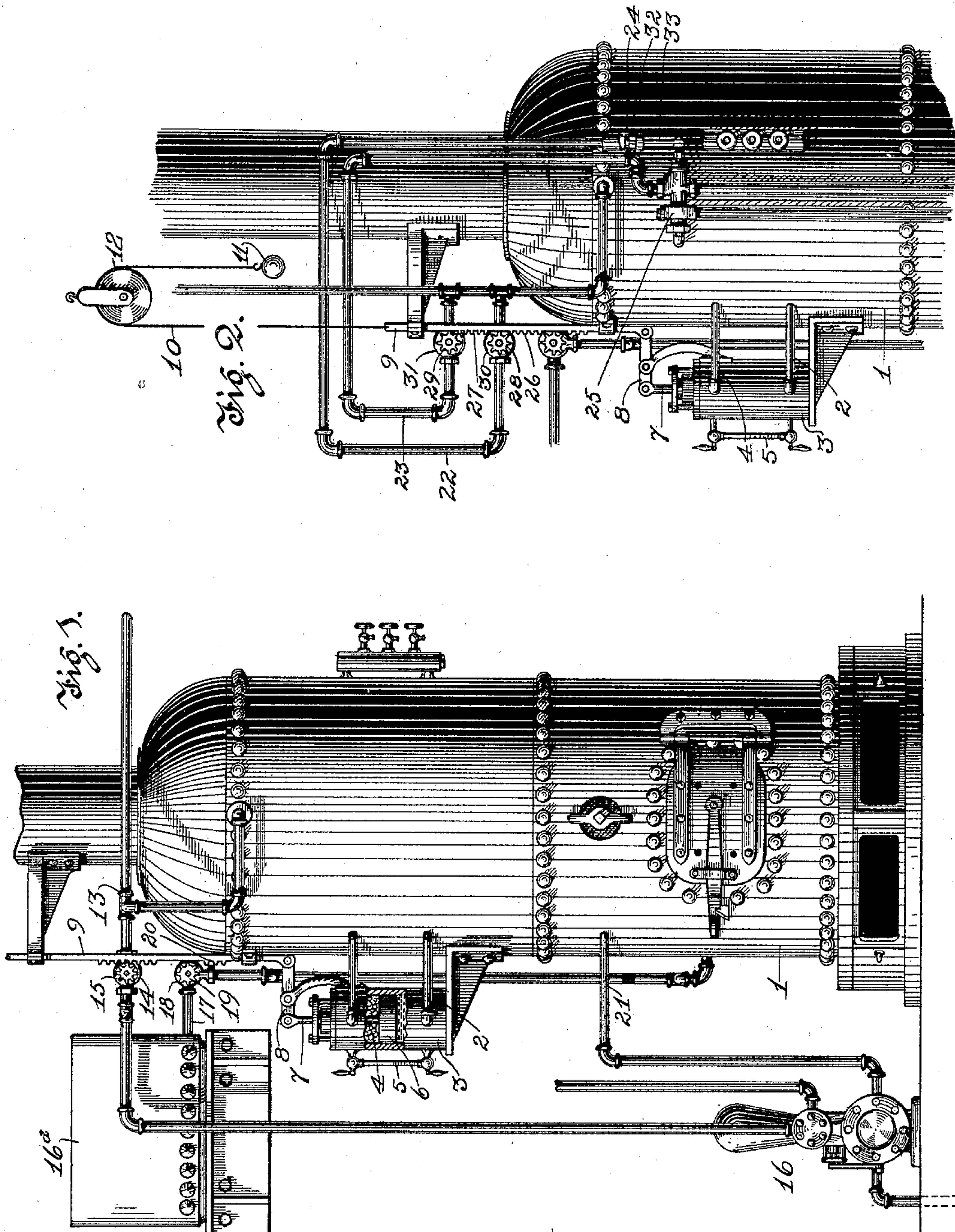


(No Model)

U. S. ARCHER.
WATER REGULATOR FOR BOILERS.

No. 584,535.

Patented June 15, 1897.



WITNESSES

H. H. Gillis
E. B. Sam

INVENTOR,

Ulysses S. Archer,

By John Wedderburn
Attorney

UNITED STATES PATENT OFFICE.

ULYSSES S. ARCHER, OF LENOIR CITY, TENNESSEE.

WATER-REGULATOR FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 584,535, dated June 15, 1897.

Application filed May 6, 1896. Serial No. 590,433. (No model.)

To all whom it may concern:

Be it known that I, ULYSSES S. ARCHER, a citizen of the United States, residing at Lenoir City, in the county of London and State of Tennessee, have invented certain new and useful Improvements in Water-Regulators for Boilers; 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.

My invention relates to water-regulators for steam-boilers, the object of the same being to provide automatic mechanism whereby an even and predetermined quantity of water is kept in the boiler at all times.

The invention consists of a steam-boiler, a water-reservoir or cylinder located in close relation therewith, having pipes connecting the upper and lower ends thereof with said boiler, a float or follow-head in said reservoir or cylinder, having a stem or piston-rod extending upwardly therefrom and provided with a series of racks thereon, a steam-pipe leading from said boiler, and branches in said pipes having valves therein whose stems are provided with pinions engaging the teeth on said rack, said branch pipes leading to a pump or to an inspirator or injector connected with the under side of the boiler for forcing the water thereto.

It also consists in other details of construction and combinations of parts which will be hereinafter more fully described and claimed.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a boiler with my improvements shown applied thereto. Fig. 2 is a similar view of the same, showing the upper end of the boiler with the parts removed.

Like reference-numerals indicate like parts in both views.

