Aug. 14, 1928. 1,680,285

J. DOCKINGS

SLIDE VALVE FOR STEAM ENGINES

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Fig. 1.

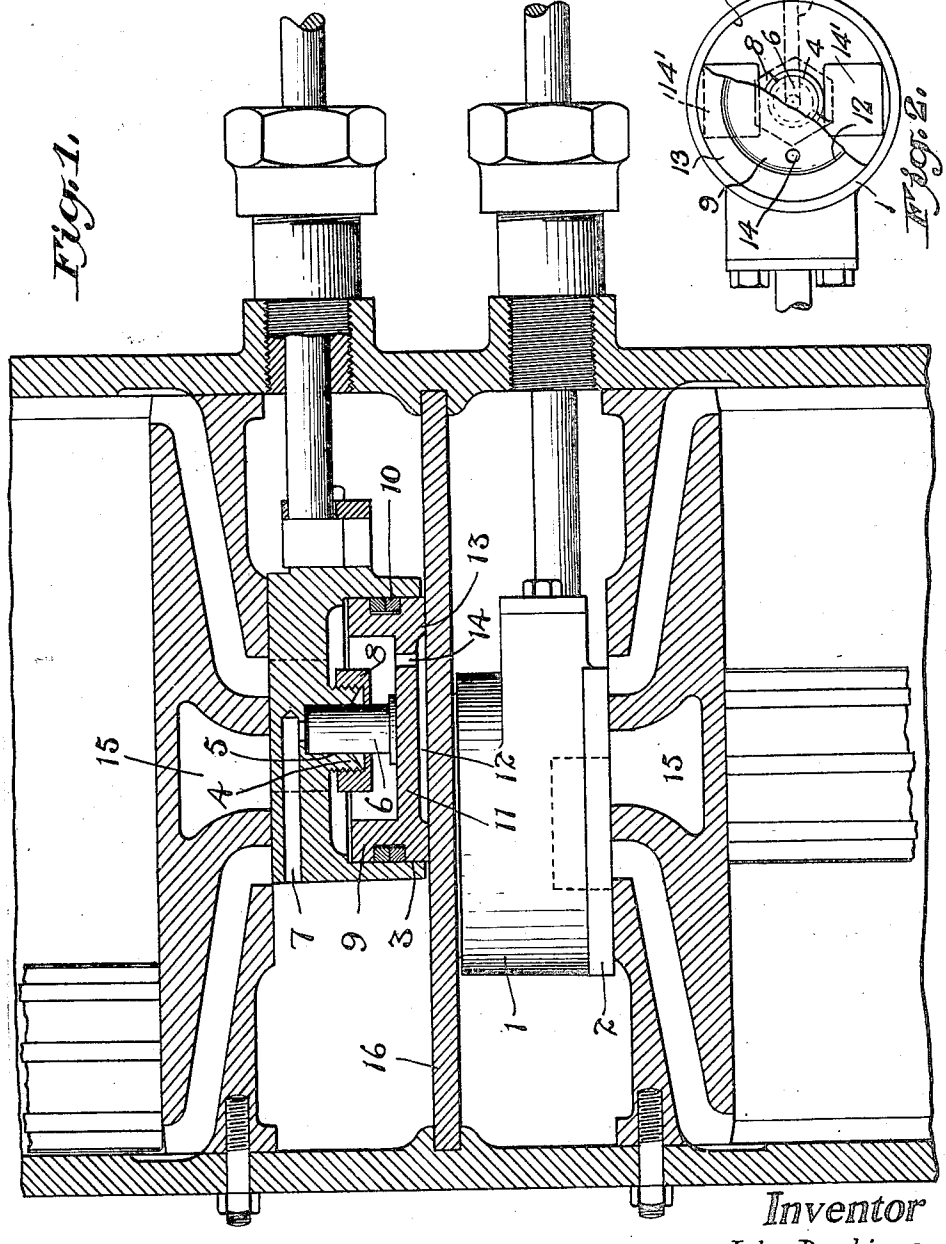


Fig. 2.

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SLIDE VALVE FOR STEAM ENGINES.

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The principal object of the invention is to effect the balancing of slide valves for steam engines by reducing the area of the valve exposed to the live steam pressure and thereby reducing to a desired minimum the friction of the valve on its seat.

The principal feature of the invention consists in the novel construction and arrangement of parts whereby access of the live steam pressure to the major area of the back of the valve is prevented by providing a piston member in the back of the valve to engage a face plate arranged parallel with the valve face, said piston member being held in sealing engagement with said face plate by piston means of a lesser area acted on by the live steam pressure.

