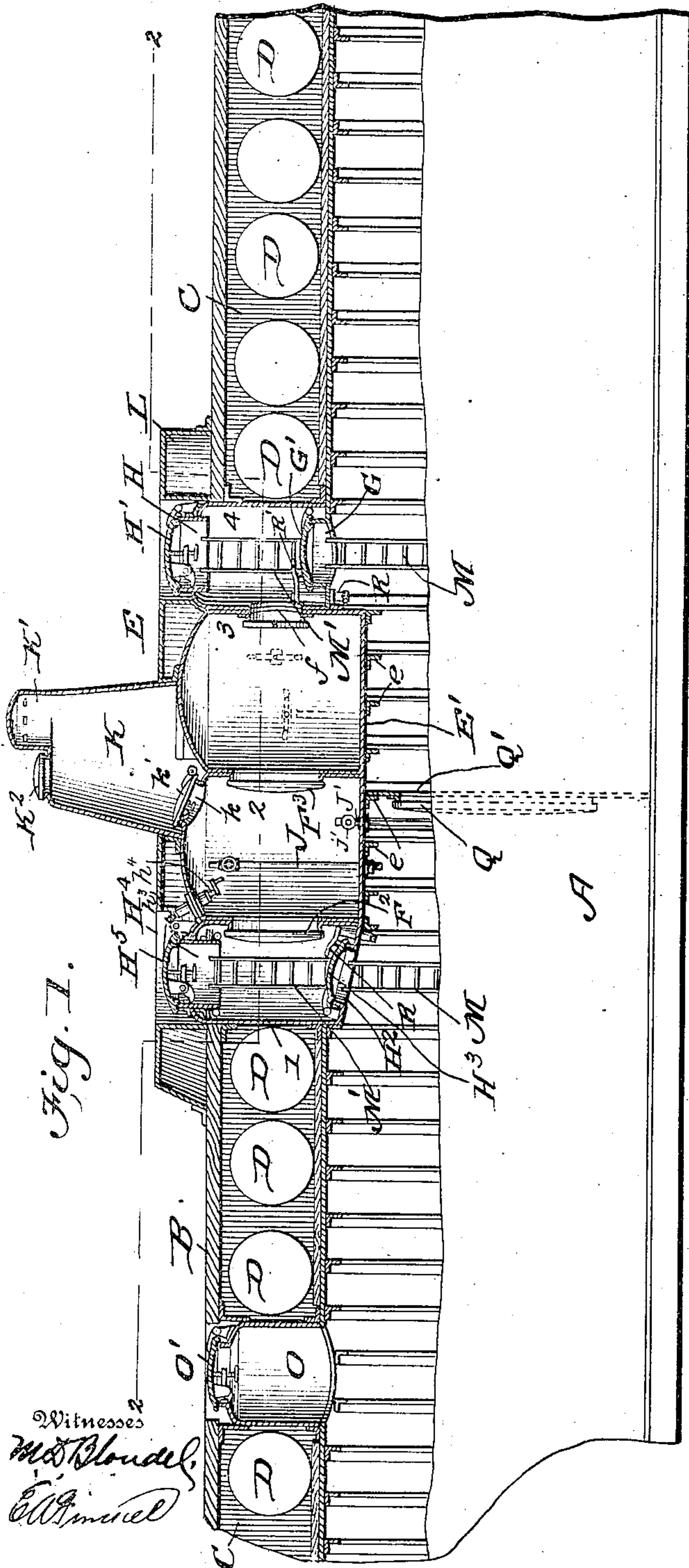


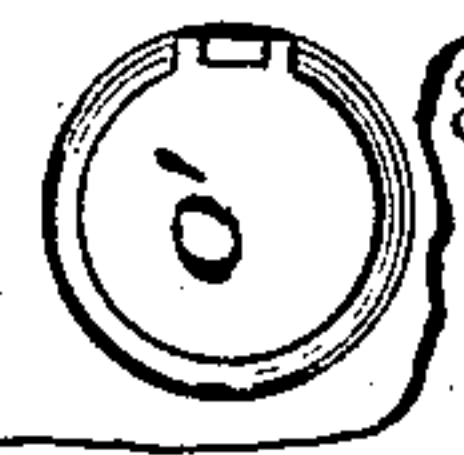
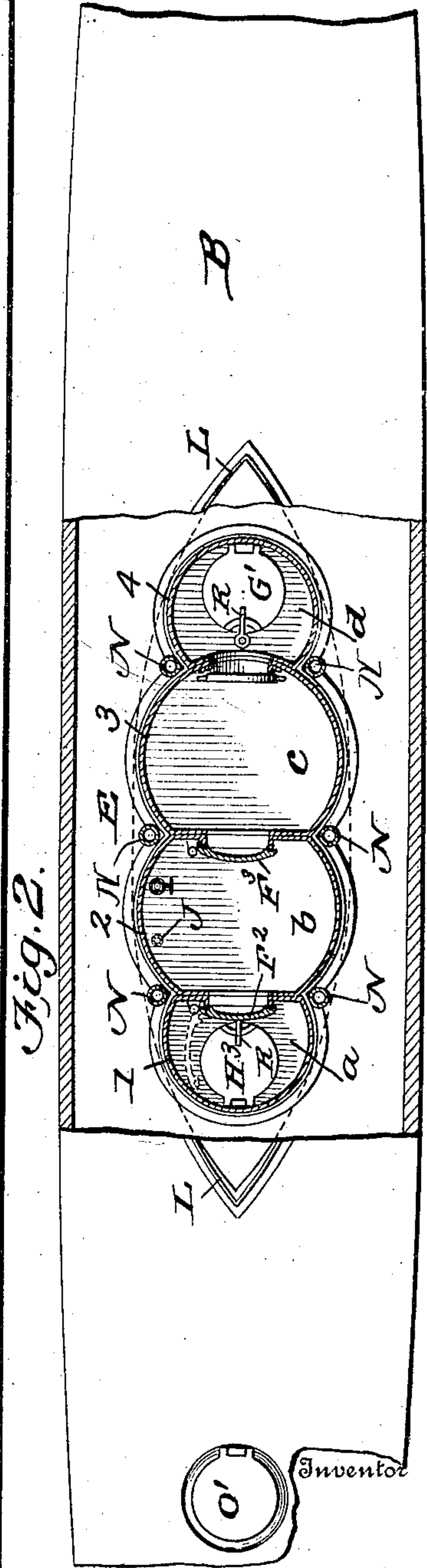
S. LAKE.  
NAVIGATING TURRET FOR SUBMERGIBLE VESSELS.  
APPLICATION FILED NOV. 13, 1907.

