F. H. CLARK & J. M. COFFEY.

THROTTLE VALVE.

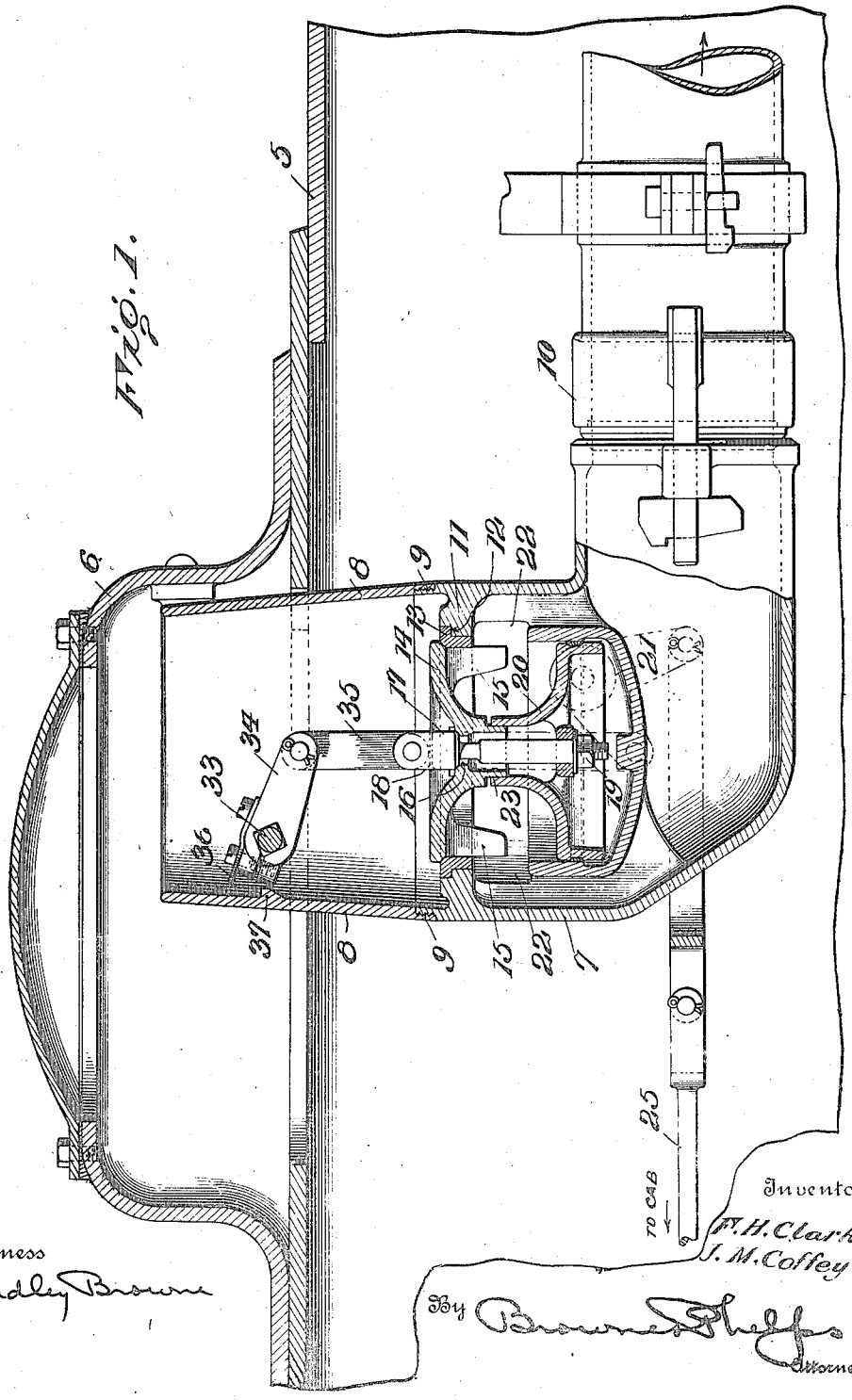
APPLICATION FILED MAY 19, 1916.

