H. L. HENSZEY.

THROTTLE VALVE.

APPLICATION FILED JULY 7, 1914.

1,167,300.

Patented Jan. 4, 1916.

4 SHEETS—SHEET 1.

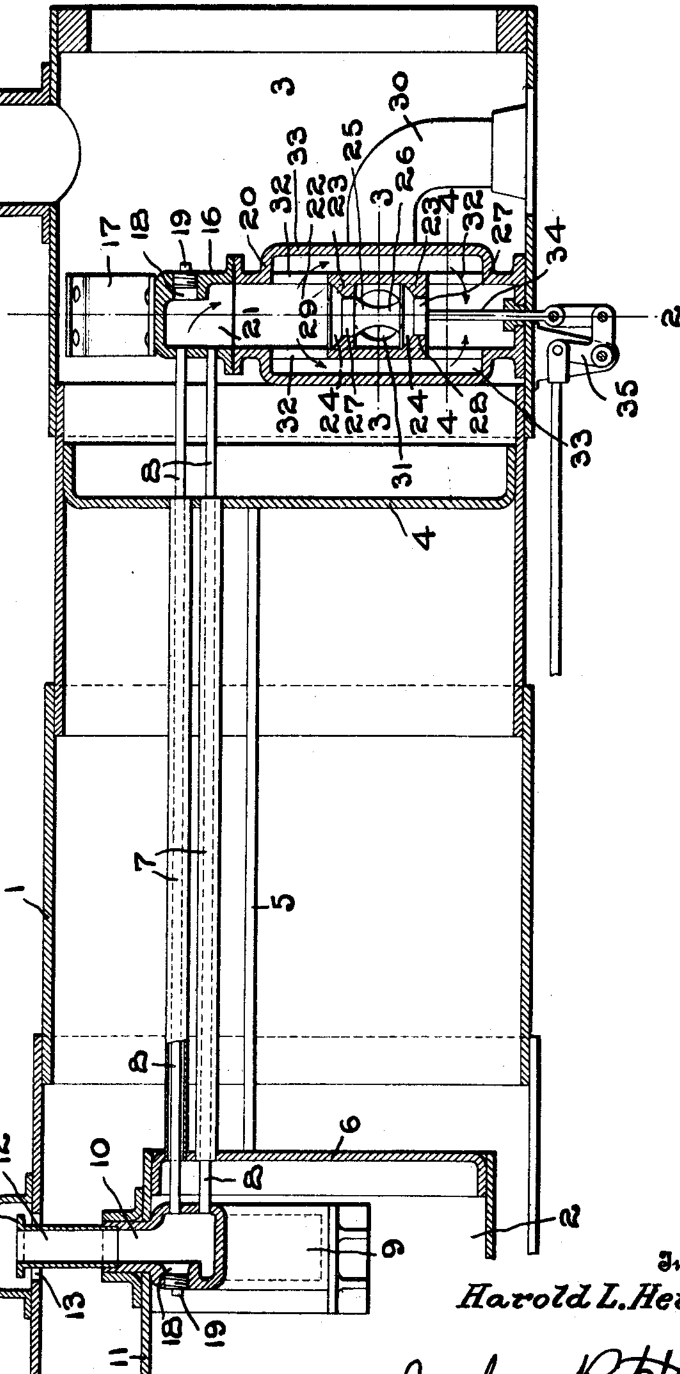

Fig. 1.

Witnesses

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4 SHEETS—SHEET 2.

FIG-2.

