W. A. KITTS, Sr. & W. A. KITTS, Jr.

WATER FEED REGULATOR.

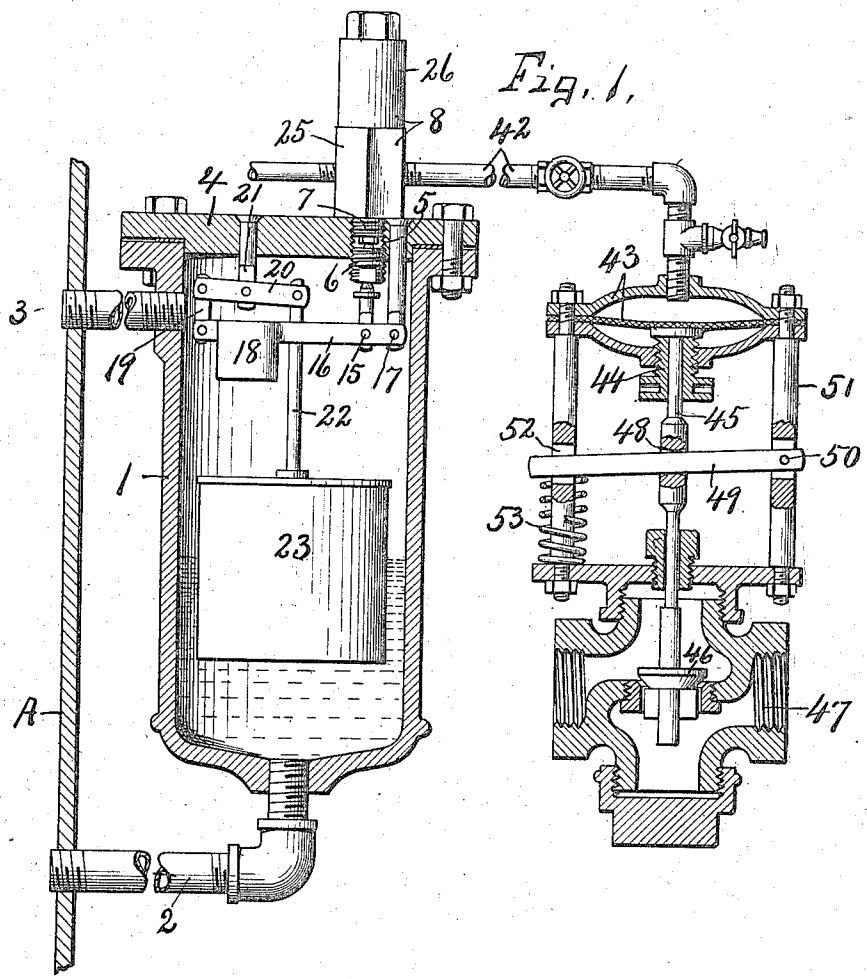
APPLICATION FILED OCT. 15, 1907.

946,139.

Patented Jan. 11, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.
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2 SHEETS—SHEET 2.

Fig. 2.

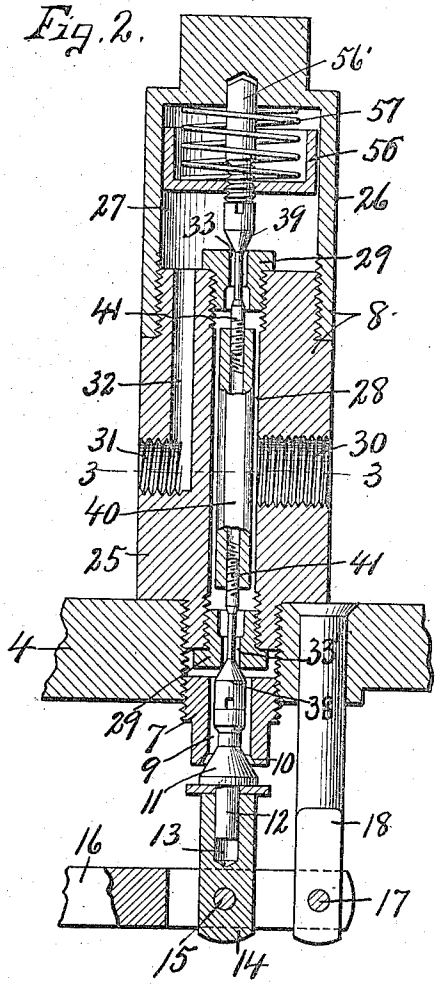


Fig. 4.

