

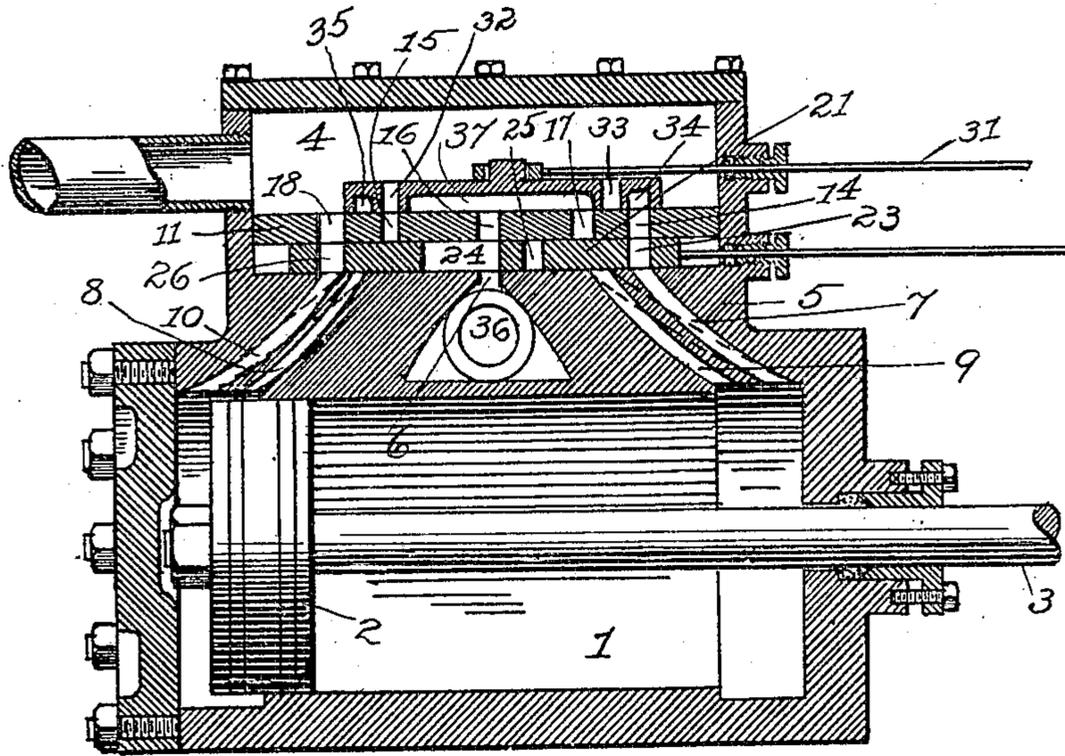
No. 837,427.

PATENTED DEC. 4, 1906.

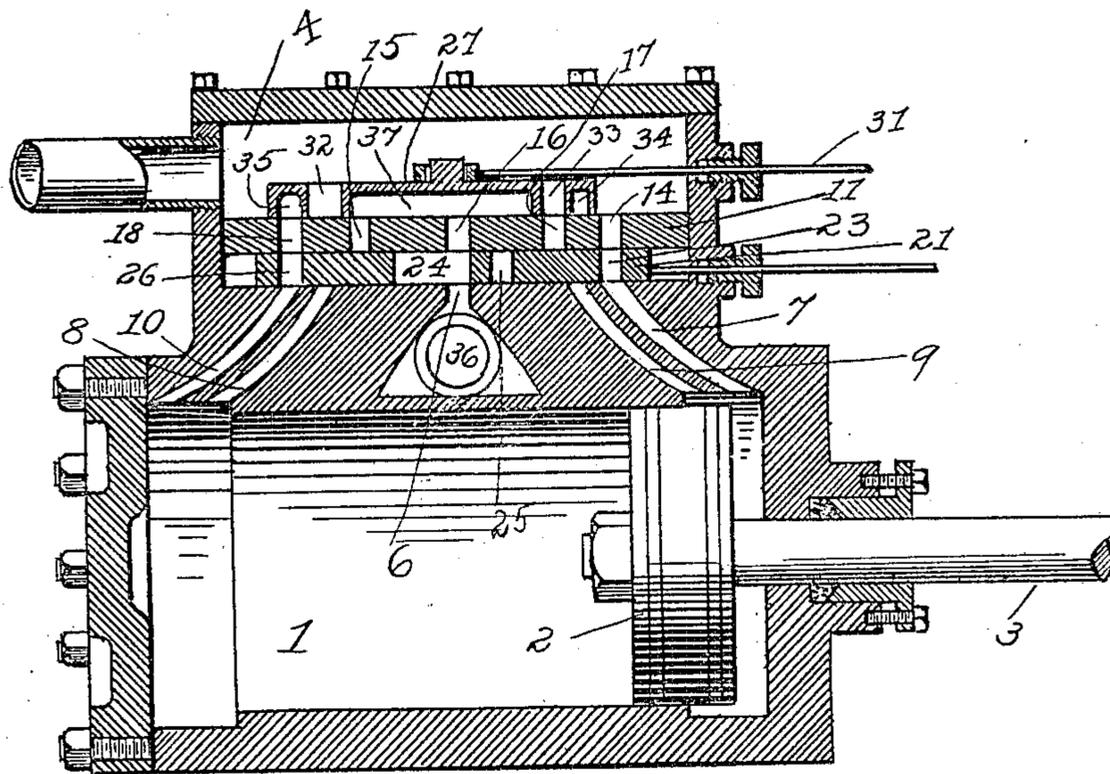
B. SMARTT.  
REVERSING VALVE.  
APPLICATION FILED DEC. 28, 1905.

