J. S. CHAMBERS.

THROTTLE VALVE.

APPLICATION FILED MAY 26, 1906.

952,510. Patented Mar. 22, 1910.

2 SHEETS—SHEET 1.

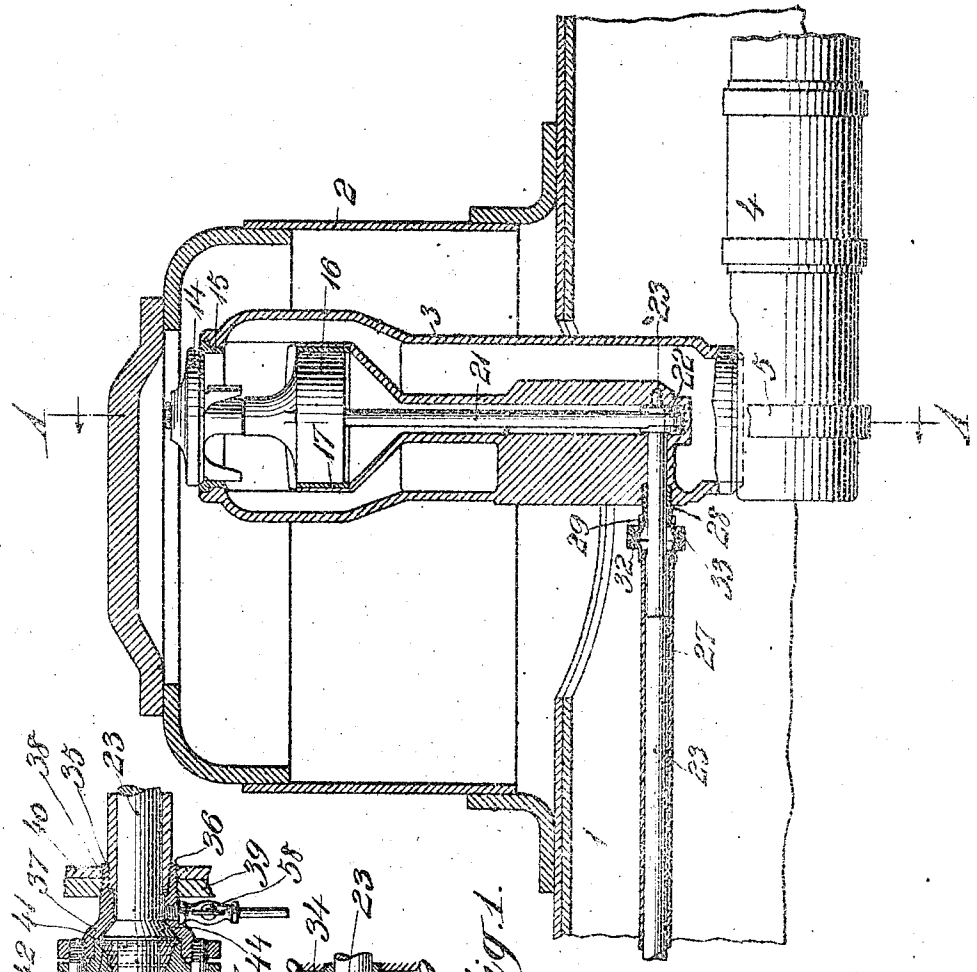


Fig. 1.

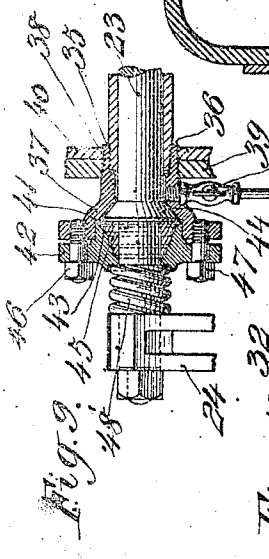


Fig. 2.

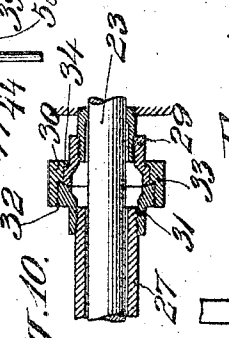
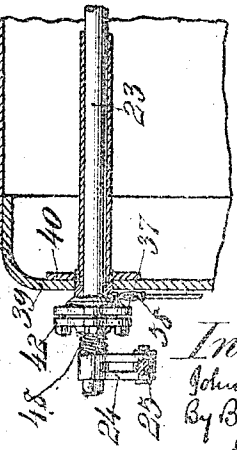


Fig. 10.