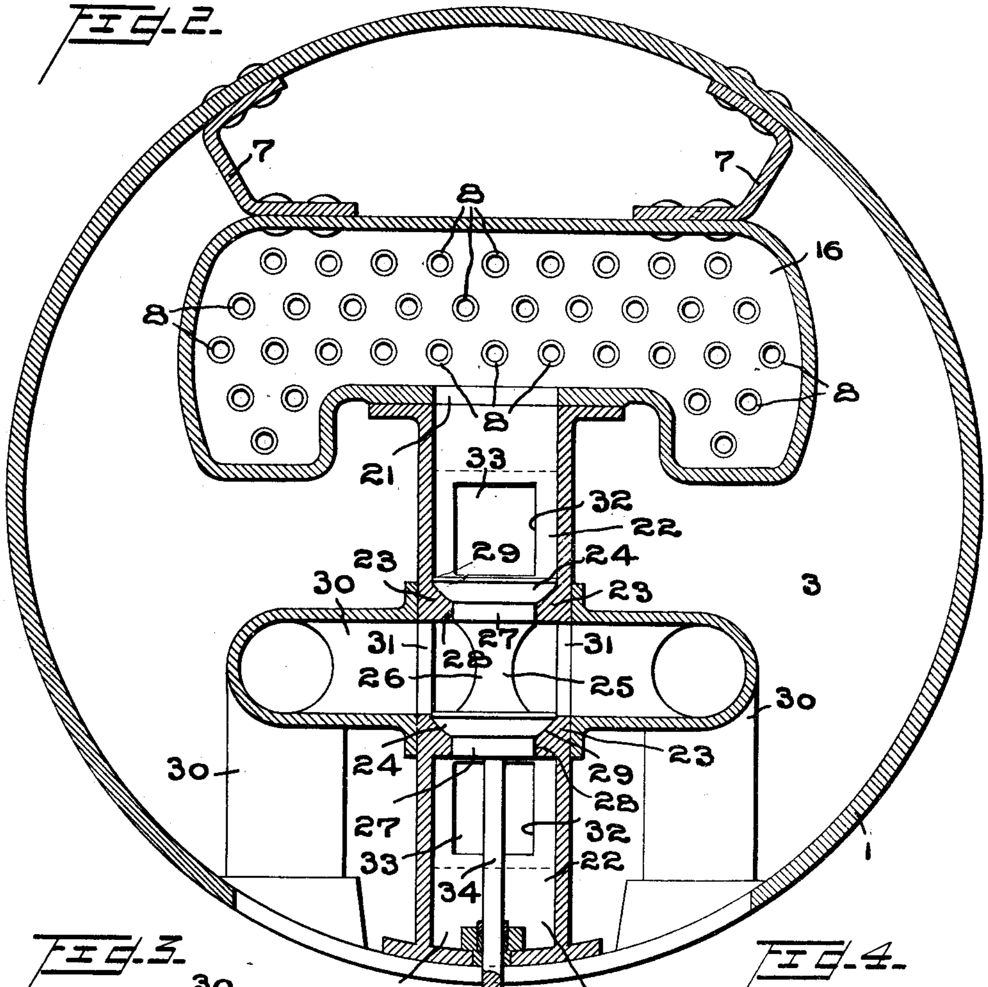


FIG-3.

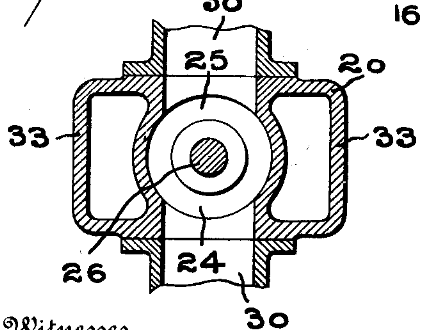
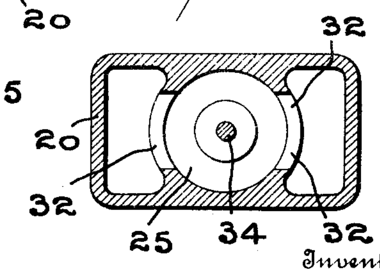


FIG-4.



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4 SHEETS—SHEET 3.

FIG-5.

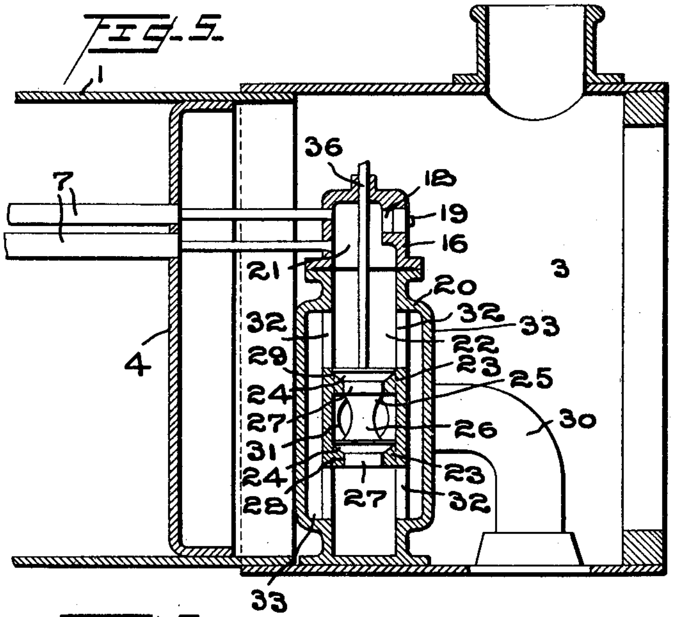


FIG-6.