2 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2.*



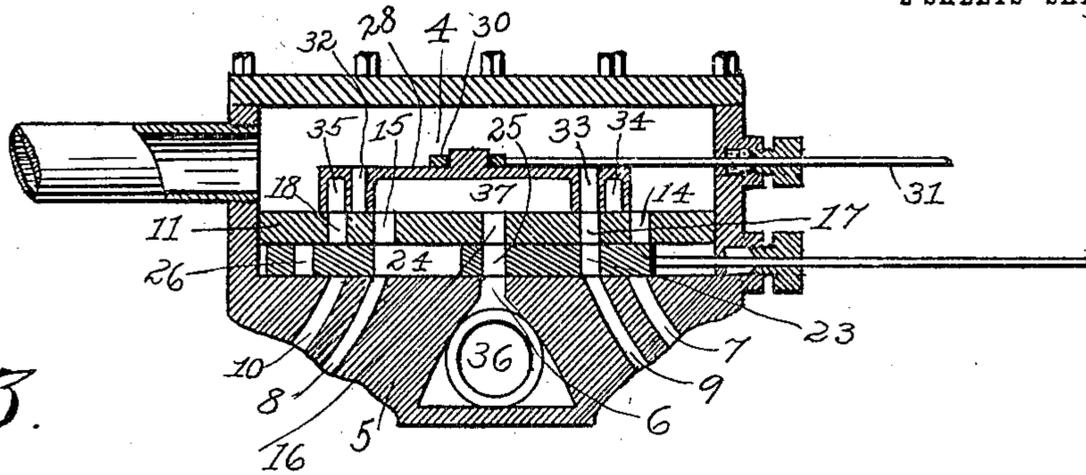
Witnesses  
*Philip Ferrell*  
*E. J. Braudenburg*

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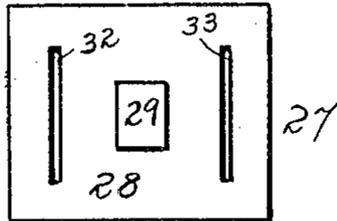
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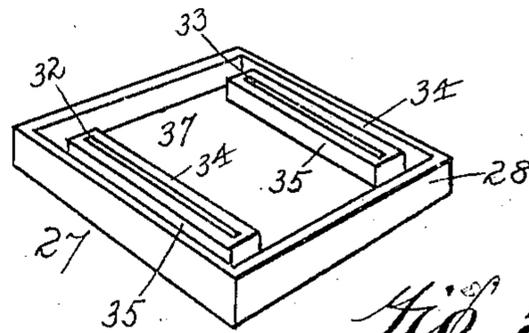
2 SHEETS—SHEET 2.



