No. 848,536. PATENTED MAR. 26, 1907.

J. M. COSPER.

BALANCED VALVE FOR ENGINES.

APPLICATION FILED SEPT. 26, 1905.

3 SHEETS—SHEET 1.

Fig. 2.

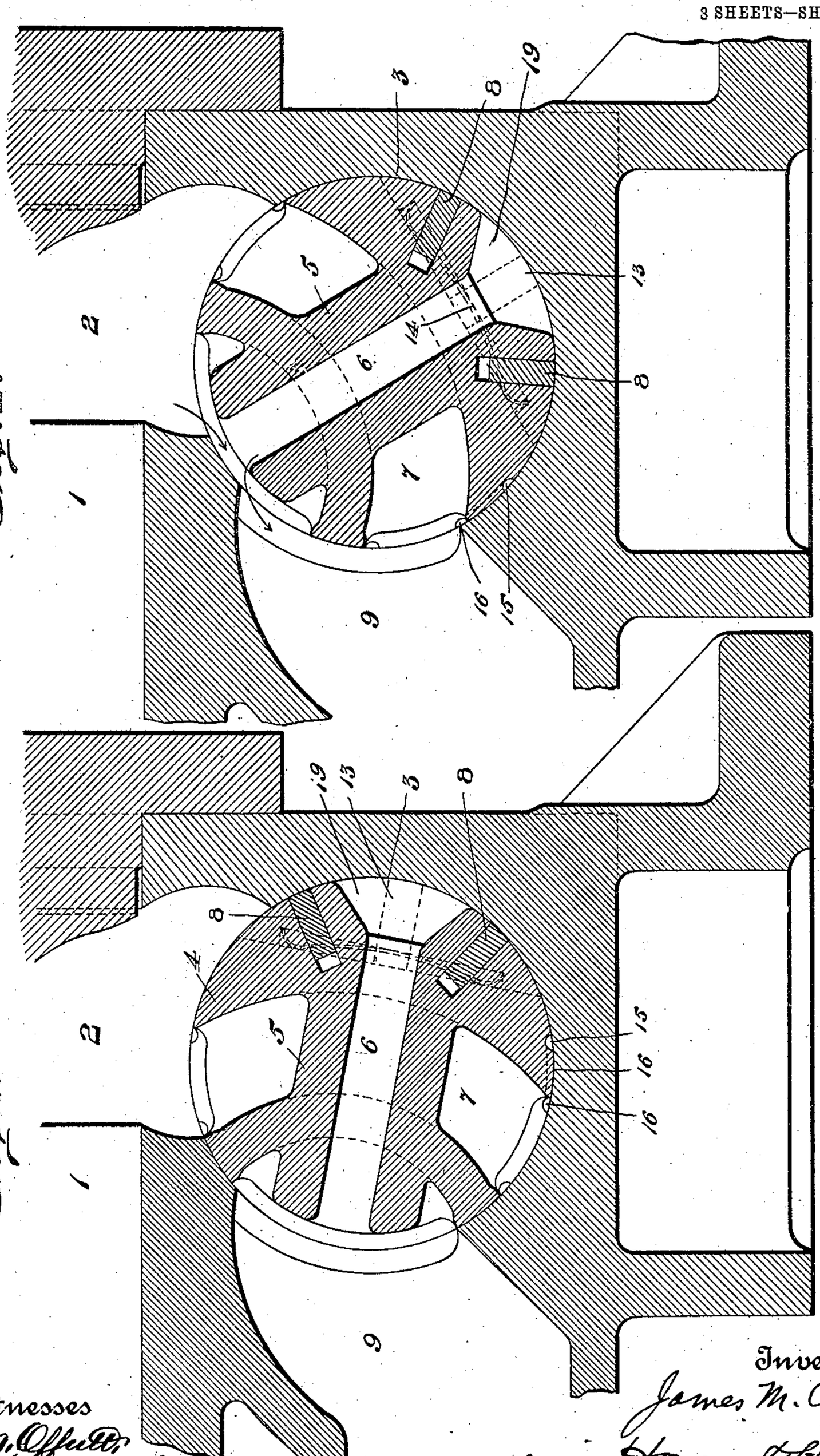

Fig. 1.

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No. 848,536. PATENTED MAR. 26, 1907.