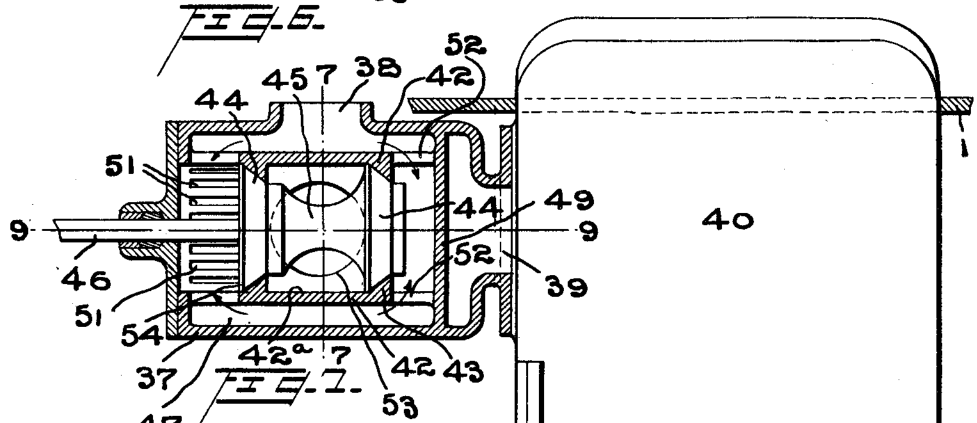
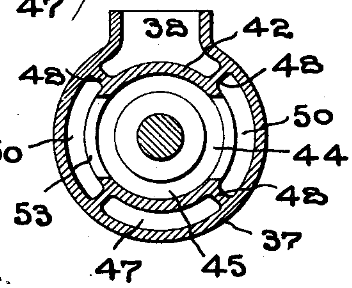


FIG-7.



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4 SHEETS—SHEET 4.

FIG. 8.

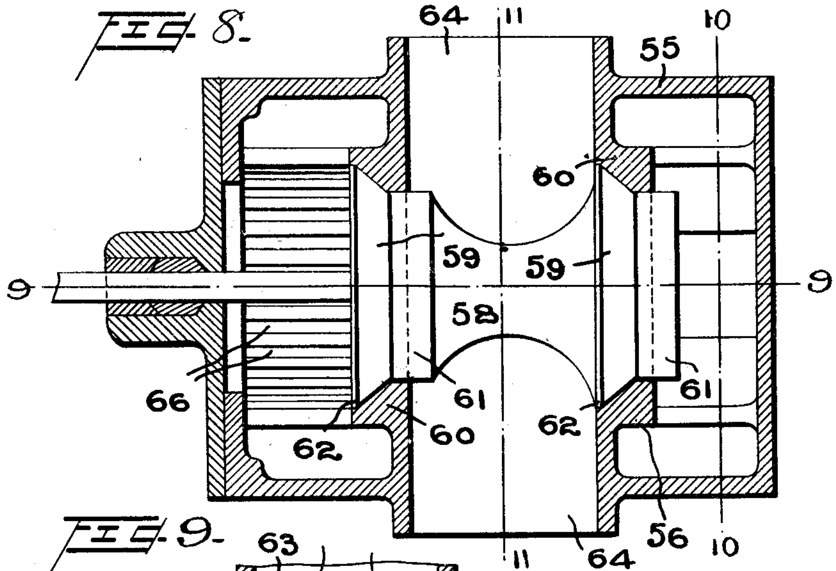
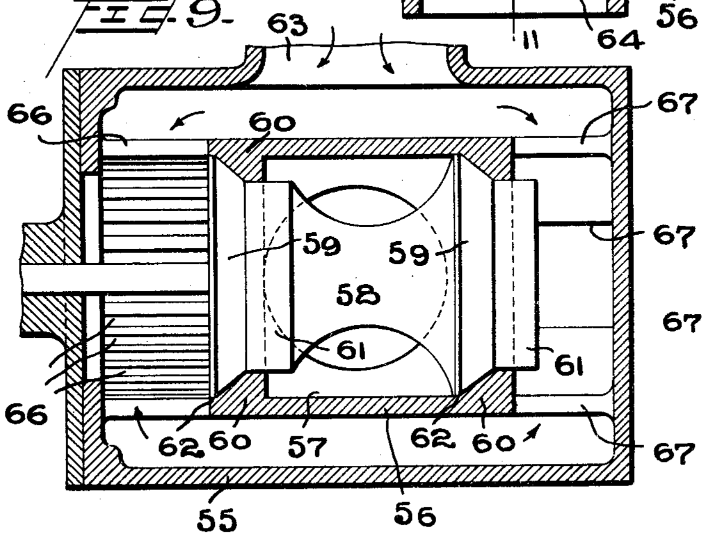


FIG. 9.