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2 SHEETS—SHEET 2

Fig. 5.

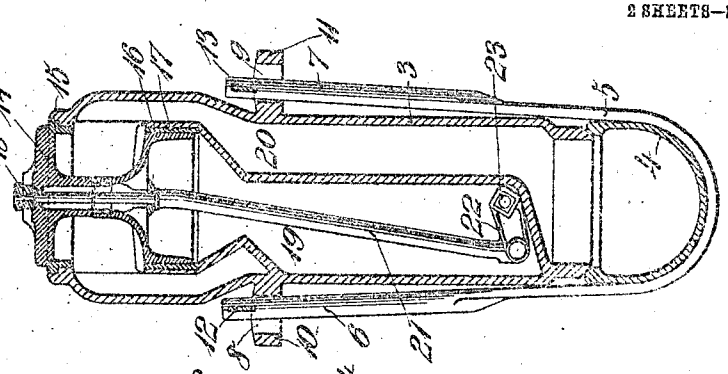


Fig. 6.

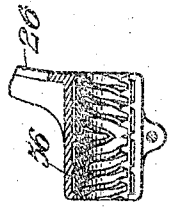


Fig. 7.

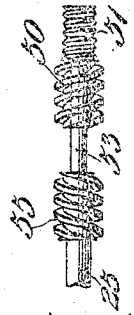


Fig. 8.

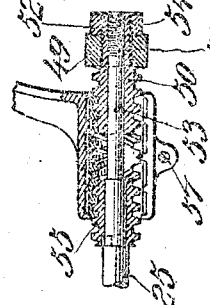


Fig. 4.

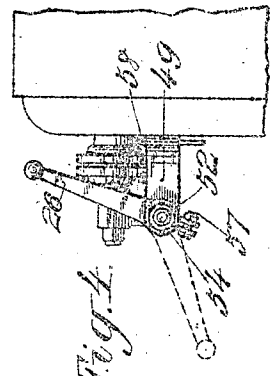
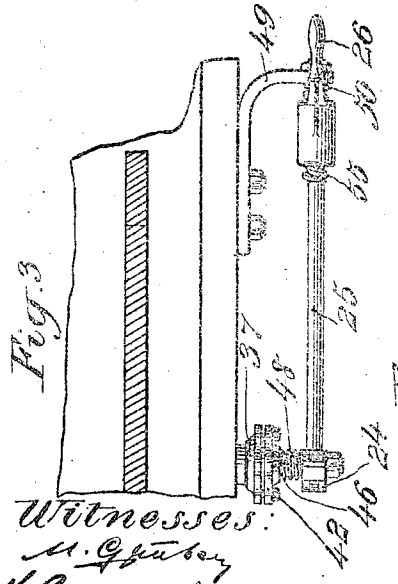


Fig. 3



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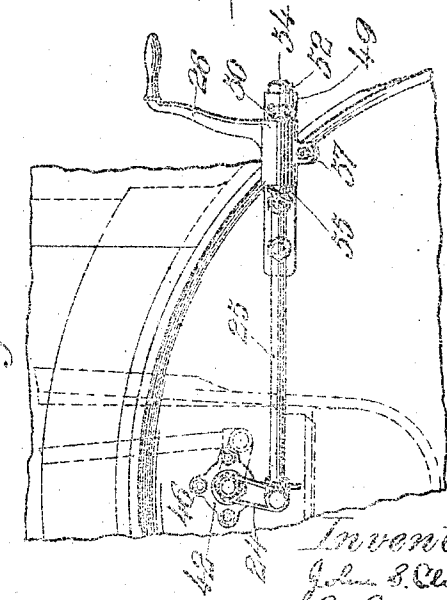

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UNITED STATES PATENT OFFICE.

JOHN S. CHAMBERS, OF ROCKY MOUNT, NORTH CAROLINA.

THROTTLE-VALVE.

952,510.

Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed May 26, 1909. Serial No. 498,462.

To all whom it may concern:

Be it known that I, JOHN S. CHAMBERS, a citizen of the United States, and resident of Rocky Mount, in the county of Edgecombe and State of North Carolina, have invented a new and useful Throttle-Valve, of which the following is a specification.

My invention relates to throttle valves and more particularly to means for operating the valve from the cab or back end of the locomotive boiler and for indicating accurately the extent of valve opening.