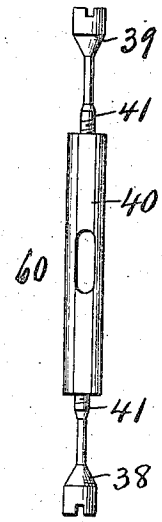


Fig. 5.

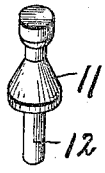


Fig. 3.

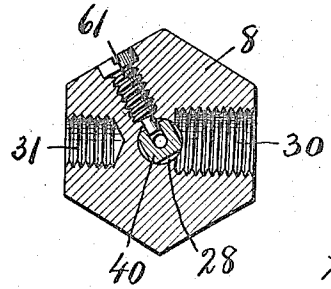


Fig. 6.

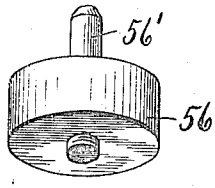


Fig. 7.

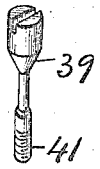


Fig. 8.

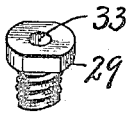
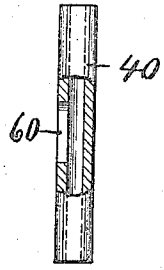


Fig. 9.



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UNITED STATES PATENT OFFICE.

WILLARD A. KITTS, SR., AND WILLARD A. KITTS, JR., OF OSWEGO, NEW YORK.

WATER-FEED REGULATOR.

946,139. Specification of Letters Patent. Patented Jan. 11, 1910.

Application filed October 15, 1907. Serial No. 397,575.

To all whom it may concern:

Be it known that we, WILLARD A. KITTS, Sr., and WILLARD A. KITTS, Jr., of Oswego, in the county of Oswego, in the State of New York, have invented new and useful Improvements in Water-Feed Regulators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in water feed regulators for steam boilers in which the action of the water-regulating valve of the supply pipe is automatically controlled by a steam pressure device and suitable mechanism controlled by the rise and fall of the water in the boiler for regulating the inlet and exhaust of steam to and from the pressure device.

Heretofore the inlet and exhaust of steam to and from the pressure device has been controlled by float actuated valves, the float being located within a water column, which is connected to the water and steam chambers of the boiler so as to effect the same level of water in the column as exists in the boiler. The action of the float is almost always more or less unreliable and variable, and the same may be said of the action of the inlet and exhaust valves where they are separately connected, and especially where they are located in chambers opening directly into the steam chamber of the water column, and all dependent for their action upon gravity alone.

One of the essential objects of my present invention is to locate the steam inlet and exhaust valves for the pressure device wholly within a separate casing, which is removably secured to the water column, and to provide an intercommunicating passage with an automatically closing valve which is normally held open by one of the inclosed parts of the valve-casing when the latter is secured in place, but is free to automatically close by the pressure of steam or by the action of the weights and levers, when the valve casing is removed to prevent the escape of steam from the steam chamber of the water column.

Another object is to control the action of these valves through the medium of differential weights and differential levers located within the water column.

Another object is to provide a rigid coupling for the inlet and exhaust valves, whereby the action of both valves is positive and simultaneous.

Another object is to make these valves adjustable in the coupling relatively to each other and to their respective valve seats so as to vary the degree of opening, when desired.

A still further object is to provide the valve casing with a removable cap whereby access may be had to one of the valves for adjustment, when necessary.

Another object is to provide adjustable means for limiting the action of the pressure device whereby the valve in the water supply pipe may be prevented from closing positively so that a limited quantity of water may always flow to the boiler when such a condition is desirable.

Other objects and uses will be brought out in the following description.

In the drawings—Figure 1 is a vertical sectional view, partly in elevation, of a water-feed regulator, embodying the various features of our invention. Fig. 2 is an enlarged sectional view of the valve chamber for the steam inlet and exhaust valves, showing also the head of the water column and intercommunicating passage, together with the valve for said passage, and the adjacent portion of one of the operating levers. Fig. 3 is a transverse sectional view taken on line 3—3, Fig. 2. Fig. 4 is an elevation of the detached inlet and exhaust valves, and the coupling therefor. Fig. 5 is a perspective view of the main valve in the communicating passage between the column and valve-casing. Figs. 6, 7 and 8 are perspective views respectively, of the valve-operating piston, the exhaust valve and bearing having a valve seat co-acting with said exhaust valve. Fig. 9 is an elevation, partly in section, of the detached valve coupling.

