No. 763,724. PATENTED JUNE 28, 1904.

J. COLLIS.

HEATING APPARATUS.

APPLICATION FILED AUG. 14, 1903.

NO MODEL.

Fig. 1.

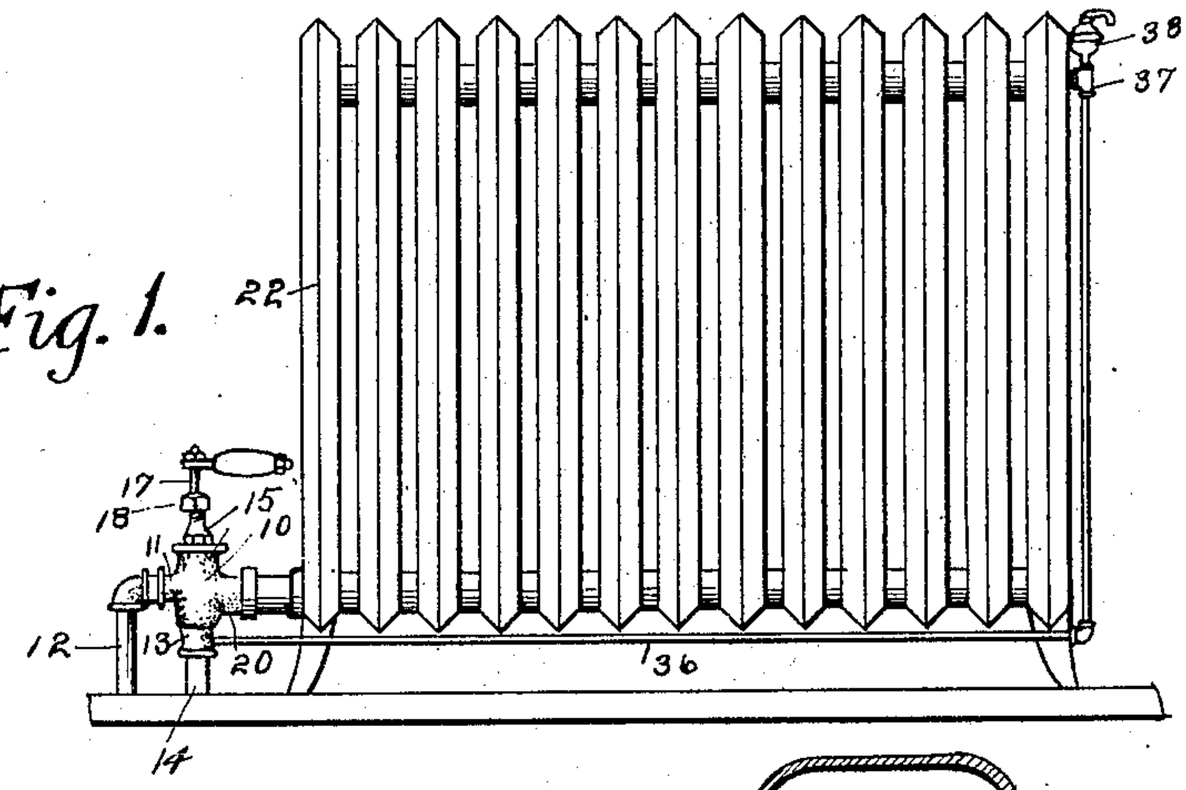


Fig. 3.

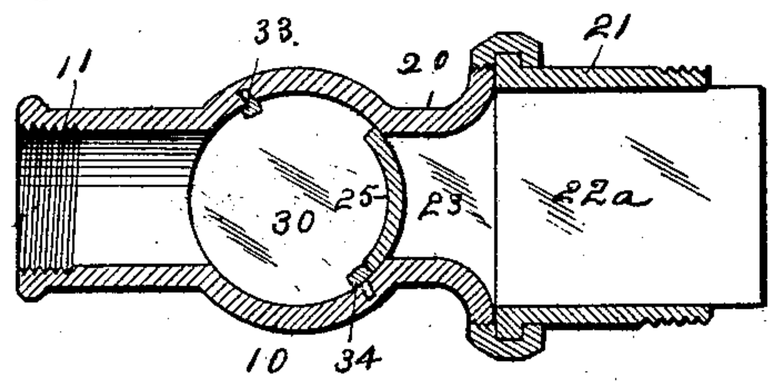


Fig. 6.