1,220,729.

Patented Mar. 27, 1917.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

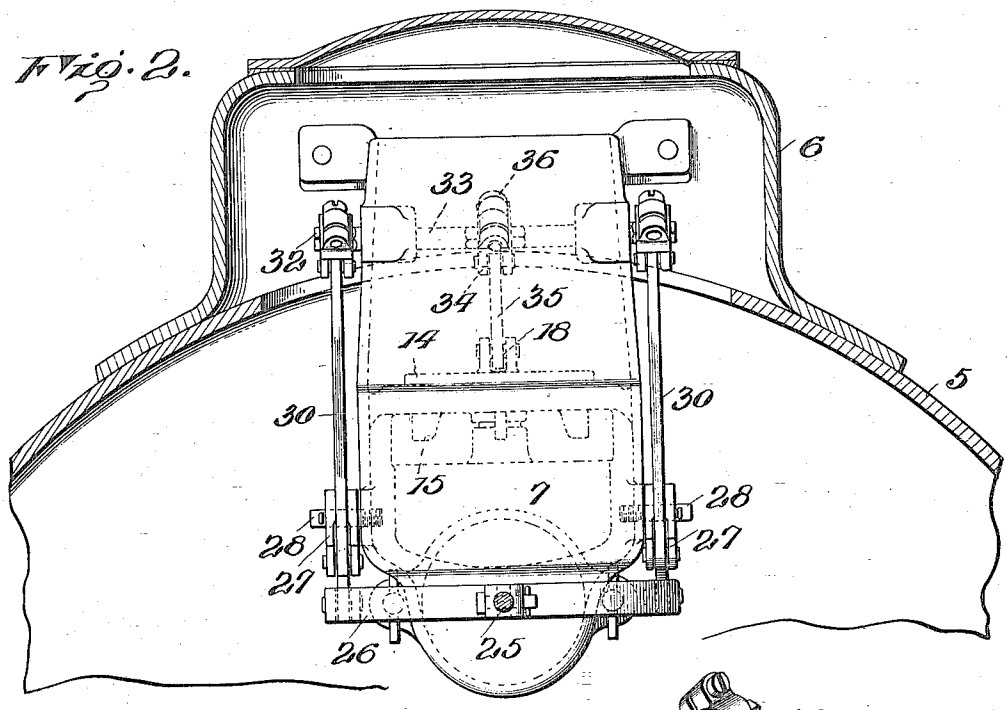
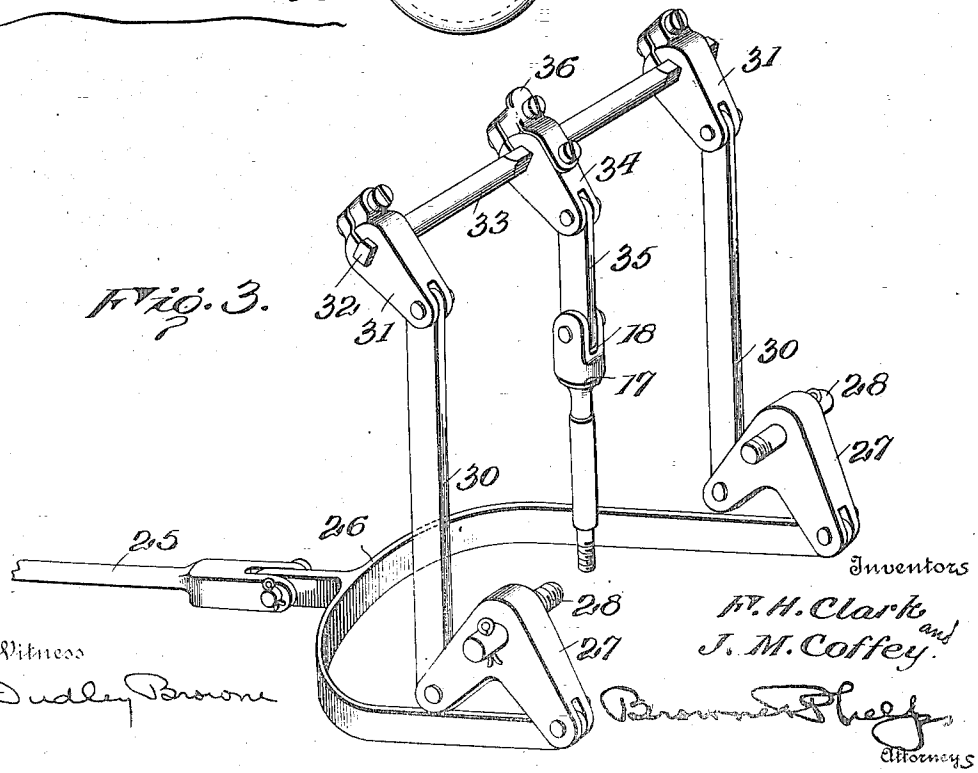