In carrying out the objects stated, we provide a suitable water column —1— with a water inlet pipe —2— and a steam inlet-pipe —3—, which latter may be connected in any desired manner to the water and steam chambers respectively of a steam boiler, not shown, said column extending above and below the water line of the boiler in the usual manner, so as to establish the same water lever in the column as exists in the boiler, the water inlet pipe —2— usually entering the bottom of the column, while the steam inlet pipe —3— enters the upper

end of said column. This water column —1— is closed at the top by a suitable head —4— having a threaded aperture —5— therethrough for receiving a threaded bushing —6— and also the reduced threaded end —7— of a valve casing —8—. The bearing —7— is provided with a central lengthwise passage —9— therethrough for establishing communication between the interior of the valve casing —8— and steam chamber of the water column —1— and is formed at its lower end with a valve seat —10— with which coacts a suitable valve 11—, the latter being provided with a depending stem —12— which is loosely guided in the socket 13— having a vertically movable support 14— so that the valve —11— may automatically close against its seat 10— by the pressure of the steam when the valve casing —8— is removed. The support 14— is pivoted at 15— to a lever 16—, which latter is fulcrumed at 17— to an arm 18'— depending from and secured to the member —4—. This lever 16 extends some distance laterally beyond the pivot 15— of the support 14— and is provided with a weight 18— normally tending to depress the valve support 14— to open the valve 11—, said lever 16 being connected by a link 19— to a second lever —20—, which is fulcrumed intermediate its ends to a supporting bracket —21— depending from and secured to the head —4—, the inner end of the lever —20— being connected by a rod or stem —22— to a second, but similar larger weight —23—. This latter weight —23— extends downwardly and dips into the water in the base of the column —1— and when the water in the boiler and column lowers, operates in the manner hereinafter described to more effectively close the steam inlet valve leading to the pressure device and to simultaneously open the exhaust valve leading from said pressure device than would be possible with a float, thereby permitting the feed water valve to be opened by a suitable mechanism hereinafter described. On the other hand, as the level of the water in the column —1— rises the weight —18—, which is slightly greater than the difference in specific gravities of the weight —23— and water in which it is submerged lowers the valve —11— farther from its seat and allows an additional valve presently described to open communication between the steam chamber of the column —1— and the pressure device, thereby causing the water-regulating valve to close or partially close to reduce the quantity of water fed to the boiler.

The valve casing —8— is removably secured to the head —4 of the column —1— and comprises essentially a base portion —25— and cap —26— screwed to the upper end of the base —25— and forming therewith a steam chamber —27—. The base —25— is provided with a central lengthwise opening —28— having in its opposite ends screw-threaded bushings —29—, the intermediate portion of said base being provided with opposite ports —30— and —31—, the latter constituting an exhaust port and communicates with the by-pass —32— leading to the chamber —27—. The bushings —29— are formed with lengthwise passages —33— and —33'—, the passage —33— connecting the passage —28— with the chamber —27— while the passage —33'— connects the lower end of the passage —28— with the passage —9—. These bushings —29— form valve seats for opposed valves —38— and —39—, the valve —38— controlling communication between the steam chamber of the column —1— and passage —28— while the valve —39— controls communication between the passage —28— and exhaust passages —32— and —31—, said valves being located at opposite ends of the base section —25— and are connected by a coupling —40— having threaded sockets in its opposite ends for receiving threaded stem —41— of the valves —38— and —39—, thereby permitting either or both of said valves to be adjusted relatively to their respective valve seats. The port —30 is connected by a conduit 42— to a suitable steam pressure device —43— consisting in this instance, of a shell having a transverse diaphragm against which the steam impinges. At the lower side of the pressure device below the diaphragm is located an adjustable screw stop —44— formed with a central aperture in which is guided a stem —45—, carrying at its lower end a valve —46— for regulating the water supply through a conduit —47— which may lead to the boiler, as —A—, indicated in Fig. 1.

The stop —44— is made adjustable to limit the action of the diaphragm or pressure device by steam and for the purpose of permitting the valve 46— to close entirely, or to remain partly open when the pressure device is at the limit of its downward movement, as controlled by the stop —44—. By this arrangement I am enabled to allow a greater or less quantity of water to pass through the conduit —47— to the boiler at all times, although the general supply is regulated by the pressure device —43—, which in turn is controlled by the valves —38— and —39—.

