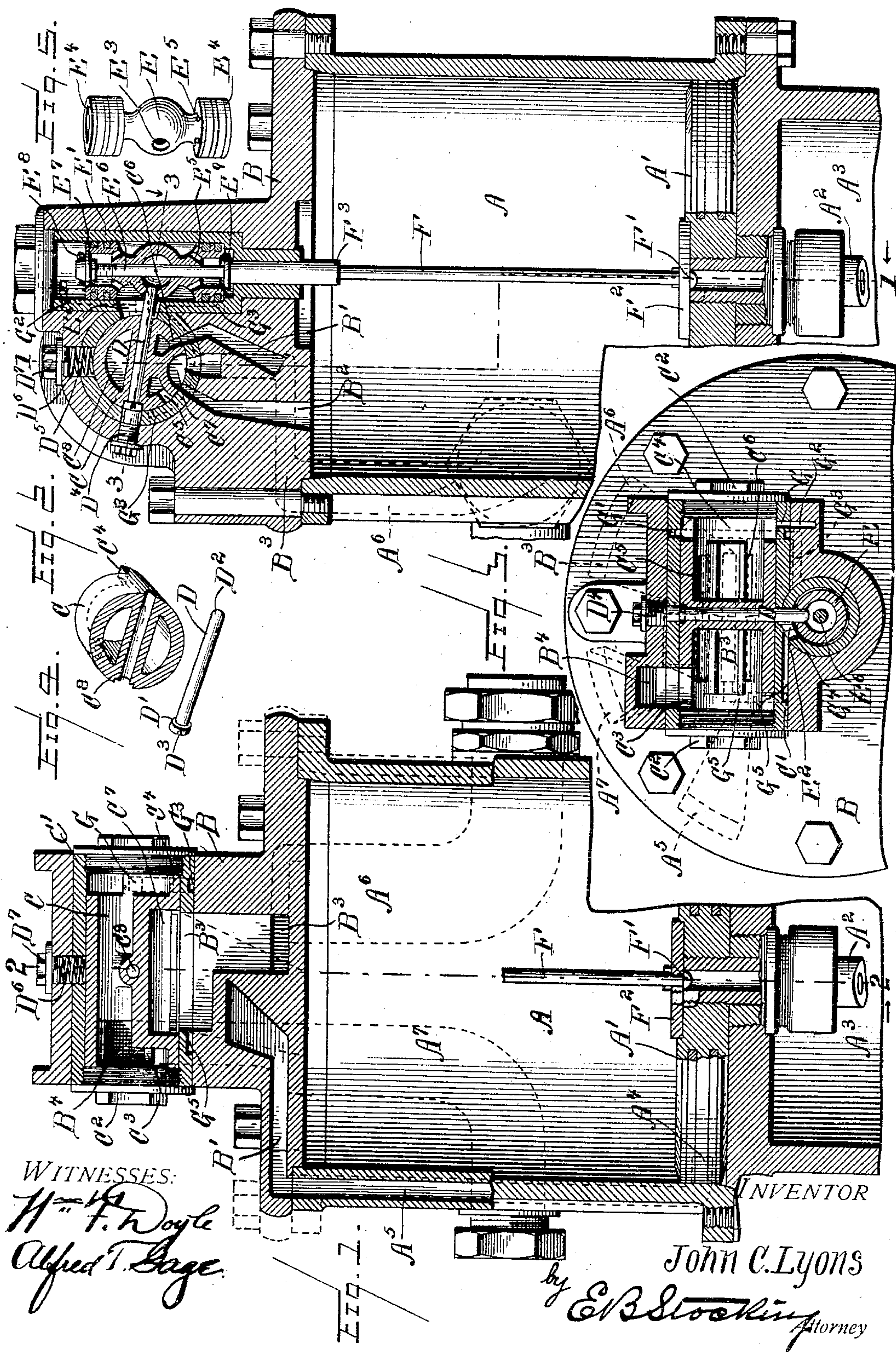


PATENTED JULY 26, 1904.

J. C. LYONS.
STEAM HEAD FOR AIR PUMPS.
APPLICATION FILED APR. 11, 1904.

NO MODEL.



UNITED STATES PATENT OFFICE.

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STEAM-HEAD FOR AIR-PUMPS.

SPECIFICATION forming part of Letters Patent No. 765,929, dated July 26, 1904.

Application filed April 11, 1904. Serial No. 202,632. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. LYONS, a citizen of the United States, residing at McComb, in the county of Pike, State of Mississippi, have
5 invented certain new and useful Improvements in Steam-Heads for Air-Pumps, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a steam-head for
10 air-pumps, and particularly to a reversible valve coöperating with the steam-cylinder thereof.

The invention has for an object to provide a construction of valve and coöperating re-
15 versing-piston by which a smooth positive motion in the starting movement of the valve will be secured, thus avoiding any material friction, and providing a structure simple in construction, so as to be economically manu-
20 factured.

