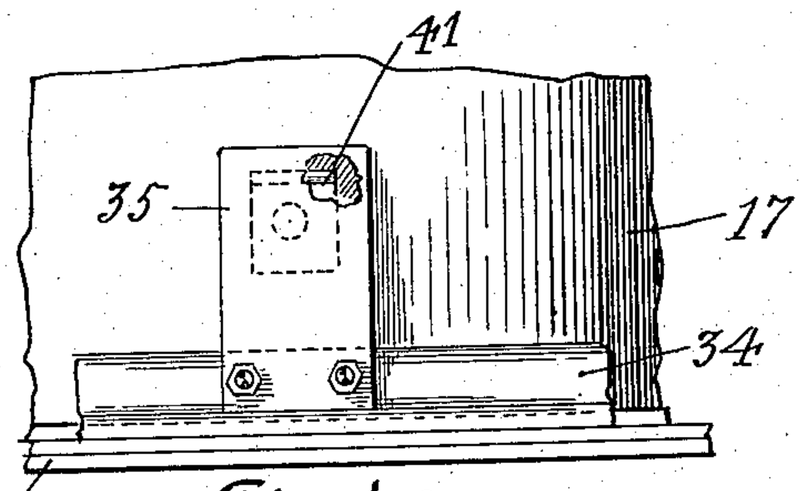


Fig. 10.

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UNITED STATES PATENT OFFICE.

CHARLES E. BECK AND HAROLD E. BECK, OF EL MONTE, CALIFORNIA.

SUBMARINE.

1,166,651. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed May 8, 1915. Serial No. 26,694.

To all whom it may concern:

Be it known that we, CHARLES E. BECK and HAROLD E. BECK, citizens of the United States, residing at El Monte, in the county of Los Angeles and State of California, have invented new and useful Improvements in Submarines, of which the following is a specification.

This invention relates to a submarine.

It is the object of this invention to provide a construction for submarines whereby an inclosed portion or compartment thereof, preferably the conning tower, may be readily detached from the main structure in event control of the submarine is lost from any cause while submerged, and thereafter hoisted to the surface with the crew therein.

Another object is to provide means connecting with the detachable compartment of the submarine whereby its submerged position may be indicated and whereby the compartment may be raised to the surface without the necessity of making direct connections therewith.

A further object is to provide means adapted to be operated by water pressure for automatically releasing a signal buoy or float and which may be adjusted to operate automatically at any predetermined depth or actuated manually as occasion requires.

Another object is to provide a reel for carrying the hoisting cable attached to the detachable structure so mounted and arranged that the cable may be freely unwound therefrom in event the submarine be turned on its side or inclined longitudinally when at rest in a submerged position.

A further object is to provide means whereby a cable attached at one end to a demountable compartment of a submarine and secured at its opposite end to a float may be coiled intermediate its ends so that upward movement of the float will operate to unwind the cable without danger of entanglement thereof.

Other objects will appear hereinafter.

The invention is illustrated in the accompanying drawings in which:

Figure 1 is a view in side elevation of the upper portion of a submarine, showing the detachable conning tower and the signal and cable connections therewith. Fig. 2 is a detailed view in side elevation of the automatic signal-buoy releasing mechanism. Fig. 3 is a detail in perspective of the universal pivotal mounting of the cable carrying reel. Fig. 4 is a detail in perspective of the latch for locking the cable carrying reel against displacement. Fig. 5 is a detail in side elevation of the releasing trigger. Fig. 6 is a detail end view of the setting device for adjusting the automatic releasing mechanism to operate at predetermined pressures, as seen in the direction indicated by the arrow 6 in Fig. 2. Fig. 7 is an enlarged horizontal section on the line 7—7 of Fig. 1. Fig. 8 is an enlarged detail section on the line 8—8 of Fig. 7. Fig. 9 is an enlarged detail section on the line 9—9 of Fig. 7, showing the device for detachably connecting the conning tower to the submarine deck. Fig. 10 is a view in elevation with parts broken away, as seen in the direction indicated by the arrow 10 in Fig. 9. Fig. 11 is a view in section and elevation on the line 11—11 of Fig. 2.

