

(No Model.)

3 Sheets—Sheet 1.

A. T. HENDERSON.
HOT WATER HEATING APPARATUS.

No. 520,677.

Patented May 29, 1894.

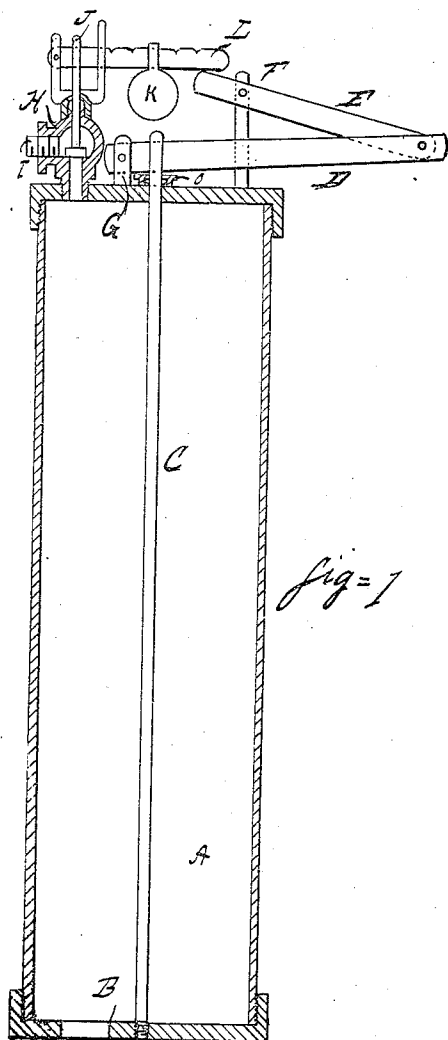


fig. 1

Witnesses
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Geo. H. Lothrop

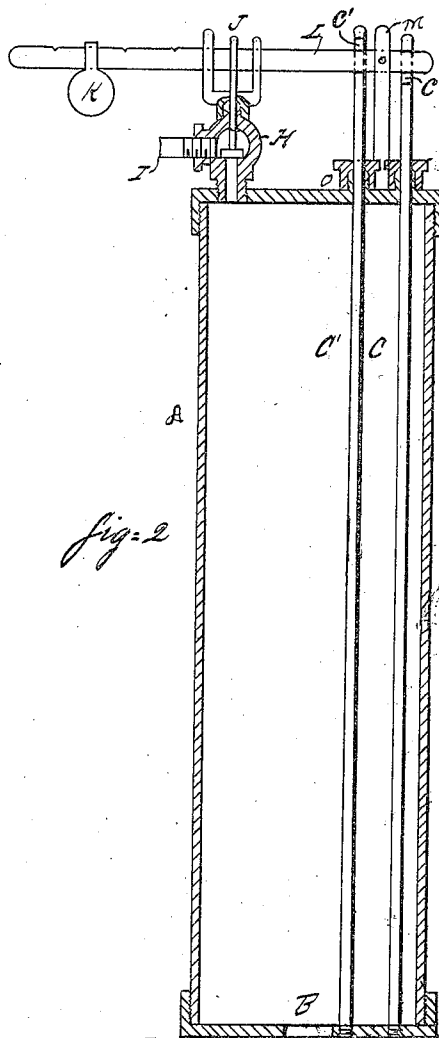


fig. 2

Inventor
Alexander T. Henderson

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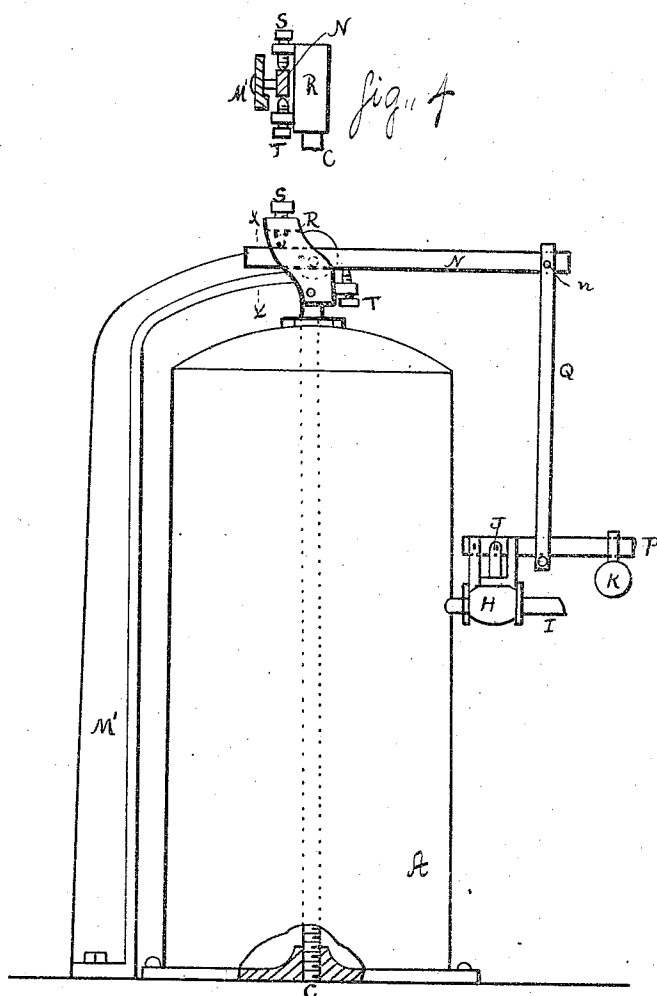


