Nov. 18, 1924.

1,515,613

W. H. PHILLIPS

EXPANSION JOINT

Filed April 11, 1922

Fig. 1.

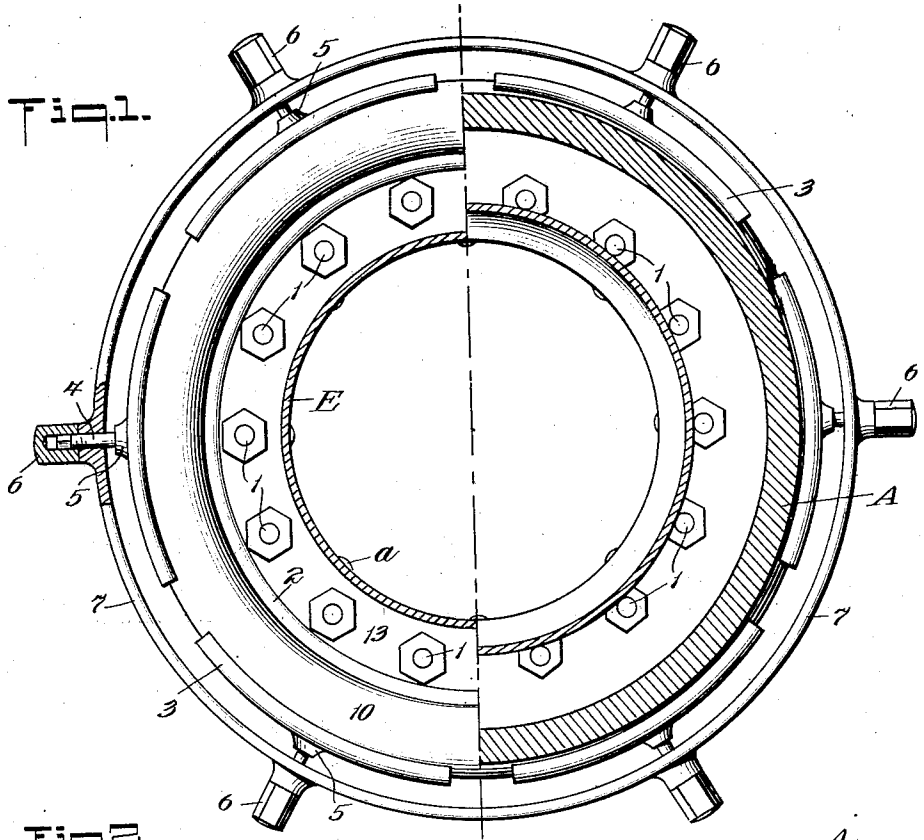
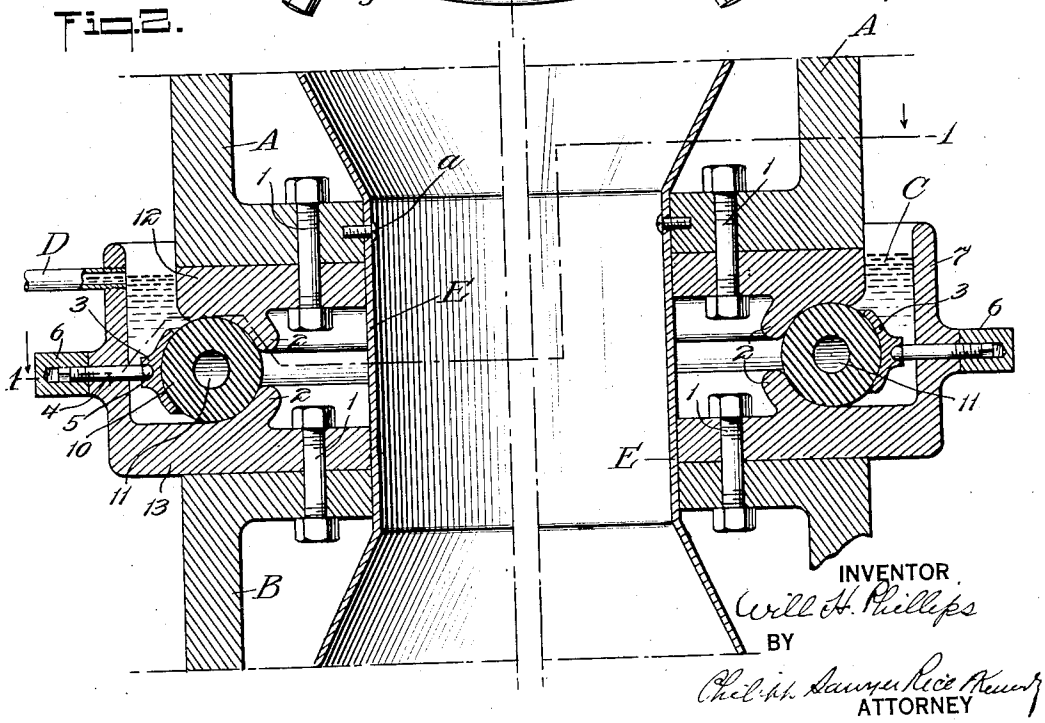


Fig. 2.



