No. 875,320. PATENTED DEC. 31, 1907.

H. BURNET.

VALVE.

APPLICATION FILED JAN. 16, 1906.

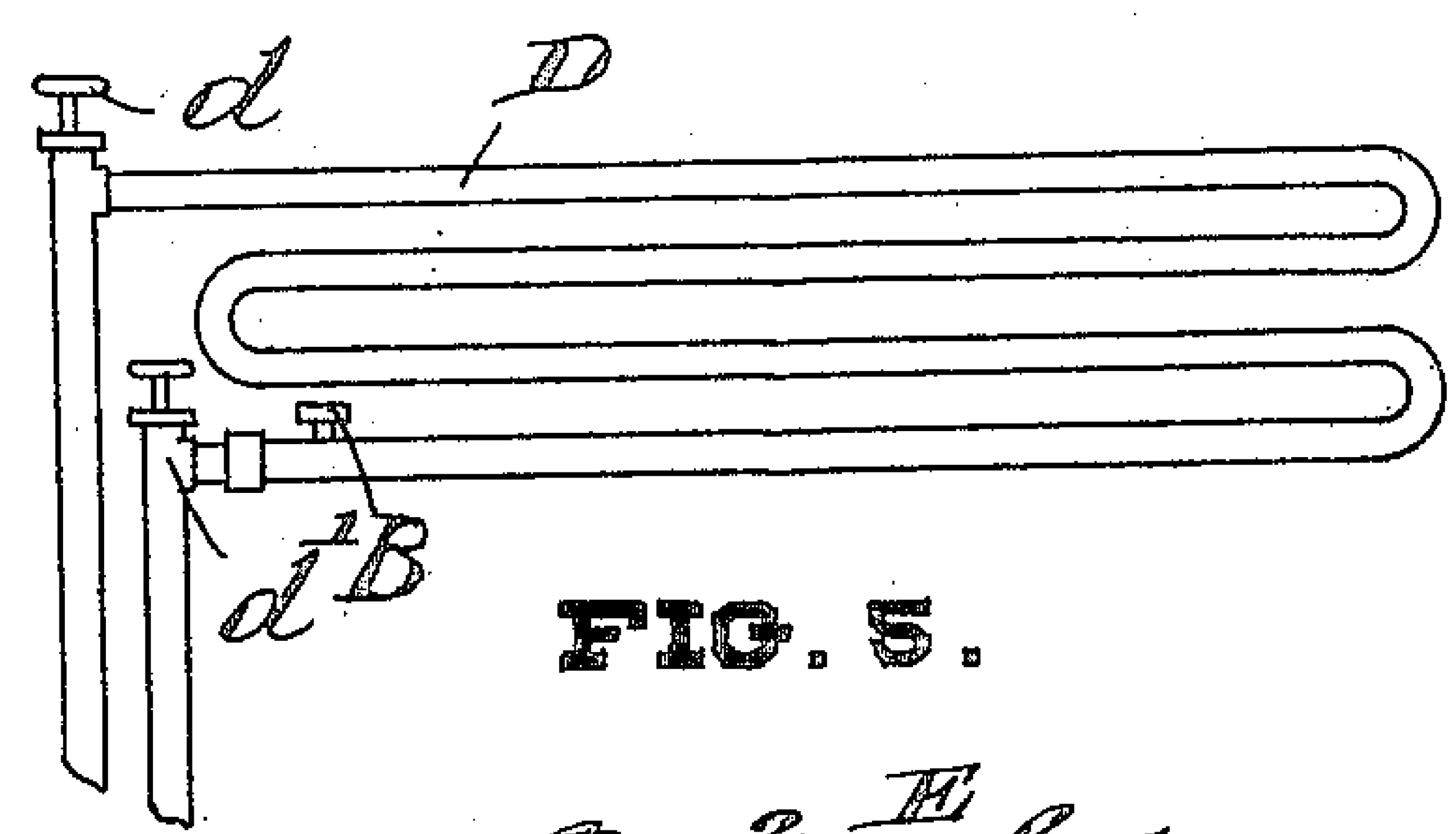


FIG. 5.