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANK H. CLARK AND JOSEPH M. COFFEY, OF NEW YORK, N. Y., ASSIGNORS TO CHAMBERS VALVE COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

THROTTLE-VALVE.

1,220,729. Specification of Letters Patent. Patented Mar. 27, 1917.

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To all whom it may concern:

Be it known that we, FRANK H. CLARK and JOSEPH M. COFFEY, citizens of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Throttle-Valves, of which the following is a specification.

This invention relates to throttle valves and more particularly to throttle valves adapted for use upon steam boilers of locomotive type.

One of the objects of the present invention is to provide an improved throttle valve which will be reliable and efficient in use and operation. A further object is to provide a simple and practical throttle valve, together with actuating means therefor, comprising relatively few parts, compactly arranged in the limited space provided therefor in the large high powered locomotives now in extensive use. A further object is to provide an improved throttle valve and actuating mechanism for locomotive boilers of the above character, in which the parts are more conveniently and safely positioned and arranged.

Other objects will be in part obvious from the annexed drawings and in part indicated in connection therewith by the following analysis of this invention.

This invention accordingly consists in the features of construction, combination of parts and in the unique relations of the members and in the relative proportioning and disposition thereof, all as more completely outlined herein.

To enable others skilled in the art so fully to comprehend the underlying features thereof that they may embody the same by the numerous modifications in structure and relation contemplated by this invention, drawings depicting a preferred form have been annexed as a part of this disclosure, and in such drawings like characters of reference denote corresponding parts throughout all the views.

Figure 1 is a longitudinal section of a portion of a locomotive boiler and throttle valve and actuating mechanism positioned therein;

Fig. 2 is a transverse sectional view of the locomotive boiler looking forward and showing the throttle valve and actuating mechanism in elevation;

Fig. 3 is a perspective view of part of the actuating mechanism.

Referring to these drawings in detail, and more particularly to Fig. 1, 5 denotes the boiler shell provided with a steam dome 6 of the usual construction. It may be noted however that in modern high powered locomotives the boiler has almost reached its maximum size, and its steam dome is consequently relatively small or short in height in order to keep the total height of the locomotive within necessary limits. Within the boiler and projecting upwardly into the steam dome 6 is an L-shaped member formed of a plurality of parts 7 and 8 connected by a joint 9 which will be hereinafter referred to as throttle box. The member 8 is open at the top to provide an inlet for the steam from the dome 6 and the opposite end of the part 7 is connected with dry pipe 10, leading eventually to the cylinders in the usual manner. This throttle box is formed of a valve casing portion 7 and a sleeve portion 8 which latter can be made of any desired height, the two being united by the joint 9 as indicated. By thus constructing the throttle box in two parts the valve casing portion can be made of standard size and a different length sleeve portion 8 provided according to the height of the dome the valve is to be placed in, whereby the top of the sleeve can always be located at the top of the dome to prevent water from the boiler entering the valve.