925,706.

Patented June 22, 1909.  
3 SHEETS—SHEET 1.



Witnesses  
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E. A. Arnold



Inventor

Simon Lake.  
by Wm. F. Linnell  
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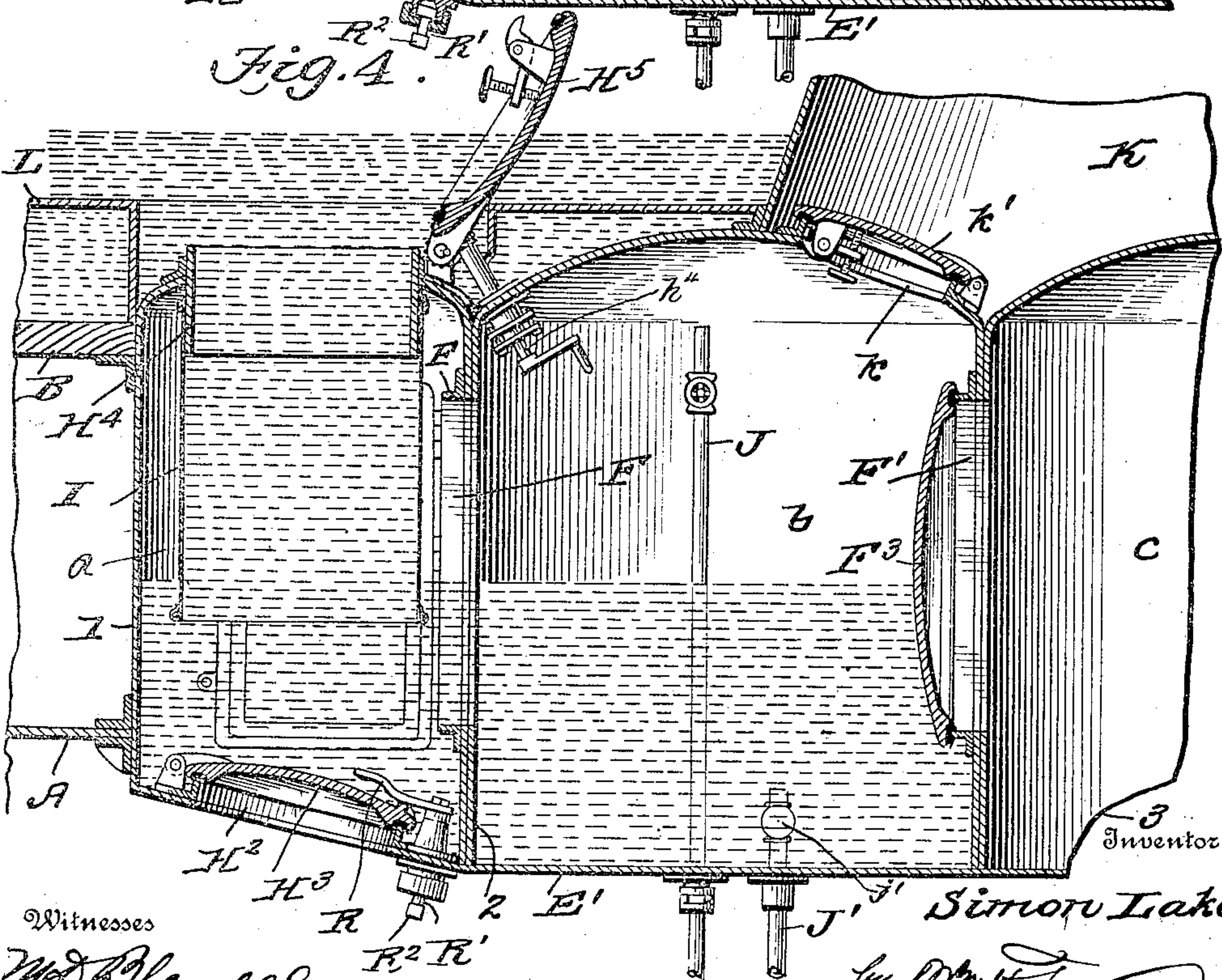
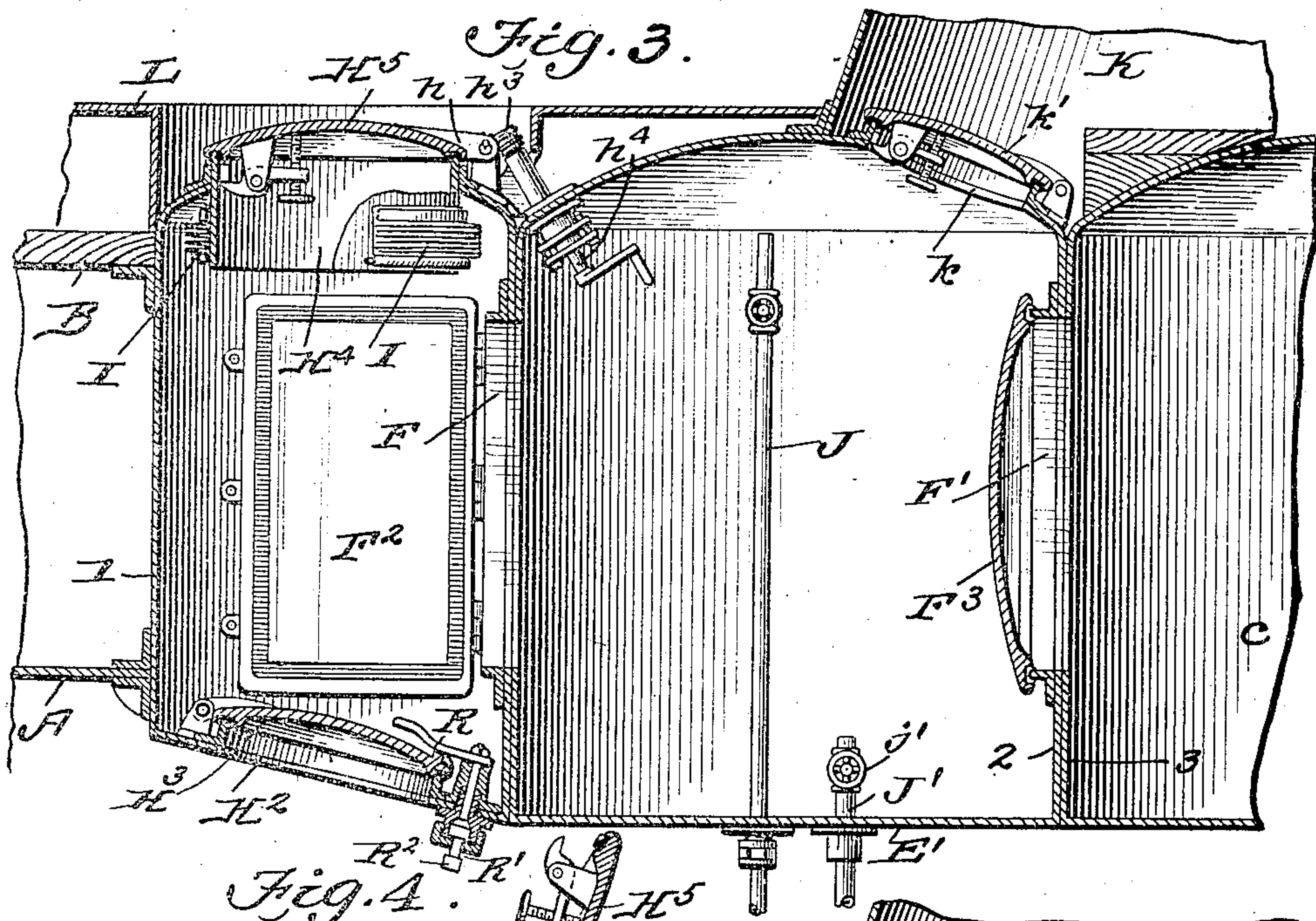