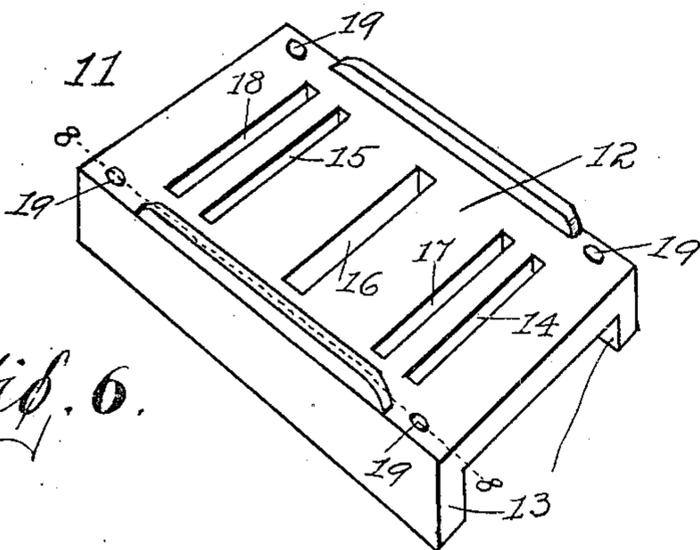
*Fig. 3.*



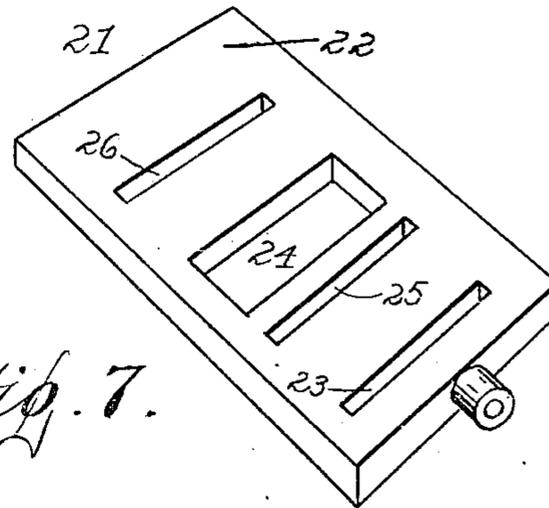
*Fig. 4.*



*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



*Fig. 8.*

Witnesses

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By

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# UNITED STATES PATENT OFFICE.

BRINAY SMARTT, OF NASHVILLE, TENNESSEE, ASSIGNOR TO THE SMARTT INVENTING & MANUFACTURING COMPANY, A CORPORATION OF TENNESSEE.

## REVERSING-VALVE.

No. 837,427.

Specification of Letters Patent.

Patented Dec. 4, 1906.

Application filed December 28, 1905. Serial No. 293,694.

*To all whom it may concern:*

Be it known that I, BRINAY SMARTT, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Reversing-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of my invention is generally the provision of a reversing-valve device designed particularly for locomotive-engines, which shall be simple in construction and exceedingly reliable and positive in its action. I do not confine my invention to application with locomotive-engines, as it may be employed in many other kinds of machinery, wherever its use may be efficacious—for instance, in stationary engines, steamboat-engines, steamship-engines, war-ship engines, automobile-engines, &c.

More specifically, the object is by the employment of my peculiarly-constructed reversing-valve with a short lever and intermediate connections to obviate the employment of the usual link motion. Thus in a locomotive the operation of my reversing-valve device will be exceedingly easy as compared with the customary link arrangement, as the reversing-valve is with greatest facility and ease operated by a small lever (which may be about the size of the ordinary throttle-lever) conveniently located in the locomotive-cab. By my invention a cumbersome six-foot lever, say, is supplanted by a small easily-operated lever, so that at the same time an engineer may operate the reversing-valve lever with one hand and the throttle-lever with the other hand, all as shown and described in my patent, No. 799,498, September 12, 1905.

As a matter of further and specific improvement I so construct the reversing-valve relative to the other parts of the mechanism of my device that it may entirely cut off the steam from the cylinder when desired, thus taking the place and performing the function of the throttle when necessary.

The object is, finally, to provide great freedom of passage of steam, both entering and exhausting to lessen friction, and to obviate possibility of binding of working parts.

With these objects in view and others ap-

pearing as the specification proceeds my invention comprehends the novel construction, combination, and arrangement of parts of a device characterized by my invention, as hereinafter fully described in the specification, summed up in the claims, and illustrated in the drawings.

In the accompanying drawings, Figure 1 is a central vertical longitudinal section of the steam-chest and underlying cylinder, displaying the relation of the steam-valve and the reversing-valve, the steam-valve being at one extreme of its range of movement. Fig. 2 is a like view, the steam-valve being at the other extreme of its range of movement. Fig. 3 is a view similar to Fig. 1 with the reversing-valve moved to effect reversing of the direction of movement of the engine. Fig. 4 is a detail top plan view of the steam-valve. Fig. 5 is a detail under plan view of the steam-valve. Fig. 6 is a detail perspective view of the steam-valve seat. Fig. 7 is a detail perspective view of the reversing-valve. Fig. 8 is a cross-section on line 8 8, Fig. 6.