INVENTOR.
Will H. Phillips
BY
Chas. A. Sawyer Rice & Kenny
ATTORNEY

Patented Nov. 18, 1924. 1,515,613

UNITED STATES PATENT OFFICE.

WILL H. PHILLIPS, OF CHICAGO, ILLINOIS.

EXPANSION JOINT.

Application filed April 11, 1922. Serial No. 551,635.

To all whom it may concern:

Be it known that I, WILL H. PHILLIPS, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Expansion Joints, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in expansion joints.

The especial object of the present invention is to provide an improved expansion joint of simple and durable construction, which shall be satisfactory in application to a turbine exhaust connection to a condenser. The invention may be advantageously used in this relation, even where the turbine and condenser are mounted on solid foundations and with the condenser beneath the turbine. Expansion of such condenser, when mounted on a solid foundation, is, of course, in an upward direction, and various expedients have been resorted to meet this condition, many of which are complicated, while the simpler means have been found more or less unsatisfactory. The present device provides an efficient means for compensating for all ordinary movement of the connected parts, as well as any abnormal expansion such as may occur in a condenser when the circulating pump stops, through accident or otherwise, with resultant excessive heating and expansion of the condenser. The invention contemplates the use of a resilient member interposed between the ends of hollow members, such as a turbine exhaust and condenser, which in use will be sufficiently compressible and resilient to compensate for such expansion and maintain constantly a tight joint. Means are also preferably provided for protecting the resilient member from contact with oil, steam or other elements harmful thereto, thereby prolonging the life of such member, and this feature, with the novel means for positioning and holding such resilient member, provide an expansion joint in which loss of the protecting liquid is prevented even when the parts are in their most widely separated positions.

For a full understanding of the invention, the same will now be described in detail in connection with a preferred embodiment thereof shown in the accompanying drawings, and the novel features thereof then be pointed out in the appended claims.

In the drawings—

Figue 1 is a section on the irregular line 1—1 of Figure 2, and

Figure 2 is a broken vertical section taken centrally through Figure 1.

Referring now to the drawings, and particularly to Fig. 2, the members subject to longitudinal expansion and contraction with respect to each other are, in the present case, the exhaust A of a steam turbine and a condenser shell, the letter B indicating the steam inlet thereof. In order to permit the required expansion and contraction of these parts, incident to temperature changes produced by the exhaust steam and otherwise, there is interposed between the parts A and B an annular member 10, preferably of circular form, and of a flexible and resilient material, which may advantageously be soft rubber, the resilient qualities of which will be enhanced by providing therein a central hollow space 11, forming, in effect, an air cushion. The member 10 may be supported in any suitable manner, but a preferred support therefor consists of circular flanges or plates 12, 13 secured, respectively, to the parts A, B by bolts 1, such flanges or plates being formed with circular ridges 2 having their outer faces shaped to conform to the curvature of the member 10, to provide a secure seat for such member. The limit of longitudinal movement toward each other of the parts A, B is, of course, the distance between the tops of the ridges 2, and sufficient space must, therefore, be left therebetween to meet all requirements of the use for which the joint may be designed. A convenient and preferred manner of preventing the member 10 from being forced laterally off of its seat on the flanges 12, 13 is shown, consisting of a plurality of arcuate members 3, conforming in shape to the periphery of the member 10 and held thereagainst by adjusting screws 4 having a loose engagement with sockets 5 formed on the arcuate members 3 whereby the resilient member 10 may be laterally compressed against the circular ridges 2. Not only is lateral displacement and distortion of the member 10 thus prevented when maximum expansion of the hollow members between which it is located occurs, but such lateral compression of the member 10 also aids materially in maintaining a fluid tight joint

when the hollow members A, B reach their maximum degree of separation under thermal changes, such lateral compression tending to increase the vertical diameter of the cylindrical member 10 and thus increase its elastic limit in this direction. The adjusting screws 4 are provided with squared or otherwise formed heads to facilitate turning thereof, and are also provided with protecting caps 6. To prevent oil or other foreign matter coming in contact with the resilient member 10 and exerting a deteriorating effect thereon, the circular plate or flange 13 is provided with an extension 7, forming a circular trough for reception of water or the like, indicated at C, the depth of such trough and height of the liquid therein being such as to entirely cover the resilient member 10. The trough is also provided with an overflow connection D leading to any suitable point, whereby any foreign substance, such, for example, as oil, which would have a tendency to rot the rubber member 10, is kept from contact therewith.