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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 5.

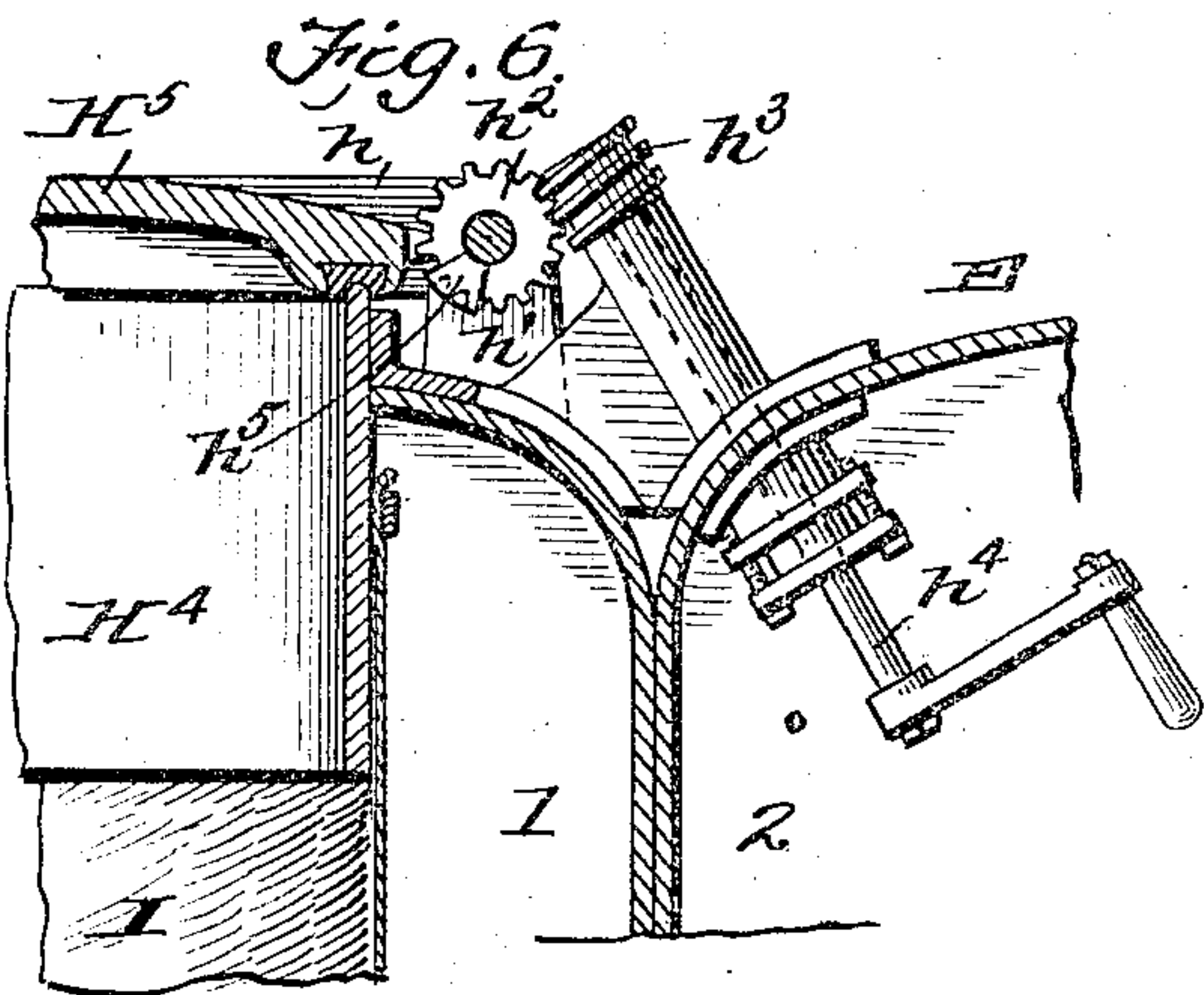
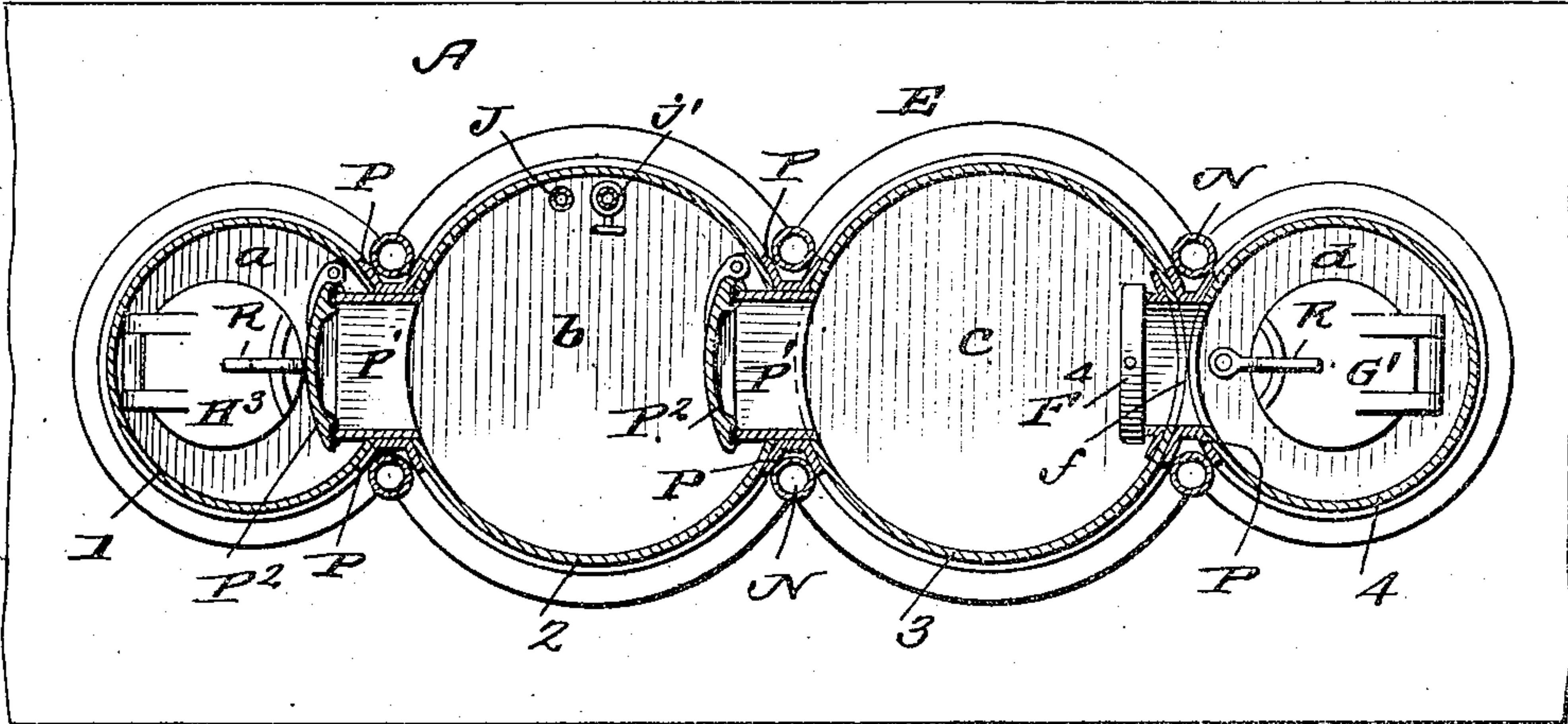
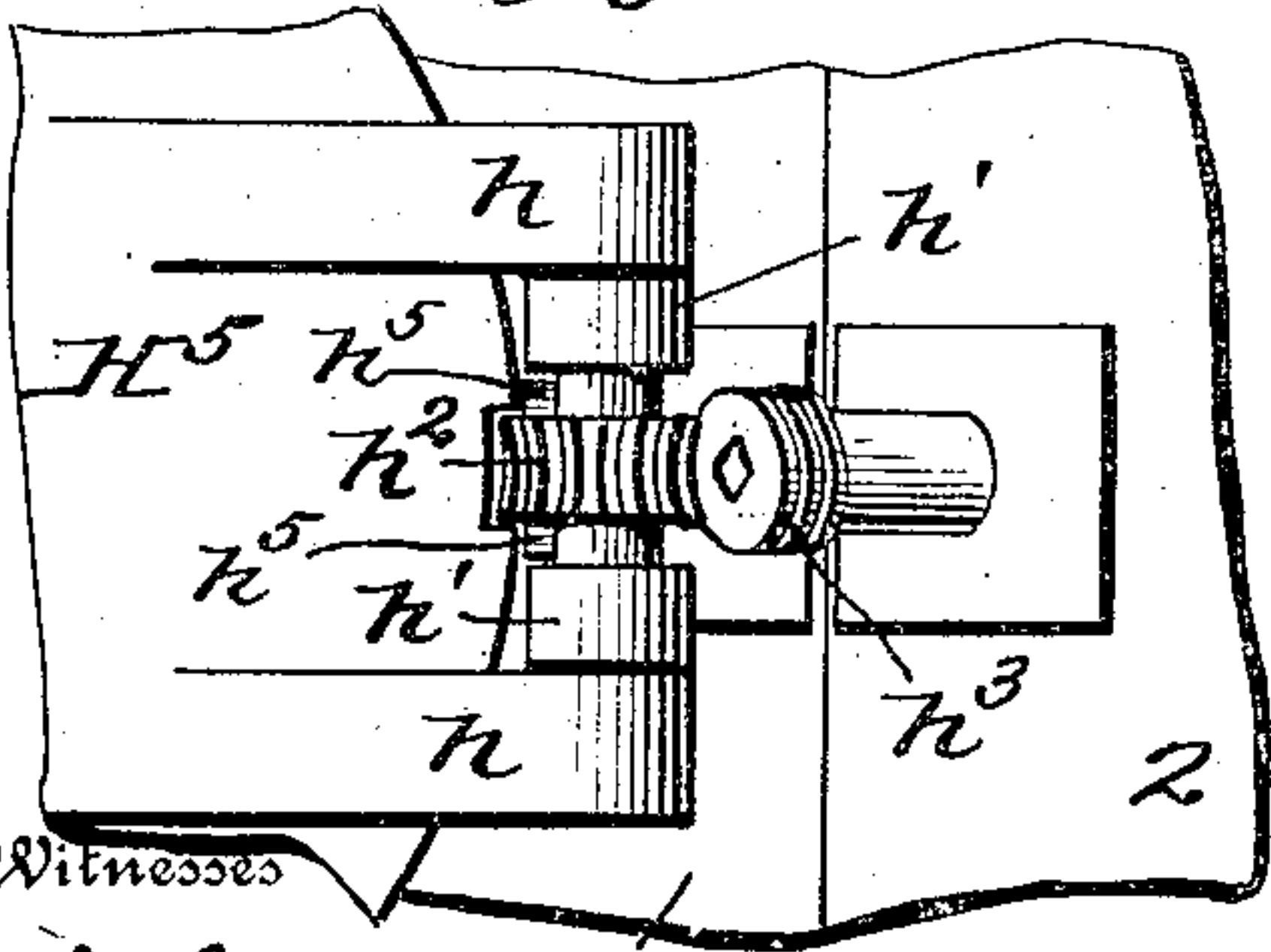