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BALANCED VALVE FOR ENGINES.

APPLICATION FILED SEPT. 25, 1905.

3 SHEETS—SHEET 2.

Fig. 3.

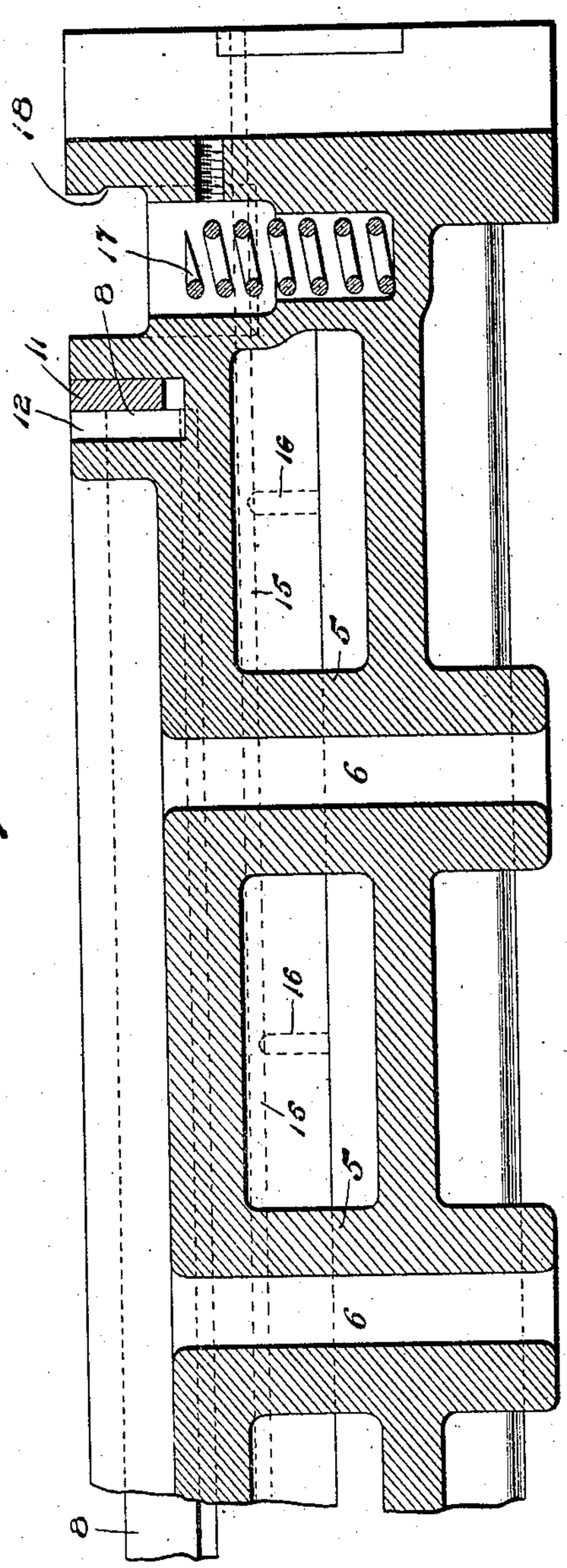

Fig. 4.

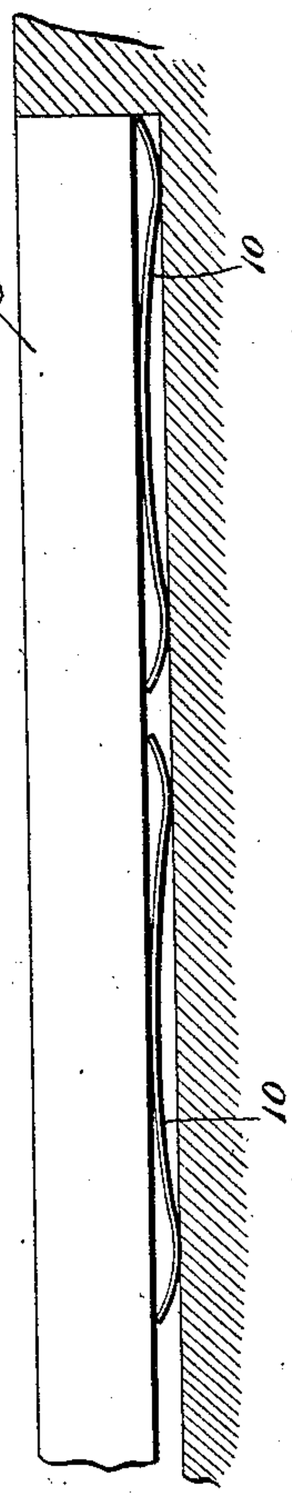

Fig. 5.

