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W. G. F. STEINMETZ.

APPARATUS FOR HEATING WATER BY STEAM.

APPLICATION FILED MAY 27, 1903.

NO MODEL.

Fig. 5

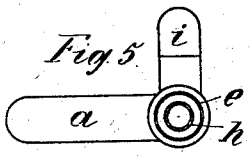



Fig. 2.

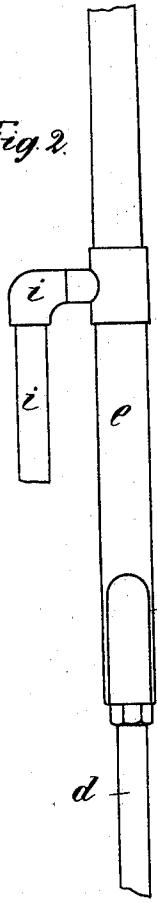



Fig. 1.

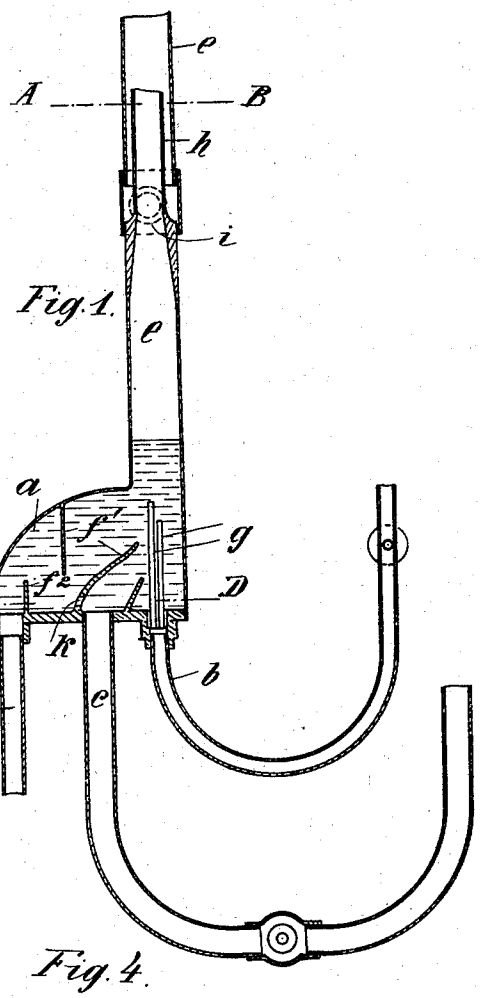



Fig. 3.

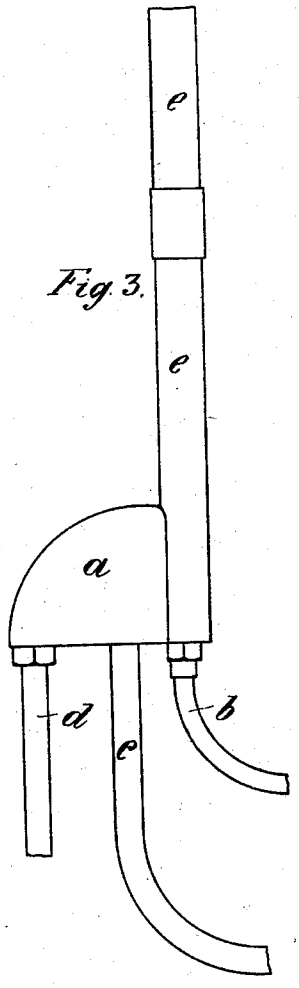
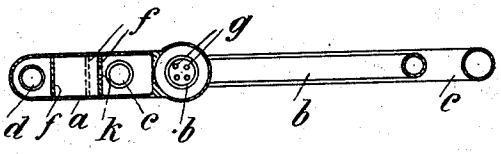



Fig. 4.




Witnesses:

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Inventor:

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No. 752,721. Patented February 23, 1904.

# UNITED STATES PATENT OFFICE.

WILLEM GEORGE FREDIRIK STEINMETZ, OF MEDEMBLIK, NETHERLANDS.

## APPARATUS FOR HEATING WATER BY STEAM.

SPECIFICATION forming part of Letters Patent No. 752,721, dated February 23, 1904.

Application filed May 27, 1903. Serial No. 158,945. (No model.)

*To all whom it may concern:*

Be it known that I, WILLEM GEORGE FREDIRIK STEINMETZ, a subject of the Queen of the Netherlands, residing at Medemblik, Netherlands, have invented a new and Improved Apparatus for Heating Water by Steam, of which the following is a specification.

This invention relates to an improved apparatus for heating water by steam which prevents the water from being heated in excess of a certain maximum temperature independently from the quantity of water and steam supplied.

The main feature of the new device consists in a steam-outlet being provided in the direction of the steam-inlet for the excess of steam in case an insufficient supply of cold water takes place, so that steam cannot escape through the discharge-pipe of the heating-chamber leading to the place of consumption. Further, the water heated by said steam can only reach the place of consumption when the quantity of cold water entering the chamber is such as to absorb the whole supply of steam.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of my improved apparatus; Fig. 2, a front view thereof; Fig. 3, a side elevation; Fig. 4, a horizontal section on line C D, Fig. 1; and Fig. 5, a similar section on line A B, Fig. 1.