More specifically, 15 indicates the top or deck of a submarine and 16 denotes a conning tower or superstructure demountably carried thereon. This superstructure 16 is formed with side walls 17, a top wall 18 and a floor 19, thus forming an inclosed compartment which preferably extends above the deck 15. A man-hole 20 is provided in the top 18 for entrance to and exit from the superstructure and a man-hole 21 is formed in the floor 19 opening to a tube 22 leading to the interior of the submarine below the deck 15. The man-hole 20 is designed to be closed by a suitable cover of usual construction. The man-hole 21 is designed to be closed when it is desired to detach the superstructure and after the crew have entered the latter. This is accomplished by means of a plate 23 normally disposed in a depression 24 formed in the deck 15 below the floor 19 and opening to the interior of the tube 22; the plate 23 being adapted to be detachably connected to a threaded stem 25 carried by a removable spider frame 26 and formed with a hand wheel 27. The frame 26 is adapted to span the man-hole 21 and to be supported by the floor 19 when it is desired to clamp the plate 23 in position against the lower face of the floor 19 to close the man-hole 21, as shown in Fig. 8. The tube 22 is designed to be closed to prevent the entrance of water

into the interior of the submarine therethrough when the superstructure 16 is detached. This is effected before closing the man-hole 21 by clamping a plate 28 on an annular flange 29 carried on the inner wall of the tube 22; the plate 28 being here shown as secured against displacement by means of a bar 30 extending above the plate 28 and seated thereon with its ends engaged by hand screws 32 carried by brackets 33 on the flange 29. The hand screws 32 are adapted to be screwed to bear upon the bar 30 to press and hold the plate 28 against the upper face of the flange 29.

Mounted on the deck 15 and surrounding the wall 17 in slidable contact with the latter is an upwardly extending flange 34 which is adapted to hold the superstructure against lateral displacement. Attached to the flange 34 at suitable intervals apart are standards 35 which extend upwardly alongside the outer face of the wall 17. The standards 35 are formed with recesses 36 on their inner faces, the upper walls of which are beveled, as particularly shown in Fig. 9; the recesses 36 extending opposite openings 37 formed in the wall 17. Caps 38 extend over the openings 37 on the inner face of the wall 17 and are formed with recesses 39 on their inner faces.

Extending through the caps 38 are threaded stems 40 which are pivotally connected to blocks 41 slidably mounted in the space formed by the openings 37 and the recesses 36 and 39. Each block 41 is rectangular in form and has a beveled upper edge arranged to engage the beveled upper wall of the recesses 36 and operate as a wedge to clamp the superstructure in position on the deck 15 and securely hold it against displacement. The blocks 41 are adapted to be retracted into the recesses 39 out of engagement with the walls of the recesses 36, as indicated by dotted lines in Fig. 9, when it is desired to detach the superstructure. The retraction of the blocks 41 is effected by rotating the threaded stems 40.

Connecting with the superstructure 16 on the upper portion thereof is a suitable cable or chain 42 which leads to and is wound on a reel 43. This reel 43 comprises a central bar 44 on which a disk 45 is rigidly mounted; the cable being wound on the bar 44 in layers of graduated lengths so that the cable will assume the form of a cone with the innermost portion of the cable extending from the bar 44 adjacent the base disk 45 and with the outer portion of the cable extending from the apex of the cone thus formed adjacent the end of the bar 44. The bar 44 is pivoted at 46 to a yoke 47 which in turn is pivoted at 48 at right angles to the pivot 46 to lugs 49 on a base 50 secured to the deck 15. This mounting of the bar 44 permits of a universal pivotal movement of the bar without rotation thereof so that the bar may be disposed in a vertical position irrespective of the lateral or longitudinal inclination of the submarine; this arrangement facilitating the unwinding of the cable from the conical coil endwise of the latter on exerting a vertical pull on the outer portion thereof. The conical coil is designed to be normally disposed horizontally as shown in Fig. 1, and locked against movement, with the apex of the cone extending toward the forward end of the submarine so as to offer the least resistance to the advance of the submarine when it is submerged. The locking of the coil is effected by means of a latch 51 having a head portion 52 formed with a square socket 53 for the reception of the squared end of the bar 44, as shown in Fig. 4. When the bar 44 is engaged by the latch 51 it will be held against sidewise and vertical movement, and rocking of the conical coil will be obviated. The latch 51 is pivoted to a suitable support and is normally held in engagement with the bar 44 by means of a spring 54, as shown in Fig. 2.