Fig. 7.

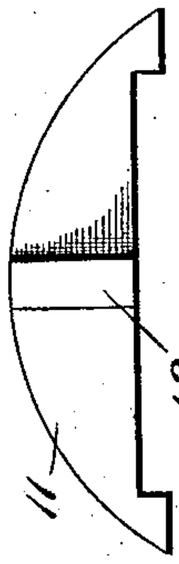

Fig. 6.

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3 SHEETS—SHEET 3.

Fig. 9.

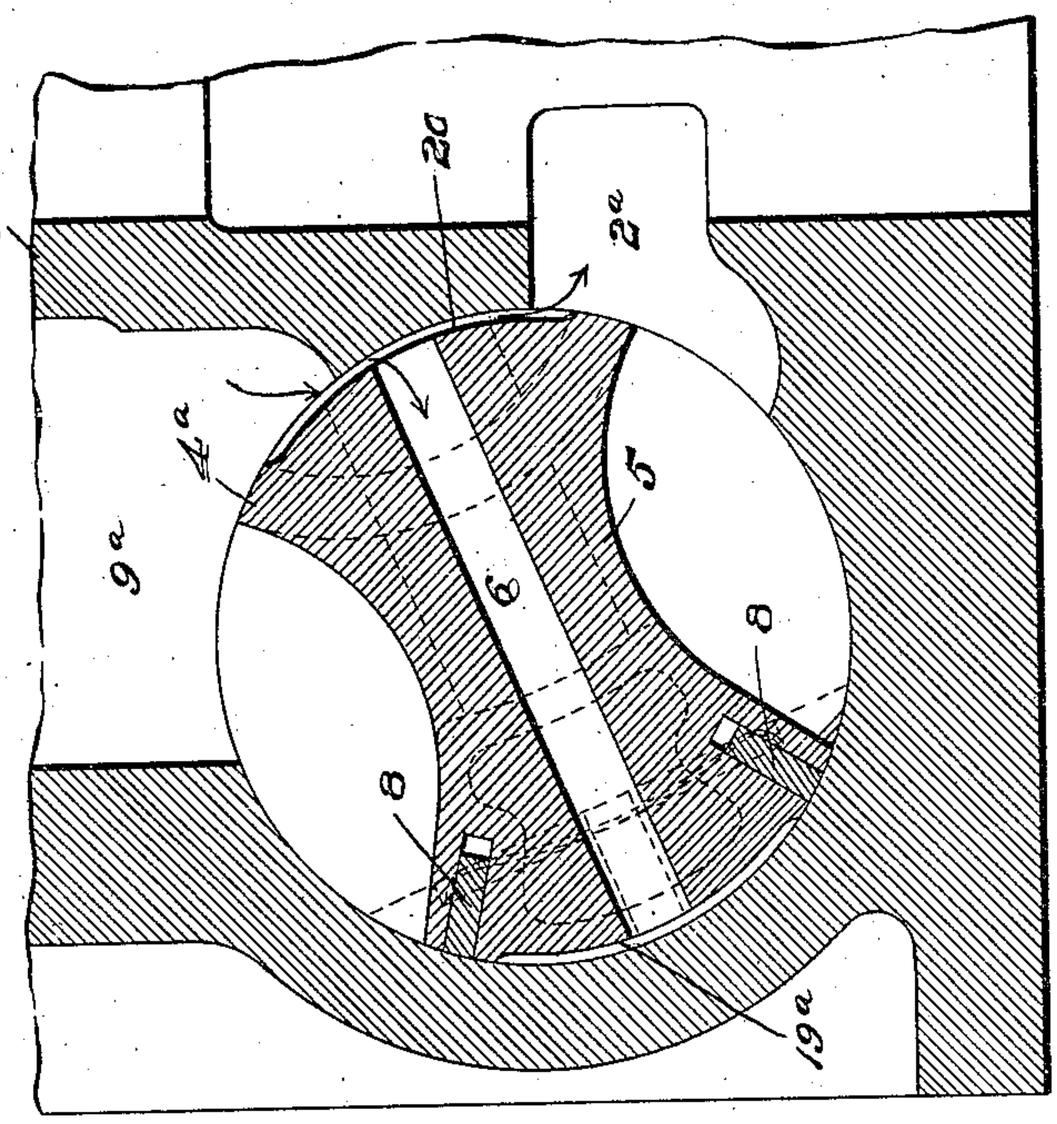
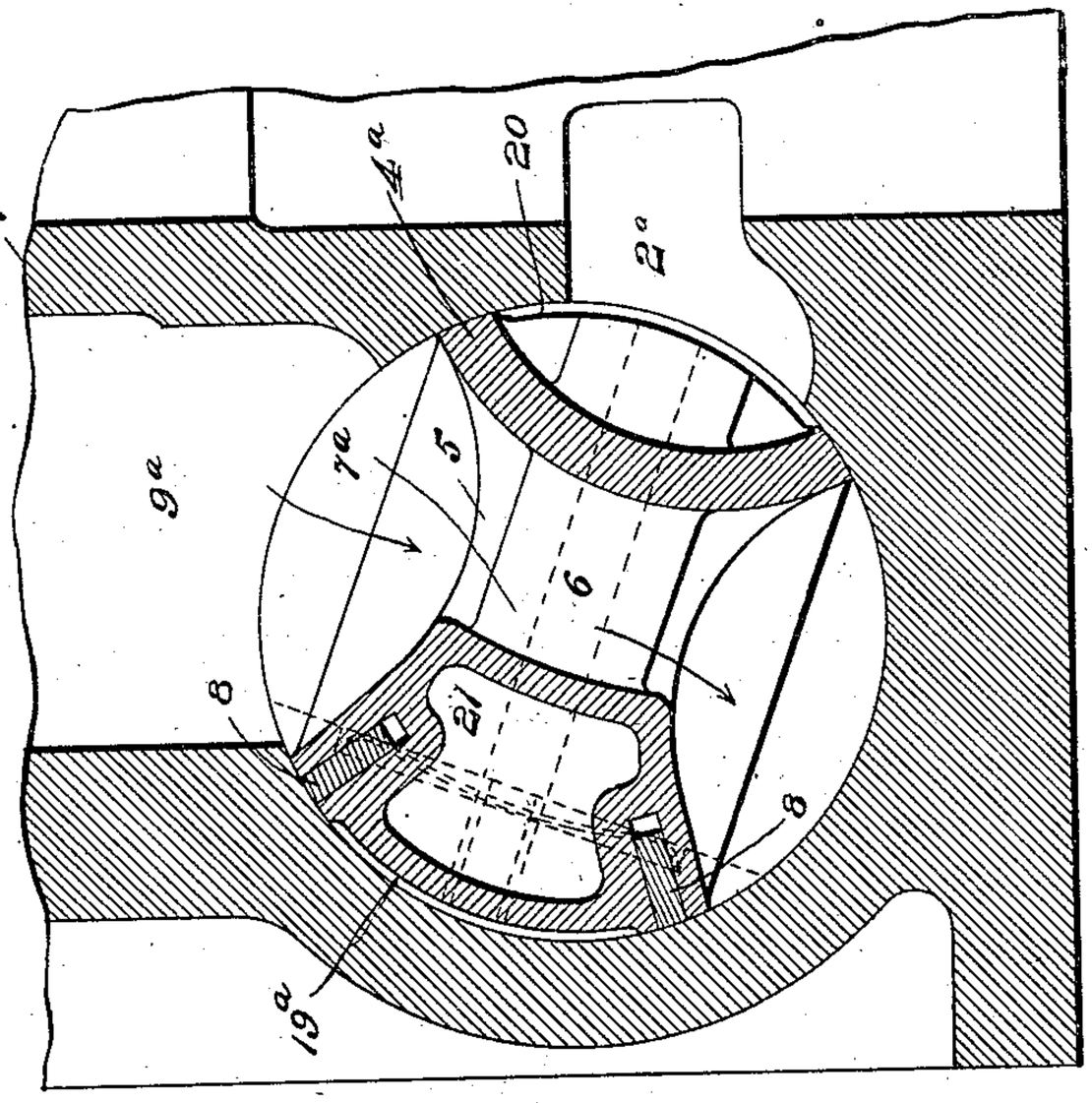


Fig. 8.



