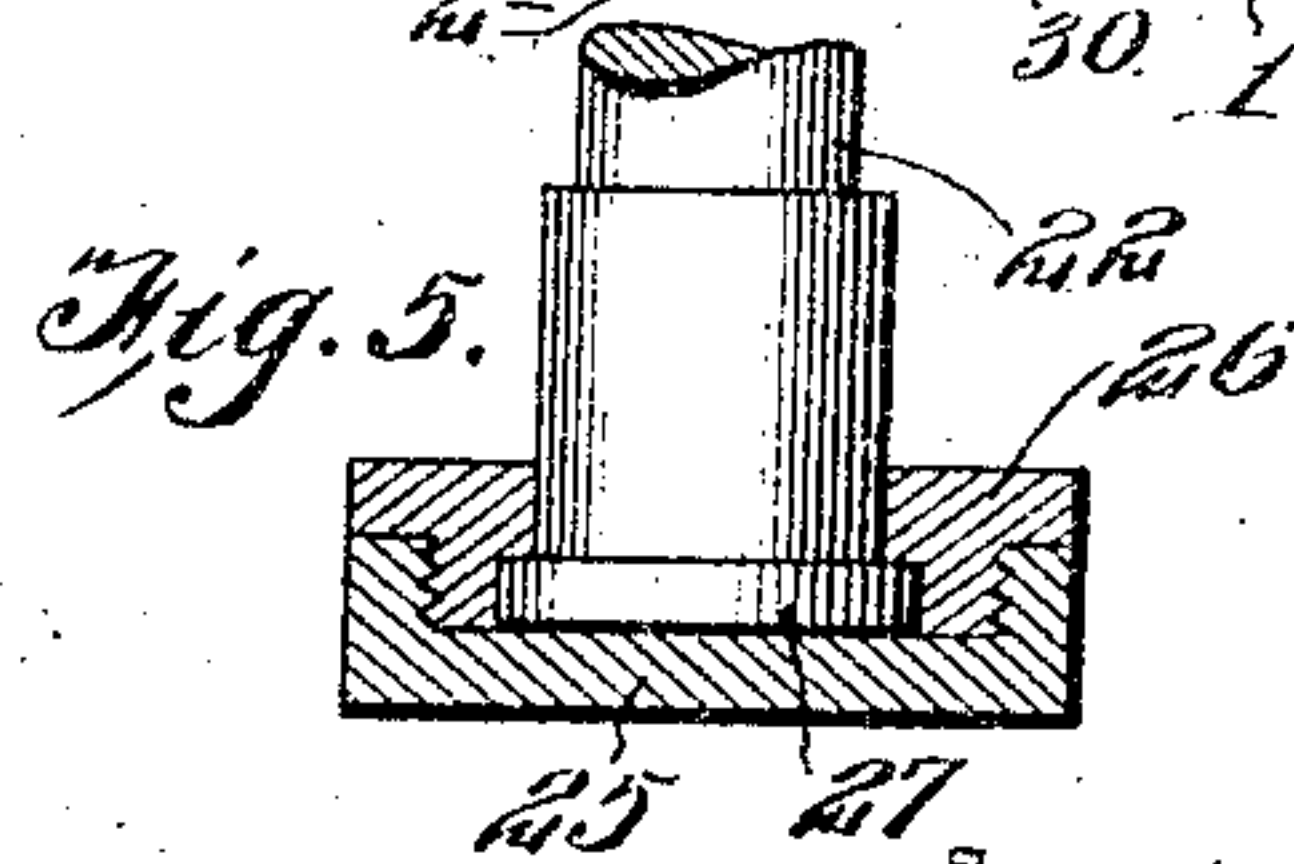
