Nov. 27, 1928. 1,693,317

C. S. RICE

METHOD OF BRACING CASING STRUCTURES FOR ELASTIC FLUID TURBINES AND THE LIKE

Filed June 1, 1927

Fig. 1.

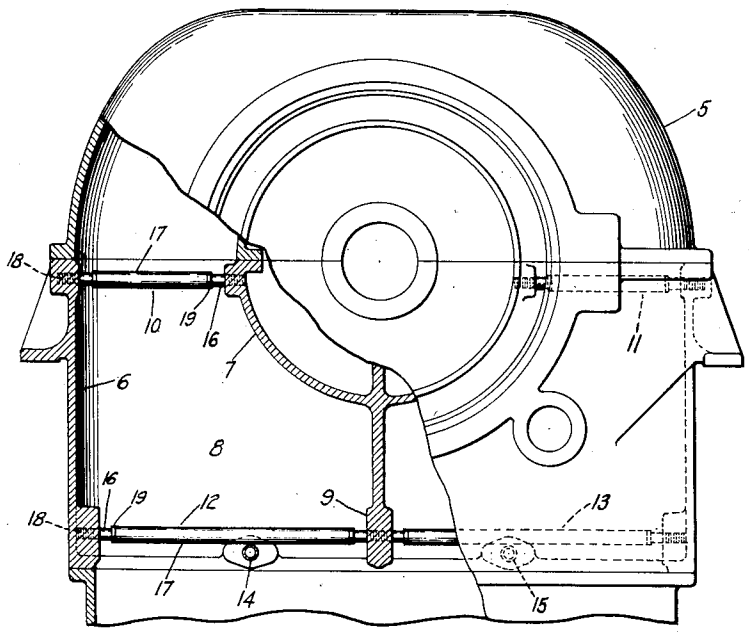
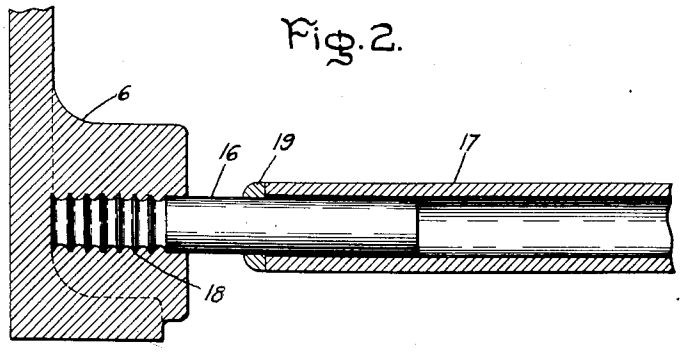


Fig. 2.



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UNITED STATES PATENT OFFICE.

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METHOD OF BRACING CASING STRUCTURES FOR ELASTIC FLUID TURBINES AND THE LIKE.

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The present invention relates to casing structures, such as the exhaust hood structures of elastic fluid turbines for example, the walls of which are subjected to pressures and stresses tending to deform or strain them, and has for its object to provide an improved method for bracing the walls of such casing structures against pressures and stresses of that character.

The method of the present invention is particularly applicable in the construction of elastic fluid turbine casings. For this reason the invention will be further described in connection with an elastic fluid turbine casing and for a consideration of what is believed to be novel and the invention, attention is directed to the accompanying drawing, description thereof and the appended claims.

In the drawing, Fig. 1 is an end view, partly in section, of an elastic fluid turbine casing embodying the invention, and Fig. 2 is a detail thereof in section, on an enlarged scale.

Referring to Fig. 1 of the drawing, 5 is the exhaust hood or casing of an elastic fluid turbine having walls 6, 7 and 8 and a central interior web 9 which require bracing against atmospheric pressure and expansion stresses which would tend to deform or strain the casing when the turbine is in operation.

To provide against deformation or strains, such walls are usually connected or braced by cast members which are machined at the ends and carefully fitted and bolted in place after the casing has been annealed. This type of bracing construction is comparatively expensive, particularly in the case of large turbines where the bracing members are numerous.

In the drawing, the location for suitable bracing for the casing shown is indicated at 10, 11, 12, 13, 14 and 15. According to the invention, such bracing (Fig. 2) comprises two or more telescoping members united by suitable means such as fused metal after the ends of the bracing thus formed are cast in the casing walls. In the present example, the telescoping members are studs 16 which are placed in each end of a hollow tube or third member 17. The studs and tubes thus assembled are placed in the mold for the casing, with the studs projecting from the tube into positions wherein they become embedded in the casing walls when the mold is formed. In order to hold more securely, the exposed ends of the studs are preferably corrugated as indicated at 18. The opposite ends are freely slidable in the hollow tube.

When the turbine casing is cooling, after being cast or later when being annealed, the studs being movable in the tube, permit the walls to expand and contract properly without restraint. Finally, after the casing is in readiness for having its walls braced and definitely spaced apart, the studs and tubes are rigidly united by fusion of metal. In the present example this is done by placing a weld bead 19 at the ends of each tube around the studs. The tubes and studs are then united to form a rigid brace or strut at each desired point in the turbine casing.

The strength of the strut or brace is determined, of course, by the size and thickness of tubing employed which may be of any desired size and thickness to meet the stresses to which the casing is subjected at the points where this bracing is employed.

This type of strut or brace is particularly well adapted to stiffen the side walls of a steam turbine exhaust hood, such as that shown, against atmospheric pressure or other strains, and being made up of hollow tubing and studs cast in the casing walls with a weld bead to unite the parts, is of very simple construction. It is far less costly and easier to manufacture than the usual cast stud or brace which must be machined, drilled, carefully fitted and bolted in place.

This type of strut or brace has further advantages in that it is easily assembled and may be placed in the mold without regard for alignment of the parts because being telescoping they are automatically aligned when assembled and remain so while assembled, and that finally, such as after the final annealing of the casing for example, it may be set too rigidly and permanently brace the walls by a simple welding operation.

From the foregoing description it will be be seen that the invention is not limited to turbine casings, but may be applied to any casing structure requiring bracing against undesirable pressures or stresses tending to cause deformation of the walls thereof.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The method of providing a brace between walls of a cast casing structure having spaced walls, which comprises assembling the

brace by inserting studs in the ends of a hollow tube with the stud ends exposed, casting the exposed ends of the studs of the assembled brace in said walls, and welding the studs to the tube after the casing structure has been annealed.

2. The method of providing a brace between the walls of a cast casing structure, which comprises inserting in the mold telescoping relatively slidable parts providing a composite brace in assembled relation to each other and in a position to permit the ends of said brace to become embedded in the walls when the mold is poured, pouring the mold, and as a final operation uniting the parts of the brace by fusion of metal.

In witness whereof, I have hereunto set my hand this 31st day of May, 1927.

CHESTER S. RICE.