Within the throttle box 7 is an inwardly projecting flange 11 preferably formed integrally therewith, and provided with a shoulder 12 adapted to support a loose valve seat 13 capable of very slight lateral movement to accommodate the parts to variations due to expansion and contraction because of differences in temperature. This valve seat is provided with an outwardly projecting shoulder adapted to rest on the shoulder 12 and is preferably made of a metal having a different coefficient of expansion in order to accommodate itself to the varying temperature conditions, thus providing a seat for the coacting valve member 14, which

will automatically adjust itself to the position of the valve and form a tight connection.

This valve member 14 may be of the usual construction provided with downwardly extending guide wings 15 to maintain proper alinement, and a central opening 16 forming a valve seat adapted to coact with a valve 17 formed integrally with a spindle or stem 18. This stem extends downwardly a considerable distance below the valve member 14 and is provided with an adjustable nut 19 at its lower end upon which is supported a piston member 20 closely fitting in a well or balancing chamber 21 formed within the throttle box. This chamber 21 is spaced apart or provided with openings 22 between it and the flange 11, whereby steam on entering through the top of the throttle box will, when the valve 14 is open, pass through these openings 22 and thence into the dry pipe 10.

It will be noted that the members 14 and 20 are provided with a telescopic or lost motion connection at a point 23, which will permit the stem 18 on being raised to first open the valve 17 and allow the steam to pass therethrough into the chamber 21, thus equalizing the reactive steam pressures on the upper side of the member 14 and the lower side of the member 20. As soon as this equalization takes place, which is practically instantaneous, the main valve 14 may be opened in the usual manner by a further upward pull of the spindle or valve stem 18. At this point an added advantage of the loose valve seat 13 may be noted, namely that the balance piston may be made equal in size to the main valve 14, thus obtaining a substantially perfect balance and an easier assembling of the parts thereof.

The actuating means for the throttle valve is shown more clearly in Figs. 2 and 3, and includes a rod 25 extending rearwardly through the end wall or back head of the boiler to connect in the usual manner with the throttle lever (not shown). This rod 25 is connected with a stirrup member 26 branching to each side of the throttle box where its ends connect with bell crank levers 27 pivotally mounted, as by means of trunnions 28, on the side walls of the throttle box.

The opposite arms of the bell cranks 27 are each connected by upright members or links 30, to the free ends of levers 31, mounted upon squared ends 32 of a transverse rod or rock shaft 33 projecting through side walls of the throttle box, as clearly shown in Fig. 1. Upon the central part of this transverse shaft 33 is mounted a lever 34 having at its free end a link 35 connected with the stem 17. In order to prevent excessive upward movement of the valve 14 there is provided upon this lever 34 a stop lug 36 adapted to coact with an abutment 37 within the throttle box, as clearly shown in Fig. 1.

It will thus be seen that as the pull rod 25 is actuated by means of the throttle lever to move the same toward the left for example the motion will be transmitted through this series of power transmitting devices including the stirrup 26, bell crank levers 27, links 30 and levers 31, to cause a rotation of the transverse rock shaft 33 in a counterclockwise direction, which motion will, of course, cause an upward movement of the valve stem 17. Conversely, when it is desired to close the throttle valve a movement of the pull rod 25 toward the right will produce an opposite movement of the valve stem 18.

It is believed that the construction and operation of this device is clear from the above statement, and a further discussion thereof is unnecessary. By having the actuating mechanism entirely within the boiler and steam dome, as herein illustrated, there is less danger of the parts becoming damaged, as might occur if certain parts of the actuating mechanism were located exteriorly of the boiler. Furthermore, the parts are kept at a more uniform temperature when in operation, thus preventing expansion and contraction of metals, as might otherwise occur, and the consequent binding action of certain operative parts.