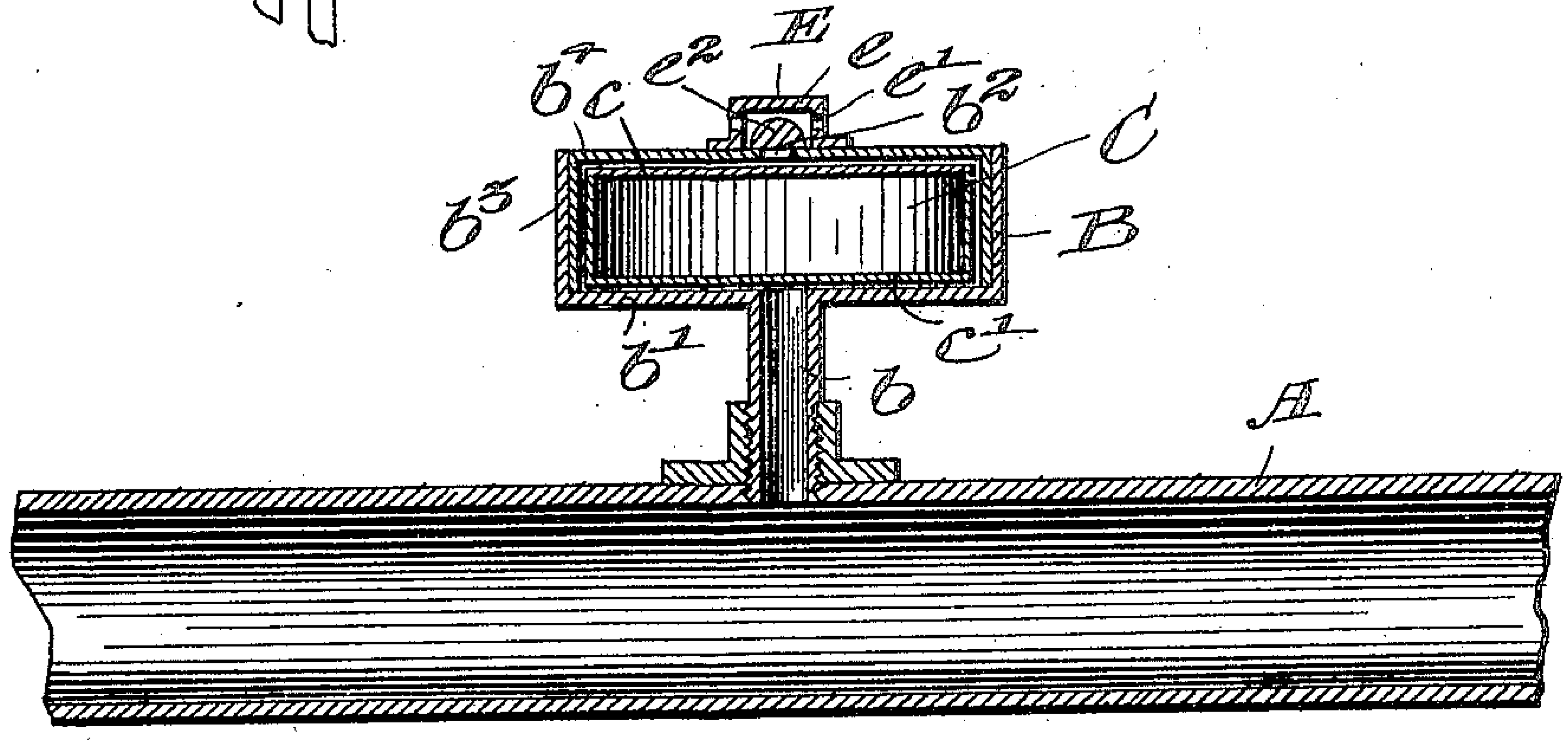


FIG. 1.

