

No. 860,382.

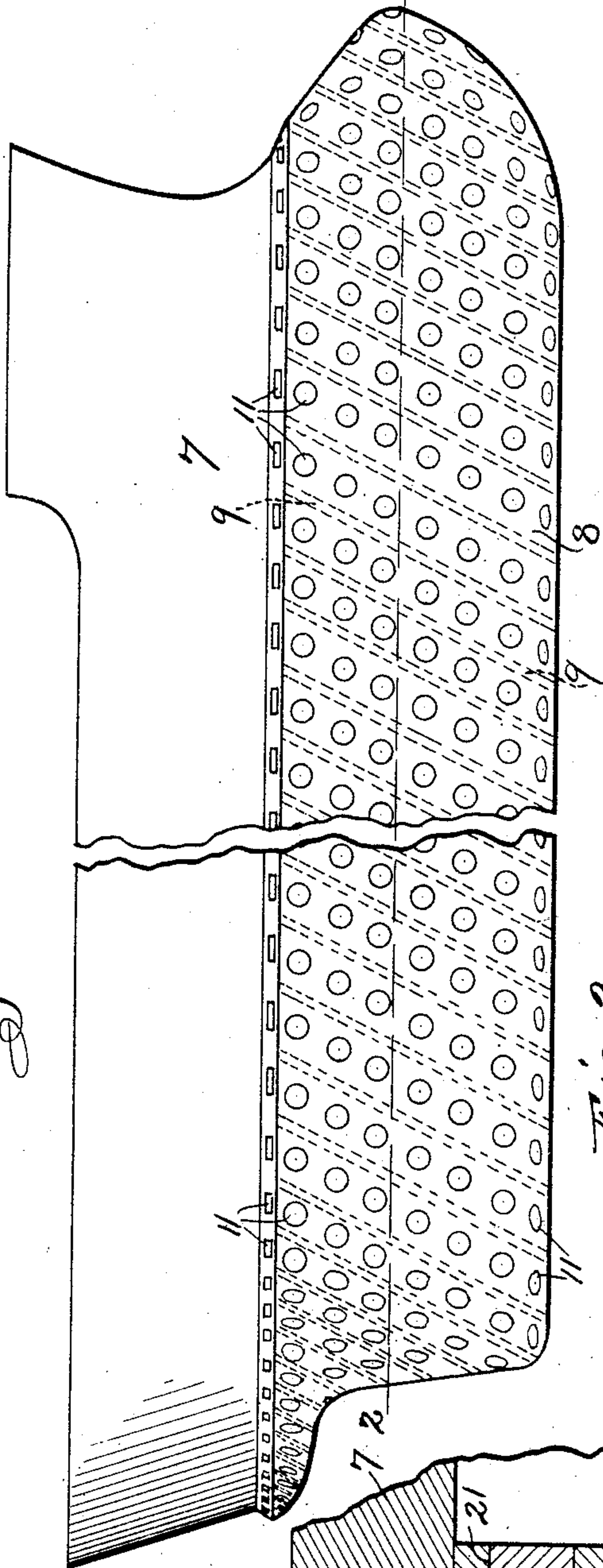
PATENTED JULY 16, 1907.

