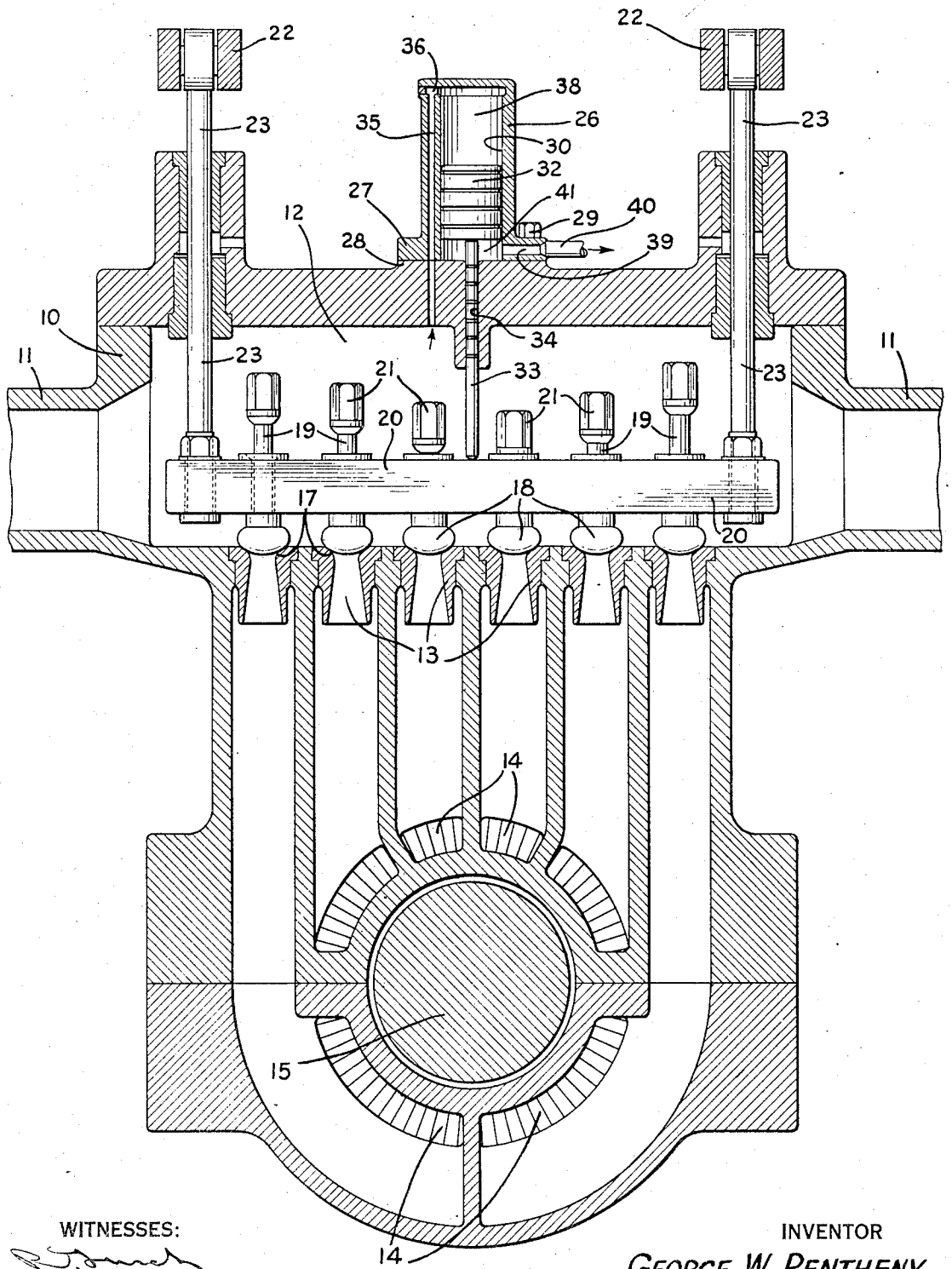
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VALVE OPERATING MECHANISM

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WITNESSES:

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VALVE OPERATING MECHANISM

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2 Claims. (Cl. 277—20)

This invention relates to valve chests, more particularly to valve-actuating mechanism housed therein, and has for an object to provide improved apparatus of this character.