A further important feature consists in providing the face of the balancing piston with a passage communicating with the exhaust passage of the cylinder thereby permitting the free escape of any steam which might find its way between the balancing piston and the face plate.

In the drawings Figure 1 is a mid-sectional view through the steam chest and ports of a pair of steam cylinders showing one of the valves in section; Figure 2 is a part sectional view on a reduced scale of a valve constructed in accordance with this invention.

Certain undesirable conditions have been found to exist in the slide valve type of steam engine since the live steam in the chest acting on the back surfaces of the valve exerts a tremendous pressure between the valve and its seat causing excessive wear and loss of power.

In engines where very high steam pressure is employed the condition became acute and it has been found necessary to relieve the pressure on the valve.

Various structures have been devised with a view to effecting a compensating action and thus overcome the effects of the steam pressure on the valve but the methods employed have not been entirely satisfactory and were unreliable in their results.

The present invention proposes to overcome these undesirable features in a simple yet highly effective and dependable manner and in carrying the invention into effect, the valve 1 having the usual rectangular faced portion 2 which covers and uncovers the ports to the cylinders, is provided with a large shallow cylindrical bore 3 extending inwardly from the back face of the valve.

Centrally of the shallow bore 3 and at the inner end thereof is an externally threaded boss 4. The boss 4 is bored centrally to form a cylinder 5 to receive the small piston member 6 and a passage 7 in the valve connects the cylinder 5 with the steam chest. A packing nut 8 is threaded on to the boss 4 in order to render the piston 6 steam tight in the bore 5.

Slidably arranged in the cylindrical bore 3 is a shallow piston 9, rings 10 being carried thereby to effect a seal between the piston and cylinder wall and prevent the passage therebetween of live steam.

The head 11 of the piston 9 is provided with a recess 12 centrally thereof to form a narrow annular flange 13 around the periphery of the piston head and a hole 14 through the piston head allows any steam leaking past the flange 13 to escape by way of the passages 14′ in the valve body 1 to the engine exhaust port 15, said passages 14′ being arranged either side of the central boss 4 and communicating with the exhaust port.

Extending longitudinally of the steam chest and having its flat surface arranged in parallel relation to the valve engaging surface of the port wall is a face plate 16.

The spacing of the plate 16 from the surface of the port wall is such as to permit of a slight clearance between the same and the back of the valve.

The live steam pressure from the steam chest enters the passage 7 and entering the cylinder 5 exerts an outward pressure on the piston 6 therein.

The outer end of the piston 6 engages the head 11 of the large piston 9 and forces the piston 9 outwardly causing the annular flange 13 thereof to engage the surface of the plate 16. The engagement of the annular flange 13 of the piston with the surface of the plate 16 effects a seal between the two members and consequently the effective area of the valve on which the live steam would otherwise act is reduced by an amount equal to the area of the head of the piston and as a result the pressure applied on the valve through the action of the steam is reduced in a corresponding proportion.

Any steam which may leak past the seal afforded by the annular flange 13 against the plate 16 is prevented from exerting a

surface pressure on the valve by means of the hole 14 connected with the exhaust through the passages 14′ in the valve 1.

It will be at once apparent that an arrangement such as described will be extremely efficient in its action. The small pressure piston may be made to any size suitable for a given pressure and will ensure a positive and predetermined outward pressure on the large sealing piston 9 at all times during the operation of the engine. One or more pistons 6 may be used as desired.

In single cylinder steam engines employing only a single valve the plate 16 will not be necessary as the balancing piston will engage the cap of the steam chest.

What I claim as my invention is:

A slide valve for steam engines comprising the combination with a steam chest and cylinder having inlet and exhaust ports, of a valve body in said steam chest co-operating with said ports and having a shallow cylindrical bore in its outer face, a boss threaded externally and extending centrally of said shallow bore from the bottom thereof, a cylindrical bore of small diameter in said boss having a piston therein extending beyond the end of the boss into the shallow cylindrical bore, a packing nut threaded on the end of said boss and sealing said piston, a passage in the valve body connecting the small cylindrical bore with the interior of the steam chest, a piston in said shallow cylindrical bore having a depressed outer head and adapted to be engaged and forced outwardly by the former piston, steam passages in said valve body at either side of said central boss connecting the inner end of the shallow cylindrical bore with the exhaust port, and a vent in the depressed head of the piston leading to the interior of the shallow cylindrical bore.

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