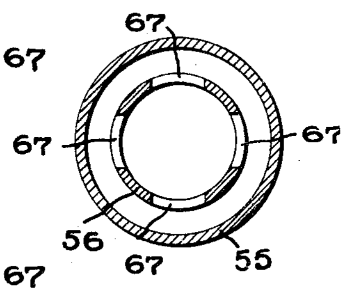
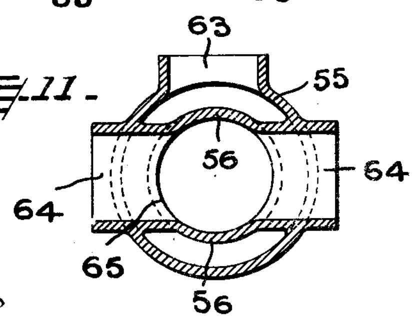


FIG. 10.

FIG. 11.



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UNITED STATES PATENT OFFICE.

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THROTTLE-VALVE.

1,167,300. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed July 7, 1914. Serial No. 849,380.

To all whom it may concern:

Be it known that I, Harold L. Henszey, a citizen of the United States, residing at Haddonfield, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Throttle-Valves, of which the following is a specification.

My invention relates to improvements in throttle valves, the object of the invention being to provide improved throttling means either in the smoke box or outside of the smoke box in proximity to the engine cylinders, whereby the superheater is maintained full of steam at all times whether the engine be running or standing stationary.

A further object is to provide an improved construction of throttle valve and casing communicating directly with the superheater, and which receives a uniform pressure of steam at both sides or ends of the valve, so that the valve is nicely balanced and can be easily and quickly opened to any degree desired.

With these and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts as will be more fully hereinafter described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a fragmentary view in vertical longitudinal section illustrating a modern type of locomotive boiler equipped with my improved superheater and throttle valve. Fig. 2 is a view in transverse section on an enlarged scale on the line 2—2 of Fig. 1. Fig. 3 is a similar view in horizontal section on the line 3—3 of Fig. 1. Fig. 4 is a view in horizontal section on the line 4—4 of Fig. 1. Fig. 5 is a fragmentary view in vertical section illustrating a modification in which the throttle valve is operated by a rod extending upwardly and located within the smoke box. Fig. 6 is a view partly in elevation and partly in vertical longitudinal section illustrating a modified form of throttle valve and showing its connection with the steam cylinder. Fig. 7 is a view in transverse section on the line 7—7 of Fig. 6. Fig. 8 is a view in longitudinal horizontal section illustrating a modified form of horizontally positioned throttle valve and casing therefor. Fig. 9 is a view in vertical longitudinal section on the line 9—9 of Fig. 8. Fig. 10 is a view in vertical transverse section on a reduced scale on the line 10—10 of Fig. 8. Fig. 11 is a view in vertical transverse section on a reduced scale on the line 11—11 of Fig. 8.

1 represents the shell of a locomotive boiler having the ordinary fire box 2 at its rear end, and the smoke box 3 at its forward end.

At the rear of the smoke box, the ordinary front tube sheet 4 is located, and the ordinary fire tubes 5 connect the same with the rear tube sheet 6 at the forward end of the fire box. Certain of the fire tubes at the upper portion of the boiler are appreciably larger than the others, and I have given these larger fire tubes the reference numeral 7, and it is to be understood they are of a sufficient size to accommodate tubes 8 of my improved superheater which extend entirely through them, and receive the direct heat in its passage through the fire tubes 7.

The tubes 8, at their rear ends, connect with a header 9 secured within the fire box 2, and having an inlet 10 projecting through the crown sheet 11 of the fire box and communicating with an inlet pipe 12. This inlet pipe 12 extends through an opening 13 in the top of shell 1, and terminates in a relatively small dome 14.