H. HOYOSS.  
MEANS FOR PREVENTING THE DESTRUCTION OF SHIPS BY SUBMARINE  
EXPLOSIONS.

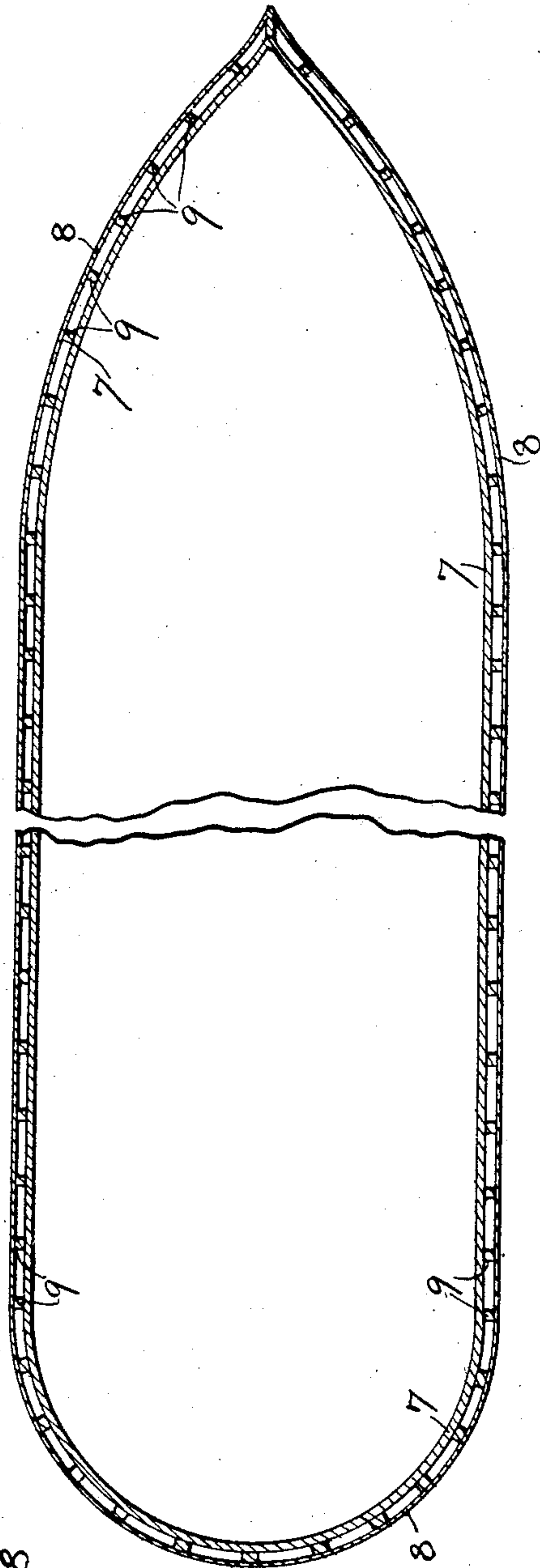
APPLICATION FILED NOV. 28, 1906.