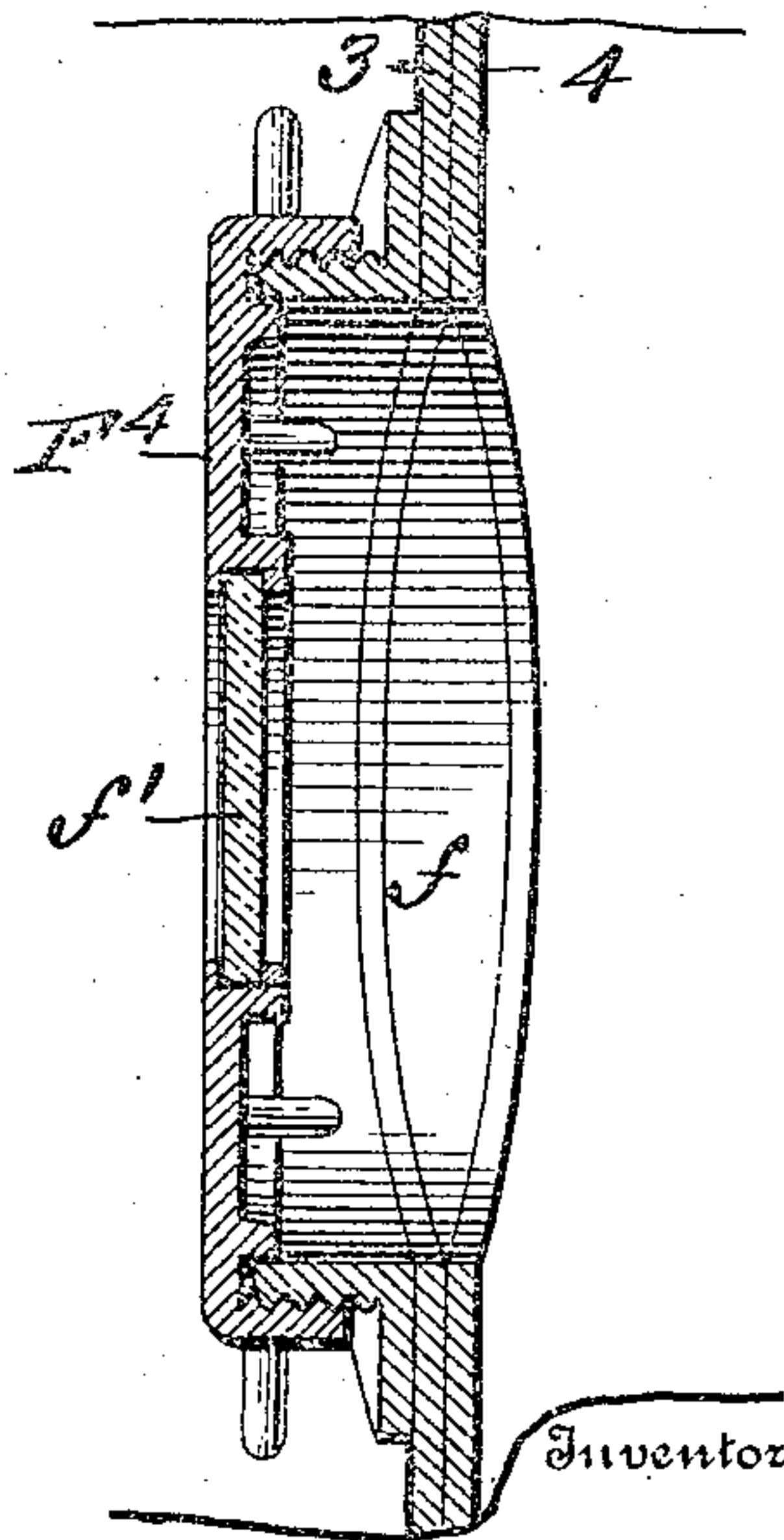
Fig. 7.



Witnesses

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Fig. 8.



Inventor

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# UNITED STATES PATENT OFFICE.

SIMON LAKE, OF BRIDGEPORT, CONNECTICUT.

NAVIGATING-TURRET FOR SUBMERCIBLE VESSELS.

No. 925,706.

Specification of Letters Patent.

Patented June 22, 1909.

Application filed November 13, 1907. Serial No. 492,025.

*To all whom it may concern:*

Be it known that I, SIMON LAKE, a citizen of the United States, and a resident of Bridgeport, in the county of Fairfield and State of Connecticut, temporarily residing in London, England, have invented certain new and useful Improvements in Navigating-Turrets for Submergible Vessels, of which the following is a specification.

10 The object of this invention is to provide a submarine or submergible vessel with a navigating turret having a series of intercommunicating compartments and which is of light weight construction and of the necessary strength to withstand the external pressure to which the vessel is subjected when submerged, and through which the occupants of the vessel may readily escape from either end of it should the vessel be incapacitated when operating in a submerged condition and when the other exits could not be used.

Another object is to render these compartments capable of being successively and alternately used, should any one of them be injured, thereby not only permitting escape but also allowing the occupants to safely control and navigate the vessel, a result not attainable were the turret constructed with only a single compartment.

25 Having thus stated the objects of the invention and indicated its essential characteristics, I will proceed now to describe its construction and then will particularly point out and distinctly claim that which I claim as my invention.

30 In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a partial vertical longitudinal section of the turret and central parts of the vessel. Fig. 2 is a horizontal sectional plan drawn through the turret, on the line 2—2 of Fig. 1. Fig. 3 is a vertical longitudinal sectional view drawn on a larger scale through the turret. 40 Fig. 4 is a similar view showing open one of the hatches controlling the hatchway in the upper end of the rear end section, and also showing the means employed for effecting escape from the vessel when submerged. 45 Fig. 5 is a horizontal longitudinal sectional view drawn through the turret and illustrating the sections of the turret formed of perfectly cylindrical construction. Fig. 6 is a detail vertical section on a larger scale of the upper part of the rear section and the section adjacent thereto of the turret and illustrating

the mechanism employed for opening the hatch upon the rear section, and Fig. 7 is a detail plan view of the same. Fig. 8 is a detail sectional view drawn on a larger scale 60 illustrating the closure for the man-hole formed in the abutting surfaces of the two adjacent forward sections of the turret.

A, designates the hull of a submarine or submergible vessel, having a superstructure 65 B, the deck of which is arranged some distance above the hull to provide an intervening space C between the said deck and hull. In the space C is arranged a series of tanks D, D, that may be employed to receive air to 70 increase the buoyancy of the vessel, or ballast when the vessel is submerged, or for the storage of water, fuel or other commodities.

