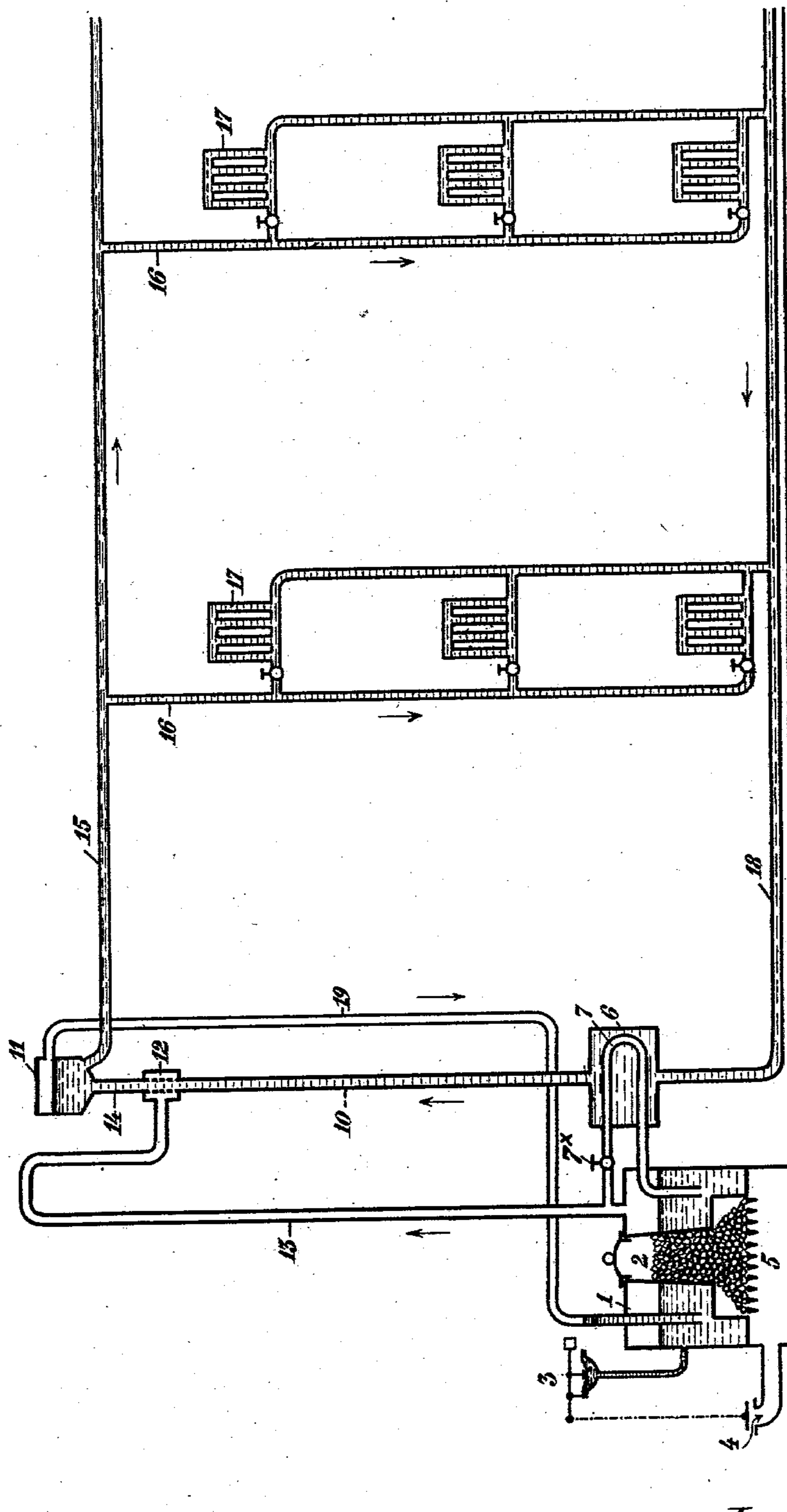


No. 741,070.

PATENTED OCT. 13, 1903.

A. B. RECK.  
HOT WATER HEATING SYSTEM.  
APPLICATION FILED JULY 18, 1899.

NO MODEL.



Witnesses,  
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# UNITED STATES PATENT OFFICE.

ANDERS BORCH RECK, OF COPENHAGEN, DENMARK.

## HOT-WATER HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 741,070, dated October 13, 1903.

Application filed July 18, 1899. Serial No. 724,233. (No model.)

*To all whom it may concern:*

Be it known that I, ANDERS BORCH RECK, a subject of the King of Denmark, and a resident of Copenhagen, Denmark, have invented certain new and useful Improvements in Hot-Water Heating Systems, of which the following is a specification.

This invention relates to hot-water heating systems worked by steam, especially low-pressure steam; and the object of the invention is to create means for attaining that by only changing the load on the pressure-regulator that controls the pressure of the steam, the hot-water system can be worked in two distinctly different manners, one for low and the other for high temperature on the water.

In order that the invention may be more readily understood, I have appended hereto a drawing diagrammatically illustrative of an installation in which water-heaters are shown as arranged on three floors of a building.

In the said drawing, 1 is a steam-boiler heated by the furnace 2 and provided with a pressure-regulator 3, which serves to regulate the draft to the furnace by opening and closing to a greater or less extent the damper-valve 4, leading to the ash-pit 5.