A further advantage of this construction resides in the fact that the operating pull rod 25 is in direct line or in the same vertical plane with the axis of the throttle valve and the motion is transmitted directly and equally thereto through the pairs of corresponding motion transmitting members to the rock shaft, thereby preventing a relative twisting or turning movement of the valve with respect to its seat and insuring proportional movement of the valve to the movement of the throttle lever.

From the above it will be clear that the present invention provides a simple and practical throttle valve with its associated operating mechanism which is reliable and efficient in use and operation, and in short is adapted to accomplish among others all of the objects and advantages herein set forth.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can by applying current knowledge readily adapt it for various applications without omitting certain features that, from the standpoint of the prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention, and therefore such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

What we claim as new and desire to secure by Letters Patent is—

1. In a throttle valve, in combination, a throttle box open at its upper end and having its lower end connected with a dry pipe, a valve seat within said box, a valve cooperating therewith, a transversely disposed rock shaft through the upper part of the box to which said valve is flexibly connected, a pair of similar power transmitting members connected with said shaft outside of the box, and an operating rod connected with said pair of members and positioned substantially in the plane of the axis of said valve.

2. In a throttle valve, in combination, a throttle box open at its upper end, a flange formed in said box having a loosely mounted valve seat thereon, a vertically movable valve adapted to coact with the seat having a loosely connected stem, a transverse rock shaft associated with said box above the valve, intervening connections between the stem and shaft adapted to raise and lower the valve as the shaft is rotated, similar power transmitting members connected with said shaft, and a pull rod connected with said similar power transmitting members.

3. In a throttle valve, in combination, a throttle box open at its upper end, a valve therein, actuating mechanism for said valve including a transverse rock shaft having a flexible connection with said valve and adapted to raise and lower the valve as the shaft is rotated, levers connected with the ends of said shaft, links connected with said levers, bell cranks connected with the ends of said links, and means adapted to connect said bell cranks with a throttle lever within the cab.

4. In a throttle valve, in combination, a throttle box, a valve, a balancing chamber below the valve, a valve stem positioned in the throttle box and providing a valved entrance through the valve to said chamber, a transverse rock shaft through the upper part of said box having operative connections with the stem, a pair of similar power transmitting members connected with said transverse shaft and positioned at opposite sides of the throttle box, a stirrup connected with the lower ends of the said power transmitting members, and a pull-rod connected with the central part of the stirrup substantially in the plane of the axis of the valve.

5. In a throttle valve, in combination, a vertically disposed throttle box open at its upper end, a valve seat centrally and loosely disposed within said box, a balance chamber below said valve seat, a valve stem having a main valve loosely mounted thereon for coacting with the valve seat and providing a valve entrance through the main valve to said chamber, a hollow piston member within said chamber connected to the stem and having a lost motion connection with the valve, and means operable from the upper part of the throttle box adapted to first actuate the valve stem to open the entrance to said chamber so as to equalize the steam pressures and then to open the main valve.

6. In a throttle valve, in combination with a steam dome, a throttle box open at its upper end and projecting into the steam dome, a valve mounted in said box, a central stem, a transverse rock shaft, a plurality of actuated parts connecting the stem and rock shaft adapted to raise and lower the valve as the shaft is rotated, and means on the box to engage one of said parts adapted to limit the rotation of said shaft whereby the valve is actuated only within proper limits.

7. In a throttle valve, in combination with a steam dome, a throttle box open at its upper end and projecting into the steam dome, a valve mounted in said box, a central stem, a transverse rock shaft through the upper part of said box connected with said stem adapted to raise and lower the valve as the shaft is rotated, means adapted to be engaged by the connection between the transverse shaft and stem to limit the rotation of said shaft whereby the valve is actuated only within proper limits, and means for rotating said shaft including a series of similar power transmitting members connected with the opposite ends of said shaft and terminating in a stirrup, and an actuating pull rod connected with the stirrup.