A practical embodiment of my invention is represented in the accompanying drawings in which,

Figure 1 is a longitudinal vertical section through a portion of a locomotive boiler steam dome and stand pipe, showing the arrangement of the valve operating means, Fig. 2 is a partial back end view of the boiler, showing that portion of the valve operating means which is exposed for manipulating the valve, Fig. 3 is a top plan view of the same, Fig. 4 is a side view of the same, Fig. 5 is a transverse vertical section through the stand pipe, in the plane of the line A—A of Fig. 1, Fig. 6 is a view in detail in longitudinal section of the hub of the operating crank, Fig. 7 is a view in detail of the right and left hand screws which coöperate with the hub of the operating crank, Fig. 8 is a similar view showing the hub of the crank and the right and left screws in coöperative relation to one another, Fig. 9 is an enlarged view in detail, showing in longitudinal section through the end stop for the rock shaft which transmits motion to the valve rod, and Fig. 10 is a similar view showing the coupling for securing the shaft casing to the stand pipe.

The boiler is denoted by 1, the steam dome by 2, the stand pipe by 3, and the steam pipe by 4.

My present invention provides for operating the valve in the stand pipe without making an opening in the wall of the steam dome. To this end the stand pipe 3 is supported on the steam pipe 4 and is held fast thereto in the present instance, by a strap 5 which passes around beneath the steam pipe 4 and up on opposite sides of the stand pipe 3, the branches 6 and 7 of the strap extending through perforations 8 and 9 in lugs 10 and 11 formed on the opposite sides of the stand pipe. Strain is exerted upon the strap to draw the steam pipe into steam-tight contact with the open lower end of the stand pipe by means of keys 12 and 13 passing through slots in the branches 6 and 7 and engaging the upper walls of the lugs 10 and 11.

The throttle valve is of a well known type, the upper section being denoted by 14 and arranged to seat on the valve seat 15 at the top of the stand pipe and the lower section, denoted by 16, being of the piston type and sliding within the valve seat 17. The lower section 16 telescopes on the reduced lower end of the section 14 and is permitted a slight movement relative to the section 14 before the section 14 is lifted, this preliminary movement serving to lift the small auxiliary valve 18 from its seat and permit steam to enter the interior chamber 19 within the stand pipe as well as beneath the valve section 16 to balance the valve before the section 14 is lifted to admit steam into the chamber 20 within the stand pipe and thence to the steam pipe 4. The valve rod 21 extends downwardly within the interior chamber 19 and is connected by a short crank 22 with a rock shaft 23 which extends horizontally through the wall of the stand pipe and rearwardly within the boiler 1, through the back end of the boiler where the said rock shaft is provided with a short crank 24 of the same length as the crank 22, the free end of the crank 24 being connected by a transverse operating rod 25 of the operating crank 26 as will hereinafter more particularly appear. The rock shaft 23, throughout that portion which extends along within the boiler 1, is housed steam-tight within a tubular casing 27. This casing 27 is coupled to the projecting end of a nipple 28 set in the wall of the stand pipe, the said coupling being located near the wall of the stand pipe where it may be manipulated through the top of the dome 2 when, for any cause, it may be desired to remove the stand pipe, without disturbing the shaft casing 27 at the back end of the boiler. The coupling in the present instance consists of a gland 29 screwed on to the hollow nipple 28, and provided with a shoulder 30, a gland 31 screwed on to the end of the casing 27 and provided with an enlarged screw-threaded portion 32 and a coupling nut 33 provided with an interior projecting flange 34 for engaging the shoulder 30 on

the gland 29, and thereby drawing the gland 31 into steam-tight contact with the gland 29, and at the same time closing the joint circumferentially between the two glands. The glands 29 and 31 are preferably provided with oblique engaging faces to produce a wedge-like joint between the two. The opposite end of the casing 27 is exteriorly screw-threaded, as shown at 35, and slightly tapered to engage the interior screw-thread 36 on the stem of the gland 37, the said stem of the gland being provided with an exterior screw-thread 38 for screwing the gland into the wall 39 at the back end of the boiler 1. An additional packing plate 40 rests in close contact with the interior face of the wall 39 to give additional support to the screw-threaded stem of the gland 37 and increase the extent of the joint to make it steam-tight.