A further object of the invention is to provide an improved construction of rotary re-
versing-valve adapted to control the ports from the motive cylinder and also from the
25 reversing-piston, whereby each of these parts are simultaneously fed and exhausted in the movement of the main reversing-valve.

A further object of the invention is to provide an improved construction of reversing-
30 piston whereby an automatic exhaust is provided through the piston-heads, so as to permit a free movement of the piston as the feed of motive power is shifted to the opposite ends thereof.

35 Other and further objects and advantages of the invention will be hereinafter set forth and the novel features thereof defined by the appended claims.

In the drawings, Figure 1 is a vertical sec-
40 tion upon the line 1 1 of Fig. 2, showing the invention applied to the steam-head of an air-pump; Fig. 2, a similar view on the line 2 2 of Fig. 1; Fig. 3, a section on the line 3 3 of Fig. 2; Fig. 4, a sectional perspective of the
45 reversing-valve with the throw-lever separated therefrom, and Fig. 5 a detail perspective of the reversing-piston.

Like letters of reference refer to like parts in the several views of the drawings.

This invention is adapted for application to
50 and use in connection with any desired character of motive cylinder, but is particularly adapted for use in connection with the steam-head of an air-pump and is therefore illus-
55 trated in that connection in the present case.

The letter A designates the steam-cylinder of an air-pump of ordinary construction, within which a piston A' is disposed and provided with a hollow piston-rod A², which extends downward into the air-cylinder A³, where it is
60 provided with a piston at its opposite end in the usual manner. The steam-cylinder is provided with the usual port A⁴ at its lower portion, which extends, by means of a passage A⁵, to the pump-head B and there communicates
65 with a passage B' therein extending to the reversing-valve C. At the opposite end of the cylinder an intake-passage B² is provided in the head and extends to the reversing-valve. Intermediate of the passages B' and B² an ex-
70 haust-passage B³ is provided and extends downward, so as to communicate with a passage A⁶ carried by the cylinder A and leading to the usual exhaust. For the purpose of conveying
75 steam or a motive agent to the reversing-valve a passage A⁷ is adapted to communicate with the source of power at one side of the cylinder and extends upward through the head, as shown
80 by dotted lines in Fig. 1, where it is provided with a port B⁴, communicating with the reversing-valve C. This valve is disposed within a suitable chamber within the head B and surrounded by a bushing C', provided with ports to communicate with the passages B', B², and
85 B³, leading to the valve. The valve C is open at its opposite ends and is of a cylindrical character, and these ends are closed by means of caps C², threaded in the opposite ends of the bushings C', while opposite the port B⁴ the
90 valve is provided with an inlet-port C³. The opposite end of the valve is provided with an extended flange C⁴, adapted to coöperate with ports controlling the reversing-piston, to be hereinafter described, while the lower portion of the valve is provided with a port C⁵
95 to communicate with the passage B² and a port C⁶ to communicate with the passage B', while intermediate these ports an exhaust-

cavity C⁷ is provided to communicate with either of the ports and with the exhaust-passage B³. The reversing-valve is provided with a laterally-extending sleeve C⁸, within which a throw-rod D is disposed, this rod being provided at one end with a head or shoulder D' and suitably rounded at its opposite end, as at D², to engage the reversing-piston E, to be hereinafter described. For the purpose of permitting the removal of the throw-lever the head may be provided with a recess D³, within which a hook may be engaged for withdrawing the lever from contact with the reversing-piston. For the purpose of permitting access to this hook a screw cap or plug D⁴ is inserted through the valve-casing and bushing, which when in position forms a flush bearing with the head of the lever and when removed permits access thereto. At the upper portion of the valve-casing a recess D⁵ is also provided and adapted to contain a tension-spring D⁶, extending through the bushing C' and bearing upon the valve, while the tension thereof may be adjusted by means of the screw-plug D⁷. This chamber D⁵ is also desirable for use in retaining a lubricant in feeding relation to the valve.

The reversing-piston E is disposed within a bushing E', carried by the pump-head within a suitable chamber therein and provided with a slotted portion E² to permit the passage therethrough of the throw-lever D, extending from the reversing-valve. This lever at its free end is adapted to seat within a recess E³, formed in the body of the piston, which may be of hollow globular form, as shown in Figs. 2 and 5, and provided at opposite ends with piston-heads E⁴, each similar in construction and provided with ports E⁵, extending therethrough to permit an exhaust from the ends of the cylinder formed by the bushing E'. Extending through the piston E is a valve-stem E⁶, carrying at its free end a valve E⁷, which may be secured thereon in any desired manner—for instance, adjustably held by a threaded connection therewith and locked by means of a cotter-pin E⁸. Beyond the opposite head of the piston a similar valve E⁹ is provided to cooperate with the seat in the head. These valves are located at a greater distance apart than the seats upon the opposite heads, so that when one valve is seated the other is removed from its seat to permit an exhaust-passage through the piston-head.