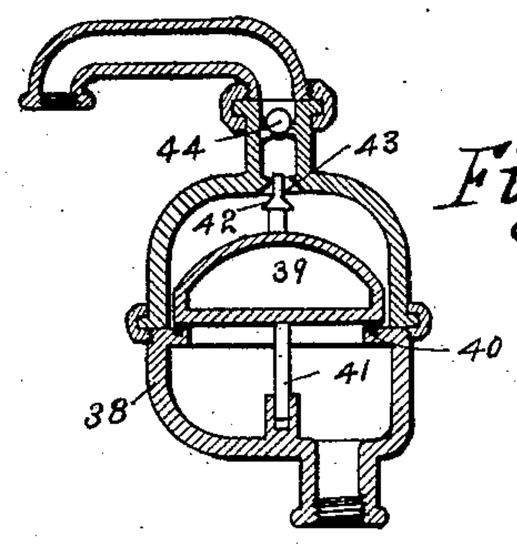


Fig. 5.

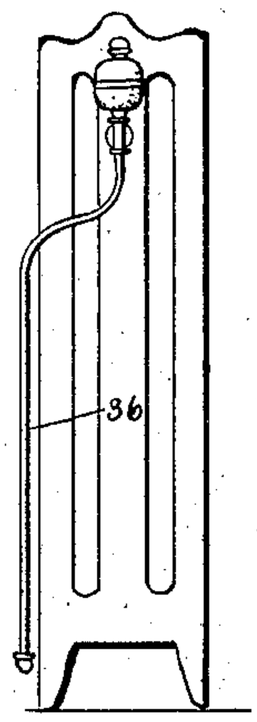


Fig. 4.

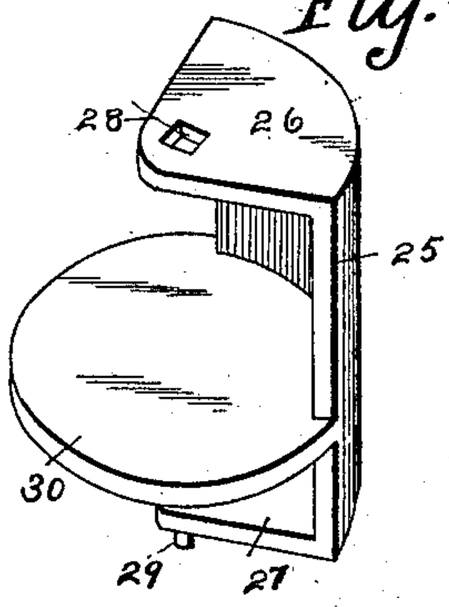
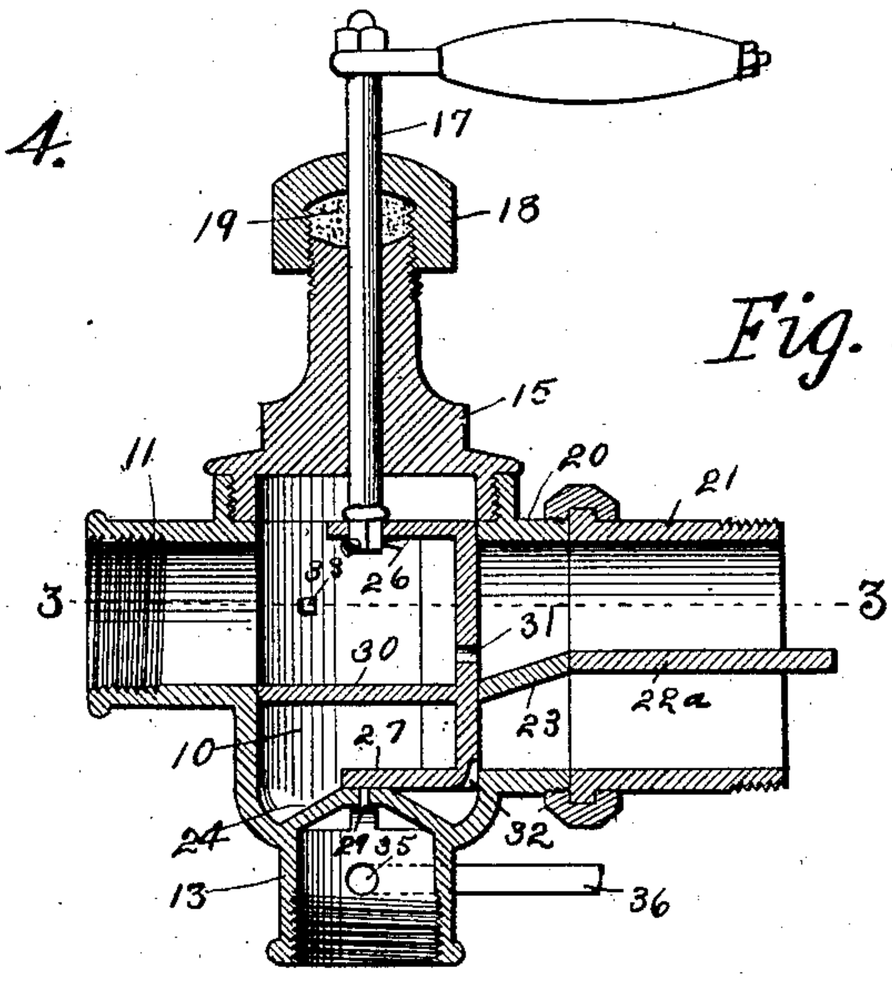