It will be noted that the casing 27 is screwed within the stem of the gland 37, at the point where the stem of the gland is screwed into the wall 39 so that the wedging effect of the tapered screw will not spread the hollow stem of the gland, however tight it may wedge by screwing the gland in place. The gland 37 is provided with an interior shoulder 41 and the co-acting gland 42 is provided with a reduced and interiorly tapered extension 43 which telescopes within the gland 37. The rock shaft 33 is provided within the gland 37 with a tapered flange 44 which corresponds to the tapered interior of the gland 37 and within the coöperating gland 42 around the shaft 23 and against the face of the flange 44 there is located a Babbitt or other metal packing 45 which is forced against the flat face of the tapered flange 44 by the bolts 46 and 47 which force the gland 42 toward the gland 37. This metal packing 45 receives the endwise thrust of the shaft 23 when steam is admitted into the interior chamber 19 within the stand pipe, producing an effective and steam-tight end stop to the shaft, and to further hold the shaft 23 in contact with the stop 45, a coil spring 48 is introduced between the back of the gland 42 and the hub of the crank 24.

The operating rod 25, which is connected to the free end of the crank 24, is supported at its end opposite the crank 24, by a bracket 49 fastened to the end of the boiler. The bearing for the rod 25 is provided for by a hollow screw 50, provided with an extended exteriorly screw-threaded neck 51 which screws into the bracket 49 and receives on its outer end a clamp nut 52 to hold it in position. The operating rod 25 is provided with a reduced end 53 which passes longitudinally through the screw 50 and has a free longitudinally sliding movement within the screw 50. At its extreme outer end, the reduced portion 53 is provided with a series of annular grooves or marks 54 which are used to determine the amount of opening of the throttle valve, as will hereinafter appear. The operating rod 25 also has secured thereon a short screw 55, leaving a short distance between the two screws 55 and 50, the two screws 55 and 50 being the one right hand and the other left hand screw-threaded. The two screws 55 and 50 are engaged by the interiorly right and left hand screw threaded hub 56 of the operating crank 26. The hub 56 is here shown a split hub, the parts of which are drawn into operative engagement with the screws 55 and 50 by means of a bolt 57 passing through lugs on the hub, located on opposite sides of the slot.

In operation, when it is desired to open the throttle, the crank 26 is turned toward the direction shown in dotted lines Fig. 4, the result being to move the crank bodily toward the end of the bracket 49 by the engagement of its hub with the stationary screw 50, and thereby draw the screw 55 and operating rod 25 to the right, as the drawing is shown, and simultaneously therewith to draw the screw 55 and hence the operating rod 25, to the right, thereby rapidly sliding the rod 25 through the hollow stationary screw 50, causing its end to project beyond the outer face of the jam nut 52. The number of annular marks or grooves 54 which are brought into view beyond the outer face of the nut 52, will determine accurately the opening of the throttle valve, since the distance between two consecutive annular grooves or marks 54 is accurately made to correspond to a certain extent of opening of the valve; for instance, the distance between two consecutive grooves may indicate an opening of the throttle valve one-eighth of an inch. Therefore, if the operating crank 26 be turned until four of these grooves project, the throttle valve will be opened one-half inch. These figures are taken merely as illustrative, it being evident that the distance between two consecutive grooves may be made to represent any desired opening of the throttle.

The manner in which the screws 55 and 50 are secured and the manner in which they coöperate with the hub 56 of the operating crank cause the valve to open twice as rapidly for a given extent of movement of the operating rod as it would if a single screw were employed having the same pitch, since the operating crank moves bodily, drawing the operating rod with it, and at the same time causes the operating rod to longitudinally move in the same direction relative to the hub of the crank.

The rock shaft 23 may be withdrawn through the back end of the boiler without disturbing the casing and the valves may also be withdrawn from the top of the stand pipe through the top of the dome, without disturbing the casing, by sliding the

rock shaft out of engagement with the crank on the valve rod 21; and the stand pipe itself may be removed, without disturbing the casing, by withdrawing the shaft 23 and uncoupling the casing 27.

The structure admits of operating the auxiliary valve by operating means housed within the interior chamber within the stand pipe and within the steam-tight casing connecting this interior chamber with the back end of the boiler and the rock shaft which communicates motion from the operating rod to the valve rod may be removed if occasion requires while steam is on within the boiler.

A small drain and test valve 58 is conveniently set in the wall of the gland 37 at the back end of the boiler.

It is obvious that the wall of the stand pipe may be tapped for the shaft 23 and nipple 28, at a point higher than that shown, if it be desired to lower the stand pipe within the dome or to suit a lower dome, and that other changes might be resorted to without departing from the spirit and scope of my invention; hence I do not wish to limit myself strictly to the structure herein set forth, but

What I claim is:

1. In a locomotive boiler provided with a steam dome and stand pipe extending from a point within the boiler up into the steam dome, a steam conduit leading from the stand pipe, a throttle valve in the stand pipe, a rock shaft extending along within the boiler from within the stand pipe to the rear end of the boiler, a connection between the valve and the shaft within the stand pipe and means for operating the shaft at the rear end of the boiler.