Referring now in detail to the drawings, 1 designates a cylinder with a piston 2 and connected piston-rod 3 working therein. Above the cylinder and connected therewith in any suitable manner is a steam-chest 4. In the wall or partition 5, separating the steam-chest and underlying cylinder, I form a central exhaust-port 6 and on opposite sides thereof two pairs of ports 7 8 and 9 10, each pair leading to opposite ends of the cylinder, though the ports 8 and 9 may merge, as shown in dotted lines in Fig. 1, at any suitable point into the ports 10 and 7, respectively, and each pair of said two pairs of ports would in this instance have a common exit or outlet into the steam-cylinder 1.

Located in the steam-chest 4 and supported in contact with the wall 5 is my peculiarly-constructed removable steam-valve seat (designated generally by 11, Fig. 6) and comprising a substantially oblong-shaped plate 12, having flanges or downturned longitudinal edges 13 13 and having five transverse slots or ports 14, 15, 16, 17, and 18, port 16 constituting the exhaust-passage. While my steam-valve seat may be formed as a "floating" seat, (that is, entirely unattached to any part of the device,) I have in this instance shown the same as removably secured to the wall 5 by screws 19, and dis-

posed between the flanges 13 13 and the top of wall 5 and surrounding the lower projecting portion of the shanks of the screws may be what I term "balance-springs" 20, being  
 5 spiral coils exerting upward pressure or tension on the steam-valve seat 11, for a purpose presently appearing. Also located in the chest 4 and supported in contact with the wall 5 and working under and guided by the  
 10 flanges of the steam-valve seat 11 is my peculiarly-constructed reversing-valve (designated generally by 21, Fig. 7) and comprising, preferably, an oblong-shaped plate 22, having four ports or slots 23, 24, 25, and 26,  
 15 port 24 normally constituting the exhaust-passage and being, as shown, much larger than the other ports to facilitate passage of exhausting-steam. When the reversing-valve 21 is actuated, however, port 25 con-  
 20 stitutes the exhaust.

The openings for passage of steam are so arranged, as shown, that when the reversing-valve 21 is at a point in the middle of its range of movement from one end of the  
 25 steam-chest to the other all ports in the steam-valve seat 11 are blanked, thus effectively cutting off steam from the cylinder, wherefore my reversing-valve may be used instead and to perform the function of the  
 30 throttle when necessary or desired, as in the case of an emergency and the throttle refusing to work.

Adapted for reciprocatory movement on the steam-valve seat is my peculiarly-formed  
 35 steam-valve (designated generally by 27, Fig. 5) and desirably comprising a substantially square plate 28, provided, preferably, with a top knob or projection 29, adapted to be engaged by a removable collar 30 for re-  
 40 movable engagement with the steam-valve propelling or actuating stem 31 and with two transverse slots or ports 32 33, disposed near the ends of the valve. My steam-valve  
 45 is constructed hollow, with the exception of walls 34 and 35, surrounding the ports 32 and 33 and being of the same depth as the steam-valve, and by thus peculiarly constructing the valve I get great space for exhausting  
 50 steam, thus largely reducing friction. It will be noticed that the walls 32 and 33 form channels 34 and 35, communicating with the larger space or chamber 37 of the hollow valve.

Any well-known or desired intermediate  
 55 mechanisms for connecting up the steam-valve with the eccentrics on the axles of the driving-wheels and for effecting movement of the reversing-valve may be utilized; but my preferred and improved forms of mechan-  
 60 isms for accomplishing these results are fully disclosed in my patent above-mentioned, and repetition thereof here is deemed unnecessary.

It will be noted that the balance-springs 20  
 65 prevent any possible "sticking" or binding

of the reversing-valve, which might otherwise occur, and in use the steam-valve seat may be screwed down closer or adjusted as desired, all as the exigencies of the particular  
 70 situation may require.