The plunger or valve stem —45— is provided with a transverse aperture —48— between the valve —46— and pressure device, through which is passed a lever —49— having one end pivoted at —50— to one side of a supporting frame —51— and its opposite end guided in a slot —52— in the opposite side of the supporting frame and adapted to bear against the retracting spring —53—, which latter acting upon the lever —49— op-

erates the valve —46— when the pressure is relieved upon the pressure device —43—. This relief of the pressure device is afforded by means of the valve —39— and exhaust passages —32— and —31—, because when the valve —38 is closed to cut off communication between the steam chamber of the column —1— and pressure device, said pressure device is placed in communication with the exhaust passage —32— by the opening of the valve 39.

When the water in the column —1— rises to its normal level the weight 18 tends to draw the lever 16— and post —14— mounted thereon downwardly, thereby relieving the upward pressure upon the valve —11— and incidentally through the coupling —40— allows both valves and their coupling to descend, thereby opening the lower valve —38— and closing the valve —39—, this latter operation being facilitated by means of a piston —56— and a spring —57—, the piston 56— being movable in the chamber —27—, and together with the spring, is located wholly within, but separable from the cap —26—. During this opening of the valve —38— and closing of the valve —39—, the steam is allowed to pass from the steam chamber of the column 1— through the passages —9— and 33′ into the passage —28— of the valve casing, from which it passes through the port —30— and conduit —42— into the pressure device —43—, thereby depressing the piston of said pressure device and tending to close or partially close the valve —46— according to the position of the limiting stop —44— which may be adjusted to allow the valve to close entirely or to limit the depression of the pressure device sufficiently to hold the valve slightly open. On the other hand, assuming that the water level is lowered in the column 1— then the weight —23— which is heavier than the weight —18— descends and operates through the levers —20— and 16— to close the valve —38— and to open the valve —39—, thereby cutting off communication between the steam chamber of the column 1— and pressure device 43, and establishing communication between said pressure device and exhaust-port —31— through the pipe —42—, passages 28— and 33— and passage —32, said valves being opened against the action of the spring —57—, which is comparatively light and of just sufficient tension to hold the valves —39— and —38— down against steam pressure on the lower valve.

The valves —11—, 38 and 39— are arranged in alinement, and although the valve 11— is separate from the adjacent valve —38— and also separate from its support 14— it is utilized as an abutment to engage the lower end of the valve —38— to close the latter and open the valve —39— when the water level in the column 1— lowers, and on the other hand, the downward pressure upon the valves —38— and 39— and their coupling —40— by the spring —57—, causes the valve 38— to depress the valve 11— and thereby assist the weight —18— in its function.

As previously stated, the valves —38— and 39— are adjustable by simply screwing them in or out, as may be desired, in the adjacent ends of the coupling —40— so as to vary the degree of opening, but in either position the space between the seat for the valve —38— and that for the valve —11— is less than the distance between the seat-engaging portions of the valves —38— and 11— so that when the valve —38— is closed the valve 11 will still be open, thereby assuring a passage of the steam from the steam chamber of the column to the pressure device. The coupling —40 is of less cross sectional area than the passage —28— in which it is movable so as to allow the passage of steam through the passage —28—, and this coupling is provided with a lengthwise slot 60— for receiving the inner end of a screw —61— which prevents turning of the coupling in the passage —28— during the adjustment of the valves —38— and —39—.

If for any reason it should be desired to remove the valve casing —8— by unscrewing it from the column head the pressure of the steam in the steam chamber of the water column or the movement of the weights and levers will immediately close the valve —11— as soon as the valve —38— is withdrawn from engagement therewith during the act of unscrewing the valve casing —8— and thereby automatically shutting off the escapement of steam from the water column when such valve casing is removed.

The piston —56— which is cup shape is provided with an adjusting screw —56′— bearing against the upper end of the valve —39— for adjusting said piston and thereby regulating the tension of the spring —57— which is interposed between the piston and top of the cap, said piston serving to partially inclose the spring to protect the latter from direct contact with the steam and thereby conserve the temper of said spring.

The object of placing the exhaust by pass —32— in the base —25— of the valve casing is to permit the removal of the cap —26— for adjustment of the valves or other interior repairs without being obliged to disjoin or remove any of the pipe connections for the admission or exhaust of steam to and from the pressure device.