fig. 3

Witnesses
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Inventor
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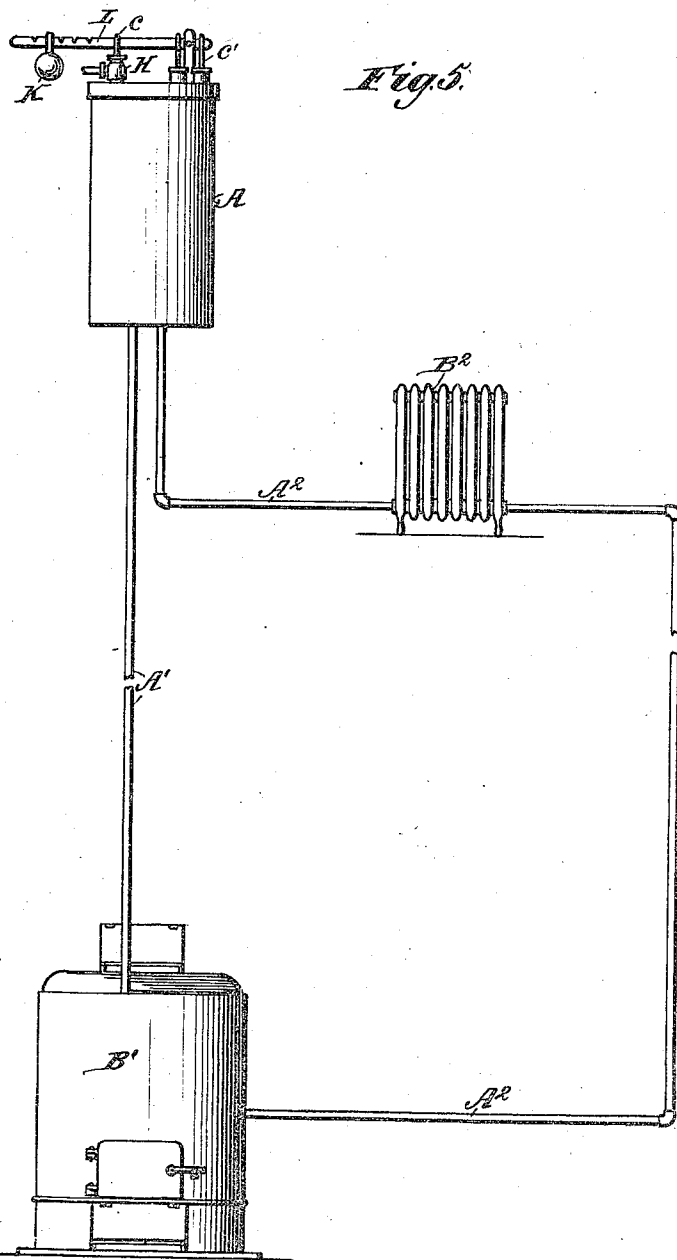
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3 Sheets—Sheet 3.

A. T. HENDERSON.
HOT WATER HEATING APPARATUS.

No. 520,677.

Patented May 29, 1894.



Witnesses.
John Smith,
J. A. Rutledge.

Inventor.
Alexander T. Henderson.
By *Geo. S. Lothrop* Atty.

UNITED STATES PATENT OFFICE.

ALEXANDER T. HENDERSON, OF DETROIT, MICHIGAN.

HOT-WATER HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 520,677, dated May 29, 1894.

Application filed July 28, 1892. Serial No. 441,516. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER T. HENDERSON, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Hot-Water Heating Apparatus, of which the following is a specification.

My invention consists in an improvement in hot water heating apparatus, hereinafter fully described and claimed.

Figures 1 and 2 are sections through the expansion tank of a hot water heating apparatus. Fig. 3 is a side elevation. Fig. 4 is a section on line $x-x$, Fig. 3, and Fig. 5, is a diagram to show the connection of the tank with a boiler and a radiator.

Hot water heating apparatus have been operated upon two systems: In one the expansion tank (which is placed at the highest point of the apparatus) is constantly open to the outer air, and the temperature of the water can never rise above 212° . This system gives a soft, pleasant heat, but requires a large heating and radiating surface to compensate for the low temperature of the heating agent. In the other system the expansion tank is closed and provided with a safety valve, by means of which the water can be raised above 212° (without passing into steam) until it reaches the limit at which the safety valve is set. This system does not need as much heating and radiating surface as the first named, but is dangerous for the reason that as expansion tanks are usually placed in garrets, and are rarely ever examined, the safety valves become corroded to their seats and frequently refuse to work, thereby causing great danger of explosion.