While the flanges or plates 12, 13 are shown as formed in one piece, it will be understood that they may be made in any number of sections desired and such sections bolted or otherwise secured together in the usual manner, as, for instance, by forming abutting rightangle flanges on each section with provision for bolting the flanges together. In the present use of the device, also, it is preferable to protect the inner surface of the member 10 from contact with the exhaust steam, and this may conveniently be done by providing a hollow cylinder E, secured to either the member A or B, or the flanges 12 or 13, as desired, by screws *a*, so that, as shown in Fig. 2, the part B and its flange 13 may be free to move longitudinally on the cylinder E, as the condenser expands and contracts, and yet protect the inner surface of the member 10 from contact with the exhaust steam.

It will be understood that the invention is not confined to use as an expansion joint between a steam turbine exhaust and a condenser, as shown, but that the device is capable of use in various other relations and, in its broader aspects, on either vertical or horizontal joints. It is to be understood, also, that various changes and modifications may be made in the construction and arrangement of parts shown and described, while still retaining the invention defined by the claims.

What is claimed is:

1. In an expansion joint, the combination with a plurality of hollow members, of a resilient annular member interposed between the juxtaposed ends of said hollow members, and adjustable means for laterally compressing said annular member to increase the pressure thereof against the ends of said hollow members and hold said annular member in place.

2. In an expansion joint, the combination with a plurality of hollow members, of a resilient annular tube interposed between the juxtaposed ends of said hollow members, and ajustable means for laterally compressing said annular tube to increase the pressure thereof against the ends of said hollow members and hold said tube in place.

3. In an expansion joint, the combination with a plurality of hollow members, of a rubber ring interposed between the ends of said hollow members, means for laterally compressing said cylindrical member to increase the pressure thereof on the ends of said hollow members and hold it in place and liquid sealing means for preventing contact of oil with said rubber ring.

4. In an expansion joint, the combination with a plurality of hollow members, of a rubber ring interposed between the ends of said hollow members, laterally movable members for applying pressure to the periphery of said rubber ring to increase the pressure thereof on the ends of said hollow members and hold it in place, and a liquid holding trough surrounding said rubber ring for preventing contact of oil with said rubber ring.

5. In an expansion joint, the combination with a plurality of hollow members, of plates secured to the juxtaposed ends of said members, said plates having grooves formed therein, a resilient packing member seated in said grooves, and laterally movable members for applying pressure to the periphery of said resilient packing member to hold it in place and increase its pressure on the ends of said hollow members.

6. In an expansion joint, the combination with a plurality of hollow members, of a rubber tube interposed between the juxtaposed ends of said hollow members, adjustable arcuate members arranged to engage the periphery of said rubber tube and hold it in place under lateral compression, and liquid sealing means for preventing contact of oil with said tube.

7. In an expansion joint, the combination with the juxtaposed ends of a plurality of cylindrical hollow members, of a rubber ring interposed between the ends of said hollow members, seats for said rubber ring formed on the ends of said hollow members, adjustable members arranged to engage the periphery of said rubber ring and hold it in place under lateral compression, a liquid holding trough surrounding said rubber ring for preventing contact of oil therewith, an overflow connection to said trough, and means for protecting the inner surface of said rubber ring from fluid passing through the hollow members.

8. In an expansion joint, for a turbine exhaust connection to a condenser, the combination with the juxtaposed ends of a turbine exhaust A and condenser inlet B, of flanges 12, 13 tubular rubber ring 10 interposed therebetween, adjustable arcuate members 3 arranged to engage the periphery of said rubber ring and hold it in place under lateral compression, and liquid holding trough 7 for preventing contact of oil with said rubber ring.

9. In an expansion joint for a turbine exhaust connection with a condenser, the combination with the juxtaposed ends A, B, respectively, of a turbine exhaust and condenser inlet, of flanges 12, 13, respectively, secured thereto, tubular rubber ring 10 seated on said flanges, adjustable arcuate members 3 for positioning and holding said rubber ring in place, and screws 4 for adjusting said arcuate members.

10. In an expansion joint for a turbine exhaust connection to a condenser, the combination with the juxtaposed ends of turbine exhaust A and condenser inlet B, of grooved flanges 12, 12 tubular rubber ring 10 interposed therebetween, adjustable arcuate members 3 arranged to engage the periphery of said rubber ring and hold it under lateral compression, liquid holding trough 7 for preventing contact of oil with said rubber ring, and cylinder E arranged to protect the inner surface of said rubber ring 10 from contact with exhaust steam.

In testimony whereof, I have hereunto set my hand.

WILL H. PHILLIPS.