What we claim is:

1. In a water feed regulator for steam boilers, a water regulating valve, a steam chamber, a diaphragm movable in said

chamber, hollow adjusting means for said diaphragm connections between the diaphragm and valve and extending through said adjusting means for controlling the action of the latter, automatic means controlled by the water level in the boiler for controlling the entrance and exit of steam to and from the steam chamber, a lever actuated by the connection between the diaphragm and valve during the closing of the valve, and a spring acting upon the lever to return the valve and diaphragm to their normal positions during the exit of steam from the steam chamber.

2. In a water feed regulator for steam boilers, a water regulating valve, a steam pressure device controlling the action of said valve, a column having a steam-and-water chamber, a valve casing communicating with said chamber and also communicating with the pressure device and provided with an exhaust opening, valves in said casing, one of said valves controlling communicaton between said chamber and pressure device, and the other valve controlling communication between the pressure device and exhaust port, a coupling connecting said valves, means to hold the coupling against rotation, and means controlled by the water level in the column for controlling the action of said valves one of said valves being adjustable relatively to the other valve.

3. In a water feed regulator for steam boilers, a water regulating valve, a steam pressure device controlling the action of said valve, a column having a steam-and-water chamber, a valve casing communicating with said chamber and also communicating with the pressure device and provided with an exhaust opening, valves in said casing, a non-rotatable coupling connecting said valves one of said valves controlling communication between said chamber and pressure device, and the other valve controlling communication between the pressure device and exhaust port, and means movable in said column for controlling the action of said valves said means comprising a heavier-than-water weight immersed in the water in said column, and a lesser weight partially counterbalancing the first named weight.

4. In a water feed regulator for steam boilers, a water regulating valve, a steam pressure device controlling the action of said valve, a column having a water chamber, a valve casing communicating with said chamber and with said pressure device and provided with an exhaust port, valves movable in the valve chamber a coupling connecting said valves, one of said valves controlling communication between said chamber and pressure device, and the other valve controlling communication between the pressure device and exhaust port, one of said valves being adjustable, and means including differential weights controlled by the water level in the column for controlling the action of said valves one of said weights being heavier than water and the other weight being connected to and partially counterbalancing the first named weight.

5. In combination with a water column, a valve casing exterior to the column and removably secured thereto and communicating with the interior of the column, said valve casing having inlet and exhaust ports, separate valves for said ports, a coupling connecting said valve, and means controlled by the water level in the column for controlling the action of said valves and including a separate valve adapted to close communication between the valve chamber and column by the pressure of steam when the valve casing is removed.

6. In combination with a steam boiler, a water column, a valve casing secured to the upper end of the column and provided with inlet and exhaust ports, a valve coupling movable in the valve casing between said ports, means to hold the coupling against rotation valves adjustably secured to opposite ends of said coupling and coacting with said ports to control the inlet and exhaust of steam to and from the valve casing.

7. In combination with a steam boiler, a water column, a valve casing secured to the water column, and provided with inlet and exhaust ports, a valve coupling playing between said ports, and separate valves for said ports secured to opposite ends of the coupling, both of said valves being adjustable and a separate self-closing valve between the water column and valve casing and engaged and opened by the inlet valve when the valve casing is secured in operative position.

8. In combination with a steam boiler, a water column, a valve casing secured exteriorly to the water column and communicating with the interior thereof, said valve casing being removable, a valve controlling the exit of steam from the water column, means carried by the valve casing for holding the valve open when it is in operative position, said valve closing automatically by the steam pressure from within the water column when the holding means is removed.

9. In a water feed regulator, the combination of a column having a steam outlet, a valve for the outlet, a valve casing removably secured in the outlet and provided with means for holding the valve open when the valve casing is in position, said valve closing automatically by steam pressure within the column when the valve casing is removed.

10. In a water feed regulator for steam boilers a water column, a valve casing having inlet and exhaust ports, valves for said

ports, a coupling connecting said valves, one of the valves being adjustable in the coupling a separate self-closing valve between the water column and valve casing and engaged and opened by the inlet valve when the valve casing is placed in operative position, a weighted lever upon which said separate valve is mounted, and means controlled by the water level in the column for operating said weighted lever to control the action of the first named valves through the medium of the separate valve.

In witness whereof we have hereunto set our hands this 12th day of October 1907.

WILLARD A. KITTS, SR.
WILLARD A. KITTS, JR.

Witnesses:
H. E. CHASE,
C. M. MCCORMACK.