July 9, 1957 W. E. ENDREZZE 2,798,446

CONCUSSION BREAKER

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Fig. 3

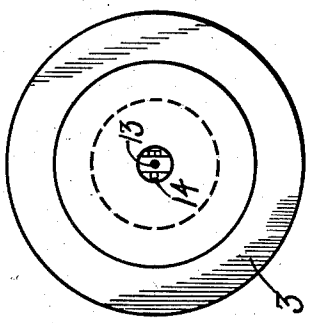


Fig. 1.

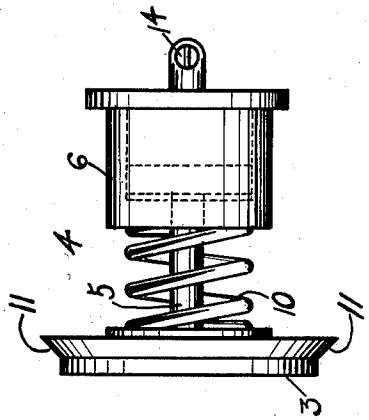


Fig. 2

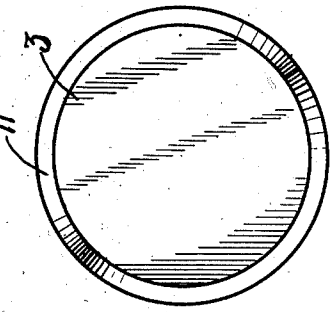
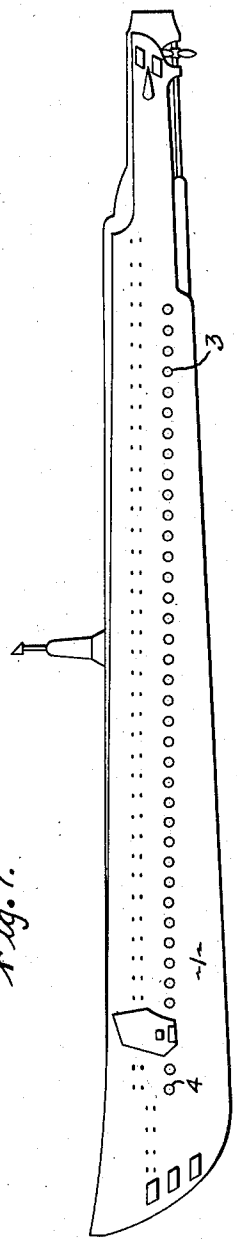


Fig. 7.



INVENTOR.

William Eugene Endrezze

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Fig. 5.

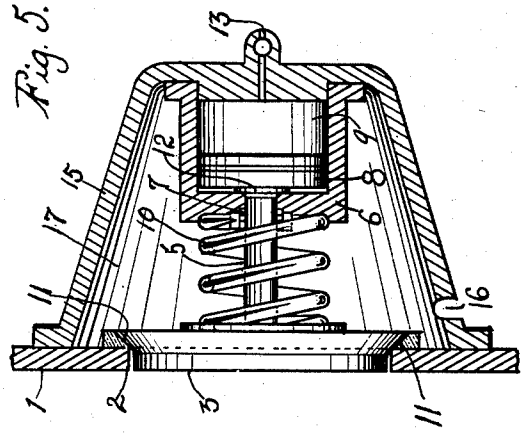
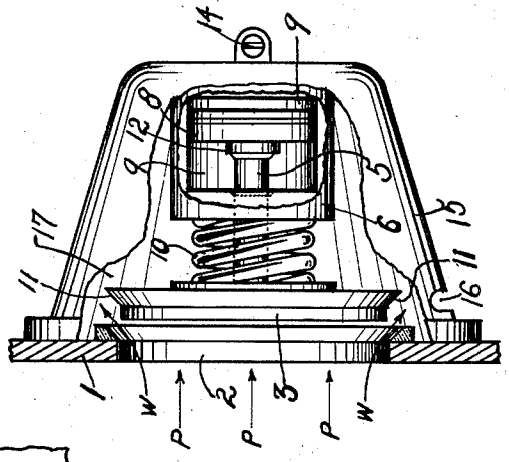


Fig. 6.