The object of this invention and of the two cognate inventions, for which applications were filed simultaneously herewith, is to combine the advantages of the two systems without the danger of the closed system, and the principle of my invention consists in providing the expansion tank of a hot water system with a safety valve, which at a low temperature is constantly open through the contraction of some of the parts, which closes when a steam temperature is approached, and which acts while steam temperature is maintained, as a safety valve, and which opens through the contraction of some of the parts when the

system is allowed to wholly or partially cool. From this it is evident that as the safety valve remains open during all the time the apparatus is not in use, there is no opportunity for the valve to rust or stick to its seat.

Referring to the figures, A represents an expansion tank which in practice is suitably connected with a boiler and one or more radiators. For the purpose of exhibiting one connection of the parts I have indicated in Fig. 5 a boiler B' connected by a pipe A' with the tank A at the point B, Figs. 1 and 2. The tank is also connected by a pipe or pipes A² with a radiator or radiators B².

H represents a safety valve of the lever type, (though the spring type may be used,) secured to tank A.

C represents a metal rod fastened at one end to the bottom of tank A and extending out beyond the other end of said tank, preferably through a stuffing box O.

D represents a lever pivoted at one end to a post G carried on tank A, and at its other end pivoted to the long arm of lever E, fulcrumed to a post F also carried on tank A. The short arm of lever E engages with the safety valve lever L, which by means of the adjustable weight forces down the valve stem J. The end of rod C is connected with lever D near its fulcrum, either by being pivoted thereto, or by being slotted and embracing said lever, or in any other suitable way.

The operation of this invention is as follows: When the water in tank A is below the temperature at which it is desired to bring the safety valve into action the rod C pulls down on lever D thus depressing the long arm of lever E and raising the short arm of said lever, which raises the lever L and valve stem J, thus holding the safety valve open. When the water in tank A becomes heated the rod C expands and lengthens, forces lever D upward, and thus permits the safety valve lever L to descend and close the safety valve, which then operates in the usual manner, opening with an excess of pressure and blowing off through pipe I.

Fig. 2 illustrates a modification designed to force the safety valve lever in both directions. In this arrangement the rod C has a slot c which embraces the short arm of the valve lever L, which is fulcrumed on post M. The

slot *c* is wider than lever *L*, and is so placed that when rod *C* is expanded sufficiently to allow the safety valve to close the upper end of slot *c* just touches the upper side of lever *L* while the length of said slot permits the short arm of lever *L* to descend freely when the safety valve opens through excess of pressure. *C'* represents another expansion rod similar to *C* and engaging with lever *L* on the other side of its fulcrum by means of a slot *c'* so arranged that when rod *C* has expanded sufficiently to permit safety valve to close rod *C'* will have expanded sufficiently to bring the lower side of slot *c'* nearly against the under side of lever *L*, and a certain further expansion of said rod *C'* from excessive temperature will open the safety valve. When the temperature of the water in tank *A* falls both rods contract and shorten, and rod *C* opens the safety valve, and holds it open until the water is again heated sufficiently to again expand said rods.

Fig. 3 represents a modification in which a lever *N* fulcrumed on a bracket *M'* is connected by a rod *Q*, pivoted at *n* with the lever *P* of a safety valve *H*. The expansion rod *C* carries on its end a head, *R*, having a set screw *S* adapted to bear on the short arm of lever *N* and open the safety valve when rod *C* is cold, and to permit the safety valve to close when rod *C* expands. Another set screw *T* will open the safety valve if rod *C* becomes unduly expanded.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a heating apparatus the combination of an expansion tank, a safety valve, and an

expansion rod connected with the safety valve to hold the safety valve open when the water in the tank is below the temperature at which it is desired to bring said valve into action, substantially as and for the purposes set forth.

2. In a hot water heating apparatus the combination of an expansion tank, a safety valve, and an expansion rod having one end rigidly fastened and having its free end connected with the safety valve lever to hold the safety valve open when the water in the tank is below the temperature at which it is desired to bring said valve into action, substantially as shown and described.

3. In a hot-water or steam-circulating heating system, the combination of a safety-valve, and means whereby the valve is automatically unseated and held open at a low temperature and seated by a rising temperature, substantially as described.

4. The combination with the expansion tank *A*, safety valve *H*, and pivoted lever *L*, of the expansion rods *C* and *C'* connected with the lever at opposite sides of its pivot, substantially as and for the purpose described.

5. In combination with the expansion tank of a closed hot water system a safety valve connected with said expansion tank, and an expansion rod carried on said tank and adapted when expanded by undue heat to connect with and open said safety valve, substantially as and for the purposes set forth.

ALEXANDER T. HENDERSON.

Witnesses:

GERTRUDE H. ANDERSON,
GEO. H. LOTHROP.