6 is the water-heater, designed to supply hot water to the heaters. The water in said heater 6 is heated by the steam-pipe 7, by which steam is led from the steam-space of the steam-boiler 1, the water condensing in the said pipe 7 being returned to the steam-boiler, as will be well understood. From the top of the water-heater 6 extends the vertical pipe 10, leading to the separator 11, which will be hereinafter mentioned. Upon said pipe 10 and a few feet below the separator 11 is situated a steam heating mixing-chamber 12, fed by steam from the steam-space of the boiler 1 through pipe 13. This mixing-chamber consists, preferably, of two spaces separated by perforated metal partitions, the steam being led to the outer space, while the water traverses the inner space. The steam meeting the water heats it further and is partially condensed. The remainder of the steam rises with the water through the short pipe 14 into the separator, where it is separated and condensed.

15 is the main supply-pipe leading to the branch supply-pipes 16 16 and to the radia-

tors 17, from which the water returns by the return-pipes 18 to the heater 6.

19 is an overflow-pipe by means of which the superfluous or overflow water from the separator 11 is led back to the water-space of the steam-boiler 1.

The pressure-regulator acts in the well-known manner, the furnace-draft being diminished by increase of steam-pressure in the boiler.

The apparatus works in the following way: When only little heat is needed in the building in which the apparatus is installed, the pressure of the steam is kept at or very near atmospheric pressure by taking off weight from the pressure-regulator. At such pressure heat will only be imparted to the water through the heater 6, and the temperature of all pipes and radiators 17 will be low. When more heat is needed in the building, the pressure-regulator of the steam-boiler is loaded so much that the pressure of the steam gets a little higher than the pressure of the water column from the mixing-chamber 12 to the water-line in separator 11. Then steam will force its way into the water in the mixing-chamber. The water will be heated here to the very temperature of the steam, and the admixture of steam-bubbles to the water in the short tube 14 between the mixing-chamber and the separator will produce a strong circulation through the whole apparatus.

From what has been said it will be seen that the whole system can be worked in two distinctly different manners by only keeping the pressure of the steam either low or high. By low pressure the steam cannot force its way into the mixing-chamber 12, but only condenses in the pipes 7 of the heater 6. If then the condensing-surfaces of the pipes 7 are correctly proportioned, the water will only be heated to a moderate temperature in the heater 6, and as in this case the heater is the only place where heat is imparted to the water the temperature in all hot-water pipes and radiators can only be low. On the other hand, if the pressure of the steam is kept sufficiently high the steam will be able to force its way into the mixing-chamber 12, the temperature of the water leaving the separator 11 through the main 15 will be just as high as the temperature of the steam, and by

the action of the steam-bubbles rising in pipe 14 the velocity of the water will be three-fourths times as great as in the former case.

I only here claim as new a system that has this feature: that a heater 6 and a mixing-chamber 12 on the main rising pipe of the hot-water system are combined in such a manner that by low pressure of the steam heat is only imparted to the water in the heater, whereas by higher pressure a change is made quite automatically, by which heat is imparted to the water as well in the mixing-chamber as in the heater.

It is not necessary to have a separate steam-boiler for each hot-water heating apparatus; but in such cases where several hot-water apparatus are to be worked from the same boiler the system is only altered in that manner that a common steam-main supplies steam to all the hot-water apparatus and the pressure-regulator 3 controls a valve on the branch pipe from the steam-main instead of a valve in the air-supply pipe of the furnace of the boiler, as shown at 4 in the drawing.

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

1. A heating system including a boiler, a heater 6 adjacent to said boiler, a pipe 7 leading from the boiler through the heater and having a return, and provided with a valve 7<sup>x</sup>, a continuously-circulating system associated with the heater, a separating-chamber 11 in said system, a heating and mixing chamber 12 in the outgoing pipe of the system and between the chamber 11 and heater 6, a supply-pipe 13 between the boiler and chamber 12 and having communication with the pipe 7 and a return-pipe 19 extending from the upper portion of the chamber 11 back to the boiler, substantially as described.

2. The heating system including a boiler, a heater 6 adjacent to said boiler, a pipe 7 leading from the boiler through the heater, and having a return and provided with a valve 7<sup>x</sup>, a continuously-circulating system associated with the heater, a separating-

chamber 11 in said system, a heating and mixing chamber 12 in the outgoing pipe of the system and between the chamber 11 and heater 6, and a supply-pipe 13 between the boiler and chamber 12 and connected to the pipe 7.

3. A heating system including a boiler, a heater 6 adjacent to said boiler, a pipe leading from the boiler through the heater, a continuously-circulating system associated with the heater, a separating-chamber 11 in said system, a heating and mixing chamber 12 in the outgoing pipe of the system and between the chamber 11 and heater 6 and a supply-pipe 13 between the boiler and chamber 12 and connected with the pipe 7.

4. A heating system including a boiler, a heater 6 adjacent to said boiler, a pipe leading from the boiler through the heater, a continuously-circulating system associated with the heater, a separating-chamber 11 in said system, a heating and mixing chamber 12 in the outgoing pipe of the system and between the chamber 11 and heater 6, a supply-pipe 13 between the boiler and chamber 12 and connected with the pipe 7, and means for regulating the steam.

5. A heating system including a boiler, a heater adjacent to said boiler, a pipe 7 leading from the boiler through the heater, a continuously-circulating system associated with the heater, a separating-chamber in said system, a heating and mixing chamber in the outgoing pipe of the system and between the separating-chamber and the heater, said mixing and heating chamber including the two spaces and a perforated partition separating the same, and a supply-pipe between said chamber and the boiler and connected with the pipe 7.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ANDERS BORCH RECK.

Witnesses:

RICH. JORGENSEN,  
A. THULES.