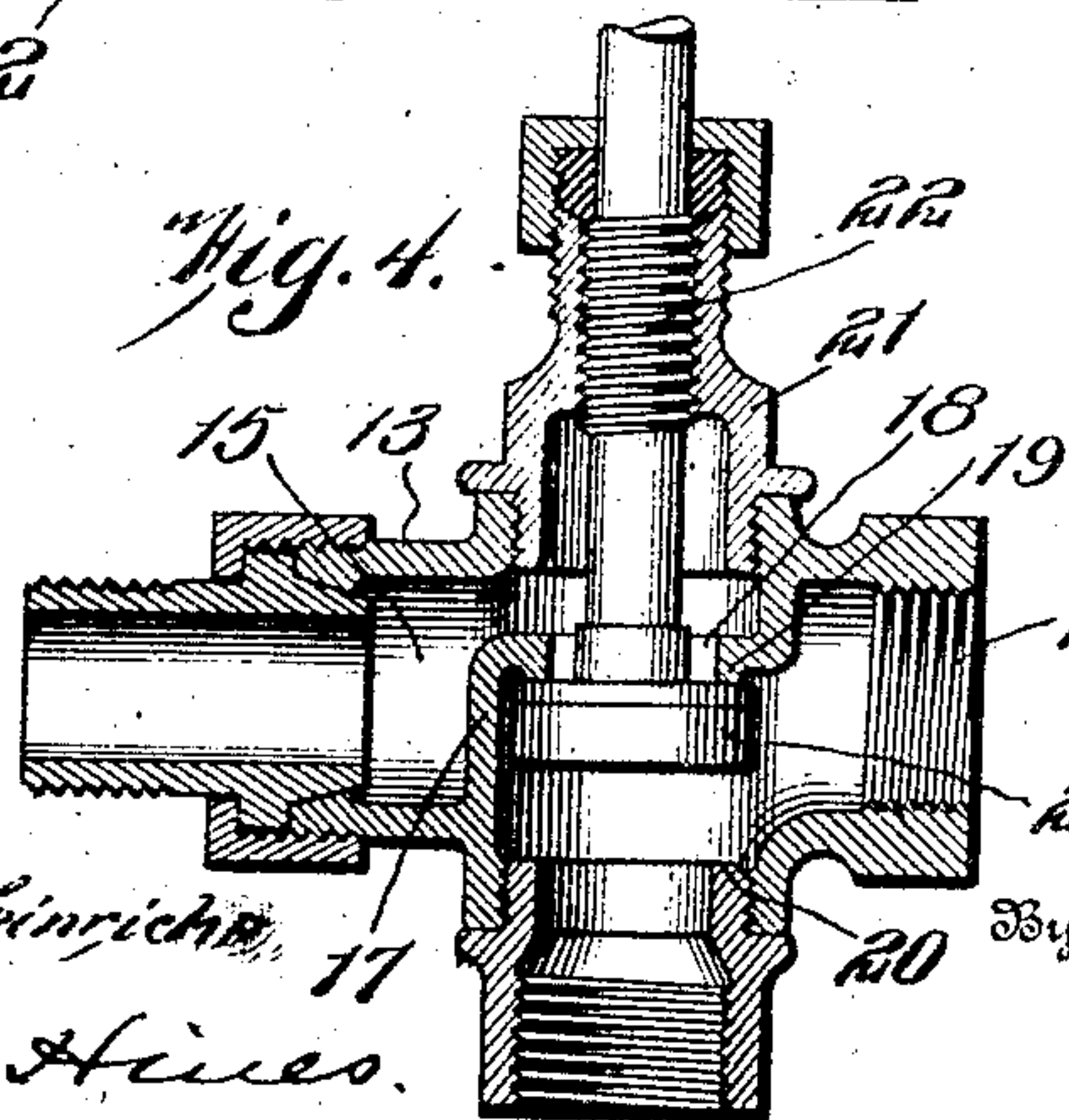