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UNITED STATES PATENT OFFICE

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BALANCED VALVE FOR ENGINES.

No. 848,536. Specification of Letters Patent. Patented March 26, 1907.

Application filed September 25, 1905. Serial No. 280,095.

To all whom it may concern:

Be it known that I, JAMES M. COSPER, a citizen of the United States, and a resident of Brighton, Jefferson county, Alabama, have invented certain new and useful Improvements in Balanced Valves for Engines, of which the following is a specification.

My invention relates to balanced valves for steam and other fluid-pressure-operated engines; and my object is to provide a balanced rotary valve for such engines, particularly of the Corliss type, and other engines employing rotary valves which will be effective in use and easily manufactured and which, further, may be readily adapted to the well-known Corliss valve in common use and other valves of the like type. In valves of this type it is well known that during the period that the valve is on lap there is an excessive pressure on the cylinder side of the valve, due to the high pressure to which the valve is exposed from the interior of the cylinder, opposed only by the exhaust or atmospheric pressure, thereby causing the valve to bind against one side of the seat on which it operates, and this excessive pressure is overcome by my invention in the manner hereinafter described with reference to the accompanying drawings, and more particularly pointed out in the claims.

In the drawings, Figure 1 is a transverse section of an exhaust-valve and so much of the cylinder structure as is necessary to illustrate the application of my invention thereto with the valve closed. Fig. 2 is a similar view with valve open for exhaust. Fig. 3 is a longitudinal section of the valve. Figs. 4, 5, 6, and 7 are details of the packing-strips. Fig. 8 is a similar view to Fig. 1, showing the application of my invention to an admission-valve with valve closed; and Fig. 9 is a similar view thereof, showing the valve open, the section being on a different transverse plane.

Referring to the drawings, in which the same reference characters relate to the same parts in all the views which illustrate my invention in its preferred form embodied in an exhaust-valve, the numeral 1 designates the cylinder structure provided with an exhaust-port 2, opening into the valve-chest 3, in which the exhaust-valve 4 is seated, a rotary movement being imparted to the valve to cause it to control the passage of exhaust fluid from the cylinder 1 through the port 2 to the exterior chamber, receiver, or exhaust-passage 9. The numeral 17 indicates the spring usually employed in these valves for pressing against the shoe, (not shown,) which is usually seated in the groove 18 to force the valve against the walls of the valve-chamber, these, as well as other features of the valve, being the same as in the ordinary type of Corliss valve and not necessary to further describe herein.

In order to prevent access of pressure to the side of the valve opposite the exterior chamber or exhaust-passage 9 when the valve is on lap, as in Fig. 1, I provide the valve with packing-strips 8 and 11, seated in grooves in the body of the valve, and pressed outwardly by springs to form a fluid or steam tight cavity or space 19 of an area a little less than the area of the port opening into the chamber, receiver, or exhaust-passage 9. This space may be enlarged or reduced, as desired, in proportion to the port-opening in order to make the valve partially or fully balanced, according to the desire of the user, the degree of equalization being dependent upon the relative areas of the cavity or space between said strips and the opposite side of the valve-body exposed to pressure.

The strips 8 are seated in longitudinal grooves in the valve and are pressed outwardly by springs 10, while the strips 11 are seated in circumferential grooves 13, abutting the grooves of the strip 8 at each end, and are pressed outwardly by springs 14, the outer surface of said strip conforming to the contour of the valve, with a central offset portion or dowel 12 fitting a recess in the valve. The inclosed space thus formed is maintained in constant communication with the chamber, receiver, exhaust-passage, or other receptacle 9 by cored passages 6, extending through webs 5 of the valve structure to the exhaust-port, thus maintaining atmospheric or exhaust pressure at all times within the surrounding space, from which any leakage of pressure from the cylinder

thereinto readily escapes through said cored passages.

I provide oil and steam circulating grooves 15, which communicate with the steam or other fluid passages 7 of the valve through grooves 16 in the periphery of the valve, which provide for the lubrication of the contacting surfaces of the valve-body and valve-chamber and also for the circulation of steam or fluid around the outer surface of the valve-body.