2 SHEETS—SHEET 1.

*Fig. 1.*

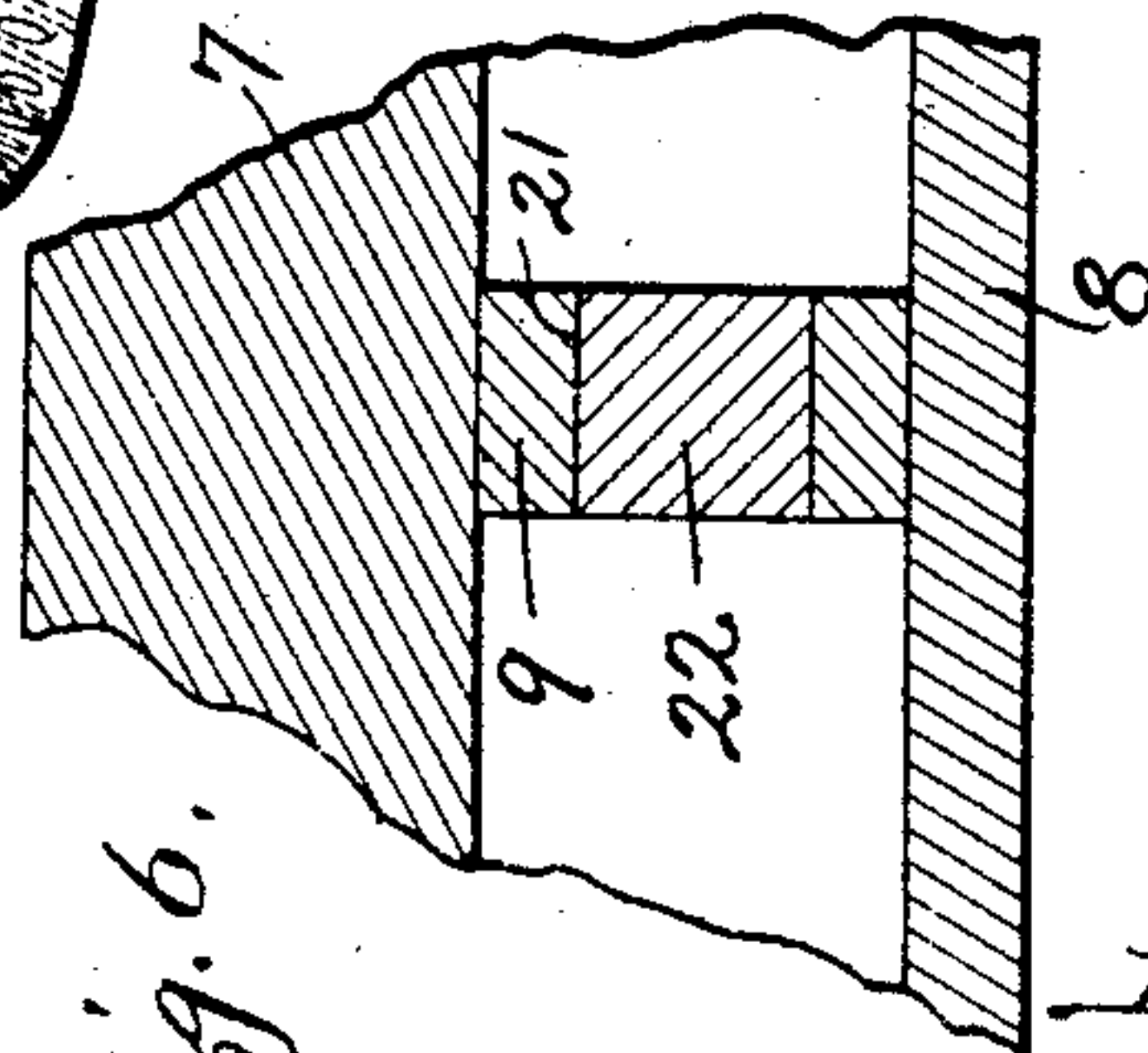


*Fig. 2.*



Witnesses:  
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*Fig. 6.*



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Fig. 3.

