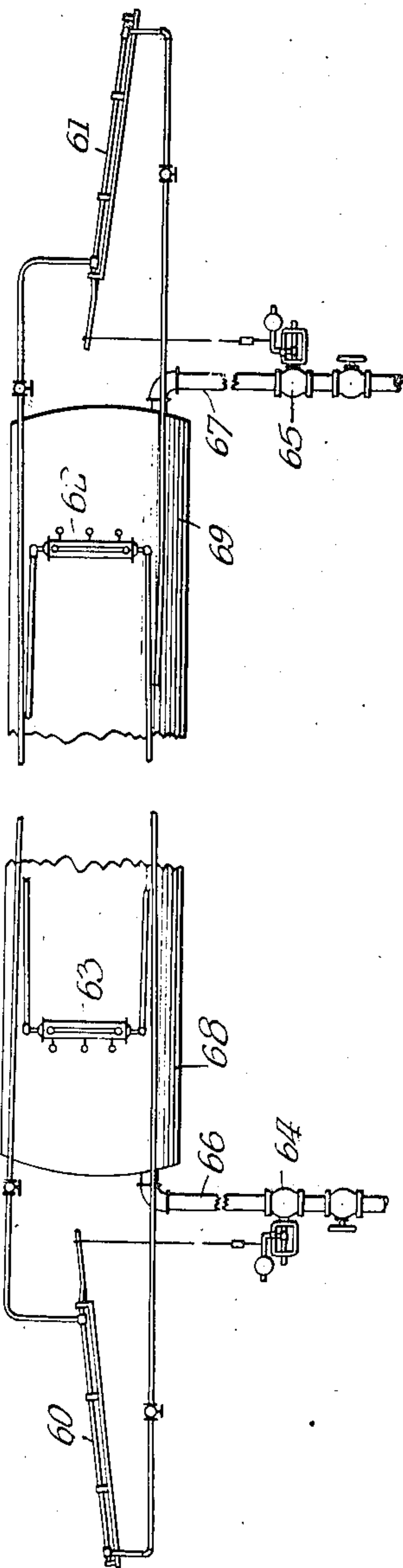


Jan. 2, 1923.

1,440,521

R. W. ANDREWS.
FEEDING WATER TO BOILERS.
ORIGINAL FILED NOV. 8, 1915.



Witness:
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By *E. J. Andrews*
Atty

UNITED STATES PATENT OFFICE.

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FEEDING WATER TO BOILERS.

Original application filed November 8, 1915, Serial No. 60,455. Patent No. 1,299,283, dated April 1, 1919. Divided and this application filed June 7, 1918. Serial No. 238,765.

To all whom it may concern:

Be it known that I, ROGER W. ANDREWS, a citizen of the United States, residing at Washington, in the District of Columbia and the United States of America, have invented certain new and useful Improvements in Feeding Water to Boilers, of which the following is a specification.

This invention relates to methods and apparatus for controlling the flow of water to boilers, and this application is a division of Patent No. 1,299,283, issued to me April 1, 1919.

It has been found in practice that, in feeding water to boilers of large capacity, particularly boilers comprising several more or less independent drums, the water level in different portions of the boiler, particularly in different drums, even with a steady output of steam, varies very materially. In case of thin places in the fire bed, or defective grates, or imperfect or irregular drafts, or water currents in the boilers, or for various other causes, the water level in different portions of the boiler system, especially in vertical types of boilers, varies frequently very materially because of the variation in temperature of the water and the consequent variation in the amount of entrained steam therein, and for other reasons. By the ordinary methods of feeding boilers by the use of a single regulator the variations in temperature are frequently increased rather than diminished. For instance, if the regulator is controlled by the cooler drum the feed valve will be opened wider, and relatively cold water will be fed into the drum which is receiving the least heat. Such variations materially increase strains on the boiler, and decrease the efficiency of the boiler, and for other reasons they are undesirable. One of the purposes of this invention is to diminish materially such variations in temperature and in water levels. Other objects of the invention will be apparent upon a consideration of the drawings attached hereto and the description of the invention contained herein.

The drawing shows an elevation of the drum of a boiler with a system of regulators

attached thereto which embody the features of my invention.