In present-day steam turbine practice, it is customary to use valve chests housing a plurality of valve members connected to a horizontal bar in such a manner that raising and lowering of the bar results in progressive opening and closing of the plurality of valves. In order to raise and lower this horizontal bar, it is the practice to connect the same to governing mechanism by a number of rods extending through a wall of the valve chest. This construction results in unbalanced load on the bar due to the fact that the ends of the rods within the chest are subject to the relatively high pressure therein, while the outer ends are subject only to atmospheric pressure. This pressure difference is effective over an area equal to the total cross-sectional areas of the rods.

Where the rods are a number of inches in diameter and the steam supplied to the chest is under a pressure of the order of 1000 lbs./sq. in. or more, it will be apparent that there may be an unbalanced force on the bar of several tons, due to the difference in pressure on the inner and outer ends of the rods, this force tending to raise the valves from their seats.

Therefore, it is another object of the invention to provide means counteracting otherwise unbalanced forces tending to raise valve members from their seats.

These and other objects are effected by the invention as will be apparent from the following description and claims taken in connection with the accompanying drawing, forming a part of this application, in which the single figure is a transverse sectional view through a steam turbine valve chest embodying the features of the invention.

Referring now to the drawing more in detail, there is shown a valve chest 10, having steam inlets 11 to the chamber 12, discharge of steam from the chamber being controlled by a plurality of valves 13. Steam passing the valves 13 is directed through inlet ports 14 to the conventional turbine 15.

In the embodiment herein illustrated, each valve structure includes a tubular valve seat 17, preferably of the diffuser type, adapted to be closed by a plug 18, the plugs having upstanding stems 19 extending through a horizontal bar 20 positioned thereabove. A nut 21 is provided at the upper end of each stem and is adapted to be engaged by the bar upon upward movement of the latter. The nuts are positioned at successively greater distances from their respective plugs, so that, as the bar 20 is raised, it engages the nuts 21 and raises the plugs 18 in succession.

The bar 20 is operated by a governing mechanism (not shown) through levers 22 connected by rods 23 to the horizontal bar 20.

It will be apparent that, with the inner ends of the rods or stems 23 subject to the high pressure existing in the chamber 12 and the outer ends thereof subject only to atmospheric pressure, there will be an unbalanced upward force acting on the bar 20 and tending to open the valve.

To counterbalance the upward pressure acting on the bar 20, there is provided a cylinder 26 having a flanged lower end 27 adapted to be secured to a mating boss 28 machined on the upper surface of the chest 10, by bolts 29. The cylinder 26 has an internal bore 30 for the piston 32, which bears on the upper end of a thrust rod or stem 33 slidable vertically in a chest opening 34 and has its lower end abutting the upper surface of the horizontal bar 20.

Connecting passages 35 and 36 provide for flow of steam from the chamber 12 of the valve chest to the space 38 at the upper end of the cylinder 26, with the result that the upper surface of the piston 32 is subject to the same pressure as exists within the steam chest 10. Passage 39 and cooperating conduit 40 serve to vent the space 41 below the piston 32 to a region of lower pressure, preferably within the turbine 15.

The piston 32 is so dimensioned that the area of its upper surface is at least equal to the combined cross-sectional areas of the rods 23 which produce the unbalanced condition on the horizontal bar 20 within the steam chest. If desired, the effective upper surface of the piston 32 may be of even greater area to provide an unbalance in the opposite direction tending to retain the valves in closed position.

While the invention has been shown in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and it is desired, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What is claimed is:

1. For use with an elastic fluid turbine: a valve chest; a plurality of valves housed within the chest for controlling the flow of fluid therefrom

to the turbine, each of said valves including an element movable up to open and down to close the valve; a horizontal bar within the chamber and connected to said movable valve elements; a plurality of vertical rods extending through a wall of the chest with their lower ends secured to the bar and presenting an area subject to the differences in pressure within and without the chest to exert an unbalancing force on the bar tending to move the valves to open position; and means acting on said bar to counteract said force, said last-mentioned means comprising a vertical cylinder closed at its upper end and having its lower end attached to the chest so as to be closed thereby, a piston slidable in the cylinder, means for supplying fluid from the chest to the cylinder space above the piston so that a downwardly-acting force is exerted thereon, and a rod slidable in an opening provided in the portion of the chest wall closing the lower end of the cylinder for transmitting force of the piston to the bar.

2. Structure as specified in claim 1, wherein the pressure area of the piston is such that the force exerted thereon by the pressure is at least as great as the unbalancing force on the bar.

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