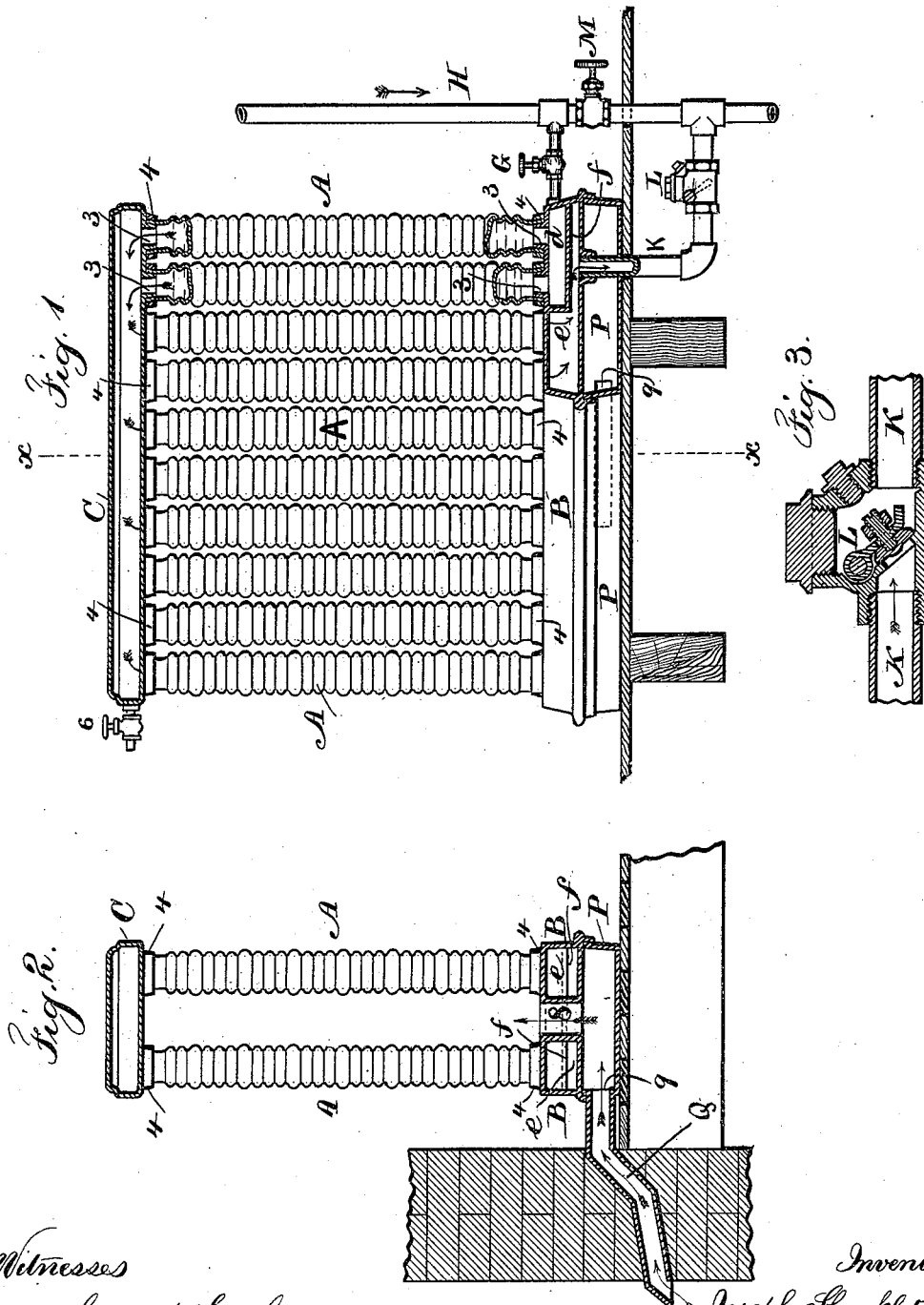


(No Model.)

J. SHACKLETON.
HEATING APPARATUS FOR BUILDINGS.

No. 419,366.

Patented Jan. 14, 1890.



Witnesses

Chas H. Smith
J. Stair

Inventor

Joseph Shackleton
per Lemuel W. Terrell
attys

UNITED STATES PATENT OFFICE.

JOSEPH SHACKLETON, OF NEW YORK, N. Y.

HEATING APPARATUS FOR BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 419,366, dated January 14, 1890.

Application filed August 26, 1887. Renewed November 16, 1889. Serial No. 330,542. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SHACKLETON, of the city and State of New York, have invented an Improvement in Heating Apparatus for Buildings, of which the following is a specification.