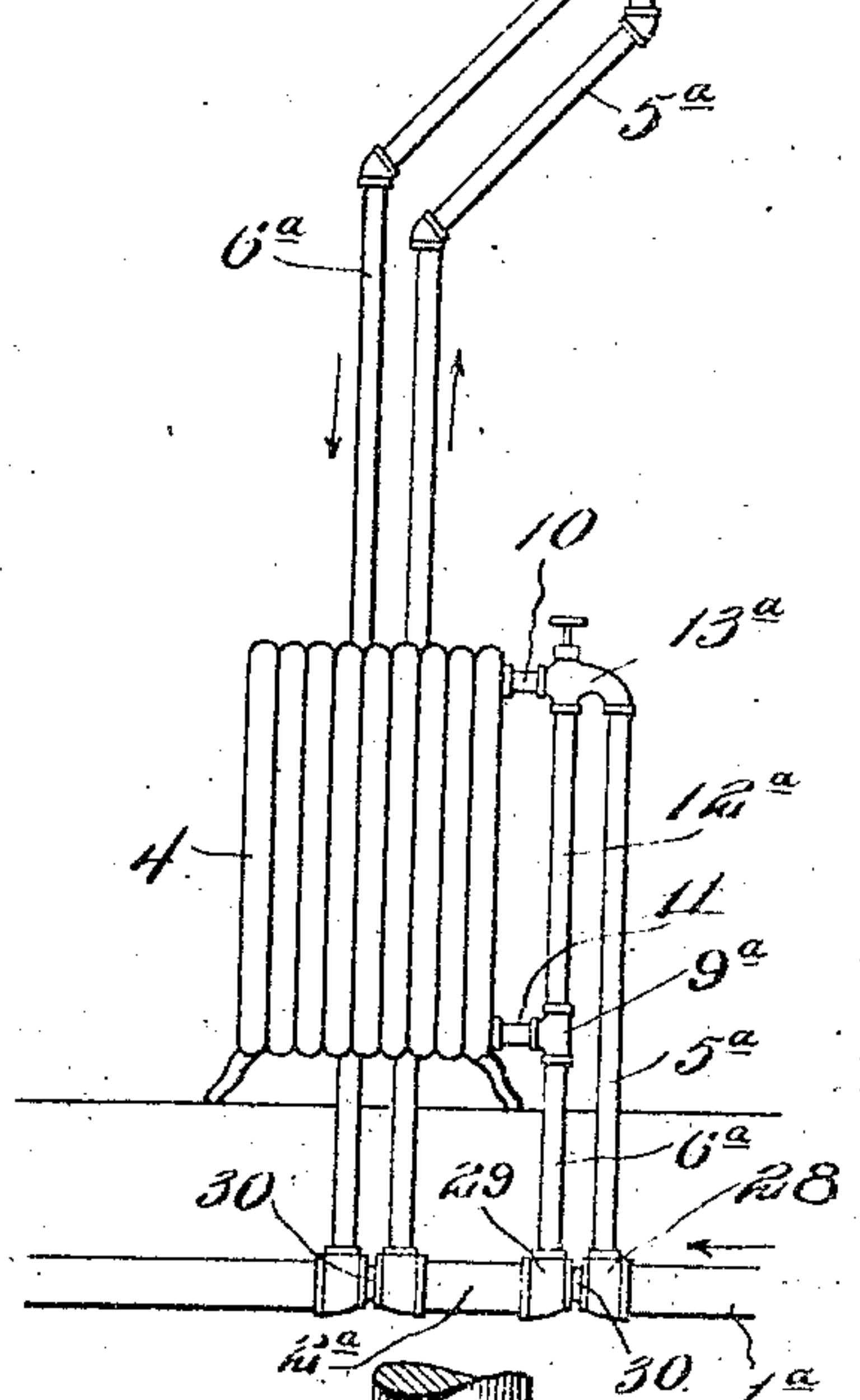
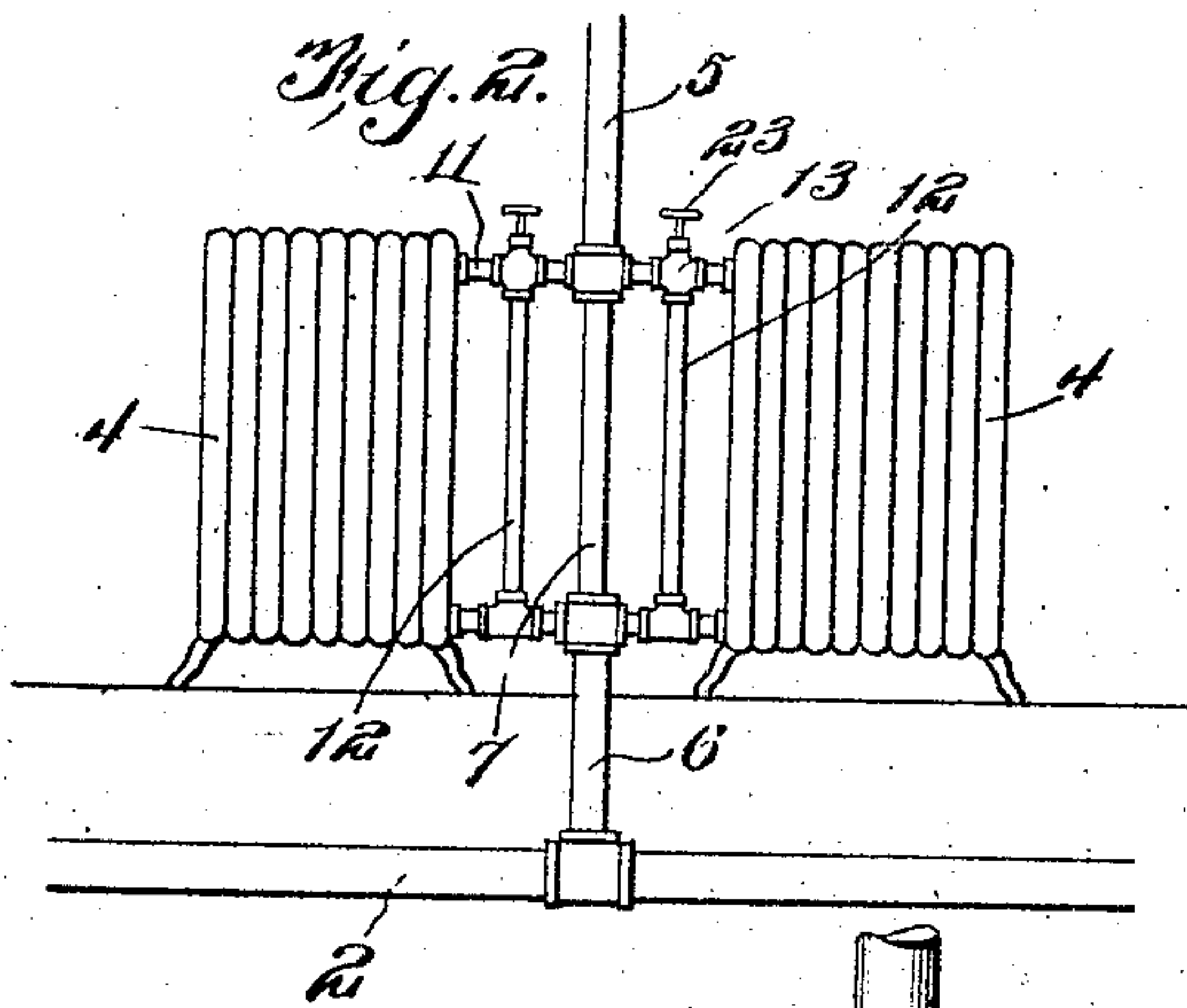