Mounted on the deck 15 is a base frame 55 which forms a seat for a dependent frame 56 carried on the under side of a float or buoy 57. The frame 56 is detachably secured in place on the frame 55 by means of an arm 58 on the frame 55 which engages a link 59 carried by the frame 56 and is in turn engaged by a latch 60 pivoted on the frame 55, as shown in Fig. 2, the latch 60 being designed to be retracted to disengage the arm 58 when it is desired to release the float 57. The frame 56 carries a reel 61 on which a cable 62 is wound; this cable connecting with the cable 42 wound on the conical reel.

Extending parallel with the deck 15 is a rod 63 which is mounted to slide longitudinally and extends from a point adjacent the wall 17 of the superstructure through the frame 55 and through a bearing 64. Mounted on the outer end of the rod 63 is a pair of spaced collars 65 between which the lower portion of the latch 51 extends; a pair of corresponding spaced collars 66 being formed on the rod 63 remote from the collars 65 between which the lower portion of the latch 60 extends. A collar 67 is mounted on the inner end of the rod 63 and is adapted to be engaged by a trigger 68 pivoted on a standard 69; this trigger being normally held against retraction by engagement with an arcuate face 70 formed on a trip lever 71 pivoted at 72 on the standard 69 adjacent the trigger 68, as shown in Fig. 5. The trip lever 71 is formed with a flat face 73 which when the lever 71 is rocked inwardly will release the trigger 68 and permit the rod 63 to be advanced to actuate the latches 51 and 60. This advance movement of the rod 63 is effected by

means of a spring 74 wound on the rod 63 and bearing between the bearing 64 and a collar 75 on the rod; the spring 74 being under a state of compression when the rod 63 is retracted and engaged by the trigger 68, as shown in Fig. 2.

Means are provided for automatically actuating the trip lever 71 by water pressure when the submarine has been submerged to a predetermined depth, to release the float and the pivoted cable carrying reel. The following structure is provided for this purpose: Mounted on the wall 17 of the superstructure over an opening 76 formed therein is a corrugated diaphragm 77 preferably arranged exteriorly of the wall 17. Connecting with the diaphragm 77 is a rod 78 the outer end of which is provided with a pair of spaced collars 79 between which the upper end of the trip lever 71 extends. Encircling the opening 76 on the inner face of the wall 17 is an internally threaded tube 80 in which an externally threaded sleeve 81 is adjustably mounted, and interposed between the sleeve 81 and the diaphragm 77 is a spring 82 arranged to yieldably oppose pressure on the diaphragm 77. The pressure of the spring 82 may be adjusted by rotating the sleeve 81, the latter being fitted with a hand hold 83 for this purpose. The outer end of the sleeve 81 is provided with gage marks 84 arranged to register with a reading line 85 on the end of the tube 80, as shown in Fig. 6 to indicate the pressure of the spring 82. By rotating the sleeve 81 to advance or retract it in relation to the tube 80, the tension of the spring 82 may be set so that a predetermined pressure on the diaphragm 77 will operate to depress the spring 82 and shift the rod 78 sufficiently far to actuate the trip lever 71 and release the trigger 68. By this arrangement the float and cable reel may be automatically released by pressure of water against the diaphragm 77 in event control of the submarine is lost from any cause and it sinks below a predetermined level so that the float will be released and rise to the surface without operation of the releasing device by a member of the crew.