2 SHEETS—SHEET 2.

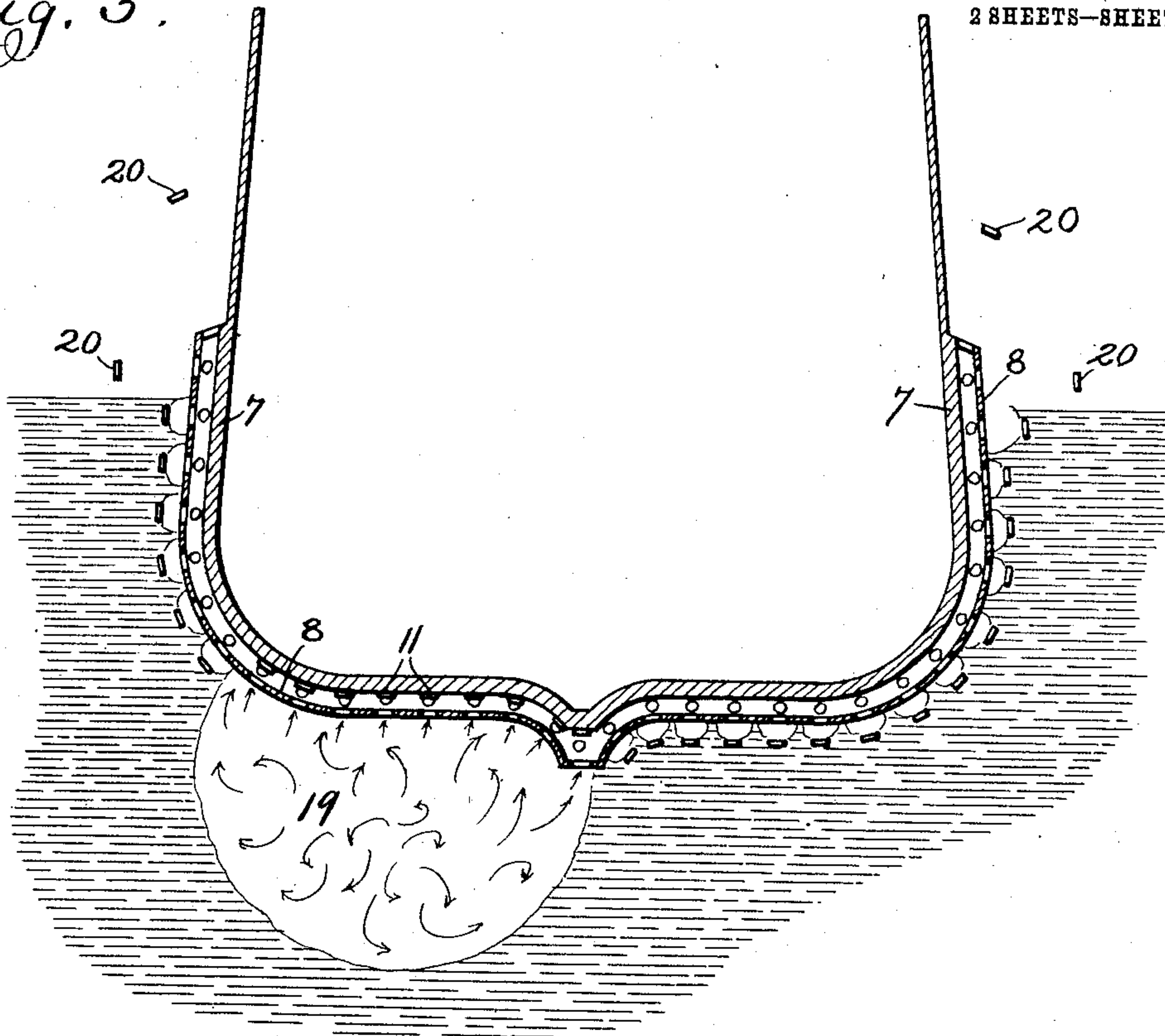


Fig. 4.