Amidships and preferably equally disposed fore and aft of the center of gravity, is the 75 navigating turret E, a portion of which extends down into the hull. The turret is constructed of a series of cylindrical sections 1, 2, 3 and 4, whose vertical walls are joined together in longitudinal alinement by rivets, 80 or by otherwise connecting the abutting faces of the sections, to provide air-tight joints, and which sections when thus connected and provided with appropriate tops, form practically a single structure, with a series of vertical 85 convex surfaces throughout the length of the sides of the turret, whereby the strength of the turret, as a whole, is greatly increased. The sections provide a series of compartments, *a*, *b*, *c* and *d*, which communi- 90 cate with each other through openings formed in the abutting vertical walls of the sections. The openings between the compartments *a* and *b*, and *b* and *c*, are provided with doorway frames *F* and *F'*, respectively, which are securely fastened to the sections to provide air-tight joints. Doors *F*<sup>2</sup> and *F*<sup>3</sup>, respectively, are hinged to the frames for closing the openings or doorways to make the compartments air-tight. The 100 sections 1 and 4 are somewhat smaller in diameter than the intermediate sections 2 and 3, and form the ends of the turret, and the compartment of section 4 communicates with the compartment *c* of section 3 through 105 openings formed in the abutting surfaces of the sections and constituting a man-hole *f*, that is normally closed by a cover *F*<sup>4</sup> preferably screwed upon a collar surrounding the man-hole, but the cover may be hinged or 110 otherwise held in position, if desired. The man-hole provides a passage-way from the



compartment *d* to the compartment *c* from the fore part of the hull of the vessel, or vice versa. A sight opening is formed in the cover *F*<sup>4</sup> which is closed by a glass plate *f*<sup>1</sup>, whereby the occupant of the compartment  
5 may look through into the interior of the fore part of the vessel.

The lower ends of the sections 1, 2 and 3 within the hull are closed by a plate *E*<sup>1</sup> which forms the bottom of the sections and is supported by cross-beams *e*, *e*, which may be connected to the ribs of the hull, or, if desired, the ribs may be formed with segmental horizontal portions and the bottom allowed to rest thereon. The forward section 4 rests at its lower end upon the hull of the vessel and the hull is provided with a hatchway *G* opening into said section and closed by a cover *G*<sup>1</sup> opening upwardly. The upper end of the section 4 is provided with a circular opening in which is fixed a cylindrical band or collar *H* that projects slightly above the section and provides a hatchway which is closed by a hatch *H*<sup>1</sup>, and through which access to and exit from the compartment may be had from the interior to the deck of the vessel, or vice versa.

The bottom of the section 1 of the turret is provided with a hatchway *H*<sup>2</sup> which is closed by a hatch *H*<sup>3</sup> opening into the compartment *a*. The upper end of this section is provided with an opening in which is fixed a collar *H*<sup>4</sup> forming a hatchway which is somewhat longer than the collar *H* and its upper end is closed by a hatch *H*<sup>5</sup>. The pintle of the hinge of the hatch *H*<sup>5</sup> is held fast in lugs or ears *h*, *h*, Fig. 7, projecting from the hatch and is journaled in bearings *h'*, *h'*, projecting from the top of the section 1, and loosely mounted upon the pintle, between the bearings, is a worm-wheel *h*<sup>2</sup> which is meshed by a worm *h*<sup>3</sup> carried at the outer end of a shaft *h*<sup>4</sup>, Figs. 1, 3, 4 and 6, journaled in a sleeve projecting from the top of the section 2. This shaft projects through the top of section 2, and is surrounded by a stuffing-box secured to the under side of the top (see Fig. 6) and has a crank-handle at its inner end by which the shaft is revolved. The peripheral edge of the hatch *H*<sup>5</sup> is cut out to provide a recess for the gear-wheel in which the latter snugly fits, and upon each side of the gear-wheel is formed a lug *h*<sup>5</sup>, Figs. 6 and 7, which lugs are designed to engage the edge of the hatch adjacent to the recess, so that as the shaft is revolved, motion will be imparted to the gear-wheel, which will bring the lugs into engagement with the hatch and swing the hatch upon its hinges to an open position, and by a reverse movement of the shaft the hatch may be lowered. To the inner end of the collar *H*<sup>4</sup> is connected a collapsible sleeve *I*, which is normally collapsed and held elevated as shown in Fig. 3, but which may be extended and lowered to form a continuation  
65

of the collar, as shown in Fig. 4. The purpose of this arrangement is to provide an exit from the vessel when the latter is submerged, should it be desired to escape therefrom in the event of the vessel being incapacitated and its occupants unable to bring it to the surface.

*J*, designates a compressed air supply pipe which extends from an air supply tank (not shown), carried by the vessel, into the compartment *b* and has a valve at or adjacent to its free end to control the admission of air to the compartment.

*J'*, designates a water outlet pipe, which may extend to one of the ballast tanks (not shown) of the vessel, or direct to the surrounding body of water. A valve *j*<sup>1</sup> is interposed in the pipe within the compartment by which the outlet may be controlled.

In the illustration, Fig. 4, the vessel is supposed to be in a submerged condition and the parts adjusted for escape from the vessel with the hatch *H*<sup>5</sup> open. Before the hatch is opened, however, the flexible sleeve *I* is lowered and the hatches controlling communication to the compartment *b* and also the hatch *H*<sup>3</sup> controlling communication to the compartment *a*, are securely fastened down. Enough compressed air is then admitted into the compartment *b*, through the valve-controlled pipe *J*, to counterbalance the external water pressure and provide an air-lock or breathing space in the upper part of the sections. The hatch cover *H*<sup>5</sup> is then raised, by revolving the shaft *h*<sup>4</sup>, which can be easily accomplished, as the air within the compartments counterbalances the external pressure and therefore only enough leverage force is necessary to overcome the weight of the hatch itself. Immediately the hatch is raised from its seat, water rushes through the hatchway into the compartments *a* and *b* and rises until the lower end of the flexible sleeve is surrounded, the amount of water let in being of course regulated by the air pressure within the compartments. When ready to escape from the vessel, the occupants of the compartment then dive down under the end of the sleeve and rise to the surface of the water, and when all but one of the occupants have escaped, the hatch *H*<sup>5</sup> is again lowered and the valve in the exhaust water pipe *J'* is opened and the water drained or forced from the compartment into any one of the ballast tanks of the vessel. The hatchway *H*<sup>2</sup> is then opened and other occupants of the vessel enter the compartment *b*, when the hatch *H*<sup>3</sup> is closed and the operation of escape is repeated until all of the crew have escaped. The operation for effecting the escape as described is in the event of the bow of the vessel being injured, in which case the door *Q* in the bulkhead *Q'* arranged centrally of the vessel is closed so that the water or chlorine gases from the batteries  
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will not enter the rear or stern compartment of the vessel, but in the event of the stern being injured, the crew assemble in the bow of the vessel and the door Q is closed, when entrance may be had to the compartment b through the hatchway G, manhole f, and doorway F', after which the doorway F<sup>3</sup> is closed, and the operation as before described is performed.