For the purpose of positively operating the reversing-valve E a reversing-rod F is connected to the lower end of the stem E⁶ of the valve therein, which rod at its lower end is provided with a head F', disposed beneath an apertured plate F², to extend into the hollow piston-rod A², extending beyond the piston. At the opposite end of the cylinder A a shoulder F³ is provided upon the reversing-rod, which in the upward movement of the piston is engaged by the plate F² to shift the

reversing-piston, while the opposite movement of the piston A' effects the same result by an engagement of the plate F² with the head F'.

The reversing-piston is assisted in its movement and held in position by means of steam-pressure thereon, which is taken from the main reversing-valve through the ports G and G', which are controlled by the lip or flange C⁴ at one end of the valve. The port G communicates with the upper end of the cylinder of the reversing-piston by means of a passage G², (shown by dotted lines in Fig. 2,) while the port G' communicates with the opposite end of the reversing-piston cylinder by means of a passage G³, the valve in Fig. 2 being shown in position to open the port communicating with the top of the reversing-piston and close the lower port, so that the steam-pressure is upon the top of the piston, holding the reversing rod and piston down and keeping the port open to admit steam to the bottom of the main pump-piston. The reversing-piston cylinder is provided between its ends with an exhaust-port G⁴, communicating by a passage G⁵ with the exhaust-port B³ of the reversing-valve. (See Fig. 3.)

In the illustration of the invention the steam-port leading to the bottom of the main pump-cylinder is shown as open, and in the operation thereof the steam forces the main pump-piston upward, which strikes the reversing-plate carried thereby against the shoulder upon the reversing-rod, thus lifting the rod to close the lower valve in the reversing-piston head and open the upper valve, thus permitting the steam to escape from the space beyond the upper head of the reversing-valve to the exhaust as the main piston moves upward, taking with it the reversing rod and piston, which movement through the throw-lever shifts the main reversing-valve to cut off the supply of steam at the upper end of the reversing-piston and throw it to the lower portion thereof, by which a retaining pressure is obtained to hold the piston and valve controlled thereby in proper position until the subsequent downward movement of the main pump-piston through the reversing-plate opens the valve at the opposite end of the reversing-piston. The reversing-valve thus controls the supply of steam for actuating the main pump-piston and also an independent supply for holding the reversing-piston in position, which position is held until the main piston positively actuates the reversing-piston to shift the position of the valve. It will be noted that the construction of valves operating with the reversing rod and piston permit an automatic operation of the exhaust from the opposite ends of the reversing-piston cylinder, while the connection between the reversing-piston and the reversing-valve affords a leverage by which the most positive and efficient operation of the valve is obtained.

The invention thus presents a pump-head construction involving a reversing-valve which is positive in starting in any position of the main piston and is balanced so as to secure a minimum of friction, consequently requiring but little lubrication and having no parts to become loose in operation. The valve can be manufactured at a very small cost, and on account of its large bearing-surface and slight downward pressure the wear thereon is reduced to the smallest extent.

It will be obvious that changes may be made in the details of construction and configuration without departing from the spirit of the invention as defined by the appended claims.

Having described my invention and set forth its merits, what I claim, and desire to secure by Letters Patent, is—

1. In a reversing-valve, a reversing-piston operatively connected to shift said valve, a main power-piston controlled by said reversing-valve, a connection between the power-piston and the reversing-piston, and means carried by said valve to control simultaneously the reversing and power pistons.

2. In a reversing-valve, a reversing-piston operatively connected to shift said valve, a main power-piston controlled by said reversing-valve, a connection between the power-piston and the reversing-piston, and means carried by the reversing-valve for controlling a motive agent at the opposite ends of the reversing-piston.

3. In a reversing-valve, a reversing-piston operatively connected to said valve, a main power-piston controlled by said reversing-valve, a connection between the power-piston and the reversing-piston, means carried by the reversing-valve for controlling the motive agent at the opposite ends of the reversing-piston, valved heads at the opposite ends of the reversing-piston, and means adapted to be actuated by the main power-piston for alternately seating one of said heads.

4. In a reversing-valve, a cylinder provided with steam and exhaust ports, a reciprocating reversing-piston, a throw-lever carried by said valve and connected to said piston, a main power-piston adapted to primarily actuate the reversing-piston, and means carried by said valve to alternately control a motive agent at the opposite ends of the reversing-piston.

5. In a reversing-valve, a cylinder provided with steam and exhaust ports, a reciprocating reversing-piston, a throw-lever carried by said valve and connected to said piston, a main power-piston adapted to primarily actuate the reversing-piston, means carried by said valve to alternately control a motive agent at the opposite ends of the reversing-piston, and means for disconnecting said throw-lever from contact with said reversing-piston.