The upper end of inlet pipe 12 is provided with an annular flange 15 which is of a diameter approximating the same diameter as the opening 13 so as to prevent any water from the boiler entering the inlet pipe 12, and thereby maintaining the steam in the superheater in a dry condition.

The tubes 8, at their forward ends, communicate with a header 16 supported in the fire box 3 by metal straps 17 secured to the shell 1 and header 16 respectively. These headers 9 and 16 are provided in their walls opposite the walls in which the tubes 8 are secured, with relatively large openings 18 normally closed by plugs 19. These openings 18 facilitate the entrance of a tool to secure the tubes 8 to the headers and also permit the tubes 8 to be cleaned whenever desired or to be removed and replaced without dismantling the superheater.

The headers 9 and 16 are of cast metal, and are of the same shape in cross section, attention being called particularly to Fig. 2 in which the front header 16 is shown in cross section. By reason of this shape, a large number of tubes 8 may be employed to maintain a relatively large quantity of steam in the superheater, giving free outlet of steam for all purposes. Furthermore, the shape of the headers permits their use without interfering with the draft, so that the boiler may operate with the maximum of efficiency.

Referring to Figs. 1, 2, 3, and 4, of the drawings, it will be noted that I provide a throttle valve casing 20 vertically positioned in the fire box supported at its lower end upon the shell 1, and at its upper end secured to the header 16 and communicating at its upper end with an opening 21 in the bottom of the header 16. The casing 20 is provided with a longitudinal bore 22 having a pair of valve seats 23 therein spaced apart and adapted to receive valve faces 24 on my improved throttle valve 25. The valve 25 is provided with an intermediate restricted portion 26 and with cylindrical portions 27 adjacent the valve faces 24. These cylindrical portions extend through the openings 28 adjacent the valve seats and said valve adjacent its seats is provided with cylindrical bearing surfaces 29 which snugly fit the bore 22 of the valve casing and guide the valve so that it operates as a piston having a pair of annular bearing surfaces which maintain the valve in proper relative position at all times, and insure the proper seating of the valve when moved to closed position.

Branch pipes 30 communicate with openings 31 in opposite sides of the valve casing, said openings being located between the valve seats 23 as clearly shown in Fig. 2.

The valve casing 20 is provided at front and rear with integral hollow enlargements 33 which constitute steam passages and which communicate with openings 32 in the valve casing above and below the valve when the latter is in normal closed position. These openings 32 are of the same size, so that an equal amount of steam finds free passage through them, and the steam is maintained in direct communication with both ends of the valve at all times, so that the valve can be easily opened and closed and gradually opened and closed so that the control of steam to the cylinders shall be perfectly under control at all times. The hollow enlargements 33 also insure a lining of live steam around the valve seats and valve when the engine is at a stand still as well as when running, so that the parts are protected from the intense heat of the fire box. The valve may be operated from below by means outside of the shell 1 or from within the shell.

In Figs. 1 and 2, I illustrate the valve as having a stem 34 extending through the bottom of the shell and connected to operating means 35 below. In Fig. 5, I illustrate the valve as provided with a stem 36 extending upwardly through the header 16 and adapted to be operated by any suitable means within the shell, hence the invention is not limited to the particular means or its location for moving the valve.

When the valve is moved longitudinally from its closed position, the steam will flow through both openings 28 and through the branch pipes 30, the direction of flow of steam being indicated clearly by the arrows, and pressure of steam is maintained uniformly upon all parts of the valve, so that it can be opened and closed at will.

