G. A. WELD.

NOISELESS STEAM AND WATER MIXER.

APPLICATION FILED AUG. 2, 1912.

1,152,459. Patented Sept. 7, 1915.

Fig. 1.

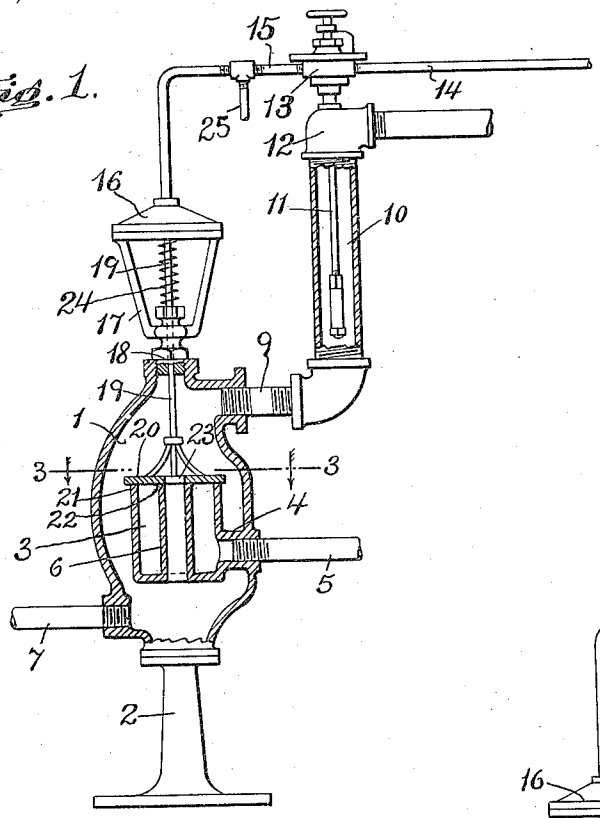


Fig. 2.

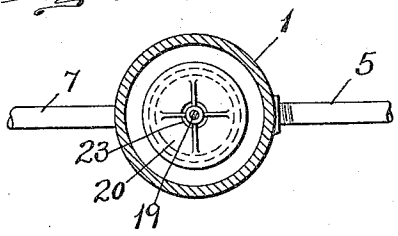
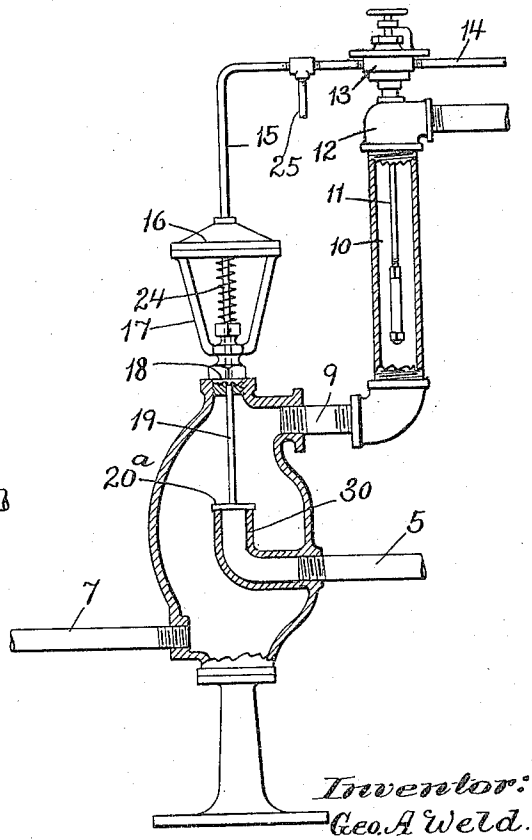


Fig. 3.



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UNITED STATES PATENT OFFICE.

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NOISELESS STEAM AND WATER MIXER.

1,152,459. Specification of Letters Patent. Patented Sept. 7, 1915.

Application filed August 2, 1912. Serial No. 712,927.

To all whom it may concern:

Be it known that I, GEORGE A. WELD, a citizen of the United States, and resident of Winchester, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Noiseless Steam and Water Mixers, of which the following is a specification.

This invention relates to a mixer designed to produce hot water by forcing steam into a chamber to which water at ordinary temperatures is admitted and from which the hot water is drawn.