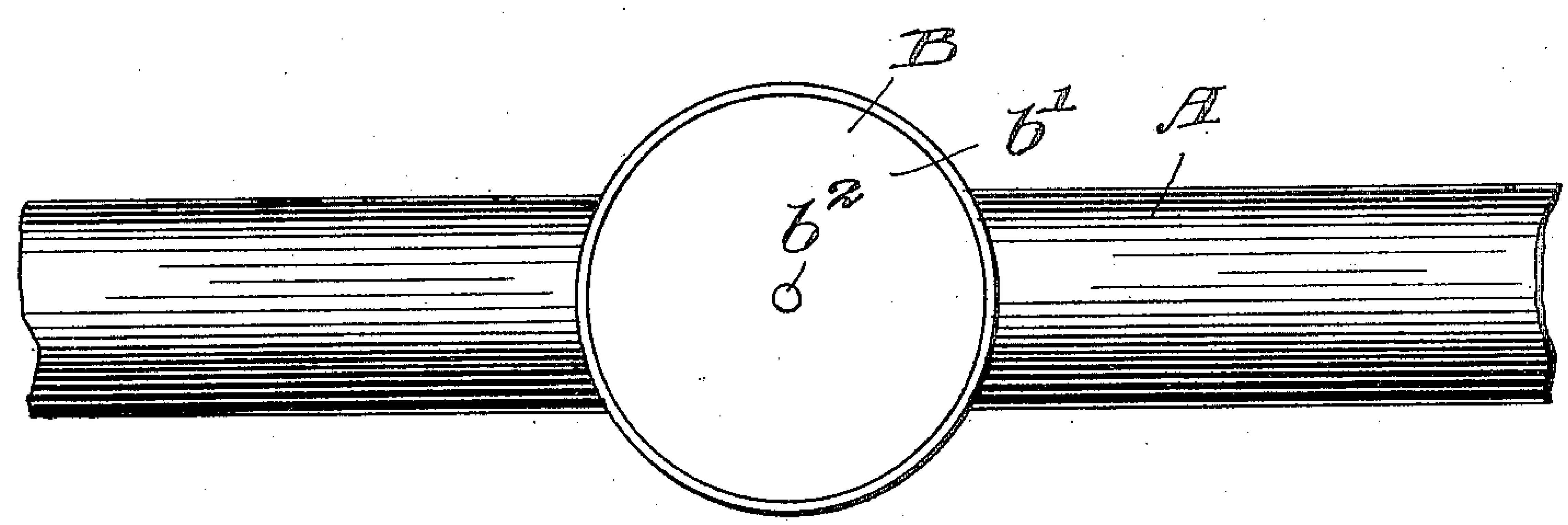


FIG. 2.

FIG. 3.