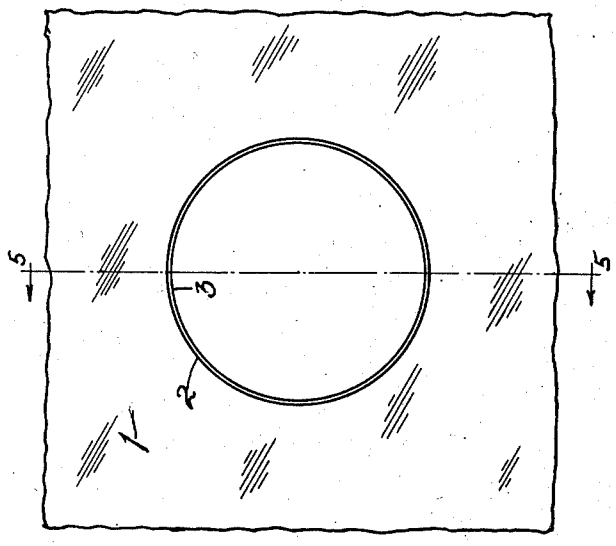


Fig. 4.

INVENTOR.
William Eugene Endrezze

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2,798,446

CONCUSSION BREAKER

William Eugene Endrezze, Long Beach, Calif.

Application February 2, 1954, Serial No. 407,653

1 Claim. (Cl. 114—16)

The present invention relates to the field of hydraulic concussion breaking device for submarine or vessels subjected to the hazard of proximity explosions such as depth charges, submerged mines, etc. This application is a continuation-in-part of my copending application Serial Number 327,259, filed December 22, 1952.

A submarine being a vessel which operates under water in a medium of noncompressible matter. Consequently there is no give to water such as would be in air. At depth the shock of an explosion creates a zone of equal intensity in all directions, diminishing only by distance from zero point of the explosion. This zone of explosion intensity is in the main solid hydraulic pressure, capable of collapsing certain sections of a submarine in a near hit explosion of a heavy charge. As the destructive effect of the solid hydraulic pressure is instantaneous at the instant of the explosion, the escape of a small quantity of water into a void chamber at the instant of the explosion greatly reduces the intensity of the solid hydraulic pressure and its destructive effect. This is the instant of relief.

It is the object of this invention to provide means to break the instantaneous intensity of this solid hydraulic pressure at the instant it is created, by relief.

To accomplish this object I propose to apply concussion breakers at certain vulnerable sections of the submarine to effect relief from the intense instantaneous hydraulic pressure, by discharge of a small quantity of water past the valve gate of the concussion breaker into a void chamber at the instant of opening of the valve gate by the intensity of the explosion. The instant of relief is instantaneous by the spurt of a small quantity of water past the valve gate, and this valve gate is fixed to open only when overcome by a certain intensity of solid hydraulic pressure caused by an explosion of a near hit or proximity explosion.

Another object of this invention is to provide a concussion breaker whose valve gate is operated by mechanical action in the closing thereof.

A still further object of this invention is to provide a concussion breaker whose valve gate is operated by pneumatic action in the closing thereof.

And a still further object of this invention is to provide a concussion breaker whose valve gate is operated by mechanical and pneumatic action in the closing thereof.

For the purpose in the description and illustration of this invention I have selected a concussion breaker whose valve gate is operated by mechanical and pneumatic action such as a spring and high pressure compressed air or a gas suitable for the purpose.

In order that those skilled in the art to which this invention appertains, may make and understand how to use the same, I will describe its construction in detail, referring by numerals and letters to the accompanying drawings forming a part of this application in which—

Fig. 1 is a longitudinal side view of the concussion breaker, showing the valve gate, spring, slidable shaft and pneumatic pressure chamber.

Fig. 2 is a front end view of the concussion plate or valve.

Fig. 3 is an end view of the concussion breaker taken from the pneumatic pressure chamber end.

Fig. 4 is a side view of a section of a submarine outer shell, showing the plate of the concussion breaker positioned within the perforation provided upon the outer shell of a submarine.

Fig. 5 is a cross sectional side view of the concussion breaker taken on the line 5—5 of Figure 4 showing the method by which the mechanism of the concussion breaker operates to maintain the valve gate in a closed position.

Fig. 6 is a fragmentary cut-away view of the concussion breaker, showing the method by which the mechanism and pneumatic action acts to effect relief from the intensity of the solid hydraulic pressure by momentary opening of the gate at the instant of the explosion.