By forming the trip lever 71 with the arcuate face 70 this lever may be freely rocked in either direction on fluctuations of the diaphragm 77 as occasioned by varying water pressures thereon without actuating the trigger 68; the trigger 68 being released only when the trip lever 71 has been rocked sufficiently far by depression of the diaphragm 77 to dispose the flat face 73 in a position to release the trigger 68, as indicated in dotted lines in Fig. 5.

Assuming the submarine to be submerged beyond the predetermined depth, the operation will be as follows: Pressure of water on the diaphragm 77 will operate to depress it in opposition to the spring 82 and thereby act through the medium of the rod 78 and the outermost collar 79 thereon to rock the trip lever 71 into the trigger releasing position. The spring 74 will then operate to suddenly advance the rod 63 so that a forcible impact will be delivered to the latches 51 and 60 thereby retracting the latches and releasing the reel bar 44 and the float engaging arm 58. The buoyancy of the float 57 will cause it to rise from its seat on the frame 55 and out of engagement with the arm 58. The float in moving upward will exert a pull on the cable 62 which will be transmitted to the outer end of the rod 44 tending to rock the latter into a vertical position on its pivots 46 and 48 as indicated in dotted lines in Fig. 1. Continued movement of the float will then cause the cable 62 to unwind from the reel 61 and also unwind the cable 42 from its conical coil. The cable 62 may be of small diameter and of considerable length and if the submarine is submerged in comparatively shallow water, may unwind from the reel 61 without unwinding the cable 42 or elevating the conical reel. The float 57 on reaching the surface will denote the location of the submerged submarine so that those coming to the assistance of the craft may on hauling in the cable 62 unwind stronger cables from the coil 43 which connect with the superstructure 16. The reel bar 44 being held against rotation by reason of its pivotal mounting and being permitted to extend in the direction of the pull of the cable being unwound therefrom, insures against entanglement of the cable and permits ready unwinding thereof. These cables may include air hose and electrical conductors connecting with the superstructure by means of which air may be forced into the latter and signaling communication had with the crew.

If it is found to be impossible to operate the submarine the crew may enter the superstructure 16 and after closing the tube 22 and the man-hole 21 may detach the superstructure by retracting the blocks 41 out of engagement with the standards 35, whereupon the superstructure may be hauled to the surface by means of its connecting cable 42; the superstructure 16 being readily separated from the float and reel releasing mechanism by reason of the trip lever 71 not being directly connected to its actuating bar 78.

It is manifest that various changes in the construction and arrangement of the parts may be resorted to as occasion requires and particularly as necessitated by the application of the invention to various types of submarines or submersibles without departing from the spirit and scope of the invention as set forth in the appended claims.

What we claim is:

1. In a submarine, a detachable super-

structure, a cable attached thereto, a reel on the submarine around which said cable is wound, a float attached to said cable, and means for detachably connecting said float to the submarine.

2. In a submarine, a detachable superstructure, a cable attached thereto, a reel on the submarine around which said cable is wound, a float attached to said cable, means for detachably connecting said float to the submarine, and means for automatically releasing said float when the submarine has been submerged to a predetermined depth.

3. In a submarine, a superstructure thereon, means for detachably connecting the superstructure to the submarine substructure, a cable attached to the superstructure, a reel on which said cable is wound, a float connected to said cable, means for detachably connecting the float to the submarine, and means adapted to be operated by water pressure for automatically releasing the float when the submarine has been submerged to a predetermined depth.

4. In a submarine, a detachable superstructure, a cable connected thereto, a reel mounted against rotation on which said cable is wound, a float to which said cable is attached, and means for detachably mounting the float.

5. In a submarine, a detachable compartment thereon, a float, a reel mounted to have universal pivotal movement without rotary movement, and a cable wound on said reel with one end connected to the float and its other end connected to the detachable compartment.