In steam-heating apparatus it has heretofore been usual to provide one set of pipes to convey the live steam to the radiators and another set of pipes to return the water of condensation. This renders the piping complicated, and efforts have been made to dispense with the return-pipes for the condensation by causing the water to run through the system of steam-pipes in the same direction as the steam.

My present improvements are especially available with a system of steam or hot-water circulating pipes in which the hot water or live steam passes to the highest or most distant point, and the radiators are connected to the return circulating-pipe, so that the water of condensation is traveling in the same direction as the steam, or in case of using hot water the return circulation is all in one direction.

In the drawings, Figure 1 is an elevation, partially in section, of the radiator. Fig. 2 is a cross-section at the line *x x*, Fig. 1, showing also the air-inlet devices. Fig. 3 is a section of the check-valve which I prefer to make use of.

The tubes A A of the radiator are preferably of sheet metal—such as copper—and corrugated, so as to increase the radiating-surface, and the corrugations may be either spiral or peripheral, and the ends of the tubes are secured to the cast-iron base B and hollow top C by tubular teats 3, cast upon the top of the base and bottom of the hollow top, which teats are slightly tapering and fit the interior cylindrical ends of the sheet-metal tubes, and they are secured by collars 4 around outside the tubes.

In putting the parts of the radiator together the tubes are set upon the respective teats, and then the base and hollow top are forced toward each other, the teats entering and slightly expanding the end portions of the metal tubes until the ends of the tubes come against the flat top and bottom surfaces of the base and top, respectively. The collars 4

are, however, placed around the cylindrical portions of each tube before it is put into place, so that each collar is forced down to its place to compress the sheet metal against the outside of the teat after the radiator-base and hollow top have been forced toward each other, as aforesaid.

The hollow top of the radiator should be provided with a cock or air-valve at 6.

The base of the radiator is separated into two chambers *d* and *e* by the partition *f*, and the pipe and cock G from the main circulating-pipe H opens into the chamber *d*, and the pipe K passes down from the chamber *e* to the pipe H, preferably below the floor, and provided with a check-valve, as at L, which is represented as having an inclined hinged valve. The heated fluid passes by the pipe and cock G into the chamber *d*, and rises through those pipes A that open into the chamber *d*, and passes into the hollow top C and down through the other pipes A into the chamber *e* of the base, and away by the pipe K and check-valve L to the pipe H.

Two pipes of two sets of pipes are shown as opening into the chamber *d*; but more of the pipes A may open into said chamber, if desirable.

If circulating hot water is used, the cock at M should be partially closed to insure the circulation through the radiator.

The pipe K, descending below the radiator before it opens into the main pipe H, insures sufficient column of water to open the check-valve and prevent the accumulation of water in the hollow base B. The base B has openings vertically through it, preferably in the form of a long central slot or mortise at 8, and the base B rests on a hollow bed or pan P, having an inlet *g* for air, either at the bottom or at the side. If the opening is at the bottom, a coinciding hole will have to be made in the floor, but where the opening is at the side, as shown, the air may pass in through the lateral pipe Q from the outside of the building, so that the air becomes warm before passing into the room.

I claim as my invention—

1. The combination, with the tubes A, of the hollow top C and hollow base B, into both of which the tubes open, the partition *f* in one end of the hollow base and separating the same

into two chambers *d e*, the pipe and cock G, connecting the chamber *d* to the main supply-pipe of heating-fluid, and the descending pipe K, having a check-valve and connecting the chamber *e* with the main supply-pipe, substantially as specified.

2. The combination, with the tubes A, of the hollow top C and hollow base B, to both of which the tubes are secured, and into both of which said tubes open, the partition *f* extending across the hollow base at one end, and separating therefrom the chamber *d*, which connects directly with two or more sets of tubes A, and a pipe and cock G, connecting said chamber *d* with the main supply for heating-fluid, and a pipe K, connected to the hollow base B, for conveying away the heat-

ing-fluid, substantially as and for the purposes set forth.

3. The combination, with the tubes A, of the hollow top C and hollow base B, into both of which the tubes open, pipes for supplying and discharging the heating-fluid, a hollow bed or pan P beneath the hollow base B, and a pipe or equivalent device forming an inlet opening for air into said pan P, there being an exit-opening through the base, whereby the air passes up between the tubes A, substantially as specified.

Signed by me this 18th day of August, 1887.

JOSEPH SHACKLETON.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.