

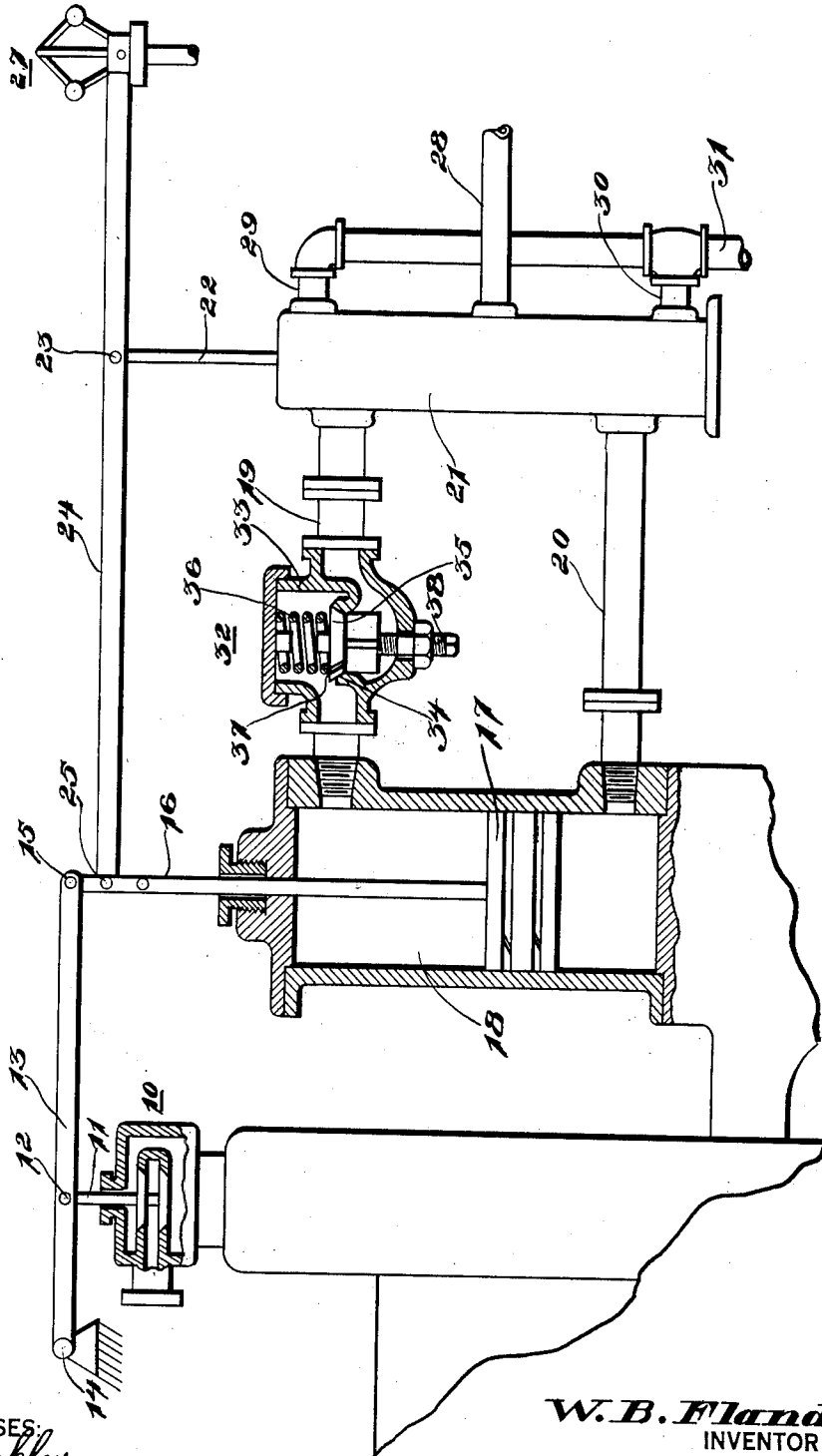
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W. B. FLANDERS

VALVE OPERATING MECHANISM

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WITNESSES
W.S. Beckley

W.B. Flanders
INVENTOR

BY *A.C. Davis*
ATTORNEY

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WARREN B. FLANDERS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

VALVE-OPERATING MECHANISM.

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My invention relates to admission valves for prime movers, more particularly for steam turbines, and it has for its object to provide operating mechanism for opening and closing an admission valve of this character which shall permit of relatively quicker closing than opening movement of the valve.

With prime movers of the relatively larger sizes, such as large turbines, owing to the large inertia of moving parts, it is desirable to open the admission valves slowly in order to obtain an admission of steam which is commensurate with the acceleration of the moving parts. It is also desirable to limit the rate at which steam is drawn from the boilers. Too rapid an increase in the rate of steam flow tends to cause priming of the boilers which is dangerous. On the other hand, if it is necessary to stop the prime mover, it is desirable to quickly shut off the supply of steam; and this is particularly true when the steam is cut off by an emergency over-speed device.

Apparatus embodying features of my invention is illustrated on the accompanying drawing, forming a part of this application, in which the figure is a diagrammatic sectional view of an admission valve and its operating mechanism showing my improvement applied thereto.

Referring now to the drawings for a more detailed description of my invention, I show an admission valve, at 10, having a valve stem 11 pivotally connected, at 12, to an operating lever 13, which has one end fulcrumed, at 14, and the other end pivotally connected, at 15, to the rod 16 of an operating piston 17 arranged in an operating cylinder 18.