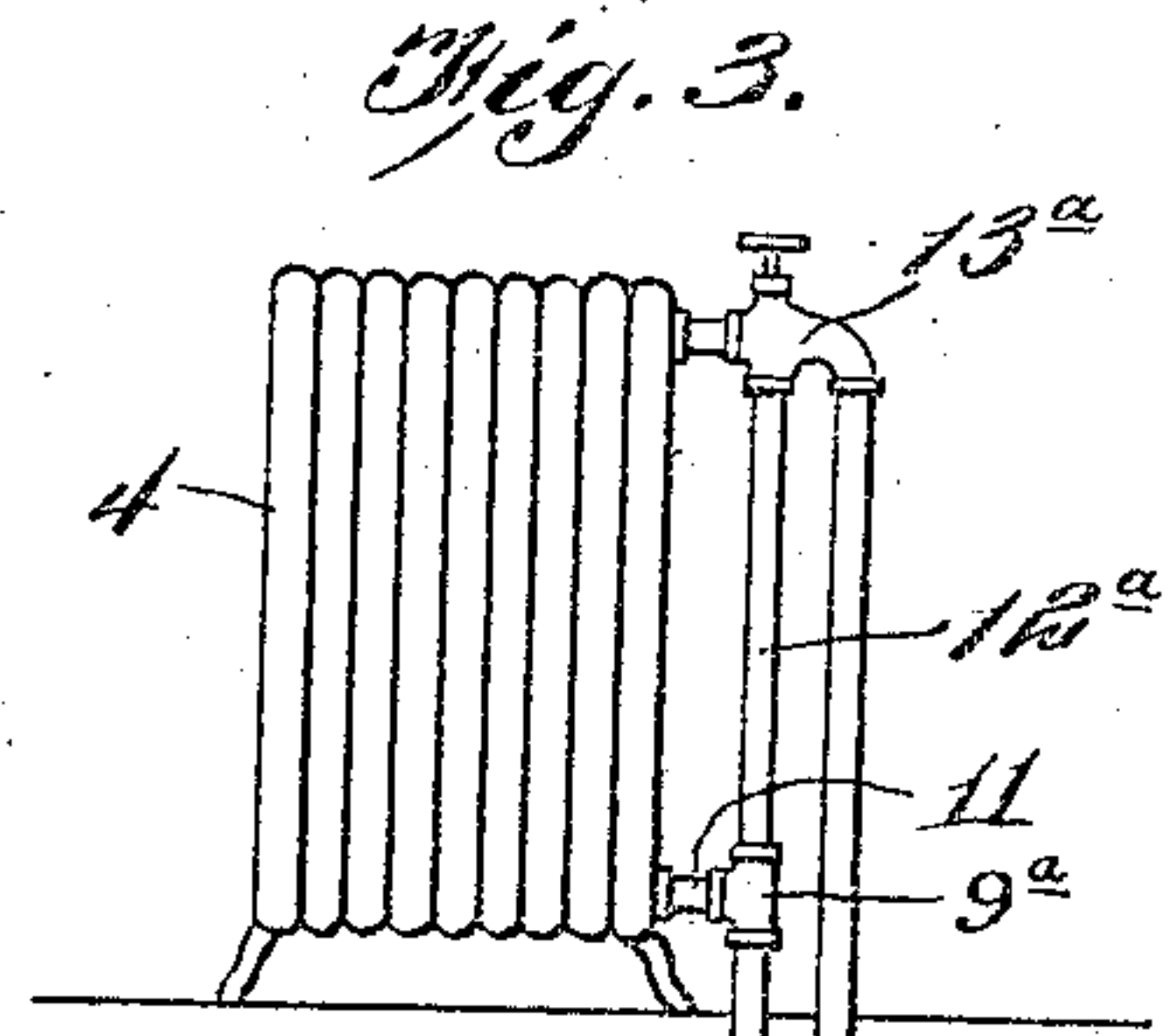