While I have shown my invention applied to an exhaust-valve of the Corliss type, it is not limited to this particular type of valve or to an exhaust-valve, as it may without departing from the spirit of this invention be applied to other types of valves, admission or exhaust, and I have shown in Figs. 8 and 9 its application to an admission-valve of the Corliss type, though it may be applied to other forms of rotary valves as well, and I will now describe the said invention as applied to such valves.

The supply-port 9^a is connected with the usual fluid-pressure supply and is adapted to be connected with the cylinder-port 2^a as the valve 4^a is rotated from the closed position, Fig. 8, to the open position, Fig. 9, thus providing for admission of fluid-pressure from the supply-port 9^a through the cavity or grooves 20 into the port 2^a. When closed, the valve is balanced by pressure on the supply side, which has access to the opposite side of the valve through the passage 7^a, and by the equalization of any fluid-pressure remaining in the cylinder through the port or passage 6 into the cavity 19^a, bounded by the packing-strips 8 and 11, this cavity serving in all respects the same function as the cavity 19 in the exhaust-valve, and hence further detailed description thereof is unnecessary. The cavity 21 is made in the valve simply for the purpose of removing excess metal, and thereby lightening the valve. In both cases it will be observed that the port or passage 6 provides for the passage of fluid-pressure from that side of the valve on which there is a higher pressure when the valve is closed to the cavity 19 or 19^a on the other side of the valve, thus equalizing the pressure, the degree of such equalization being determined by the relative areas of the spaces formed between the packing-strips 8 and 11 and that part of the opposite side of the valve-body exposed to the cylinder-pressure, and it is therefore evident that I can make either a partially or perfectly balanced valve by suitably varying the area between the packing-strips 8 and 11 as desired.

I claim as my invention—

1. In a balanced valve for fluid-pressure-operated engines, the combination with the cylinder, having an exterior chamber or passage, of a valve-chest having ports communicating with said cylinder and chamber or passage, a rotary valve having passages therein adapted to connect said ports as the valve is rotated, packing-strips in the periphery of the valve forming a fluid-tight space or cavity on one side of the valve, there being a passage or passages connecting said space or cavity with the opposite side of the valve, whereby excess pressure from the latter side of the valve will pass into the said space or cavity and equalize the pressure on both sides of the valve, said latter passage or passages being independent of said first passages and having a portion placed to also connect the ports as the valve is rotated, substantially as specified.

2. In a balanced valve for fluid-pressure-operated engines, the combination with the cylinder and a chamber or passage outside of the cylinder, of a valve-chest having ports communicating with said cylinder and chamber or passage, a rotary valve having passages therein adapted to connect said ports as the valve is rotated, packing-strips in the periphery of the valve on one side of the valve, and a passage or passages connecting said space or cavity with the opposite side of the valve, whereby excess pressure on the latter side of the valve will pass into the said cavity or space and equalize pressure on both sides of the valve, and fluid-pressure-circulating grooves in the cylindrical surface of the valve communicating with the fluid-pressure passages extending through the valve for connecting the cylinder and the outside chamber, substantially as specified.

3. In a balanced valve for fluid-pressure-operated engines, the combination with the cylinder, of a valve-chest having a port for exhaust communicating with the cylinder and a port communicating with the exhaust-passage, a rotary valve having a passage or passages extending therethrough adapted to connect the cylinder-port with the exhaust-passage as the valve is rotated, means for forming a packed space or cavity on the surface of the valve opposite the exhaust-port of the valve-chamber, and passages extending therefrom through the valve to the said latter port, said latter passage having a portion placed to also connect the cylinder-port with the exhaust-passages as the valve is rotated, substantially as specified.

4. In a balanced valve for fluid-pressure-operated engines, the combination with the cylinder, of a valve-chest having a port for exhaust communicating with the cylinder and a port communicating with the exhaust-passage, a rotary valve having a passage or passages extending therethrough adapted to connect the cylinder-port with the exhaust-passages as the valve is rotated, a packed space or cavity on the periphery of the valve opposite the exhaust-port of the valve-cham-

ber, passages independent of the first passage or passages extending through the valve to the said latter port, and fluid-pressure circulating grooves in the periphery of the valve opposite the cylinder-port communicating with the fluid-pressure passages in the valve, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES M. COSPER.

Witnesses:
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