The boiler 1 is of ordinary form of construction and has a pipe 2 leading from the lower side thereof to the bottom of a reservoir or chamber 3, which is also connected by a steam-pipe 4, leading from the upper end of said reservoir and entering the boiler through the upper end of the latter. On the side of the reservoir 3 is a water-gage 5, of ordinary construction, and on the inside of said reservoir

3 is a float or follow-head 6, resting upon the surface of the water therein, provided with a stem 7, extending upwardly therefrom through a suitable stuffing-box in the top of the reservoir and connected to one arm of a lever 8, which is fulcrumed in a stationary part of the framework and connected at its outer end to a rack-bar 9, having a series of racks thereon. The upper end of the rack-bar 9 has connected to it a cord 10, with a balance-weight 11 upon its outer end and passing around a sheave or pulley 12, secured to a stationary part of the framework.

In Fig. 1 the invention is illustrated in connection with a pump which is adapted to force water into the boiler when the same is actuated. In this figure a steam-pipe 13 leads from the upper part of the boiler 1 in close relation to the rack-bar 9 and is provided with a valve 14, whose stem has a pinion 15 thereon, which engages the rack-teeth on the rack-bar 9. The said pipe 13 leads downwardly and connects with the pump 16, as clearly shown. I also provide an emergency water-tank 16^a, having a pipe 17 leading downwardly therefrom to the inside of the furnace. This pipe 17 is provided with a valve 18 therein, whose stem has a pinion 19 thereon, which is adapted to engage the rack-teeth 20 on the rack-bar 9.

From the foregoing description it will be evident that the upward or downward movement of the rack 9 will cause a rotation of the pinions in engagement therewith. The pinion 15 of the valve 14 is so adjusted relative to the rack-bar 9 that an upward movement of said rack-bar, caused by a dropping of the float or follow-head 6, will turn said pinion and open the valve 14 when the water in the boiler falls to a certain level. The pinion 19 is adapted to be turned by the rack 20 only when the device fails to operate to open the valve 14. This is done when the water in the boiler 1 falls to a point near the bottom thereof and there is danger of an explosion of said boiler. Upon the opening of the valve 19 the water from the tank 16^a flows through the pipe 17 and extinguishes the fire in the furnace.

The operation of the device is as follows, it being the purpose, we will suppose, to keep the water in the boiler 1 at the level in which

it is shown in Fig. 1: The steam is always in the pipe 13, and when the surface of the water in the boiler 1 and in the reservoir 3 falls by usage the float 6 in said reservoir 3 is carried by it. The downward movement of this float or follow-head causes an upward movement to be imparted to the rack 9 by the means described. Just after this has been done the valve 14 in the pipe 13 is opened as described, and the steam is admitted from the boiler 1, through the pipe 13, to the pump 16. The admission of the steam to the pump 16 actuates the latter and water is forced by it, through the pipe 21, to the inside of the boiler 1, raising it to the required level. When this is reached, the float or follow-head 6 is in its normal position, the rack-bar 9 is lowered, and the valve 14, whose stem 15 engages said rack-bar, is closed. As heretofore stated, if for any reason the rack-bar 9 fails to turn the pinion to admit the steam to the pump 16 the rack 20 on the rack-bar 9 will open the valve 18 and admit water from the tank 16^a to the furnace.

In Fig. 2 I have shown my invention as applied to an inspirator or injector. In this case the pump 16 and the pipe leading thereinto are dispensed with and instead branch pipes 22 23 are used in connection with the main steam-pipe 13, the pipe 22 leading to a cylinder 24 and the pipe 23 to an inspirator or injector 25. The rack-bar 9 in this case is also provided with sections of rack-teeth 26 27, which respectively engage the pinions 28 29 of valves 30 31 in the branch pipes 22 23. The cylinder 24 has moving therein a piston 32, whose piston-rod 33 is attached to the operating-lever 34 of the inspirator or injector 25. The operation of the device is similar in this case to that in which a pump is used, except that the racks 26 27 on the rack-bar 9 are so arranged as to open a valve in the pipe 23, leading to the inspirator 25, just in advance of the opening of the valve in the pipe 22, leading to the cylinder 24, this being for the purpose of permitting the flow

of water from an overflow-tank to be admitted to the inspirator or injector 25. As the water falls in the boiler the float or follow-head in the reservoir 3 falls likewise, forcing upwardly the rack-bar 9, carrying the racks 26 27 and turning pinion 29. When the latter is turned, steam is admitted from the boiler 1, through pipe 13 and branch pipe 22, to cylinder 24, forcing the piston 32 in said cylinder outwardly and operating the lever 34 of the inspirator or injector 25, forcing the water to the inside of the boiler 1. When the water rises to the proper level, a reverse operation to that described takes place and the steam is cut off from said cylinder 24 and the inspirator or injector 25.

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

In an automatic water-regulator for steam-boilers, the combination with a boiler, a pump for supplying water thereto and a water-tank having a pipe leading therefrom to the furnace of said boiler, of a main steam-supply pipe leading from said boiler, a branch pipe connected to said main pipe and leading to said pump, a valve in said branch pipe, a pinion upon the outer end of said valve, a valve in the pipe leading from said reservoir, a pinion upon the outer end thereof, a reservoir or cylinder in communication with said boiler, a float or follow-head resting upon the surface of the water in said reservoir, a rack connected to the stem of said float, the said rack being provided with sections of teeth adapted to engage respectively the pinions on the valve-stems of said valves at different positions of said rack-bar, substantially as and for the purpose described.

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

ULYSSES S. ARCHER.

Witnesses:

PAUL PRUAN,
JULIUS SHULL.