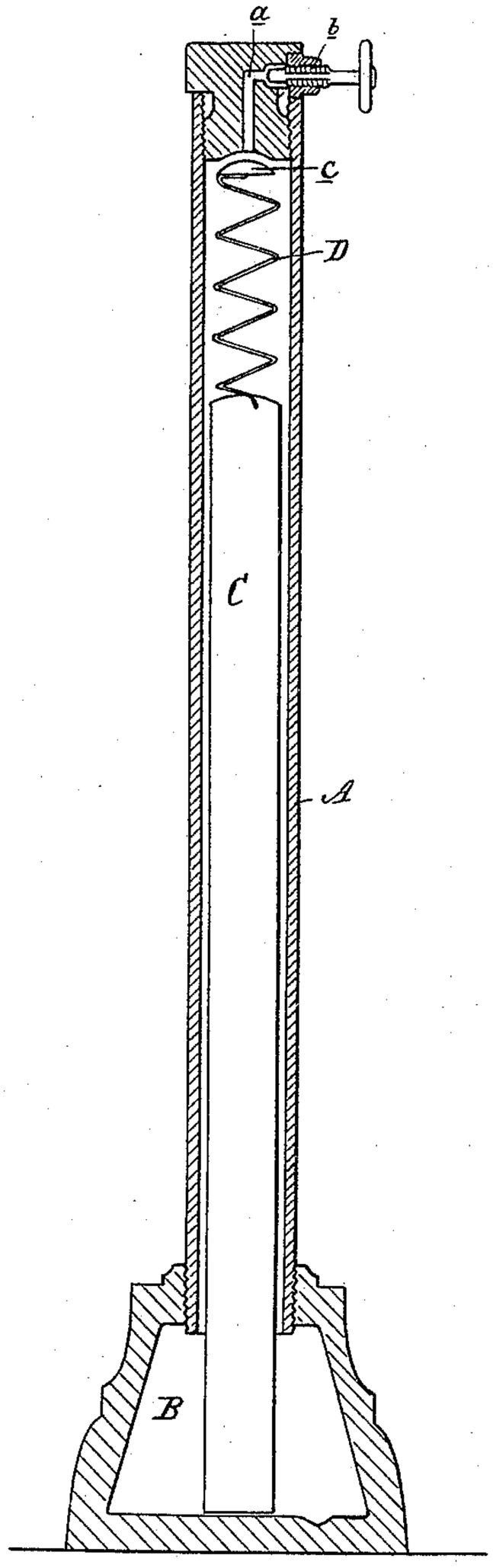
(No Model.)

G. W. LLOYD.

STEAM RADIATOR.

No. 369,863. Patented Sept. 13, 1887.



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UNITED STATES PATENT OFFICE.

GORDON W. LLOYD, OF DETROIT, MICHIGAN.

STEAM-RADIATOR.

SPECIFICATION forming part of Letters Patent No. 369,863, dated September 13, 1887.

Application filed March 10, 1887. Serial No. 230,388. (No model.)

To all whom it may concern:

Be it known that I, GORDON W. LLOYD, of Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Steam-Radiators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to certain new and useful improvements in the construction of steam-radiators of the class termed "vertical-tube radiators."

The object of my invention is to prevent the efflux of water of condensation at any time from the radiator, such as is liable to occur with all air-valves which are at present in general use; also to render it impossible for a radiator to become "air-bound" at any time, and to accomplish these ends by means which are contained within the radiator-tube itself, thereby forming a part of the structure thereof.

The invention consists in the peculiar construction and location of a valve operated by flotation and expansion, in combination with the tube of a vertical-tube radiator having an air-escape passage at or near its upper end.

In the drawings which accompany this specification and form a part thereof, my invention is shown in sectional elevation, and therein A represents a vertical tube of a radiator, and B the base thereof, of any of the known constructions, wherein steam is admitted into such base for filling the vertical tubes and producing the necessary radiation. An air-outlet, *a*, leads from near the top of the vertical tube to the atmosphere, and may be provided, if desired, with a petcock, *b*, or similar equivalent device, for closing or opening such outlet.

C is a metallic tube of a smaller diameter than the bore of the radiator-tube, and is preferably made of zinc, although I do not desire to confine myself to that metal. It is closed at top and bottom, and is so made that it will be impervious to the entrance of steam or water and will be air-tight, and it extends from the bottom of the steam-chamber B nearly to the top of the vertical tube A of the radiator, and has secured to its upper end a coil-spring, D, which latter carries upon its free end a valve, *c*, adapted, when seated, to close the air-outlet passage.

In practice, the radiator being cold and steam admitted, such steam very rapidly condenses, and when thus admitted the petcock of the radiator is opened to allow of the escape of air that may be within the radiator-tubes under the steam-pressure. As condensation takes place, the tubes become partially filled with water, when the cylinder C is floated and expanded by the heat in a linear direction, and its valve will close the inner end of the steam-passage against the efflux of water at that point, such water passing off in the usual manner provided for such steam-radiators. As long as the radiator is kept hot by the constant inflow of steam, the expansion of the cylinder C will always keep the inner end of the air-passage closed against the efflux of either water or steam at that point.

The employment of the coil-spring D is for the double purpose of increasing the amount of linear expansion and compensating for the excess of same, as any undue expansion of the cylinder would merely tend to further compress the spring.

When the device is first put into operation, the confined air escapes freely through the air-outlet at or near the top of the radiator-tubes until condensed water is present in the radiator to an amount sufficient to raise the cylinder or float C, until the valve on the end of the spring closes the air-outlet orifice until the water shall have passed away in the usual means of circulation and allows the steam to enter. Under the action of the steam the cylinder now expands in a linear direction, thereby causing the valve *c* to seat itself and prevent the escape of steam.

The use of a device of this character in combination with vertical radiator-tubes will be found very beneficial, as the air-outlet passage will be automatically controlled at all times when the device is in operation, and no evil result will occur from carelessness in leaving the petcock open, the use of which will become entirely optional.

What I claim as my invention is—

In combination with an inclosing-tube, A, provided with an air-outlet, *a*, cylinder-float C, closed at top and bottom and provided with a spring, D, and valve *c*, the parts being constructed, arranged, and operating substantially in the manner and for the purposes specified.

GORDON W. LLOYD.

Witnesses:
H. S. SPRAGUE,
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