*The operation of the device.*—In the position of the parts of the device shown in Fig. 1 the steam-valve is just beyond port 18 in the steam-valve seat, and steam enters directly  
 75 through this port 18 and through alining port 26 in the reversing-valve beneath and into registering port or passage 10 in the division-wall, from whence it enters the cylinder at the right-hand end thereof, forcing the piston  
 80 forward. This movement of the piston forces exhausting steam up through port or passage 7 at the left-hand end of the cylinder through alining port 23 in the reversing-valve and through registering port 14 in the steam-  
 85 valve seat into channel 34, whence it escapes to the larger chamber 37 of the steam-valve and into the exhaust or central port 16 of the steam-valve seat, thence through large ex-  
 90 haust-port 24 in the reversing-valve into exhaust-port 6 in the division-wall and through exhaust-chamber 36, leading to the smoke-stack of the engine. The eccentrics on the axles of the driving-wheels then cause the steam-valve to move to the position shown  
 95 in Fig. 2, thus bringing the valve just beyond the port 14 in the steam-valve seat. Then the entering steam passes directly through said port 14, through alining port 23 in the re-  
 100 versing-valve, and through registering port or passage 7 in the division-wall, and out into the forward or right-hand end of the cylinder, forcing the piston backward. The ex-  
 105 hausting steam is thereby caused to pass up through the port or passage 10 at the extreme right-hand end of the cylinder into the alining port 26 in the reversing-valve, into registering port 18 of the steam-valve seat, thence into the channel 35 of the hollow  
 110 steam-valve, communicating with the larger chamber 37 thereof, the exhausting steam thus escaping to and through central ex-  
 115 haust-port 16 of the steam-valve seat and through the large registering exhaust-port 24 of the reversing-valve, into exhaust-port 6 in the division-wall, and through exhaust-chamber 36, leading to the smoke-stack of the engine.

Suppose it be desired to reverse the direc-  
 120 tion of movement of the engine. To effect this result, the reversing-valve is moved forward to the position shown in Fig. 3, thus blanking the ports 14 and 18 of the steam-  
 125 valve seat. In this position of the reversing-valve the ports 32 and 33 of the steam-valve, (not hitherto used,) the ports 15 and 17 of the steam-valve seat, (not hitherto used,) and the ports 8 and 9 in the division-wall (not hitherto used) come into play—that is to say the entering steam passes through the port  
 130 33, through alining port 17 of the steam-

valve seat, through registering port 26 of the reversing-valve, and through the port or passage 9 in the division-wall leading to the right-hand end of the cylinder. This forces  
 5 the piston forward, and the exhausting steam is thereby caused to pass up through the port or passage 8 in the division-wall into the large alining port 24 in the reversing-valve,  
 10 into registering port 15 in the steam-valve seat, thence into the large chamber 37 of the hollow steam-valve, whence it passes to and through the exhaust-port 16 in the steam-valve seat, communicating with the smoke-stack of the engine.

15 Various slight modifications of detail of my invention not embodying a departure from the spirit thereof fall strictly within the scope and purview of my invention.

20 Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a cylinder and a steam-chest, of a steam-valve seat within the steam-chest and provided with a central exhaust-port and with two pairs of ports, one  
 25 pair on each side of said central exhaust-port, a normally stationary reversing-valve disposed beneath the steam-valve seat and provided with ports adapted to register simultaneously with said central exhaust-port  
 30 and with one port in each said pair of ports, the reversing-valve, upon movement, being constructed simultaneously to blank all but the central exhaust-port and simultaneously  
 35 to bring ports thereof into register with the remaining port in each said pair of ports, and a steam-valve on the steam-valve seat constructed of an area to embrace, in one position thereof, all ports in the steam-valve seat  
 40 except one port therein registering with a port in the reversing-valve, and constructed, upon movement, to embrace and blank said excepted port and to traverse and clear another port registering with a port in the re-  
 45 versing-valve; said steam-valve being formed with two ports or elongated openings cut transversely therethrough and adapted, upon movement of the reversing-valve, to open up communication for entering steam through  
 50 one of said ports and a registering port in the steam-valve seat and the reversing-valve respectively, and, upon movement of said steam-valve, to blank said open port and to bring the other port of the steam-valve into  
 55 register with another port in the steam-valve seat registering with a port in the reversing-valve; said steam-valve being excavated on its under surface so as to form, with the exception of a wall around each port, an en-  
 60 tirely hollow valve.