Although any suitable type of feed water regulators may be used, yet, for the purposes of illustrating my invention I prefer the type which is fully shown and described in said Patent No. 1,299,283, and which is operated according to the method fully described in Patent No. 1,148,483, issued to me July 27, 1915.

As hereinabove stated, by the use of two or more regulators operatively connected to different portions or drums of the boiler, disadvantages arising from the variations in water level and temperature caused in any manner may be materially decreased. With a single regulator connected to the boiler at one point, should the water level at that point sink, due to a lowering in temperature caused by a defective fire bed, for instance, affecting that particular portion of the boiler, the regulator immediately increases the inflow adjacent that portion and hence delivers comparatively cold water at the point where the least heat is being received from the fire. Hence, even though the variation in level is more or less offset, yet the variation in temperature is materially increased. By properly arranging two or more regulators, for example in the manner hereinafter described, the cold water may be delivered wherever desired in order to decrease the variations in temperature of the water in the boiler.

The method which I pursue in reducing variations in temperature by the use of two or more regulators may be better understood by a consideration of the drawing, which is an elevation, more or less diagrammatic, of a system of regulators for this purpose connected to the drum of a boiler, it being understood that the main portion of the boiler, or the boiler proper, as is customary, is below the drum and connected therewith so that the water circulates through both the boiler proper and the drum. The regulators 60 and 61 may be of any suitable nature, such as the regulator illustrated and described in my said Patent #1148483. In this particular instance, the regulators are

shown at the same elevation, with the same thermostatic tube length, and mounted at the same inclination to the horizontal. But it should be understood that unlike regulators 5 may be used.

Regulator 60 is connected, by means of pipes, in any suitable manner, to the water column 62, located at the opposite end of one of the drums, and regulator 61 is connected 10 similarly to water column 63, which may be in the same or another drum.

Regulator 60 is operatively connected to valve 64 in any suitable manner, and regulator 61 is operatively connected to valve 65; 15 valve 64 controlling the inflow through pipe 66 to the end 68 of the boiler or drum adjacent regulator 60, and valve 65 controlling the inflow through pipe 67 to the end 69 of the drum adjacent regulator 61.

20 By this arrangement it will be seen that, if, in case of defective fires, or variations in convection currents, or for any other reason, the water in that portion of the boiler which controls the water-level in the end 68 of the 25 drum becomes cooler than the water in the boiler which controls the level in the end 69 of the drum, and the elevation in the end 68 therefore becomes materially less than the elevation of the water in the end 69, valve 30 65 will be opened further because this valve is controlled by the water level in the end 68 of the drum. As a consequence, the inflow will increase in the end 69, which is affected by the better fire conditions, and has 35 water at the higher temperature. It will be understood that, under the conditions specified, the outflow of water from the end 69 would be greater than from the end 68 for the reason that, the end 69 being hotter, 40 more steam would be generated there, hence the pressure would be somewhat greater, and more steam would be delivered. As a consequence of this arrangement, both the in-

creased inflow and the increased outflow would occur at the point where, under the 45 conditions specified, it would be most advantageous.

Although I have described the specific feed-water regulator system which I prefer, yet I wish it understood that other types and 50 forms of feed-water regulators may be used, and various other modifications in the system, may be made by those skilled in the art to produce substantially the same results without departing from the scope of my in- 55 vention as disclosed by the following claims.

I claim as my invention:

1. A method of feeding water to boilers consisting in passing water into the boiler at two remote places, and in causing the 60 relative amounts of water passed therein to correspond to the relative levels of the water in the boiler adjacent the two places.

2. A method of feeding water to boilers consisting in feeding the water to the boiler 65 at two remote places, and in normally feeding the greater amount of water adjacent the place where the water in the boiler is higher than it is at the other place.

3. A method of feeding water to boilers 70 consisting in feeding the water to the boiler at two remote places, and in normally feeding the water at the two places at relative rates depending upon the relative elevations of water in the boiler adjacent the places. 75

4. The combination of a boiler and a plurality of feed-water regulators, each of said regulators being operatively connected to said boiler, and the point of connection to the boiler of each of said regulators being 80 near the point where the feed-water controlled by the other regulator is fed into the boiler.

In testimony whereof, I hereunto set my hand.

ROGER W. ANDREWS.