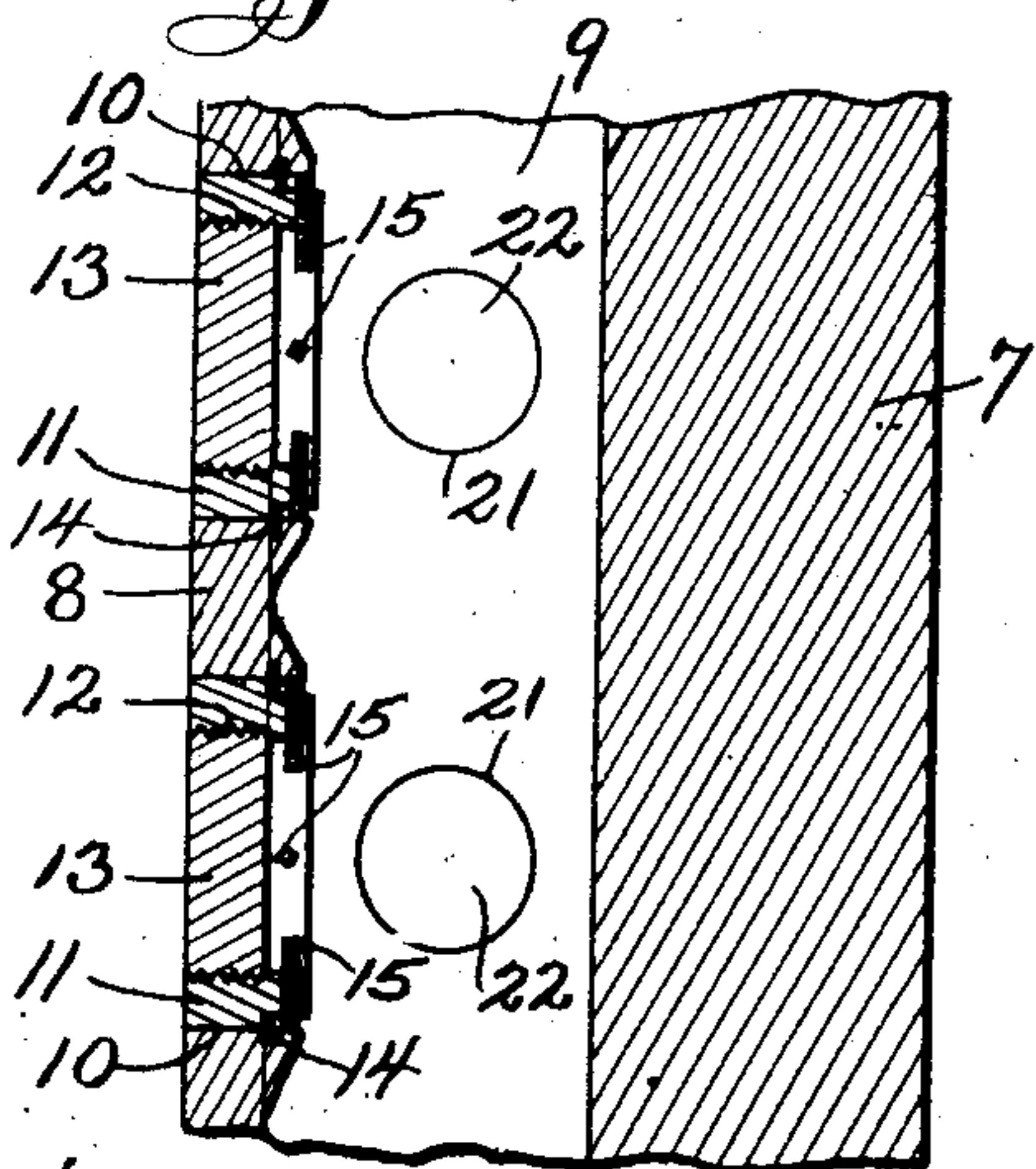
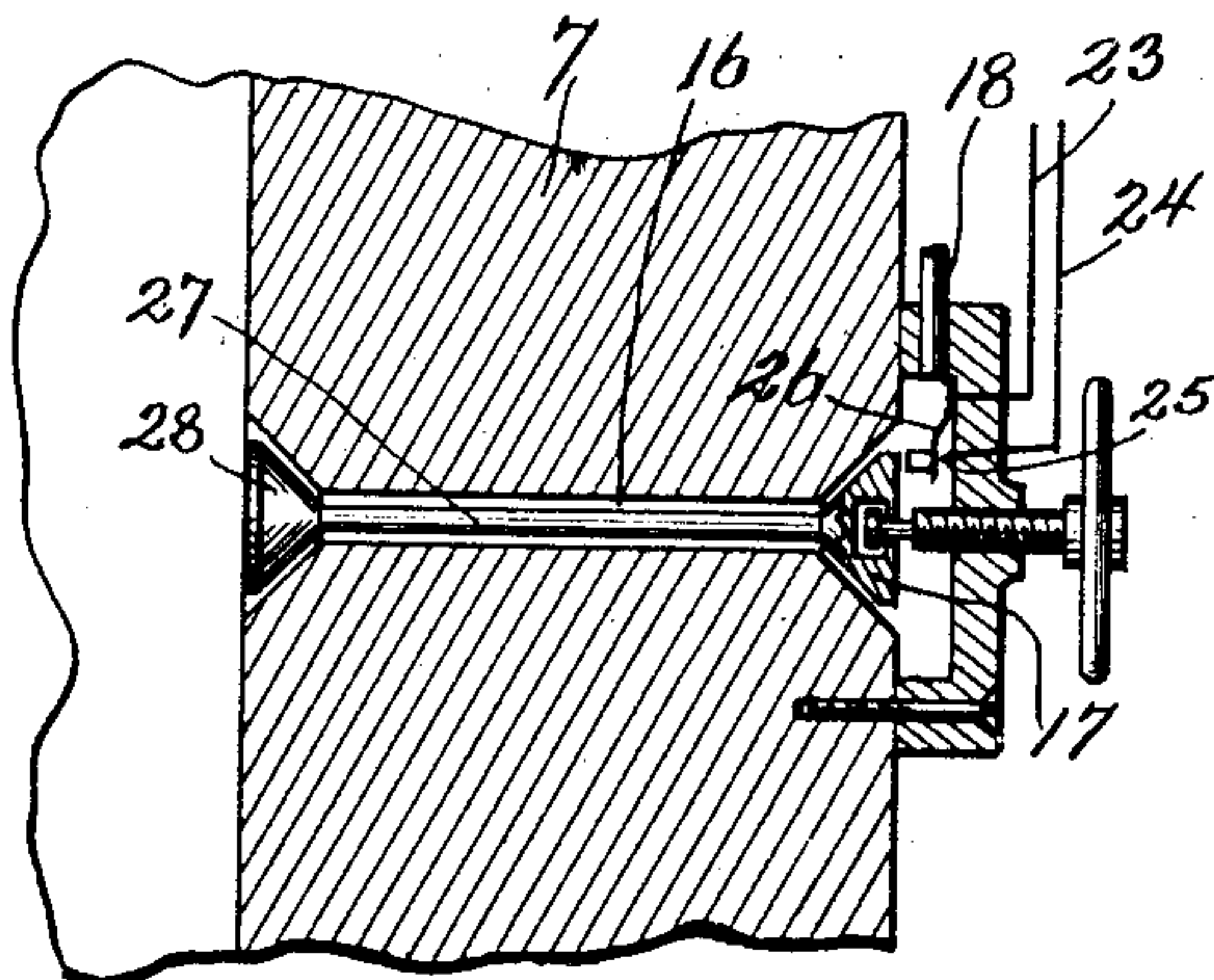


