Feb. 29, 1944. S. N. BARKER ET AL 2,342,996

TORPEDO TUBE

Filed Feb. 15, 1941

Fig. 1.

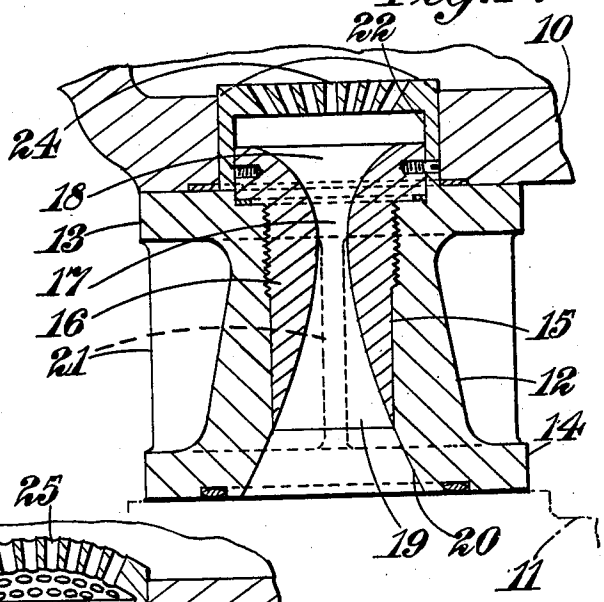
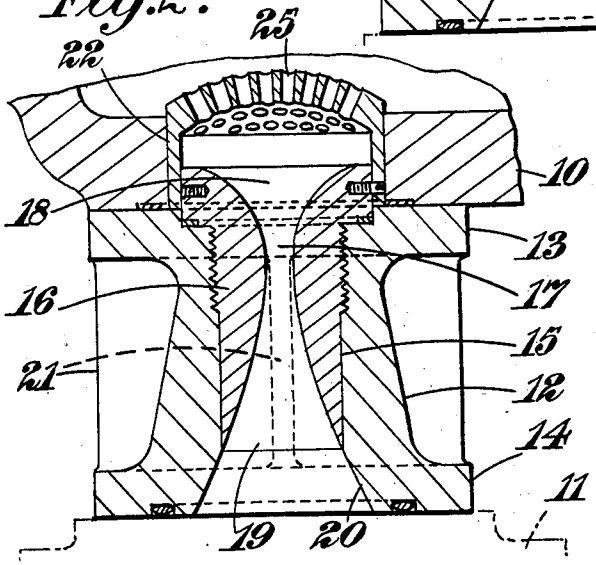


Fig. 2.



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TORPEDO TUBE

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Application February 15, 1941, Serial No. 379,052
In Great Britain October 10, 1939

2 Claims. (Cl. 114—238)

This application corresponds to the application of Stuart Netherwood Barker and George Sidney Selman, Serial No. 27,631/39, which was filed in Great Britain on October 10, 1939.

This invention is concerned with torpedo-tubes of the kind in which a propellent charge is ignited in a separate combustion chamber, and the products of combustion are transferred to the torpedo-tube through a restricted orifice which ensures a sufficiently high pressure being maintained in the combustion chamber, as is necessary for effective combustion of the propellent, whilst also ensuring that the pressure developed in the torpedo tube does not rise above the comparatively low pressure required for discharging the torpedo. It is known in such torpedo-tubes to provide an expanding nozzle between the combustion chamber and the torpedo tube, with the smallest area of the nozzle at its point of connection with the combustion chamber, and to protect this orifice against choking by means of a screen mounted over it. The screen is constituted by a stout circular plate perforated with a large number of holes; the screen is located centrally over the outlet orifice and is considerably larger. For example, the orifice in the combustion chamber may be about ½" in diameter and the screen, say, 6" in diameter.

We have found that such an apparatus leads to irregularities in the firing, and according to the present invention the restricted orifice is not in direct communication with the interior of the combustion chamber.