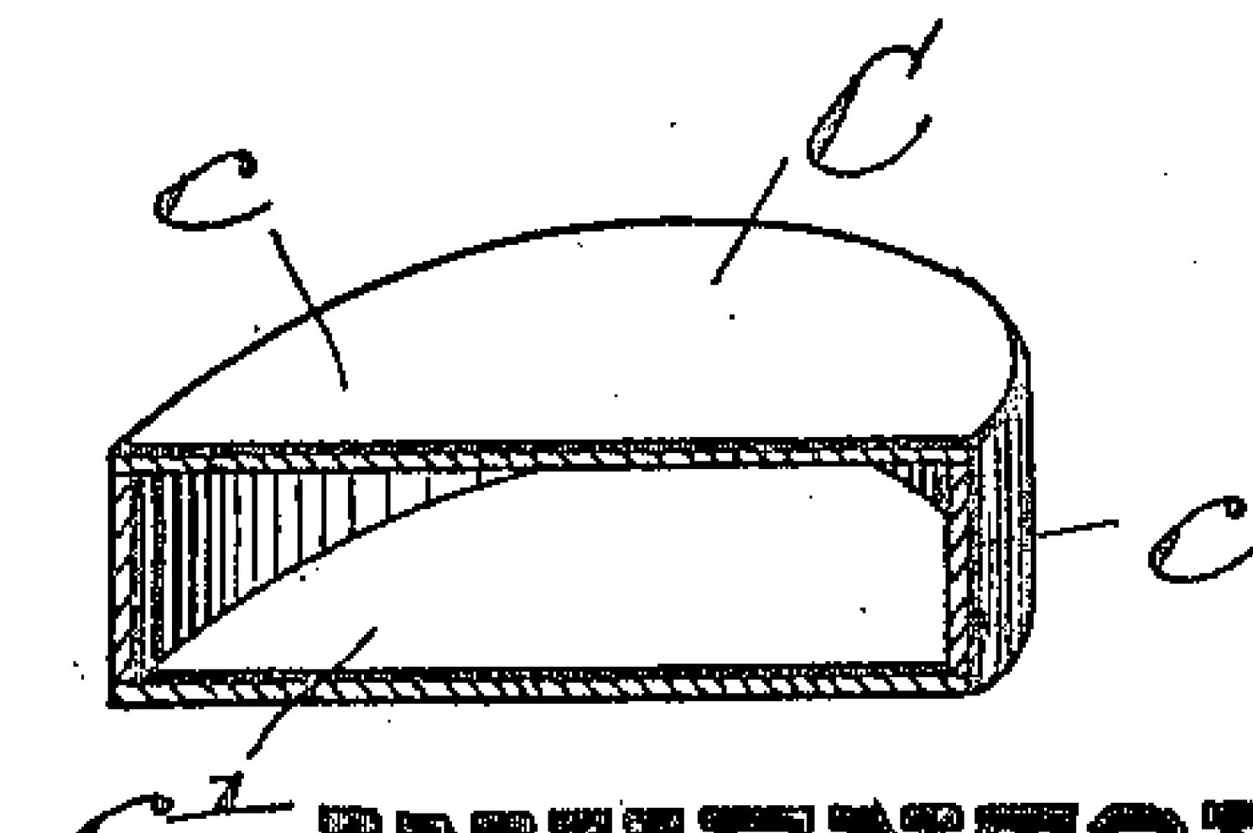
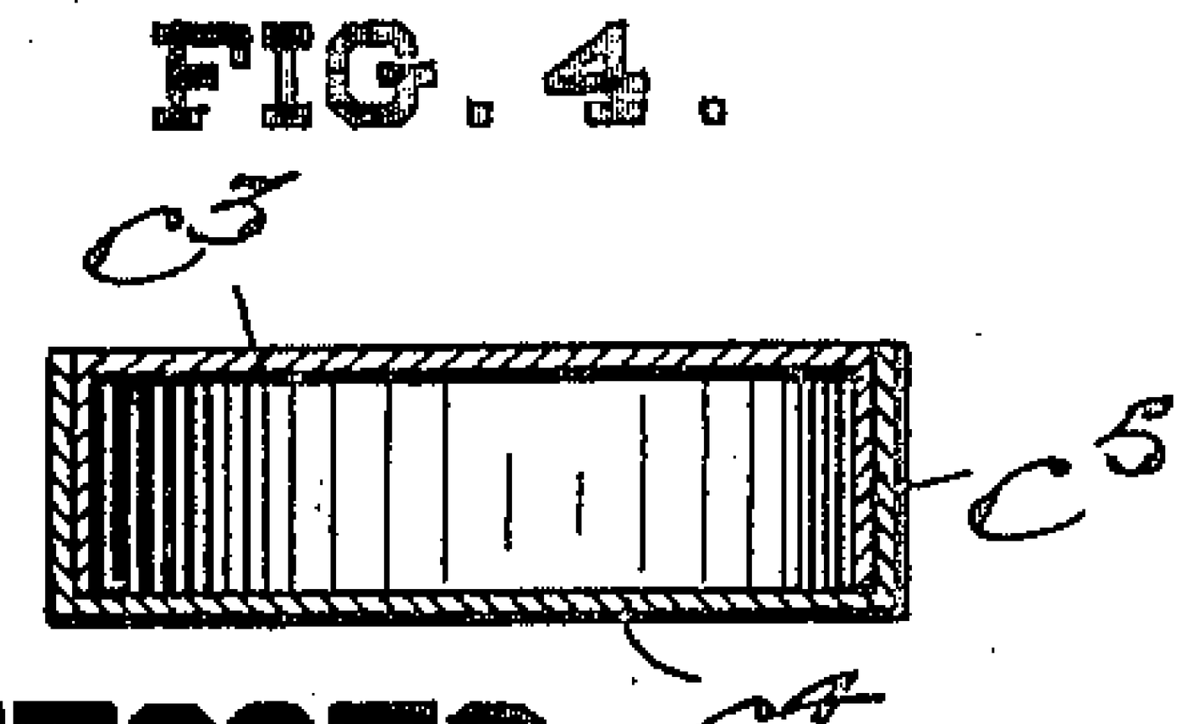


FIG. 4.



WITNESSES

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VALVE.

No. 875,320. Specification of Letters Patent. Patented Dec. 31, 1907.

Application filed January 16, 1906. Serial No. 296,400.

To all whom it may concern:

Be it known that I, HUGH BURNET, of the city of Ottawa, in the county of Carleton, Province of Ontario, Dominion of Canada, civil engineer, have invented certain new and useful Improvements in Valves, of which the following is a specification.

My invention relates to improvements in valves for steam heating pipes, radiators and the like and the objects of my invention are to provide a valve which will permit the free passage of air or cold gas therethrough but which will be automatically closed when water or steam endeavors to pass therethrough; and it consists essentially of the improved construction hereinafter more particularly described and specifically set forth in the appended claims.

Figure 1 shows a sectional view through my air relief valve attached to the pipe of an ordinary steam heating system. Fig. 2 is a plan view of the same. Fig. 3 is a sectional perspective view of the hollow expansible chamber. Fig. 4 shows a sectional view of an alternative form of the same. Fig. 5 shows a side view of a steam heating coil with my attachment applied thereto.