In order to open the hatches G' and H<sup>3</sup> from the hull of the vessel or the compartments into which they open, I provide crank-levers R, R, which engage beveled lugs formed upon the tops of the hatches, the shafts R', R', of the levers extending into the hull of the vessel and provided with handles R<sup>2</sup>, R<sup>2</sup>, by which the shafts may be revolved to disengage the levers from the lugs. To raise the hatches from within the compartments, the levers R, R, are grasped and swung around to disengage the lugs. The tops of the sections 1, 2, 3 and 4, are convex or dome-shaped, and arranged upon the tops of the sections 2 and 3 is a conning tower K, access to which is had through a hatchway k, formed in the top of the section 2, and having a hatch k'. The top of the tower terminates in a sighting hood K', and in said top and at the rear of this hood is arranged a dead light K<sup>2</sup>. The upper ends of the sections forming the turret project through the top of the superstructure and are incased in a housing L, which is double conoidal shape in longitudinal horizontal section (see Fig. 2) so as to present an even surface to the water and offer the least possible resistance to the vessel when running submerged. The housing is provided with openings which surround the hatches formed in the tops of the sections 1 and 4, as shown in Fig. 1.

M, M, designate ladders extending from the lower portion of the hull of the vessel to the hatchways at the lower ends of the sections 1 and 4, and M', M', designate ladders arranged in the compartments of the said sections and which extend to the hatchways in the tops thereof.

N, N, designate air inlet pipes which extend through the hull and project upwardly through the housing L for conducting fresh air to the hull of the vessel when the latter is running upon the surface of the water. Valves (not shown) control the inner ends of the pipes.

O, designates a hatchway leading into the hull of the vessel through the superstructure, and O' is the cover therefor.

The compartment 3 and the conning tower K are provided with the usual steering wheels for controlling the movement of the vessel, and also the necessary signaling apparatus employed in such boats, but as these features are of usual or any approved construction, I deem it unnecessary to show or further describe them.

In Fig. 2 of the drawings, the cylindrical sections are shown with their sides bent inwardly to provide flat abutting surfaces which are riveted or otherwise connected to form air-tight joints.

In Fig. 5, the sections are circular in cross-section, and are secured to one another with air-tight joints by substantially V-shaped gussets P which extend throughout the length of the sections. The openings formed in the vertical walls of the sections provide communication between the sections, and the openings in the adjacent surfaces between the sections 1 and 2, and 2 and 3, are fitted with frames P', P', to which are secured doors P<sup>2</sup>, P<sup>2</sup>, for closing the openings to render the compartment of either section air-tight. In either construction, it will be seen the sides and top of the turret are formed with a series of semi-circular or convex surfaces which greatly increases the strength of the structure as a whole and enables it to withstand the external pressure to which the vessel is subjected when submerged and without increasing its weight.

From the foregoing, the advantages of my invention will readily appear to those having experience in the construction and operation of submarine vessels.

What I claim is:—

1. A submarine or submergible vessel, having a navigating turret whose side walls are constructed with a plurality of segmental or convex surfaces and having its top likewise constructed with a plurality of segmental or convex surfaces, and hatches controlling admission to the turret.

2. A submarine or submergible vessel, having a navigating turret whose vertical walls and top are constructed with a plurality of segmental or convex surfaces, intercommunicating compartments in said turret, hatches controlling admission to the turret, and hatches for controlling communication between the compartments.

3. A submarine or submergible vessel, having a navigating turret whose vertical walls and top are constructed with a plurality of convex surfaces, partitions dividing the turret into a series of compartments having openings to afford communication between said compartments, hatches at the ends of the turret for controlling admission to the end compartments, and hatches controlling the openings in the partitions.

4. A submarine or submergible vessel, having a navigating turret constructed of a plurality of segmental or convex sections and intercommunicating compartments, and hatches controlling admission to said compartments in alternation or succession.

5. A submarine or submergible vessel, having a navigating turret whose vertical walls and tops are constructed of a plurality of segmental or convex sections and inter-



communicating compartments, and hatches at the upper and lower portions of the turret controlling admission to and exit from the said compartments in alternation or suc-

5 cession.

6. A submarine or submergible vessel, having a navigating turret whose vertical walls and tops are constructed of a plurality of convex sections with partitions dividing the turret into a series of compartments hav-

10 ing openings to establish communication between the said compartments, and hatches at the upper and lower portions of the turret controlling admission to and exit from the said compartments.

7. In a submarine or submergible vessel, a navigating turret constructed of a plurality of sections providing a series of compart-

20 ments, the sides of the said sections being convex, means for rendering the compartments formed by these sections air-tight, hatchways provided with hatches at the upper and lower portions of the turret for controlling admission to and exit from the turret, a col-

25 lapsible sleeve adapted to form an extension for one of the hatchways, and means for conducting air under pressure to the compartment having the sleeve, whereby an air-lock or breathing-space is formed in the said compartment when water enters the latter.

8. In a submarine or submergible vessel, a navigating turret having a series of commu-

30 nicating compartments, means for closing air-tight the mediums of communication between the compartments, hatches controlling openings in the upper and lower portions of the turret, a collapsible sleeve surrounding one of the openings at the upper portion of the turret and adapted to form an extension thereof, and means for conducting air under

35 pressure to the said turret.

9. In a submarine or submergible vessel, a navigating turret constructed of a plurality of cylindrical sections arranged in longitudi-

40 nal alinement and providing a series of compartments, the abutting surfaces of the sections having openings to afford communication between the compartments, means for closing the openings, hatchways at the upper and lower portions of the end sections of the turret, closures for the hatchways, an ex-

45 tensible sleeve extending from the hatchway at the upper end of one of the end sections, and means for conducting air under pressure to the compartment of the section adjacent to the compartment having the said sleeve.

10. A submarine vessel, having an air-

50 tight compartment and having a hatchway opening directly into the water when the vessel is submerged, a collapsible sleeve surrounding the hatchway and adapted to be suspended therefrom within the said compartment, a hatch for the hatchway, a communicating compartment, means therein for

55 supplying air under pressure to the first com-

partment, and means for draining the compartments of the water taken in when the hatch is open.

11. A submarine vessel, having an air-tight compartment provided with an open-

70 ing at its upper end leading directly into the water when the vessel is submerged, a collar arranged in the opening and projecting into the compartment, a collapsible sleeve surrounding the collar and adapted to be lowered into the compartment to form an extension of the collar, a hatch for engagement with the outer end of the collar for closing the opening air-tight, a communicating com-

75 partment, a pipe extending into said communicating compartment for conducting air under pressure to both compartments, a drain pipe extending into the said communicating compartment, and a hatch controlling admission to the first-named compartment from the interior of the vessel.