Fig. 2.



Witnesses.
A. D. Hagus.
S. F. Christy.

Inventor John Collis.
By Orwig & Lane Attys.

No. 763,724. Patented June 28, 1904.

UNITED STATES PATENT OFFICE.

JOHN COLLIS, OF DES MOINES, IOWA, ASSIGNOR TO WILLIAM P. COLLIS, OF NEW YORK, N. Y.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 763,724, dated June 28, 1904.

Application filed August 14, 1903. Serial No. 169,430. (No model.)

To all whom it may concern:

Be it known that I, JOHN COLLIS, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in Heating Apparatus, of which the following is a specification.

The objects of my invention are to provide a heating system consisting of a circulating-valve, a radiator, and a vent-valve communicating with the circulating-valve adapted for use in connection with steam above or below atmospheric pressure or in connection with hot water, so arranged that when used in connection with steam at or below atmospheric pressure air may be exhausted from the entire radiator vent-valve and the pipe connecting the vent-valve with the circulating-valve by applying suction to the return connected with the circulating-valve, and when used in connection with steam above atmospheric pressure or with hot water under pressure the air may escape from the vent-valve, and when the water reaches the air-valve the air-valve will automatically close and the water of condensation from the steam or the hot water used for heating will return through the pipe leading from the vent-valve to the circulating-valve.

A further object is to provide a circulating-valve for heating apparatus having openings to communicate, respectively, with the riser and return pipes, with the radiator, and with a vent-valve for the radiator.

My invention consists in certain details in the construction, arrangement, and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which—

Figure 1 shows a side elevation of a radiator provided with my improved circulating-valve and a pipe communicating between the circulating-valve and a vent-valve on the radiator. Fig. 2 shows a vertical central sectional view of my improved circulating-valve. Fig. 3 shows a horizontal sectional view on the indicated line 3 3 of Fig. 2. Fig. 4 shows an enlarged detail perspective view of the movable valve member. Fig. 5 shows an end view of a radiator to illustrate the arrangement of the pipe leading from the vent-valve, and Fig. 6 is an enlarged detail sectional view of a form of vent-valve susceptible of use in connection with my improved heating system.