Motive fluid is admitted at the ends of the operating cylinder 18 by means of conduits 19 and 20 connected to pilot valve mechanism 21, the pilot valve having an operating stem 22 pivotally connected, at 23, to a lever 24, which has one end pivotally connected, at 25, to the rod 16 and the other end operatively connected, at 26, to a suitable governor, at 27. The connection of the lever 24 with the rod 16 permits of the usual follow-up motion in response to a change in the governor position.

The pilot valve mechanism 21 is of a well-known type and it is adapted to supply motive fluid received from a conduit 28 to opposite ends of the operating cylinder 18 and to provide for the exhaust of motive fluid from opposite sides of the operating piston through the conduits 19 and 20 and the exhaust conduits 29 and 30 to the exhaust line 31.

The function of securing relatively quicker closing of the admission valve than the opening thereof is secured by means of valve mechanism, at 32, arranged in the conduit 19. This valve mechanism preferably comprises a housing 33 having a seat 34 for a valve 35, which is arranged to open in the direction of the operating cylinder. A spring 36 is located in the housing and it rests against the top of the valve 35 in order to maintain the latter against its seat. The valve 35 is provided with a recess 37, which serves to afford communication between opposite sides of the valve even when it is fully seated. A suitable screw 38 is carried by the lower portion of the housing 33 for the purpose of accurately limiting movement of the valve 35 toward its closing position so as to prevent possible sticking or jamming thereof.

As the valve 35 opens toward the operating cylinder 18, it will be clear that it does not exert any appreciable effect on the admission of motive fluid to the upper end of the operating cylinder 18 to secure movement of the admission valve, at 10, toward a closing position, whereby closure of the valve may be quickly effected. On the other hand, when motive fluid is admitted to the lower end of the cylinder 18 to secure movement of the admission valve to an open position, motive fluid which is above the operating piston 17 is exhausted through the conduit 19; and, of course, the flow is in such a direction as to permit the spring 36 to hold the valve 35 against its seat 34. The recess 37, however, permits of the slow passage of fluid through the conduit 19, whereby the operating piston 17 moves upward slowly to secure a slow movement of the admission valve, at 10, toward an open position.

It is to be understood that any suitable

mechanism may be employed in the conduit 19 which will function to permit the free flow of motive fluid therethrough to the operating cylinder to secure a quick movement of the admission valve 10 toward its closing position and which will permit of a restriction of the exhaust of motive fluid there-through when the admission valve is being opened by the operating piston. Also, the recess 37 may obviously be formed on the seat 34.

From the apparatus described, its operation will be clearly understood. Fluid under pressure is admitted to the operating cylinder by means of the pilot valve mechanism 21, which is moved initially in response to movement of the governor 27. Thereafter, motive fluid is admitted by either the conduit 19 or the conduit 20 to the operating cylinder 18 and exhausted from the latter at the end opposite to that at which motive fluid is being admitted. Movement of the operating piston results, not only in movement of the admission valve, but also of movement of the pilot valve of the pilot valve mechanism so as to bring the latter back to a neutral position when the admission valve takes up a position suitable to the position of the governor. The valve mechanism, at 32, serves to permit of the free flow of motive fluid through the conduit 19 to the operating cylinder 18 so as to secure movement of the operating piston 17 to move the admission valve, at 10, toward a closing position, whereby the supply of motive fluid to the prime mover may be quickly cut off. When pressure fluid is supplied to the cylinder 18 to secured movement of the operating piston 17 in the other direction to move the admission valve toward an open position, the valve mechanism, at 32, serves to permit a restricted exhaust of fluid therethrough so that the operating piston moves relatively slowly in order to secure a slow opening of the admission valve 10, whereby the rate of admission of steam to a suitable motor, engine or turbine is increased as the inertia of movable parts is overcome.

While I have shown my invention 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 other changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as

are imposed by the prior art or as are specifically set forth in the appended claims.

What I claim is:

1. The combination with a prime-mover admission valve, of an operating cylinder having motive fluid supply and exhaust connections at its ends, an operating piston in the cylinder and connected to the admission valve, and means associated with one of the connections to assure relatively slower motion of the operating piston in one direction than in the other, whereby the admission valve may be closed relatively quicker than it may be opened.

2. The combination with a prime-mover admission valve, of an operating cylinder having motive fluid inlet and exhaust connections at its ends, an operating piston in the cylinder which is connected to the admission valve, a valve in the connection which supplies motive fluid to the operating cylinder to secure closing movement of the admission valve and which opens in the direction of the operating cylinder, said valve being provided with a recess, whereby, when it closes upon motive fluid being admitted to the other end of the operating cylinder, it will permit of the relatively slow exhaust of fluid through its conduit to secure a relatively slow movement of the admission valve toward its open position.

3. The combination with a prime-mover admission valve, of fluid-pressure operated mechanism for moving the valve to open and closed positions, and means cooperating with said fluid-pressure operating mechanism, whereby said mechanism operates relatively more quickly in one direction than in the other to secure a relatively quicker closing motion of the valve than the opening motion thereof.

4. The combination with a prime-mover admission valve, of an operating cylinder, an operating piston arranged in the cylinder and connected to the admission valve, motive fluid supply and exhaust connections arranged at the ends of the cylinder, and a check valve provided in one of the connections having a passage which permits of the flow of fluid when the valve is seated.

In testimony whereof, I have hereunto subscribed my name this 23rd day of January, 1923.

WARREN B. FLANDERS.