12. In a submarine or submergible vessel, a navigating turret constructed of a series of cylindrical sections having convex tops and arranged in longitudinal alinement and hav-

90 ing abutting walls connected together air-tight to form a series of compartments, the abutting walls having openings to establish communication between the said several compartments, and hatches in the top and bottom of one or more of the compartments to permit admission to and exit from the said turret.

13. In a submarine or submergible vessel, a navigating turret constructed of a plural-

100 ity of cylindrical sections which form a series of intercommunicating compartments, said sections arranged in longitudinal alinement and securely fastened together in a single structure and having openings formed in the abutting walls of the sections for rendering said sections intercommunicating, closures for the openings, hatches for controlling ad-

105 mission to the end sections from the hull of the vessel, hatches controlling openings in the tops of the end sections, and a conning tower arranged upon the top of the turret and communicating with the turret through a hatchway formed in the top of one of the sections, a closure for the hatchway, and a sighting hood arranged upon the top of the conning tower.

14. In a submarine or submergible vessel, a navigating turret constructed of a series of cylindrical sections arranged in longitudinal

110 alinement and having convex tops, said sections being securely connected together and having openings in their abutting walls for establishing communication with each adjacent section, closures for the openings, hatches controlling openings in the tops of the end sections, a collar arranged in one of the openings, a collapsible sleeve surrounding the collar and adapted to form an extension thereof, hatches controlling openings at

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the lower ends of the said end sections which establish communication with the interior of the vessel, and means for opening and closing the hatch over the collared opening operable from the compartment adjacent to the said section.

15. In a submarine or submergible vessel, a navigating turret constructed of a series of cylindrical sections provided with tops and arranged in longitudinal alinement and connected together to provide a series of compartments, the abutting walls of the forward section and the section adjacent thereto having a man-hole, a closure for the man-hole, said closure having a sight-opening provided with a transparent medium, the abutting surfaces of the remaining sections having door-ways to afford communication between the compartments of the sections, doors in said door-ways, hatches controlling openings in the tops of the end sections, a sleeve adapted to form an extension of the opening in one of the end sections, means operable from within the compartment adjacent to the section having the sleeve for opening and closing the hatch controlling the opening therein, hatches controlling admission to the end sections from the hull of the vessel, and a compressed air supply pipe for conducting air under pressure to the turret.

16. In a submarine or submergible vessel, a navigating turret constructed of a series of cylindrical sections arranged in longitudinal alinement, provided with tops and connected together to form a single structure, the forward end section and the section adjacent thereto having a man-hole to afford communication between the sections, a cover having a sight-opening for closing the man-hole, a transparent closure for the sight-opening, doorways affording communication between the compartments of the remaining sections, doors for the doorways, hatches controlling openings in the tops of the end sections; a collar arranged in one of the openings and having a sleeve adapted to form an extension thereof, means operable from within the compartment adjacent to the rear end section for opening and closing the hatch upon the said rear section, and hatches controlling admission to the said end sections from the interior of the vessel.

17. In a submarine or submergible vessel, a navigating turret constructed of a series of end and intermediate cylindrical sections having tops and arranged in longitudinal alinement, the abutting surfaces of the sections having openings to afford communication between the compartments formed by the sections, closures for the openings, hatches controlling openings in the tops of the end sections, a flexible sleeve surrounding the opening in the rear end section and adapted to form an extension thereof,

means operable from within the compartment adjacent to the rear end section for opening and closing the hatch of the said rear section, means for conducting air under pressure to the compartment of said rear section when the opening between the intermediate compartments is closed, means for draining the water taken in when the hatch of the end compartment is opened, and hatches controlling admission through the bottoms of the said end sections.

18. In a submarine or submergible vessel, a navigating turret having a plurality of compartments, the sides and tops of which are segmental or convex, means for controlling communication between the compartments, whereby the turret may be divided into two air-tight compartments, a hatchway in the top of the turret through which exit may be effected through one of the compartments, means to control admission to said exit compartment, a hatch for said hatchway, and means for opening and closing the hatch from within the adjacent compartment.

19. In a submarine or submergible vessel, a navigating turret constructed of cylindrical walls having appropriate tops and arranged to form forward and rear sections and two intermediate sections, all of which communicate with each other through openings formed in their abutting surfaces, a closure for the opening between the intermediate sections, hatches controlling openings in the tops of the end sections, a sleeve providing an extension for the opening of the rear section, hatches controlling communication to the end sections from the hull of the vessel, means for opening and closing the hatch in the top of the rear section from the next adjacent intermediate section, and means for supplying air under pressure to the rear section.

20. In a submarine or submergible vessel, a navigating turret constructed of a series of communicating sections arranged in longitudinal alinement and connected together to form a single structure and having openings in their abutting surfaces, a closure for each opening, whereby the turret may be divided into forward and rear compartments, appropriate tops for said sections, hatches hinged to the tops of the end sections and adapted to be folded down upon hatchways, a worm-wheel loosely mounted upon the pintle of the hinge of the rear hatch and adapted to engage the edge of the said hatch, a shaft having a worm at one end which engages the worm-wheel and having its opposite end extending into the section adjacent to the rear end section, a collapsible sleeve providing an extension to the hatchway in the rear section, hatches controlling communication to the end sections from the hull of the vessel, means for conducting air under pressure to



the rear section, and means for discharging the water from said sections.

21. In a submarine or submergible vessel, a navigating turret constructed with a forward and a rear air-tight compartment, hatches controlling admission to and exit from the compartments from the deck of the vessel, a sleeve forming an extension of the hatchway leading to the rear compartment, means operable from one of the compartments for opening and closing its hatch, hatches controlling communication to the compartments from the hull of the vessel, and means for supplying air under pressure to the rear compartment.

22. A submarine vessel, having a navigating turret provided with a hatchway in the top thereof, a hatch hinged to the turret for closing the hatchway, the pintle of the hinge

being rigid with ears projecting from the hatch, a worm-wheel loosely mounted upon the pintle and having lugs adapted to engage the hatch, a shaft projecting through the turret and having a worm upon its outer end for engagement with the worm-wheel, and means for revolving the shaft, whereby the worm-wheel may be brought into engagement with the hatch to raise the same and open the hatchway, and hatches controlling admission to the turret from the hull of the vessel.

In testimony whereof I have hereunto set my hand this 30th day of October A. D. 1907.

SIMON LAKE.

Witnesses:

M. D. BLONDEL,  
H. D. JAMESON.