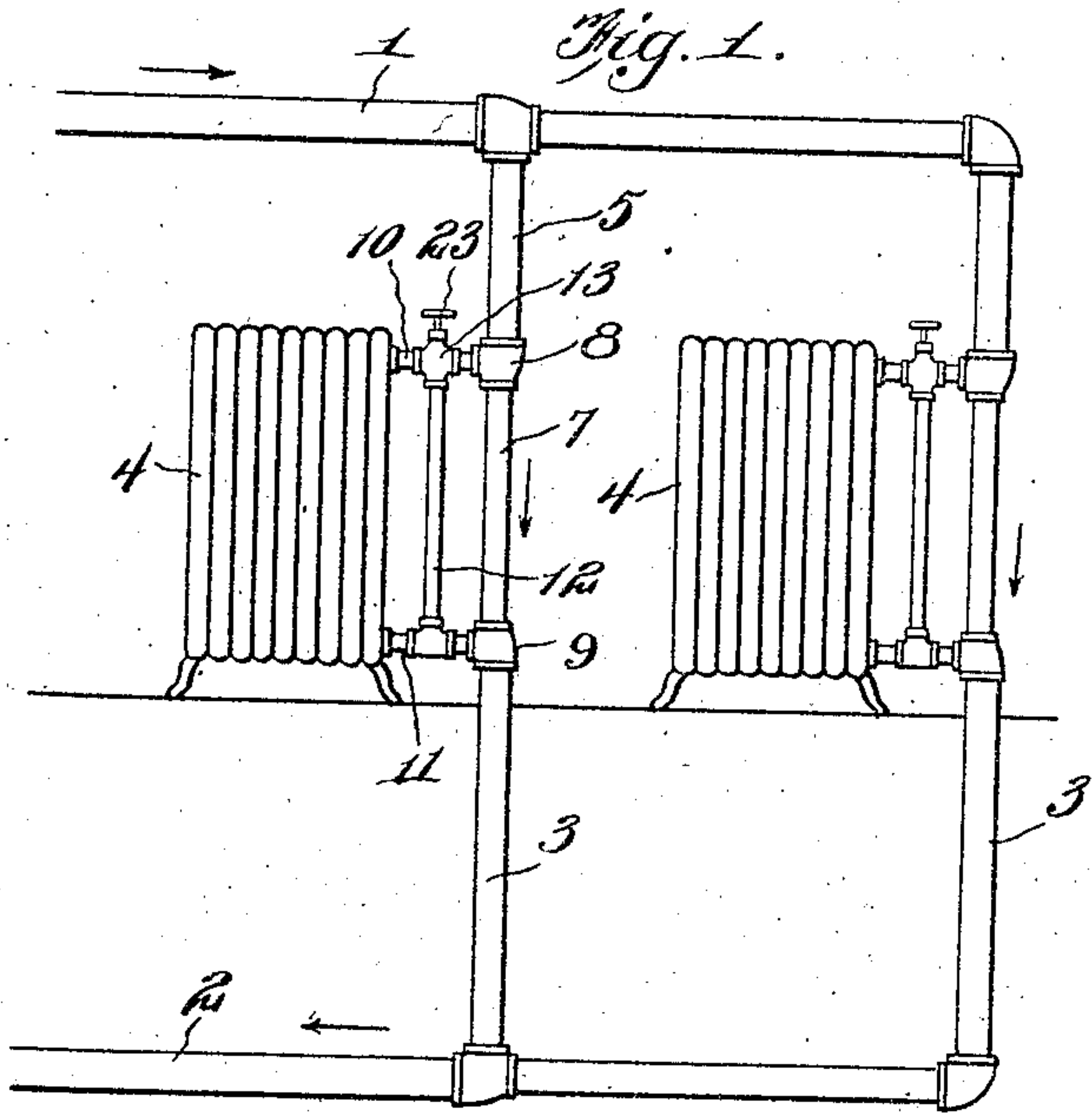