Fig. 5.



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# UNITED STATES PATENT OFFICE.

HOKON HOYOSS, OF CHICAGO, ILLINOIS.

## MEANS FOR PREVENTING THE DESTRUCTION OF SHIPS BY SUBMARINE EXPLOSIONS.

No. 860,382.

Specification of Letters Patent.

Patented July 16, 1907.

Application filed November 28, 1906. Serial No. 345,561.

*To all whom it may concern:*

Be it known that I, HOKON HOYOSS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Means for Preventing the Destruction of Ships by Submarine Explosions, of which the following is a specification.

My invention relates to any class of ships but particularly to war ships and the objects of my improvements are, first, to prevent any damage being done to the ship when a submarine explosion takes place by providing on the exterior of the entire submerged portion of the hull means which automatically furnishes a vent or outlet for the force of the explosion; second, to make a protected ship without increasing the weight of steel plate used; third, to enable the replacing of the parts displaced after an explosion takes place; fourth, to indicate at what portion of the ship the explosion took place and other objects to become apparent from the description to follow. I accomplish these objects by providing on the entire exterior submerged portion of a ship's hull an outer shell preferably of metal separated from the hull proper by space, say about four inches; the necessary ribs or spacing blocks being secured between the hull and the outer shell. The outer shell is provided with numerous holes; say about ten inches in diameter which are normally closed and made water tight by plugs fitted into them. The plugs are secured into the openings in such manner that when an unusual amount of pressure is exerted against either side of them, they will be forced out of the openings in the direction of the force exerted, either in or out. By this construction a vent or outlet is provided for the pressure exerted by a submarine explosion, the space between the outer shell and the main hull being sufficient to brake the force of the explosion when the plugs above referred to are forced inwardly. To insure the quick action of the water or gas or water and gas under compression from the explosion to enter this space the air is withdrawn from said space and a vacuum formed.

To describe my invention so that others versed in the art to which it pertains may make and use the same, I have illustrated it on the accompanying two sheets of drawing forming a part of this specification, in which:—

Figure 1, is a side elevation of a ship's hull partly broken away embodying my invention; Fig. 2, is a section on line 2—2 of Fig. 1; Fig. 3, is a diagrammatical cross sectional view of the same showing the action of the parts at the time of a submarine explosion and Figs. 4, 5 and 6 are detail sectional views.

Similar reference characters refer to similar parts throughout the several views.

The hull 7 of the ship is preferably made of steel armor plate, and the entire submerged portion thereof

is covered by an outer shell 8 made of steel plate. Rigidly secured between the hull 7 and the outer shell 8 are the ribs or partitions 9 which preferably extend diagonally; these ribs serve to secure the shell 8 rigidly to the hull 7. Referring to Fig. 4, the shell 8 is provided with numerous openings 10, into which are snugly fitted the plugs 11, which are provided with concentric openings 12 closed by screw threaded plugs 13.

The plugs 11 are forced into the openings 10 and against the protruding rings 14 made of soft metal to insure a water tight joint. The openings 10 are of uniform size throughout so that if sufficient force is exerted against the plug 11 it will shear off the protruding portion of the washer 14 and pass entirely through the opening 10. To secure the plugs 11 in position against the washers 14 a plurality of set screws 15 are provided in the plugs 11 and are set tightly against the smooth surface of the openings 10 after the plugs have been forced to their proper position with their exposed ends flush with the exterior surface of the shell 8. It will be understood that the set screws 15 serve to prevent the plugs 11 from being moved through the openings 10 in either direction when only a usual amount of pressure is exerted against the same, but when sufficient pressure is exerted against the plugs 11 they are free to pass through the openings 10 in either direction. The space between the hull 7 and the shell 8 is made sufficiently large to receive the plugs 11. One row of plugs 11, preferably on the bottom are made larger than the rest.