In Figs. 6 and 7, I illustrate a modification in which the throttle valve casing 37 is supported in a horizontal position centrally below the fire box, and is provided at its top with a steam inlet 38 which is connected with the opening 21 of the header 16. I have not illustrated any particular connection between these parts, but it is to be understood that when this modification is employed, an ordinary straight pipe will be used as a connecting means in lieu of the valve casing described above in connection with the preferred form. The casing 37 is of general cylindrical form, and is provided at one end with an outlet 39 communicating with the steam cylinder 40 in which the steam divides and flows to the respective engine cylinders 41. The casing 37 is provided with an inner shell 42 having a longitudinal bore 42ᵃ, the latter provided with a pair of valve seats 43 spaced apart and adapted to be engaged by valve faces 44 on the valve 45, the latter having a stem 46 projecting through the end of the valve casing and adapted to be moved by any suitable operating mechanism (not shown). Around the outside of the longitudinal bore or inner shell of the valve casing, I provide an annular chamber 47 divided by longitudinal webs 48 into a plurality of passages, whereby the live steam is directed against both ends of the valve as will now be explained. The inner shell 42 is closed at a point removed from the outlet end of the valve casing by means of a partition 49 which extends from the top to the bottom of the casing as shown in Fig. 6. The longitudinal webs 48 extend from this partition 49 to segmental integral partitions or webs 50 at opposite sides of the valve casing, and extending around one fourth of the circumference of the shell. The shell 42, between the segmental partitions 50 and the outer end of the valve casing 37 is provided with a circular series of openings 51 through which the steam passes freely and bears against the one end of the valve 45. The shell 42, at top and bottom between the valve seat 43 and the partition wall 49, is provided with openings 52, so that the steam from inlet 38 has free access to the interior of the shell at its inner end and bears against the inner end of the valve 45. In other words, the steam enters at 38, flows in both directions and thence through the openings 51 and 52 into communication with the opposite ends of the valve. The bottom or lower portion of the valve casing also provides communication between the respective ends of the valve, so that the steam has a free passage all around the valve, but is excluded from outlet through the sides of the inner shell except when the valve is open. Outlets 53 are provided in the sides of the shell 42 through which the steam passes and then flows longitudinally through the valve casing between the inner shell and the outer wall, and is discharged through the outlet 39 in the end of the casing as above explained. The direction of the flow of steam is indicated by the arrows. With this form of my improved valve, I also provide annular bearing surfaces 54 adjacent both valve faces which fit the bore 42^a of the inner shell 42, and guide the valve in its longitudinal movement in opening and closing.

In the modification illustrated in Figs. 8, 9, 10 and 11, I employ a horizontally positioned valve casing 55 having an inner shell 56 with a longitudinal bore 57 and a valve 58, the latter corresponding in its construction with the valves above described. That is to say, it is provided with two valve faces 59 engaging valve seats 60, and has cylindrical enlargements 61 adjacent both valve faces, and annular bearing surfaces 62 fitting the bore 57. In this modified form of throttle valve construction, the steam enters an inlet 63 at the top of the valve casing, and when the valve is open, passes through outlets 64 in opposite sides of the valve casing. These outlets 64 extend entirely through the outer casing and communicate directly with openings 63 in the inner shell 56, hence these outlets or rather the tubes forming the outlets operate to prevent the steam from entering said outlets except through the inner shell, and this inner shell is open to communication with the live steam at both ends only. In other words, the inner shell is provided at both ends with a circular series of openings 66 and 67 respectively, the openings at one end being preferably smaller to insure a more efficient guide for the valve as will be readily understood. The steam following the direction of the arrows, enters at 63, then passes to both ends of the valve casing through the openings 66 and 67 in the inner shell and bears directly against the respective ends of the valve. When the valve is opened, the steam rushes into the intermediate portion of the shell from both directions and escapes through the outlets 64 to the ends of the cylinders.

Various other slight changes might be made in the general form and arrangement of parts described without departing from my invention, and hence I do not limit myself to the precise details set forth, but consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

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

1. In a throttle valve, the combination with a casing having a pair of valve seats therein, of a valve in the casing having a pair of cylindrical faces fitting the casing and guiding the valve, said valve having a pair of valve faces smaller than the said cylindrical guides and adapted to engage said valve seats in the casing, said casing having its wall hollow forming steam passages around the outside of the valve seats, and directing live steam against both ends of the valve in all positions of the valve, substantially as described.

2. In a throttle valve, the combination with a casing having a cylindrical bore, and a pair of valve seats therein, of a valve in the casing having a pair of valve faces adapted to engage the valve seats, said valve adjacent both faces having annular bearing surfaces constituting the greatest diameter of the valve, said bearing surfaces fitting the bore of the casing, said casing having its wall hollow forming steam passages around the outside of the valve seats, and directing live steam against both ends of the valve in all positions of the valve, substantially as described.

3. In a throttle valve, the combination with a casing, having a longitudinal bore with a pair of valve seats in the bore spaced apart, of a valve having two annular bearing surfaces fitting the bore, said valve having adjacent the bearing surfaces valve faces adapted to engage the valve seats, and cylindrical portions adapted to project through the valve seats, said casing having hollow enlargements at opposite sides communicating with the bore of the casing at opposite ends of the valve, whereby live steam is admitted to both ends of the valve in all positions of the valve, and said casing having outlets in opposite sides between the valve seats, substantially as described.

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

HAROLD L. HENSZEY.

Witnesses:
M. E. DITTUS,
CHAS. E. POTTS.