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HOT WATER HEATING SYSTEM.  
APPLICATION FILED APR. 17, 1908.

907,544.

Patented Dec. 22, 1908.



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# UNITED STATES PATENT OFFICE.

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## HOT-WATER HEATING SYSTEM.

No. 907,544.

Specification of Letters Patent.

Patented Dec. 22, 1908.

Application filed April 17, 1908. Serial No. 427,623.

*To all whom it may concern:*

Be it known that I, WALLACE M. WALCUTT, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented new and useful Improvements in Hot-Water Heating Systems, of which the following is a specification.

This invention relates to certain new and useful improvements in hot-water heating systems, one of the objects in view being to provide means whereby each radiator in the system will be equally and quickly supplied with water from the main, and proper discharge of the water therefrom allowed, without restricting the flow of the water through the main or its supply in like ratio to the other radiators.

A further object of the invention is to provide a means by which the result sought may be accomplished in a simple and effective manner, and whereby the free feed of the water from the heater to the radiators and return of the same from the radiators to the heater will be insured.

A still further object of the invention is to provide a construction by which a radiator may be shut off or cut out without affecting the flow in the circuit at the point adjacent the radiator or through the branches by which the radiator is supplied, so that, upon the subsequent opening of the valve governing the supply of water to the radiator, the latter will be at once filled and quickly heated, thus enabling a room or apartment from which the heat has been cut off to be rapidly warmed.

With these and other ends in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a view showing the embodiment of the invention in a down-feed system. Fig. 2 is a view showing a different mode of arranging the radiators. Fig. 3 is a view showing the embodiment of the invention in an up-feed system. Fig. 4 is a detail section through one of the radiator valves. Fig. 5 is a cross-section through the valve *per se*.

Referring to the drawings, and particularly to Figs. 1 and 2, 1 designates the flow or supply portion and 2 the return portion of the main or circulating pipe, between which are arranged the branches or laterals 3 for

supplying the respective radiators 4. The branches or laterals are shown as each consisting of branches 5 and 6 connecting respectively at their upper and lower ends with the portions 1 and 2 of the main and connected at their proximate ends by a reducing pipe section 7 disposed opposite the radiator 4. The said sections 5, 6 and 7 are coupled by tees 8 and 9 from which lead supply and discharge branch pipes 10 and 11 to the upper and lower portions of the radiator. The reducing pipe section 7, having less area than the sections 5 and 6, acts as a choke limiting the feed area of the lateral as a whole, and operating to divert a portion of the water on its downflow therethrough through the supply connection into the radiator, from which the water discharges through the connection 11 into the lower branch 3 of the lateral and thence enters the return portion 2 of the main.