2. The combination with a cylinder and a steam-chest, of a steam-valve seat within the steam-chest and provided with a central exhaust-port and with two pairs of ports, one  
 65 pair on each side of said central exhaust-port,

a normally stationary reversing-valve dis-  
 posed beneath the steam-valve seat and pro-  
 vided with ports adapted to register simulta-  
 neously with said central exhaust-port and  
 with one port in each said pair of ports, the  
 70 reversing-valve, upon movement, being con-  
 structed simultaneously to blank all but the  
 central exhaust-port and simultaneously to  
 bring ports thereof into register with the re-  
 maining port in each said pair of ports, and a  
 75 steam-valve on the steam-valve seat con-  
 structed of an area to embrace, in one posi-  
 tion thereof, all ports in the steam-valve seat  
 except one port therein registering with a  
 port in the reversing-valve, and constructed,  
 80 upon movement, to embrace and blank said  
 excepted port and to traverse and clear an-  
 other port registering with a port in the re-  
 versing-valve; said steam-valve being formed  
 with two ports or elongated openings cut  
 85 transversely therethrough and adapted, upon  
 movement of the reversing-valve, to open up  
 communication for entering steam through  
 one of its said two ports and a registering  
 port in the steam-valve seat and in the re-  
 90 versing-valve respectively, and, upon move-  
 ment of said steam-valve, to blank said open  
 port and to bring the other port of the steam-  
 valve into register with another port in the  
 steam-valve seat registering with a port in  
 95 the reversing-valve, said steam-valve being  
 excavated on its under surface so as to form,  
 with the exception of a wall around each  
 port, an entirely hollow valve.

3. The combination with a cylinder and a  
 100 steam-chest, of a steam-valve seat within the  
 steam-chest and provided with a central ex-  
 haust-port and with two pairs of ports, one  
 pair on each side of said central exhaust-port,  
 105 springs interposed between the steam-valve  
 seat and the bottom of the steam-chest and  
 exerting upward pressure on said steam-valve  
 seat, a normally stationary reversing-valve  
 disposed beneath the steam-valve seat and  
 provided with ports adapted to register simul-  
 110 taneously with said central exhaust-port and  
 with one port in each said pair of ports, the  
 reversing-valve, upon movement, being con-  
 structed simultaneously to blank all but the  
 central exhaust-port and simultaneously to  
 115 bring ports thereof into register with the re-  
 maining port in each said pair of ports, and a  
 steam-valve on the steam-valve seat con-  
 structed of an area to embrace, in one position  
 thereof, all ports in the steam-valve seat ex-  
 120 cept one port therein registering with a port  
 in the reversing-valve, and constructed upon  
 movement, to embrace and blank said ex-  
 cepted port and to traverse and clear another  
 port registering with a port in the reversing-  
 125 valve.

4. The combination with a cylinder and a  
 steam-chest, of a removable steam-valve seat  
 within the steam-chest and provided with a  
 central exhaust-port and with two pairs of  
 130

ports, one pair on each side of said central exhaust-port, means for securing said removable steam-valve seat to the steam-chest and projecting beyond the bottom of the steam-valve seat, springs interposed between the steam-valve seat and the bottom of the steam-chest and surrounding the projecting portion of said securing means and exerting upward tension on the steam-valve seat, a normally stationary reversing-valve disposed beneath the steam-valve seat and provided with ports adapted to register simultaneously with said central exhaust-port and with one port in each said pair of ports, the reversing-valve, upon movement, being constructed simultaneously to blank all but the central exhaust-port and simultaneously to bring ports thereof into register with the remaining port in each said pair of ports, and a steam-valve on the steam-valve seat constructed of an area to embrace, in one position thereof, all ports in the steam-valve seat except one port therein registering with a port in the reversing-valve, and constructed, upon movement, to embrace and blank said excepted port and to traverse and clear another port registering with a port in the reversing-valve.

5. The combination with a cylinder and a steam-chest, of a steam-valve seat within the steam-chest and provided with downturned supporting-flanges and with a central exhaust-port and with two pairs of ports, one

pair on each side of said central exhaust-port, means passing through the supporting-flanges for securing the steam-valve seat to the steam-chest, springs interposed between the flanges and the bottom of the steam-chest and surrounding the projecting portion of said securing means and exerting upward tension on the steam-valve seat, a normally stationary reversing-valve disposed beneath the steam-valve seat and provided with ports adapted to register simultaneously with said central exhaust-port and with one port in each said pair of ports, the reversing-valve, upon movement, being constructed simultaneously to blank all said ports but the central exhaust-port and simultaneously to bring ports thereof into register with the remaining port in each said pair of ports, and a steam-valve on the steam-valve seat constructed of an area to embrace, in one position thereof, all ports in the steam-valve seat except one port therein registering with a port in the reversing-valve, and constructed, upon movement, to embrace and blank said excepted port and to traverse and clear another port registering with a port in the reversing-valve.

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

BRINAY SMARTT.

Witnesses:

F. M. STEGER,

WM. A. CROSTHWAIT.