Fig. 7 is a longitudinal side view of a submarine, showing the concussion breakers as locationally provided upon the exterior hull of the submarine.

Referring now to the accompanying drawings in detail numeral 1 indicates a section of any vulnerable place upon a submarine where the outer shell may be provided with an aperture 2 into which the concussion bumper plate 3 or valve gate may be fitted.

The concussion breaker assembly 4 is provided with a shaft 5 one end of which is secured to the valve gate 3, the other end of the shaft 5 passing through one end of the pneumatic pressure chamber 6 and packing rings 7 and is secured to the piston 8 within the pneumatic cylinder 9. A compression spring 10 surrounds the shaft 5 and is positioned between the valve gate 3 and the cylinder casing 6.

When the entire assembly is bolted in place on the inner side of the outer shell of a submarine, the spring 10 exerts a very great pressure upon the valve gate 3 firmly seating valve faces 11 as a permanent seal against any normal leakage of water that the submarine may encounter at great depth due to hydraulic head pressure.

Within the pneumatic cylinder 9 is the piston 8 which is secured to the slidable shaft 5, this piston 8 is forced to the rear of the pneumatic cylinder 9 compressing the compressible material 12 surrounding the shaft which acts along with the packing rings 7 to positively retain the permanent high pressure air or gas that had been pumped into the cylinder 9 through the passage 13 and valve 14 and permanently locked therein by the valve 14.

This completes the concussion breaker assembly for practical purpose, which may be installed in any manner suitably attached to the inside surface of the outer shell of a submarine.

Where the submarine is not provided with the necessary means in the void chamber to collect the water that had spurted past the valve gate 3 by the explosion, a casing 15 and a drain opening 16 is provided for that purpose to act as a void chamber 17 by which the water is collected and drained off to be pumped out of the submarine.

In practice when a submarine is under an attack by a depth charge, proximity bombs or proximity torpedoes, the operation of the device in an explosion of a near hit which creates a great solid hydraulic pressure towards the submarine as indicated by the arrows *p*, *p*, *p*, and against the submarine, this sudden instantaneous hydraulic pressure acts against the plate 3 forcing it back to overcome the strength of the spring 10 simultaneously the shaft 5 slides back carrying with it the piston 8 which itself is up against a great pneumatic pressure locked within the cylinder 9 as the piston is forced further back causing the pneumatic pressure within the cylinder to be very greatly increased thereby assisting the spring and cushioning the shock of the explosion. Consequently the valve gate 3

had been momentarily opened and a quantity of water indicated by the arrows *w, w,* had passed the valve faces **11** to spurt into the void chamber **17**. With the result of having a small quantity of water instantaneously removed from the large volume of water under intense hydraulic pressure greatly reducing the intense hydraulic pressure from the entire volume of water at the instant it is formed by the explosion makes harmless the explosive effect upon the hull of the submarine.

After the instant of the explosion the valve gate **3** is instantly returned to the closed position by the spring and pneumatic action and with it the piston **8** is returned to its normal position and again ready for the next explosion. The air or gas within the cylinder is permanently locked therein under high pressure. An occasional check upon the air pressure locked within the cylinder is all that is necessary to make sure the concussion breaker is ready for a depth charge or a near hit explosion.

The value of such a device upon a submarine in the possibility of it saving the submarine and the lives of a great number of men cannot be underrated.

The air or gas used in the cylinder may be of any suitable type found practical for the purpose. Of course I do not wish to be limited to the exact details of construction as here shown, as these may be varied within the limits of equivalents and the appended claim without departing from the spirit and scope of my invention.

Having thus fully described my invention, what I claim as new and useful is:

A hydraulic concussion breaking system for a submarine hull comprising a plurality of apertures through said hull, said apertures distributed throughout the surface of the hull, casings individually surrounding said openings positioned adjacent thereto and providing voids, abutments formed within the casings, valve plates within the hull closing said openings, one of said valve plates positioned at each opening, and means opposing the inward movement of each valve under the impact of gases of explosion, said opposing means including a stem mounted on each plate, a spring surrounding the stem and interposed between the plate and said abutment whereby water admitted at each valve is received by an individual void thereby reducing the pressure of explosion and trapping water admitted to the hull.

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