The letter *a* represents the heating-chamber, which communicates at its bottom with a steam-inlet pipe *b*, a cold-water-supply pipe *c*, and a hot-water-discharge pipe *d*, leading to the place of consumption. The steam-pipe *b* terminates in a number of nozzles *g*, projecting upwardly into chamber *a*, said nozzles acting in the manner of an injector. Opposite these nozzles the chamber *a* is provided with an upwardly-extending open tube *e*, which is thus in alinement with steam-inlet pipe *b*. Water from the cold-water-inlet pipe, which preferably enters the chamber near the point where the steam enters, enters at an angle to the nozzles *g*. Partitions or baffle-plates $f$ $f'$ $f^2$ are provided in the interior of the chamber, so that the cold water cannot flow directly to the hot-water-discharge pipe *d*.

The tubular extension *e* of the chamber *a*, into which the steam-jets escape, is provided at a suitable height with a device for draining off water of condensation, the drawing showing a tubular insertion *h*, that forms an annular space between it and the extension, a discharge-pipe *i* being provided at the lowest point of said annular space.

In use I first open the valve of the steam-supply pipe *b*, so that a steam-jet will pass through tube *e* into the open air. Any water of condensation formed in the upper part of tube *e* will descend along its inner surface and enter the pocket between tube *e* and tube *h*, whence it may escape through discharge-pipe *i*. A cock in the water-supply pipe *c* is then opened, so that the lower part of heating-chamber *a* will become filled with water, which passes partly through opening *k* into the space between the partitions $f$ $f^2$. The inflowing water will gradually rise to about the height of the partition $f^2$, when the depending partition $f'$ will dip into the water. In this way the upper part of chamber *a* to the right of partition $f^2$ is closed against pipe *d*, so that air cannot enter chamber *a* through such pipe. The water continuing to enter from pipe *c* will come into contact with the steam-jet, so that the steam will be condensed within the cold water and its temperature raised. Thus the water will be heated and will flow over partition $f^2$ and through pipe *d* to the place of consumption. If, however, steam enters chamber *a* in excess, it will not be entirely condensed, and the steam-jet thus flowing upwardly from nozzles *g* into tube *e* will exert a suction upon the water, which is carried along by the steam-jet and is discharged through pipe *i*. This suction is made possible, as the water in chamber *a* and outflowing over the partition $f^2$ into pipe *d* will form an air-tight closing of the chamber, as already stated. In this way the discharge of overheated water through pipe *d* is practically prevented. If the temperature of the water in chamber *a* becomes too high, the water will not be discharged through pipe *d*, but through pipe *i*, as the steam, which will not be condensed by the hot water, will take it along. Thus it will be seen that water can only be discharged through pipe *d* if cold water enters chamber *a* more or less in excess, so that

the steam becomes condensed and cannot exert a suction upon the water. Under these normal conditions the water will rise so as to fill chamber *a* and the lower part of tube *e*, Fig. 1, where it becomes heated through condensation of the steam supplied through pipe *b*, and the properly-heated water is passed through pipe *d* to the place of consumption. The temperature of the discharged water may be regulated by the quantity of water entering chamber *a* through pipe *c*.

By my construction the steam is prevented from escaping through pipe *d* if the supply of cold water should be stopped, as in this case the steam blows off through pipe *e* into the open air and will not enter pipe *d*. If, for instance, the apparatus is to furnish water of about 100° Fahrenheit, the steam and water supply are first turned on full. If the water discharged through pipe *d* is too cold, the water-supply through pipe *c* is diminished until the discharged water is sufficiently heated. Should, however, the water-supply be diminished excessively, the discharge of water through pipe *d* will decrease, as the entering steam will not be entirely condensed. The surplus of steam will form a jet in nozzles *g* and pipe *e* and exert a suction upon the water, taking it along and discharging it through pipe *i*.

It will be seen that in my apparatus the water is heated in an effective manner, while the discharge of excessively-heated water is automatically prevented.

What I claim is—

1. An apparatus for heating water by steam, composed of a chamber, a steam-inlet pipe, a cold-water-inlet pipe, a hot-water-outlet pipe, partitions between the water inlet and outlet pipes, and a steam-exit pipe at the top of the chamber and in alinement with the steam-inlet pipe, substantially as specified.

2. An apparatus for heating water by steam, composed of a chamber, a steam-inlet pipe having nozzles, a cold-water-inlet pipe and a hot-water-outlet pipe arranged at the bottom of said chamber, partitions between the cold-water-inlet and hot-water-outlet pipes, a steam-exit pipe at the top of the chamber and in alinement with the steam-inlet pipe, and means on the steam-exit pipe for discharging condensed water from said pipe, substantially as specified.

In testimony whereof I affix my signature to this specification in the presence of two witnesses.

WILLEM GEORGE FREDIRIK STEINMETZ.

Witnesses:

E. FRANSEN,

J. V. VAN EINPEL.