Referring to the accompanying drawings, the casing of the circulating-valve is composed of a cylindrical body portion 10. Communicating with the upper portion of this body 10 is the screw-threaded extension 11 to receive a riser 12. Communicating with the bottom of the cylindrical body 10 is a screw-threaded extension 13 to receive the return-pipe 14. Screwed into the top of the cylindrical body is a bonnet 15, having a central opening to receive the valve-stem 17 and also having a cap 18 screwed thereto, with a packing-chamber 19 between the parts 15 and 18. On the side of the cylindrical body 10 directly opposite the screw-threaded extension 11 is a large screw-threaded extension 20 to receive a union 21, which union is designed to be screwed into the radiator 22. The upper part of the extension 20 is preferably arranged in the same horizontal plane as the upper part of the extension 11, and the bottom of the extension 20 is arranged a slight distance above the lower end of the cylindrical body 10, and within the union 21 is a horizontal partition 22^a, the end portion of which nearest the cylindrical body inclines downwardly toward said cylindrical body at 23. Between the bottom of the cylindrical body 10 and the extension 13 are the integral arched cross-pieces 24, having openings between them. The valve proper is composed of a segmental portion 25, the curvature of which is such as to permit it to rotate within the cylindrical body and engage the inner walls of the cylindrical body. On its top and bottom are the plates 26 and 27, the former being provided with an angular opening 28, designed to receive the valve-stem 17, and the latter provided with a journal 29 to enter a concentric opening in the cross-pieces 24, and formed integral with the part 25 is a disk 30, the top of which is preferably in horizontal alinement with the bottom of the extension 11 and also in horizontal alinement

with the inclined portion 23. Formed in the part 25 above the disk 30 is a circulating-opening 31, and the lower end of the part 25 is provided with a notch 32 to provide communication between the extension 20 below the partition 23 and the extension 13 when the part 25 is in its closed position. Fixed to the interior of the cylindrical body 10 is a stop 33, arranged to limit the movement of the valve in one direction, and opposite from the stop 33 is another stop 34, arranged to limit the movement of the valve 25 in the opposite direction. The size of the valve 25 is such that when the valve is in engagement with the stop 34 it closes the opening between the cylindrical body and the extension 20, and when it is in engagement with the stop 33 the opening between the cylindrical body and the extension 20 is unobstructed.

The numeral 35 indicates an opening in one side of the extension 13, and 36 indicates a pipe communicating with the interior of the extension 13 through the opening 35. The other end of the pipe 36 communicates with a T 37, which T also communicates with the end of the radiator opposite from the end to which the circulating-valve is attached. The remaining part of the T communicates with a vent-valve 38.

The vent-valve 38 (illustrated in Fig. 6) forms no part of my present invention, and yet one performing substantially the same functions is a valuable addition to my improved heating apparatus. Contained within the valve-chamber is a float 39, normally resting on a valve-seat 40, said valve being attached to the valve-stem 41. This valve-stem 41 rests upon the bottom of the valve and is made of some material which will expand when subjected to heat. On top of the float 39 is a tapered lug 42 to enter a tapered opening 43 at the top of the valve-chamber, and above the tapered opening 43 is a gravity ball-valve 44 of ordinary construction. In the use of this valve and assuming that it is desired to use steam below atmospheric pressure, then when the air is exhausted from the radiator the ball-valve 44 will close by gravity and the float-valve 39 will be held firmly against its seat by suction, thus preventing the air from entering the radiator. If it is desired to use the heating apparatus in connection with steam above atmospheric pressure, then when the steam enters the radiator the air will be gradually forced out through the vent-valve, because it will elevate the float sufficient to permit the air to escape under the float, and yet it will not firmly hold the plug 42 upwardly, but will permit the escape of the air through the top of the valve-casing. In the event that water should enter the bottom of the valve-casing, then the float 39 would be elevated and the plug 42 forced against the seat 43 and the valve closed, or when the steam reaches the bottom of the valve-casing its heat will cause the valve-stem 41 to expand, and thus firmly hold the plug 42 against its seat. When the heating apparatus is used in connection with hot water, and assuming the radiator to be empty, then when water is forced into the radiator the air can readily escape through the vent-valve, as before explained, and when the water reaches the float 39 it will firmly hold the plug 42 against its seat.