Arranged between the supply and discharge branches 10 and 11 is a pipe 12 forming a by-pass, through which, when the water is cut off from the radiator, the supply normally diverted thereto through the action of the reducing connection 7, will be conducted by said by-pass to the lower branch of the lateral. This by-pass pipe has an area equal to the difference in area between the branches of the lateral and reducing portion 7 thereof, and operates when the radiator is shut off as a compensating pipe allowing the full amount of water to flow through the lateral as though the radiator were in operation. The by-pass and connection 10 are controlled by a valve device comprising a casing 13 provided with branches 14 and 15 communicating respectively with the coupling 8 and radiator 4 and a branch 16 communicating with the upper end of the by-pass 12. The branches 14 and 15 are separated by a partition 17 having a port 18 and formed on its underside with a valve seat 19, below which the connection 16 is formed to provide a valve seat 20. The top of the casing is formed with a threaded opening closed by a cap 21 in which operates a threaded stem 22 having at its upper end a hand wheel or disk 23 and at its lower end a valve 24 which is adapted through the upward and downward movements of the stem to engage the valve seats 19 and 20. The valve preferably consists of sections 25 and 26 having a threaded engagement and forming a socket to receive



the lower headed end 27 of the stem, by which the valve and its stem are clamped against independent movement.

When the valve is moved upward against the seat 19 the port 18 is closed, thus cutting off the supply of water to the radiator, the water diverted into the connection 10 from the upper branch 5 of the laterals by the reducing section 7 passing downward through the by-pass 12 and thence out through the discharge connection 11 into the lower branch 6 of the laterals and finally into the return portion 2 of the main, by which an unimpeded flow of the normal quantity of water past the cut out radiator is secured. When the valve is moved downward to engage the seat 20, communication between the lateral and upper end of the by-pass is cut off and communication between the lateral and radiator established, so that the water from the branch 5 flows through the connection 10 into the radiator and thence out into the branch 6. Hence, normal flow of the water through the branch or lateral by which the radiator is supplied is permitted at all times, thus preventing such branch from becoming cold or air bound when the radiator is cut out, and providing for the immediate flow of water to the radiator as soon as the valve is opened, so that the radiator will become quickly heated.

The same general construction is employed in the disclosure in Fig. 2, in which a different arrangement of the radiators is shown, a pair of radiators being coupled to the same lateral or supply branch at opposite sides of the same through a duplication of the flow connection hereinbefore specified.

In the embodiment of the invention in an up-feed system, as illustrated in Fig. 3, the supply branch 5<sup>a</sup> of the lateral is in the form of a riser connected at its upper end directly by the valve casing 13<sup>a</sup> with the supply connection 10 and by-pass 12<sup>a</sup>, which latter is connected at its lower end by a coupling 9<sup>a</sup> with the discharge connection 11 and upper end of the return branch 6<sup>a</sup> of the lateral, the lower ends of the pipes 5<sup>a</sup> and 6<sup>a</sup> being respectively connected with the sections 1<sup>a</sup> and 2<sup>a</sup> of the main by T-couplings 28 and 29, between which is arranged a reduced pipe section 30. The portions 1<sup>a</sup> and 2<sup>a</sup> of the main operate, so far as the particular radiator in question is concerned, as the supply and return portions of such main, and the pipe 30 as the equivalent of the reducing pipe 7 in the construction disclosed in Figs. 1 and 2, said pipe 30 restricting the area of the main at the point between the inlet and discharge portions of the lateral to choke the flow of water and cause a portion to be diverted through the branch 5<sup>a</sup> to the radiator when the valve is open, the water returning finally through the branch 6<sup>a</sup> to the main on the opposite side of the pipe 30, as will be

readily understood. When the valve is closed the water diverted upward through the pipe 5<sup>a</sup> flows downward through the by-pass 12 into the pipe 6<sup>a</sup> and thence to the portion 2<sup>a</sup> of the main. The pipe 30 reduces the area of the main to an extent equivalent to the area or conducting capacity of the pipes of the lateral or supply branch including the by-pass 12<sup>a</sup>, so that an unrestricted normal flow occurs at all times through the main and its lateral whether or not the radiator is in operation. When the radiator is cut out the water continues to fill the lateral up to the top thereof, so that upon simply opening the valve the radiator will be instantly supplied and quickly heated. As shown, the laterals of the radiators arranged upon the different floors extend upward from the main and are provided throughout with the by-pass connections and are separated at their points of connection with the main by a reducing or choke pipe, whereby the water is caused to flow from radiator to radiator throughout the system, thence to the heater for recirculation.