In the drawings like letters of reference indicate corresponding parts in each figure.

Referring to the drawings A is the steam conducting pipe of the heating system and B is my improved air outlet valve attached thereto in any convenient manner that shown having the downwardly extending hollow stem b screwed into the top of the heating pipe of the coil or radiator.

In the embodiment shown a hollow cylindrical valve casing b' is secured to the top of the stem b, and in this is located an expansible hollow metallic chamber C filled with air. A small outlet hole b^2 is provided in the top of the casing and the fit of the chamber C in the casing is such that, while cold, air may freely pass through the stem around the chamber and out through the opening b^2, should the chamber become heated, the gas therein expanding will fill out the ends which will abut the inlet and outlet openings and effectually close the same. To this end, the chamber C, while entirely free to rise and fall a short distance bodily, is so nearly an exact fit for the interior of the casing, both at the sides and ends, that the action of the valve in closing the outlet for steam is practically instantaneous. It will be recognized that, owing to the slight depth of the chamber C as compared with its diameter, the entire body of air therein will become heated almost as soon as the steam impinges upon its bottom. Both of the diaphragm-ends of the chamber at once expand, and, there being but a very restricted space between them and the top and bottom of the casing, both inlet and outlet are closed before practically any steam escapes whatever.

The exact mode of constructing the valve casing is unimportant, the one I have shown having a lower part b^3 formed integral with the stem b and an upper portion b^4 telescoped into the same. The two parts will be soldered or otherwise rigidly secured together. The hollow metallic chamber C may also be constructed in a variety of ways that I have shown comprising two thin flexible diaphragms c c' united to the opposite ends of a ring c^2 of stronger metal. The joint between the diaphragms and ring will of course have to be absolutely air tight whereby when the chamber is heated the diaphragms c c' thereof will distend outwardly.

To prevent the inrush of air through the valve into the pipes when the same are being cooled and the steam condensed creating a partial vacuum I provide a small gravity operated check valve E located on top of the valve casing B. This comprises a small cylindrical casing e having a plurality of holes therein e^1 for the air passing out and the valve disk e^2 which rests directly on top of the opening b^2. Thus the air may pass out freely through the check valve but cannot return. Various other forms of check valve might be employed to accomplish the same result.

The alternative form of chamber shown in Fig. 4 consists of two telescopic sections c^3 and c^4. In this form of chamber, the side walls c^5 are of double thickness, while the end walls, or diaphragms, are of single thickness.

Referring to Fig. 5 showing my device applied to an ordinary steam heating coil D is the steam heating coil, d the inlet and d^1 the outlet valves therefor. C is my improved air relief valve which is secured in the coil immediately before the outlet valve d^1 thereof. It will be necessary in a steam heating system to obtain the advantages of my invention to apply one of my air relief valves to each radiator or steam heating coil whereby the same may be automatically freed of air therethrough.

The operation of my device is exceedingly

simple. When the pipe is cool the air may freely pass out through the valve but as soon as the steam is introduced it will heat the chamber C in endeavoring to pass through the valve casing. This will expand the air contained therein and the diaphragms c c^1 each outwardly distending will abut the opening in the top of the stem b and the outlet b^2 respectively thus effectually closing the valve to the passage therethrough of the steam. When the steam pipes are closed, passage of water of condensation upward through the valve casing is prevented by the buoyant chamber, which rises with the water and finally closes the outlet b^2.

The important feature of the invention is the use of the expansion and contraction of air to effect the opening and closing of the valve. Air is one of the most elastic of fluids and its use renders the valve very sensitive to change in temperature.

I am aware that volatile products have been used in place of air in valves of this character but the disadvantage is that before the valve can operate the liquid must be volatilized and then before the valve opens it must be condensed which occupies a considerable time.

What I claim as my invention is:—

An air relief valve, consisting of a shallow casing of much greater width than depth having an inlet through its bottom and an outlet through its top, and a shallow sealed expansible-fluid-containing chamber, also of much greater width than depth, loose within said casing but so nearly fitting the interior of the same at top, bottom and sides as to cause fluid passing through the casing to form a thin sheet around the chamber, the top and bottom of said chamber being adapted to be distended, when steam flows around the chamber, to press against the top and bottom of the casing thereby closing both the inlet and the outlet.

Signed at the city of Ottawa, in the county of Carleton, Province of Ontario, this 12th day of Jan., 1906.

HUGH BURNET.

In the presence of—
RUSSEL S. SMART,
WM. A. WYMAN.