In practical use, and assuming that it is desired to use the heating apparatus in connection with steam below atmospheric pressure, then the air is exhausted through the return 14, and when this is done it is obvious that a partial vacuum will be produced in the radiator and in the pipe communicating between the vent-valve and the circulating-valve, and as the partial vacuum is established the steam may be admitted in the ordinary way. If it is desired to use steam above atmospheric pressure, then the steam is admitted through the radiator, and if the water of condensation should be forced out of the radiator and into the vent-valve the vent-valve would be closed, as before explained, and the water of condensation could readily run downwardly through the pipe 36 and into the return portion of the circulating-valve. This it would readily do, because the pressure of the steam in the riser is greater than in the return. When the apparatus is intended for use in connection with hot water, the air is forced outwardly through the vent-valve by the admission of the water, and when the water reaches the float in the vent-valve the vent-valve is immediately closed, and any water that may enter the lower portion of the vent-valve could immediately return to the bottom of the circulating-valve through the pipe 36. Hence the same heating apparatus may be successfully used in connection with steam either at, above, or below atmospheric pressure or in connection with hot water, and when the apparatus is used in any of these ways no water can discharge through the vent-valve, and all of said water that might accumulate in the vent-valve is returned through the pipe 36 to the circulating-valve, and particularly when the apparatus is intended for use in connection with steam below atmospheric pressure. Then it is not necessary to provide any exhausting means to be applied to the vent-valve independent of the exhausting means applied to the return-pipe because of the pipe connecting the vent-valve with the return-pipe.

I am aware that in a heating apparatus intended only for use in connection with steam below atmospheric pressure all of the air could be exhausted through the return and no vent-valve would be necessary. However, such a system could not be used at all in connection with steam above atmospheric pressure, and one of the important features of my invention is the provision of a heating apparatus to be used in connection with steam

either above or below atmospheric pressure or with hot water.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States therefor, is—

1. The combination of a radiator, riser and return pipes communicating with the radiator, a vent-pipe communicating at one end with the radiator and at its other end with said return-pipe and a vent-valve communicating with said vent-pipe, said vent-valve discharging to the outside atmosphere and automatically closed by suction in the vent-pipe.

2. The combination of a radiator, riser and return pipes communicating with the radiator, a vent-valve communicating with the radiator, said valve closed against the admission of air from the exterior of the valve, opened automatically by internal pressure to discharge to the outside atmosphere and closed automatically by greater internal pressure, and a pipe communicating at one end with both the vent-valve and the radiator and at its other end with the return-pipe.

3. The combination of a radiator, riser and return pipes communicating with the radiator, a vent-valve communicating with the radiator, said valve closed against the admission of air from the exterior of the valve, opened automatically by internal pressure to discharge to the outside atmosphere and closed automatically by greater internal pressure and also automatically closed by the accumulation of water in the vent-valve chamber, and a pipe communicating at one end with both the vent-valve and the radiator and at its other end with the return-pipe.

4. The combination of a radiator, riser and return pipes communicating with the radiator, a vent-valve communicating with the radiator, said valve closed against the admission of air from the exterior of the valve, opened automatically by internal pressure to discharge to the outside atmosphere, and closed automatically by greater internal pressure and also automatically closed by the accumulation of water in the vent-valve chamber, said valve also closed automatically by a rise in temperature inside of the valve-chamber, and a pipe communicating at one end with both the vent-valve and the radiator and at its other end with the return-pipe.

5. The combination with a radiator of a valve-casing having a cylindrical body portion open at its top, a hollow extension at one side, a riser-pipe communicating with said hollow extension at the side, a hollow extension at the bottom of the valve-casing, a return-pipe communicating therewith, a cross-piece on the interior of the casing between the cylindrical chamber and the return extension, a hollow extension on the side of the valve-casing opposite from the riser extension communicating with the cylindrical body portion and with the radiator, a horizontal partition in said latter extension, a valve formed with a segmental body portion, a top piece and a bottom piece, a journal connected with the bottom piece and seated in the said cross-piece, a disk secured to the valve of a diameter to closely fit the interior of the cylindrical body portion, said disk substantially in alinement with the body of the riser extension and the said horizontal partition, said body portion of the valve formed with circulating-openings above and below said disk, said return extension formed with an opening in its side, a vent-valve communicating with the radiator and a vent-pipe communicating with the vent-valve and with the said opening in the side of the return extension.

JOHN COLLIS.

Witnesses:
J. RALPH ORWIG,
S. F. CHRISTY.