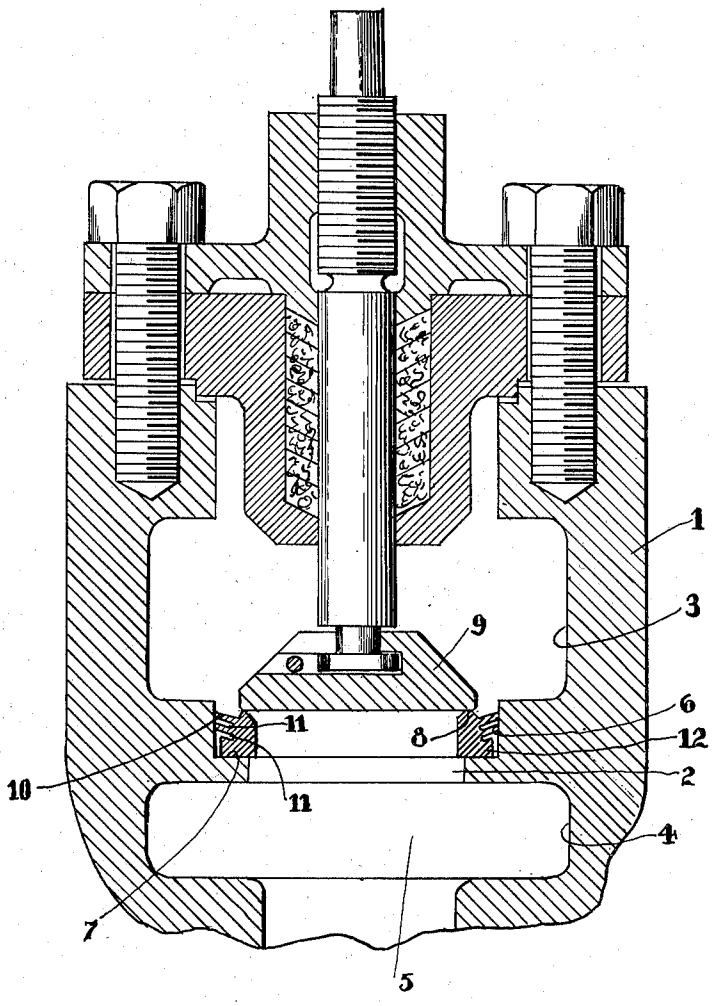
May 31, 1949. K. MacDONALD 2,471,880

VALVE

Filed Nov. 2, 1945

Fig 1



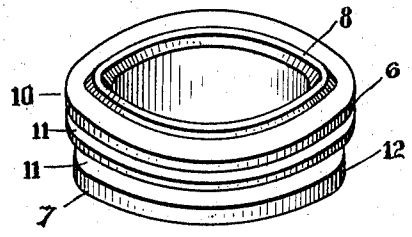


Fig 2

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VALVE

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3 Claims. (Cl. 251—167)

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This invention relates to valves, and more particularly to valve seats employed in hand operated nozzle control valves used on steam turbines to regulate the effective nozzle area of a steam turbine.

In valves of this type, the valve and valve seat are subject to great stresses, due to the fact that high pressure steam in the steam ring of a turbine contacts one side of the valve seat, while low pressure steam contacts the other side when the valve is seated. The valve seats are made of a metal differing in expansion and contraction qualities than the metal used in a steam ring of a turbine, and it has been found in practice that when the valve seat is screwed into the steam ring it leaks, due to unequal expansion and contraction of the parts under temperature variances, and if the valve seats are shrunk into the steam ring they become loose and consequently leak.

It is an object of the present invention to provide a novel form of valve seat which will be tightly held in non-leaking position under all conditions met with in its use.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a valve of a preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a longitudinal section through a nozzle control valve of a steam turbine showing the improved valve seat.

Figure 2 is a perspective view of the improved valve seat.

Referring more particularly to the drawings, the valve housing, which in the present invention is a part of the casing or housing of a steam turbine, is indicated at 1, and it is provided with a port 2 which establishes communication between the steam ring 3 which contains high pressure steam and the distribution space 4 which when the port 2 is closed contains low pressure steam or substantially a vacuum. The opening 2 is counterbored to form a seat for the valve seat 5, such counterbore including an annular

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upright wall 6 and a flat bottom surface 7 upon which the valve seat rests.

As pointed out hereinbefore, considerable difficulty has been experienced in providing a lasting fluid-tight seal about the valve seat 5 due to the conditions encountered in the use of the valve structure.

Therefore, a novel construction of valve seat has been provided which, as clearly shown in Figures 1 and 2 of the drawings, is in the form of a ring having a seat 8 against which the valve 9 rests when in closed position. The valve seat 5 has a plurality of radially extending annular ribs 10 formed thereon spaced from each other by annular spaces 11. The annular ribs 10 incline at acute angles from the plane of the flat surface of the valve seat 5 which rests upon the bottom surface 7 of the opening 2, and the portion of the valve seat 5 below the lowermost annular space 11 and adjacent to the under flat surface of the valve seat is of slightly less diameter than the diameter of the ribs 10, as clearly shown at 12 in Figure 1 of the drawings.

When assembling the valve structure, the valve seat is cooled or chilled such as by Dry Ice or a deep freeze method to cause contraction thereof so that it may be slipped into the counterbore formed in the housing 11. After the valve seat has been slipped into the counterbore of the opening 2, it will, under atmospheric temperature, expand as it heats up from its previously chilled condition, and it will form a fluidtight, firm engagement between the perimeter of the ribs 10 and the annular wall 6. The annular ribs or fins 10 will flex slightly when the valve seat 5 expands under the temperature variances encountered during the use of the valve, and therefore will not crush or become loosened in the counterbore of the opening 2.

It will be noted that the ribs 10 incline outwardly towards the high pressure steam ring 3, that is, they incline outwardly towards the point where the greatest pressure is exerted against them so that as the housing 1 and the valve seat are heated by the high pressure steam in the steam ring 3 and expand, the pressure against the ribs 10 will tend to force them downwardly or away from the point of high pressure contact, causing them always to maintain firm, fluid-tight engagement with the annular wall 6.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown, but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In combination, a valve body provided with a valve seat receiving counterbore having an annular valve seat engaging wall and a bottom surface for engagement with a valve seat, a valve seat resting on said bottom surface, said valve seat having a plurality of spaced annular ribs formed upon its perimeter and having perimetrical engagement with said annular wall, said annular ribs inclining at acute angles to said annular wall and to the face of said seat which engages said bottom surface.

2. In a nozzle control valve for steam turbines: the combination with a valve housing containing a high pressure, high temperature steam ring and a low pressure distribution space; said housing provided with an opening establishing communication between said high pressure, high temperature steam ring and said low pressure distribution space; said opening provided with a valve seat receiving counterbore having an annular

wall and a flat bottom surface; a valve seat seated on said flat surface; a plurality of annular ribs formed about the perimeter of said valve seat and having perimetrical contact with the annular wall of said counterbore; said annular ribs being inclined towards said high pressure, high temperature steam ring as they extend outwardly from the perimeter of the valve seat.

3. A nozzle control valve for steam turbines as claimed in claim 2 wherein the portion of said valve seat adjacent to the bottom surface of said counterbore is of smaller diameter than the diameter of the spaced ribs and is free from engagement with the annular wall of the counterbore.

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