The particular object of the invention is to provide a means for so controlling the admission of steam to the apparatus that the water issuing from the device will have approximately a predetermined constant temperature, and to do this without causing vibration and noise.

These objects are accomplished by the means hereinafter described and shown in the drawings in two possible embodiments.

In the drawings, Figure 1 represents a central sectional view, partly in elevation, of one embodiment of the invention. Fig. 2 is a cross section on line 2—2 of Fig. 1. Fig. 3 is a view similar to Fig. 1 showing another embodiment of the invention.

The same reference characters indicate the same parts in all the figures.

Describing first the construction of that form of the invention shown in Figs. 1 and 2, the apparatus comprises a chamber 1 which may be called a mixing chamber and is preferably supported on a suitable pedestal base 2. In the chamber 1 is an inner chamber or cup 3 connected at 4 with the wall or chamber 1 at one side thereof. Through the connection 4 and the outer chamber wall is a passage into which extends a pipe 5 screwed into place. A tubular element or tube 6 extends from a point in the bottom of the inner chamber or cup 3, preferably at the middle thereof, upwardly through the inner chamber or cup to a termination in or near the plane of the rim of the chamber or cup, and is open through the bottom of the latter. A pipe 7 is connected with the wall of chamber 1 below the cup 3.

Pipe 7 conducts water from any source of supply at the ordinary temperatures to the mixing chamber, and a part of the water is adapted to flow through the tube 6 in the cup 3, while the rest of the water passes around the cup. Such pipe 7 may therefore be considered as the water inlet of the mixer. The pipe 5 is a steam pipe which conducts steam into the annular space in the cup 3 surrounding the tube 6. Such cup acts as a steam nozzle introducing steam into the mixing chamber and will be so called hereafter in the description.

From the upper part of the mixing chamber leads an outlet or eduction pipe 9 for conducting the hot water produced by the mixture of steam with the cold water supply to the places where it is required for use. A part of the eduction pipe is somewhat enlarged, or otherwise made to form a space or chamber 10 in which is contained a thermostatic element 11. This thermostatic element passes through and is held by a pipe fitting 12 forming one end of the chamber 10. It is connected with a valve chamber 13 to which a supply pipe 14, containing water or other motive fluid under pressure, extends and from which a conduit 15 leads. The thermostatic element and valve chamber 13, with the internal parts, constitute a thermostat which may be, and preferably is, made according to the principles explained in my patent for thermostat No. 934,116 granted September 14, 1909 to which reference may be had for a full description of the thermostat. I wish to say, however, that the particular character of the thermostat is not important, nor is the point at which, or the manner in which it is located, as the thermostat may be of any character and design, other than that illustrated, suitable for accomplishing the results hereinafter described.

The outlet pipe 15 leads to a pressure chamber 16 supported by a yoke 17 secured to a plug 18 which is screwed into an opening in the mixing chamber. Pressure chamber 16 is closed, and one of its walls is formed by a flexible diaphragm connected to a valve stem 19, which passes through the plug 18 into the interior of the mixing chamber, the stem being properly packed to prevent leakage of the water. Carried by said stem is a valve 20 so formed and arranged as to seat against the rim 21 of the steam nozzle and the end 22 of the water tube 6. Said valve is thus a closure for the steam nozzle adapted to prevent inflow of steam when seated, as shown in Fig. 1, and to regulate the rate of admission of steam according to the distance from the seat. In the form here shown the valve is a flat disk

having an orifice 23 registering with the passage through the tube 6, so as to let water issue from said tube even when the valve is seated. The valve may be otherwise formed, however, and its shape is not material provided only it is adapted to close the annular space of the steam nozzle at the end thereof.