6. In a submarine, a detachable compartment thereon, a float, means controlled by water pressure for automatically releasing said float, a reel mounted to have universal pivotal movement without rotary movement, and a cable wound on said reel with one end connected to the float and its other end connected to the detachable compartment.

7. In a submarine, a detachable compartment, a float, a cable connecting said float to said compartment, means for detachably mounting said float, and means operable by water pressure for automatically releasing the float when the submarine has become submerged to a predetermined depth.

8. In a submarine, a detachable compartment, a float, a cable connecting said float to said compartment, means for detachably mounting said float, and means for releasing the float.

9. In a submarine, a detachable compartment, a cable, one end of which is connected to said compartment, a reel bar around which said cable is wound, a pivotal mounting for said bar whereby the latter may have a universal rocking movement without rotary movement, means for locking said bar, a float to which the other end of the cable is connected, means for detachably mounting said float, and mechanism for releasing said float and reel bar.

10. In a submarine, a detachable compartment, a cable, one end of which is connected to said compartment, a reel bar around which said cable is wound, a pivotal mounting for said bar whereby the latter may have a universal rocking movement without rotary movement, means for locking said bar, a float to which the other end of the cable is connected, means for detachably mounting said float, and mechanism for releasing said float and reel bar adapted to be automatically operated by water pressure.

11. In a submarine, a detachable compartment, a cable, one end of which is connected to said compartment, a reel bar around which said cable is wound, a pivotal mounting for said bar whereby the latter may have a universal rocking movement without rotary movement, means for locking said bar, a float to which the other end of the cable is connected, means for detachably mounting said float, a mechanism for releasing said float and reel bar adapted to be automatically operated by water pressure, and means for adjusting the releasing mechanism to operate at predetermined pressures.

12. In a submarine, a detachable compartment, a cable having one end connected with said compartment, a reel bar around which said cable is wound, a pivotal mounting for said bar whereby the latter will have a universal rocking movement without rotation, a latch for locking said bar, a float to which the other end of the cable is connected, a latch engaging said float, and means for operating said latches to release the reel bar and float.

13. In a submarine, a detachable compartment, a cable having one end connected with said compartment, a reel bar around which said cable is wound, a pivotal mounting for said bar whereby the latter will have a universal rocking movement without rotation, a latch for locking said bar, a float to which the other end of the cable is connected, a latch engaging said float, and means for operating said latches to release the reel bar and float adapted to be actuated by water pressure at predetermined depths.

14. In a submarine, a detachable compartment, a cable having one end connected with said compartment, a reel bar around which said cable is wound, a pivotal mounting for said bar whereby the latter will have a universal rocking movement without rotation, a latch for locking said bar, a float to which the other end of the cable is connected, a latch engaging said float, and means for operating said latches to release the reel bar and float adapted to be actuated by water pressure at predetermined depths, comprising a reciprocable bar connected to said

latches, a spring for advancing said bar, a trigger for holding said bar in a retracted position, a diaphragm, and means operable on the depression of said diaphragm for actuating the trigger to release the bar.

15. In a submarine, a detachable compartment, a cable having one end connected with said compartment, a reel bar around which said cable is wound, a pivotal mounting for said bar whereby the latter will have a universal rocking movement without rotation, a latch for locking said bar, a float to which the other end of the cable is connected, a latch engaging said float, and means for operating said latches to release the reel bar and float adapted to be actuated by water pressure at predetermined depths, comprising a reciprocable bar connected to said latches, a spring for advancing said bar, a trigger for holding said bar in a retracted position, a diaphragm, means operable on the depression of said diaphragm for actuating the trigger to release the bar, and means for adjusting the diaphragm to operate at various water pressures.

In witness that we claim the foregoing we have hereunto subscribed our names this 22nd day of April, 1915.

CHARLES E. BECK.
HAROLD E. BECK.