Referring to Fig. 5, a plurality of holes 16 are provided through the hull 7 forming the only communication from the space between the hull 7 and the shell 8 to the exterior atmosphere. A valve 17 is provided in each of the holes 16 and an air suction pipe 18 is connected to each hole 16 so that the air can be extracted from the space between the hull 7 and shell 8, and the valves 17 will act as check valves to close holes 16.

In operation all the openings 10 are closed by the plugs 11 and the space between the hull 7 and the shell 8 is practically a vacuum. In Fig. 3, I have illustrated diagrammatically the explosion of a mine underneath a ship embodying my invention. The force of the explosion is represented at 19 and as forcing a number of plugs 11 into the space between the hull 7 and the shell 8 and the pressure thus entering said space forcing out a number of plugs 11 into the water. A number of plugs 11 are shown as being forced out above the water line as at 20.

Of course if the ribs 9 are solid and span the entire space between the hull 7 and shell 8 pressure of the explosion will necessarily be confined to the area between the ribs 9 which are subjected to the force of the explosion. But, I prefer to perforate the ribs 9 so as to permit of a greater and quicker expansion of the explosion, and for this reason the holes 21 which are normally



closed by plugs 22 (see Fig. 6) are provided in the ribs 9. The plugs 22 are made to fit tightly in the holes 21 so that it requires an extraordinary pressure to force them out of said holes. In this manner the number of plugs 11 which are forced out into the water and lost is reduced to a minimum. An extra supply of plugs 11 are kept on board ship to replace those which are blown out and lost.

Another feature of this invention is to indicate at what portion of the ship the explosion has taken place. This is also accomplished by providing the plugs 22 in ribs 9, because the plugs 22 will only be forced out of the openings 21 in such localities where the force from the explosion is sufficient to possibly do damage to the ship. It will be understood that the plugs 11 which are above the water line will be forced out before those beneath the water line and thus it can be seen just what portion of the ship has been effected. Besides this visible means of indicating where the explosion took place another indicating means may be used, as for instance an electric annunciator not shown. The wire 24 is connected to the contact 25 and the wire 23 is connected to the spring arm 26 which is located so as to be engaged and moved into contact with the contact 25 by the valve 17. The valve 17 has a stem 27 extending through the hole 16 and has provided at the end thereof another valve 28. In the normal position when the space between the hull 7 and shell 8 is a vacuum the valve 17 is closed and the valve 28 is open, but when said space is filled with pressure resulting from an explosion as above described, the valve 28 is forced to a closed position and the valve 17 is opened, which movement of valve 17 is sufficient to engage switch arm 26 and move it into contact with the contact 25, which

of course closes the circuit through wires 23 and 24 and operates the annunciator not shown. A hand wheel 29 secured to a threaded stem 30 is provided to operate the valve 17 by hand when necessary.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a device of the class described, a ship's hull provided with a water tight compartment having its wall adjacent the water provided with a plurality of removable plugs. 45
2. In a device of the class described, a ship's hull provided on its exterior with a water tight compartment, a plurality of plugs in the outer wall of said compartment capable of being forced either in or out by pressure.
3. In a device of the class described, means attached to a ship's hull comprising a vacuum which will automatically be operated by the force of an explosion under water to provide a vent or outlet for said explosion. 50
4. In a device of the class described, means attached to a ship's hull comprising a water tight compartment provided with a plurality of plugs which will automatically be removed by the force of an explosion under water to provide a vent or outlet for said explosion and means for indicating the location of said explosion. 55
5. In a device of the class described, a ship's hull provided on its entire submerged portion with a water tight of its ends and engaging the upper surface of the partition divided into a plurality of compartments by solid water tight partitions, plugs capable of being forced from their openings in the outer walls of said compartments and plugs capable of being forced from their openings in said partitions. 60 65

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses this 26th day of November 1906, at Chicago, Illinois.

HOKON HOYOSS.

Witnesses:

BREXO SELCKE.  
GUY C. WHITE.