2. In a locomotive boiler provided with a steam dome and a stand pipe extending from within the dome to a point within the body of the boiler, a steam-tight housing extending from the stand pipe along within the boiler to the rear head thereof, a throttle valve in the stand pipe, a rock shaft extending along within the housing, a valve rod connecting the valve with the shaft within the stand pipe and means for operating the shaft and hence the valve.

3. The combination with a locomotive boiler, its steam dome and stand pipe, of a throttle valve, a valve rod extending down within the stand pipe, a rock shaft extending from within the stand pipe through the back end of the boiler, an operating rod at the back end of the boiler and cranks connecting the rock shaft with the valve rod and operating rod.

4. The combination with a locomotive boiler, its steam dome, a stand pipe and a throttle valve, of a valve rod within the stand pipe, a rock shaft extending from within the stand pipe through the back end of the boiler, a housing for the rock shaft connected steam-tight to the stand pipe and back end of the boiler, a crank connecting the rock shaft with the valve rod and means at the back end of the boiler for operating the rock shaft.

5. The combination with a locomotive boiler, its steam dome, a stand pipe extending from within the boiler up into the steam dome and a throttle valve in the stand pipe, of a rock shaft extending from within the stand pipe through the back end of the boiler, a steam tight housing for the rock shaft extending from the stand pipe to the back end of the boiler and provided with a coupling near the stand pipe, means for connecting the rock shaft with the throttle valve and means for operating the rock shaft.

6. In a locomotive boiler, the combination with the stand pipe, the throttle valve therein and a rock shaft connected with the valve and extending from within the stand pipe through the back end of the boiler, of a steam tight tubular housing for the rock shaft within the boiler and an end stop for the rock shaft at the back end of the boiler to receive the thrust of the shaft when steam is admitted to the stand pipe.

7. In a locomotive boiler in which the throttle valve is operated by a rock shaft extending through the back end of the boiler, the combination with the rock shaft, of a tubular housing for the rock shaft within the boiler, a crank on the rock shaft at the back end of the boiler, an end stop for the rock shaft at the back end of the boiler and a spring cushion interposed between the end stop and crank.

8. In a locomotive boiler in which the throttle valve is operated by a rock shaft extending through the back end of the boiler, the combination with the rock shaft having a shoulder near its back end, of a gland secured to the boiler and adapted to receive the shouldered portion of the shaft, a second gland provided with bearing metal in position to engage the face of said shoulder and means for forcing the glands together to form an end stop for the shaft.

9. In a locomotive boiler in which the throttle valve is operated by a rock shaft extending to the back end of the boiler, the combination with the rock shaft and an operating rod connected with the rock shaft, of a screw on the rod and a nut provided with a crank and adapted to engage the screw to operate the rod and hence the shaft.

10. In a locomotive boiler in which the throttle valve is operated by a rod at the back end of the boiler through intermediate connections, the combination with the rod, of a stationary screw within which the rod is permitted to slide, a screw carried by the rod, the said screws having opposite pitches,

and a nut provided with threads of opposite pitches for simultaneously engaging the said screws to operate the rod.

11. In a locomotive boiler in which the throttle valve is operated by a rod at the back end of the boiler through intermediate connections, the combination with the rod, of a stationary screw within which the rod has a sliding movement, a screw carried by the rod, the said screws having opposite pitches, and a nut provided with an operating handle and having screw-threads of opposite pitches for simultaneously engaging the said screws, the said rod being provided with marks to indicate the extent of valve opening.

12. In a locomotive boiler in which the throttle valve is operated by a rod at the back end of the boiler through intermediate connections, the combination with the valve and rod, of means for moving the rod and marks on the rod arranged to coact with the valve to indicate the extent of valve opening.

13. In a locomotive boiler provided with a steam dome and stand pipe extending from a point within the boiler up into the steam dome, the stand pipe being provided with an interior chamber separated from the space within the stand pipe which communicates with the steam pipe, a steam-tight housing extending from said interior chamber to the back end of the boiler, a throttle valve, an auxiliary valve arranged to coöperate with the throttle valve and valve operating connections extending downwardly within said interior chamber and rearwardly along said steam-tight housing.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this twentieth day of May, 1909.

JOHN S. CHAMBERS.

Witnesses:
R. K. Rutledge,
John H. Painter.