The stem of the valve must be so arranged that when moved back and forth in the only manner possible it will respectively seat and unseat the valve. In the arrangement shown, pressure in the diaphragm chamber, forces the valve against its seat and a spring 24 unseats the valve. A branch 25 leading from the outlet pipe 15 permits escape of the motive fluid from the chamber 16 when the valve is opened. The diaphragm chamber with its diaphragm, and the opposing spring 24, constitute one possible embodiment of means for moving the valve under the control of the thermostat, and may be correctly termed a "valve motor". The exact character of the valve motor is not important and may be varied, provided only the motor employed is constructed and arranged to seat the valve when the water in the eduction pipe becomes sufficiently hot and to unseat it when the water is cooled below the desired temperature. It will be understood that when the valve is closed and the stem is shut off, water can still flow through pipe 7 into the mixing chamber, and also through the tube 6 and the valve aperture 23 to the body of the mixing chamber to temper the water therein. If desired, the valve may be made to close the end of the tube 6 as well as the steam nozzle, and in this case there is no flow of water through the interior passage of the steam nozzle when the valve is closed.

The form of the invention shown in Fig. 3 is similar in all respects to that shown in Fig. 1, except in the following particulars. The steam inlet or nozzle instead of being annular, is a simple tube 30 extending from one side of the mixing chamber, to which the steam pipe 5 is connected. The valve 20^a is arranged as already described so as to seat against the end of the nozzle 30. The only variation in this form of the valve is that it is fitted to the nozzle 30 so as to entirely close the end thereof. It may be observed that as a feature of construction, the mixing chamber, steam nozzle, and the water tube 6, are all made as a single casting, in the form shown in Fig. 1, and that the nozzle 30 is cast integral with the shell of the mixing chamber in the form shown in Fig. 3.

The advantage of arranging the stem valve in the mixing chamber and having it closed against the end of the steam nozzle is that when closed it prevents flow of water back into the nozzle. In all the other types of steam and water mixer with which I am acquainted, the valve for the steam inlet is located outside of the mixing chamber, and as a result water is able to enter the steam pipe when the steam is cut off. This water is forced out of the steam pipe when the steam is again turned on, causing a highly objectionable hammering noise and vibration. In some instances the vibration is found severe enough to endanger the integrity of the mixer and piping. In my apparatus the objectionable noise and vibration are entirely eliminated. I believe that the idea of mounting a thermostatically controlled valve inside of a water mixer so as to close against the extreme end of the steam nozzle or inlet and to prevent water from entering such nozzle or inlet when closed, is novel with the present invention and it is this combination which I particularly desire to protect by patent.

I claim:

1. A steam and water mixer comprising a mixing chamber having a continuously open water inlet, a water outlet, a steam nozzle projecting into the chamber, a valve in said chamber arranged to seat on the outlet of said steam nozzle and means for opening and closing said valve.

2. A steam and water mixer comprising a mixing chamber having a continuously open water inlet, a water outlet, a steam nozzle projecting into the chamber, a valve in said chamber adjacent to the steam nozzle arranged to move against and from the end of the latter, and means for so moving said valve.

3. A steam and water mixer comprising a mixing chamber having a continuously open water inlet and a water outlet, a steam nozzle extending into said chamber and having a valve seat on its end, a valve within said chamber arranged to co-act with said seat, and means for moving the valve toward and from said seat.

4. A steam and water mixer comprising a chamber, a steam conduit entering said chamber, a water conduit entering the chamber and passing longitudinally through the steam conduit, and a valve within the mixer arranged to close and open the steam space between the walls of the steam and water conduits at the end of such space, and constructed to leave the water conduit always open.

5. A steam and water mixer comprising a chamber, a cup within said chamber having external steam communication through the wall of the chamber, a tube passing through the interior of said cup and having external water communication through a wall of the chamber, the termination of said tube and the rim of said cup being approximately in the same plane, a valve contained in the chamber and constructed to seat against the cup and tube to close the outer end of the steam space in the cup leaving the tube open,

and controlled means for seating and unseating said valve.

6. A steam and water mixer comprising a chamber, an annular steam nozzle in said chamber, means for conducting steam to said nozzle, a conduit for leading water into the space surrounded by said annular nozzle, said conduit having an opening within the chamber and outside of the nozzle, and means for opening and closing the nozzle, constructed to leave said conduit open at all times.

7. A steam and water mixer comprising a mixing chamber having a water inlet and a hot water outlet, a steam nozzle projecting into said chamber with its outlet orifice above the water inlet, a valve arranged to close against the outlet orifice of said nozzle and being so constructed as to prevent inflow of water to the nozzle when closed, and means for opening and closing said valve.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GEORGE A. WELD.

Witnesses:
G. L. JOHNSON,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."