6. In a reversing-valve, a cylinder provided with steam and exhaust ports, a reciprocating

reversing-piston, a throw-lever carried by said valve and connected to said piston, a main power-piston adapted to actuate the reversing-piston, means for removing said throw-lever from contact with said reversing-piston, ported heads at the opposite ends of said reversing-piston provided with valve-seats, and a valve-stem having valves thereon located at a greater distance apart than the distance between the seats upon the opposite heads.

7. In a reversing-valve, a cylinder provided with steam and exhaust ports, a reciprocating reversing-piston, a throw-lever carried by said valve and connected to said piston, a main power-piston adapted to actuate the reversing-piston, means for removing said throw-lever from contact with said reversing-piston, ported heads at the opposite ends of said reversing-piston provided with valve-seats, a valve-stem having valves thereon located at a greater distance apart than the distance between the seats upon the opposite heads, a reversing-rod connected to said valve-stem and provided with a shoulder to be engaged by the main power-piston, and a head at the opposite end of said rod to be likewise engaged in the opposite movement of said power-piston.

8. In a reversing-valve, a cylinder having steam and exhaust ports, a rotary valve having a steam-inlet at one end thereof and ports to cooperate with said steam and exhaust ports, a reversing-piston having a cylinder provided at opposite ends with steam-inlet ports, and a flange or lip carried by said rotary valve to control the ports leading to the reversing-piston.

9. In a reversing-valve, a cylinder having steam and exhaust ports, a rotary valve having a steam-inlet at one end thereof and ports to cooperate with said steam and exhaust ports, a reversing-piston having a cylinder provided at opposite ends with steam-inlet ports, a flange or lip carried by said rotary valve to control the ports leading to the reversing-piston, a central sleeve extending through said rotary valve, and a throw-lever disposed within said sleeve to engage the reversing-piston.

10. In a reversing-valve, a cylinder having steam and exhaust ports, a rotary valve having a steam-inlet at one end thereof and ports to cooperate with said steam and exhaust ports, a reversing-piston having a cylinder provided at opposite ends with steam-inlet ports, a flange or lip carried by said rotary valve to control the ports leading to the reversing-piston, a central sleeve extending through said rotary valve, a throw-lever disposed within said sleeve to engage the reversing-piston, ported heads at the opposite ends of said reversing-piston provided with valve-seats upon their outer faces, a valve-stem extending through said piston and provided with valves adapted to alternately engage one of said seats,

and means intermediate of the heads of said reversing-piston for exhausting from the cylinder thereof.

11. In a reversing-valve, a reversing-piston provided with opposite ported heads having packings thereon and a central body portion, means extending from the reversing-valve to said body portion, and a valve-stem provided with valves at opposite ends disposed a greater distance apart than the distance between the seats upon the piston-heads.

12. In a reversing-valve, a reversing-piston provided with opposite ported heads having packings thereon and a central body portion, means extending from the reversing-valve to said body portion, a valve-stem provided with valves at opposite ends disposed a greater distance apart than the distance between the seats upon the piston-heads, and means for adjusting one of said valves toward the other.

13. In a reversing-valve, a rotary-valve member disposed within a bushing and provided with steam-ports and an exhaust-cavity in its lower portion, heads adapted to close the opposite ends of said bushing, a steam-inlet having a port communicating with the upper portion of said valve, a laterally-extending sleeve within said valve, and a flange at the opposite end of said valve from the steam-inlet to control ports in the bushing thereof.

14. In a reversing-valve, a rotary-valve member disposed within a bushing and provided with steam-ports and an exhaust-cavity in its lower portion, heads adapted to close the op-

posite ends of said bushing, a steam-inlet having a port communicating with the upper portion of said valve, a laterally-extending sleeve within said valve, a flange at the opposite end of said valve from the steam-inlet to the controlled members in the bushing thereof, and a tension device bearing upon the upper portion of said valve to retain the same upon its seat.

15. In a reversing-valve, a power-cylinder and piston therein, a reversing-piston connected to said reversing-valve to operate the same, a reversing-rod extending from said reversing-piston, means carried by the power-piston for primarily operating the reversing-piston, and means controlled by said valve for retaining the reversing-piston under pressure.

16. In a reversing-valve, a power-cylinder and piston therein, a reversing-piston connected to said reversing-valve to operate the same, a reversing-rod extending from said reversing-piston, means carried by the power-piston for operating the reversing-piston at the opposite ends of its movement, and means carried by the reversing-valve for alternately admitting steam to the opposite ends of the reversing-piston.

In testimony whereof I affix my signature in presence of two witnesses.

JNO. C. LYONS.

Witnesses:

A. G. MOGAN,
JAMES HARVEY, Jr.