It will be seen from the foregoing description that all of the radiators when open will be equally and quickly supplied with water from the main in like ratio without restricting the normal flow of the water through the main, and that the laterals or supply branches will be kept full of hot water up to the height of the inlet connections of the respective radiators, thus diminishing the amount of piping allowed to cool when the radiators are cut out, and adapting the latter to be quickly filled and heated when again thrown into operation. This insures rapid warming of any portion of the building which has been for any period of time unwarmed through the cutting out of its radiator from the system.

It will be understood, of course, that while the terms "laterals" or "branches" are used as in the art for specially designating the portions of the piping leading from and to or between the portions of a main or feed pipe for conducting the water to and from the radiators, the invention is not limited to the specific construction and arrangement of parts herein shown in either form of the invention for effecting the supply of water to each radiator and its return therefrom, and I also do not restrict myself to any particular arrangement of the flow reducing or throttling means for diverting a portion of the water flowing through a portion of the system into a radiator. In its broad aspect, the parts 1 and 5 in Figs. 1 and 2 may be considered a supply pipe and the parts 2 and 6 a return or discharge pipe for either individual radiator, while in Fig. 3 the parts 1<sup>a</sup> and 5<sup>a</sup> and 2<sup>a</sup> and 6<sup>a</sup> may be considered equivalent parts for the lower radiator shown therein. It will also be understood within



the language of the claims that, while the so-called discharge portion 2<sup>a</sup> in Fig. 3 also acts as a part of the supply pipe for the upper radiator shown therein, any portions of the piping of a system which serves as the supply and return or discharge conductors for any particular radiator are to be considered as falling within the scope of the terms "supply" and "return" or "discharge" pipes or connections employed in the claims. With this understanding, it will be understood that the reducing or "choke" connection or device in both illustrated forms of the invention connects or is interposed between the supply and return pipes or connections, and I also do not limit my invention to any particular means for securing the constricting, reducing or "choke" effect to divert or divide the water, as in some cases a suitable type of valve may be used.

Having thus fully described the invention, what is claimed as new is:—

1. In a hot water heating system, a radiator having an inlet and an outlet, a conductor having supply and return portions respectively connected with the inlet and outlet of the radiator and provided with a flow restricting or reducing connection between said portions, a by-pass between the said supply and return portions of the conductor, and a controlling valve movable to connect either the radiator or the by-pass with said supply portion.

2. In a hot water heating apparatus, a hot water supply pipe, a radiator, flow and return laterals respectively connecting the inlet and outlet of the radiator with the supply pipe, a reducing connection arranged to divert a portion of the water into the radiator, a by-pass between the radiator inlet and return lateral, and a valve at the intersection of the flow lateral, radiator inlet and by-pass for connecting said lateral with said inlet or with said by-pass.

3. In a hot water heating system, a radiator having an inlet and an outlet, a conductor having supply and return portions connected respectively with the inlet and outlet of the radiator and provided with intermediate means for reducing the flow of water therethrough, a by-pass between said supply

and return portions on opposite sides of said throttling means, and a controlling valve movable to connect either the radiator or the by-pass with said supply portion.

4. In a hot water heating system, the combination of a radiator, supply and discharge pipes connected respectively with the inlet and outlet of the radiator, a pipe connection of reduced area between said supply and discharge pipes for diverting a portion of the water from the supply pipe to the radiator, a by-pass between said supply and discharge pipes, and a valve for connecting the supply pipe with the radiator or with the discharge pipe.

5. In a hot water heating system, the combination of a radiator, supply and discharge pipes connected respectively, with the inlet and outlet of the radiator, a pipe connection of reduced area between said supply and discharge pipes for diverting a portion of the water from the supply pipe to the radiator, a by-pass between the discharge end of the supply pipe and the inlet end of the discharge pipe, and a valve movable to open communication between the supply pipe and radiator and to cut off communication between the supply pipe and by-pass or to open communication between the supply pipe and by-pass and cut off communication between the supply pipe and radiator.

6. A hot water heating system including a radiator and feeding means therefor having supply and return conductors connected with the inlet and outlet of the radiator, said conductors having a reducing connection between their proximate ends, a by-pass connecting said conductors on opposite sides of the reducing connection, said by-pass having an area equal to the difference in area between said conductors and the reducing connection, and a valve controlling communication between the supply conductor and radiator and the supply conductor and by-pass.

In testimony whereof I affix my signature in presence of two witnesses.

WALLACE M. WALCUTT.

Witnesses:

C. C. HINES,  
RUTH BREDEKAMP.