8. In a throttle valve, in combination with a steam dome, a throttle box formed of a plurality of parts one of which is of standard size and located directly below the steam dome and provided with a throttle valve and another of which is a sleeve removably secured directly to the upper part of the throttle box proper and extending upwardly into the dome of the boiler.

9. In a throttle valve, in combination with a steam dome, a member positioned directly below the steam dome and adapted to be connected at one end to the dry pipe leading to the cylinders and having a seat formed integrally therewith to receive a valve seat, and a sleeve member secured directly to the upper part of said first member open at its upper end and extending upwardly into the steam dome.

10. In a throttle valve, in combination with a steam dome, a member positioned directly below the steam dome and adapted to be connected at one end to the dry pipe leading to the cylinders and having a seat formed integrally therewith carrying a detachable valve seat, a sleeve member secured directly to the upper part of said first member open at its upper end and extending upwardly into the steam dome, a valve coact-

ing with the valve seat in the first mentioned member, and actuating mechanism in the sleeve thereabove connected with said valve.

11. In a throttle valve, in combination with a steam dome, a member positioned directly below the steam dome and adapted to be connected at one end to the dry pipe and having a valve seat flange and balance chamber formed integrally therewith, a detachable valve seat carried by said flange, a sleeve connected with the upper part of said member having its open upper end projecting into the steam dome, a valve mounted in said first member having a balance piston in the balance chamber, and actuating mechanism for said valve mounted transversely in said sleeve.

12. A locomotive throttle valve comprising in combination a valve body open at its upper end and provided with an internal ported valve seat below said upper end, a valve movable toward and away from said seat to control said port and operating means for said valve comprising an upper rocking element pivotally connected to said valve body above the valve, a lower rocking element external to said valve body and pivotally connected to the latter adjacent the lower end of the valve body, links external to the valve body connecting said rocking elements, and an operating connection to the lower rocking element.

13. A locomotive throttle valve comprising in combination a valve body open at its upper end and provided with an internal ported valve seat below said upper end and a balancing cylinder located in the valve body below said seat, a main valve movable toward and away from said seat to control said port, a balancing piston working in said cylinder, a pilot valve mounted in said main valve with freedom for limited movement relative to the latter and controlling communication with the interior of said cylinder below the balancing piston and valve operating means comprising a rocking element pivotally connected to said valve body and to said pilot valve, and means external to and pivotally connected to said valve body adjacent the lower end of the latter for oscillating said rocking element.

14. A locomotive throttle valve comprising, in combination with the boiler shell provided with a steam dome, a valve body located in said shell and extending into the steam dome and having its center in front of the center of the steam dome, and being open at its upper end and provided with an internal ported valve seat below said upper end and with a balancing cylinder located in the valve body below said seat; a main valve member moving toward and away from said seat to control the port in the seat and comprising a balancing piston working in said cylinder, a pilot valve mounted in said main valve with freedom for limited movement relative to the latter and controlling communication with said chamber and valve operating means comprising a rocking element pivotally connected to said valve body above the valve and a link connection between said rocking element and pilot valve, a second rocking element pivotally connected to the valve body with its axis below the valve seat, means external to the valve body and located at the sides of the latter pivotally connecting said rocking elements, and an operating rod connected to said second rocking element and projecting through the rear end wall of said shell.

15. In a throttle valve, in combination, a throttle box open at its upper end, a flange formed in said box and having a valve seat, a valve adapted to coact with the seat and having a loosely connected stem, a transverse rock shaft associated with said box above the valve, intervening connections between the stem and shaft adapted to raise and lower the valve as the shaft is rotated, similar power transmitting members connected with said shaft, and a pull rod connected with said similar power transmitting members.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK H. CLARK.
JOSEPH M. COFFEY.

Witnesses:
FRED A. KUNEMUND,
ALEX. TURNER.