According to the present invention, the conduit, through which the expanding gases are conveyed from the combustion chamber into the torpedo tube, comprises a tubular member shaped internally as a converging and then diverging passage between which is a constricted throat; and arranged transversely across but spaced from the entrance end of this conduit is a plate provided with a plurality of holes directed toward the constricted throat of said tubular member. This construction and arrangement of parts diminishes the tendency to turbulent flow of the gases from the combustion chamber into the torpedo tube.

In the drawing, Fig. 1 is a central sectional elevation of a construction embodying the invention; and Fig. 2 is a similar central sectional elevation of another embodiment of the invention. Like reference characters indicate like parts in these figures.

Referring first to Figure 1, the reference 10 indicates a part of the wall of a combustion chamber within which a propellent charge is ignited, and the reference 11 indicates the torpedo-tube to which the gases are transferred for the purpose of discharging the torpedo. The connection between these two parts is effected through a casting 12 provided with flanges 13, 14 to abut the combustion chamber and torpedo-tube, respectively, and with a central passage 15 through it. It is also provided with suitable strengthening ribs 21. This part is secured in any convenient manner to the combustion chamber and torpedo-tube, respectively. Within the central passage 15 there is mounted a tube or liner 16 which is shaped internally as a converging-diverging passage having its constricted throat or smallest cross-sectional area at 17. This constricted throat 17 receives gases from the interior of the combustion chamber through a rapidly converging passage 18, and the gases pass to the interior of the torpedo-tube through a more gradually diverging passage 19. If the part 16 extends only part of the way through the member 12, as in the example shown, the outlet end 20 of the passage 15 is shaped to continue the smooth streamlined form of the passage through the liner 16.

In a specific example of a pressure-reducing nozzle according to the present invention, we have found, in one instance, that a suitable area for the throat 17 is from 0.4 to 0.5" in diameter. This throat is formed about 1¼" from the inlet end 18, which is about 2.5" in diameter. The outlet end is about 3¼" from the throat 17 and is about 2.9" in diameter. This member was used with a combustion chamber in which a cordite charge was burnt, giving a pressure of 800 to 1200 lbs. per square inch, and the pressure in the torpedo-tube was about 60 lbs. per square inch. It will be understood, however, that these dimensions are given merely by way of example, since they will need to be varied according to the weight of propellent which is used and the pressures which are required in the combustion chamber and in the torpedo-tube, respectively.

At the upper end of the part 16, where it communicates with the interior of the combustion chamber 10, there is provided a screen which is formed as a cylindrical member 22 screwed to the upper end of the pipe 16, the end-plate of this cylindrical member being perforated with a large number of holes 24 which are directed toward the constricted throat 17; thereby providing an adequate area for the passage of the gases through them, but effectively prevent the entry of any solid products of combustion to the restricted orifice or throat 17 which would choke it, and re-

ducing the tendency to turbulent flow of the gases. This screen is made of mild steel and to prevent or reduce corrosion, it is heavily dull nickel plated.

In the modified construction shown in Figure 2, the end wall of the cylinder **22** which constitutes the screen is domed to an appropriate radius about a centre which lies at or near the throat **17**, and the apertures **25** are formed normal to the surface so as to lie approximately in the direction of flow of the gases toward the constricted throat **17**.

We claim:

1. In combination with a tube adapted to contain a torpedo, a combustion chamber secured to said tube and adapted to contain a combustible charge which when ignited produces gases for propelling a torpedo from said tube, a conduit through which the said gases are conveyed from said combustion chamber into said torpedo tube comprising a tubular member shaped internally as a converging and then diverging passage between which is a constricted throat, and a plate arranged transversely across but spaced from the entrance end of said conduit and provided with a plurality of holes directed toward the constricted throat of said tubular member, the axes of said holes converging toward said restricted throat whereby tendency to turbulent flow of said gases from said combustion chamber to said torpedo tube is diminished.

2. The combination according to claim 1 in which the plate is domed to an approximate radius about a centre which lies near the constricted throat.

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