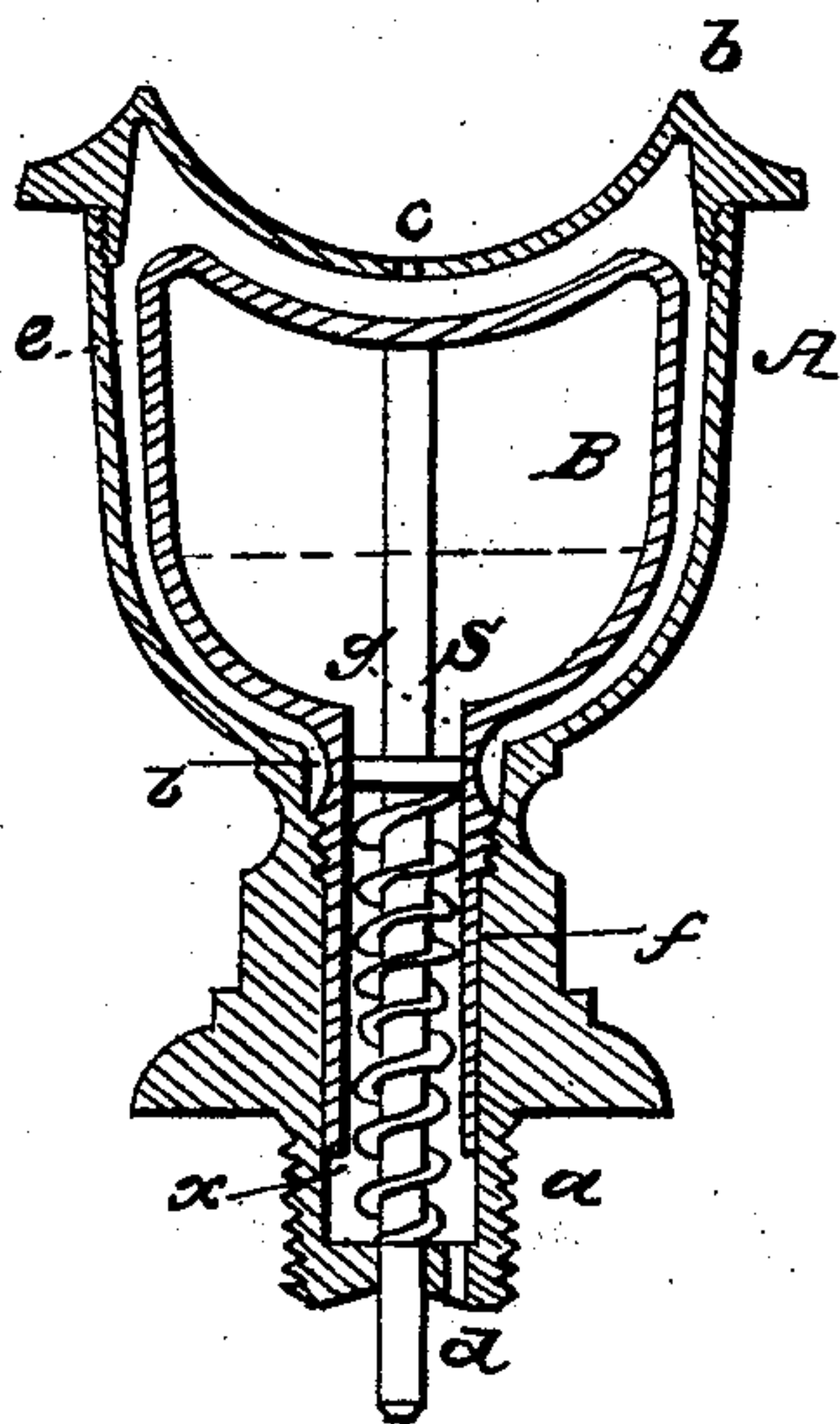


PARKER & REYNOLDS.
Steam-Heater Attachment.

No. 14,617.

Patented April 8, 1856.



UNITED STATES PATENT OFFICE.

WM. REYNOLDS AND EARL PARKER, OF EAST HARTFORD, CONNECTICUT.

AUTOMATIC THERMO-HYDRO-OLEO-PNEUMATIC VALVE.

Specification of Letters Patent No. 14,617, dated April 8, 1856.

To all whom it may concern:

Be it known that we, WILLIAM REYNOLDS and EARL PARKER, both of East Hartford, in the county of Hartford and State of Connecticut, have invented a certain new and useful Improvement in Automatic Air or Escape Valves Applicable to Steam-Heating Apparatus and other Purposes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawing, which forms part of this specification and which represents a vertical section of an automatic valve constructed according to our improvement.

In steam heating apparatus for dwellings and other purposes, where the heat is given out by radiation from pipes in which the steam generated by the boiler circulates or into which it is made to pass, it is usual to attach to the pipes an air cock or valve that is opened by the hand when the steam is first let into the pipes for the discharge of the air contained in them and is afterward closed to prevent the egress of the steam through said valve when the pipes are filled with the steam for the performance of the heating process. It also in very close pipes is advisable to open said cock for the admission of atmospheric air to prevent "collapse" or injurious outside pressure when the steam is being let down and by condensation forms a vacuum within the pipes and so forth. This timely operation of the air cock or valve in such arrangements is both inconvenient and troublesome and is accompanied by great uncertainty where the opening and shutting of the cock is dependent upon manual attention owing to the neglect of the person whose duty it is to attend to the same. These inconveniences and objections have in part been removed by automatic arrangements for the purpose consisting generally of zinc or copper rods which, being caused to expand or contract according to the local temperature as the pipes are exposed to steam or air, open or shut the cock, as the case may require for the purposes specified, by means of cranks or levers connected with the zinc or copper rods so that but a small dilation or contraction of the said rods is necessary to open or shut the air cock. Without great complication however of parts, the action of the rods on the cock or valve is comparatively a slow one owing to the trifling expansibility and contractability of the rods under

moderate temperatures, while the frequent exposure to sudden contraction and expansion impairs or kills the "virtue" in the metal of these rods and renders them in time slow and irregular in the performance of their work to the full extent of their stroke—by dilation or contraction—to fully and perfectly open and close the cock or valve.

The air valve represented in the accompanying drawing is of the piston order or kind, but a flap or hinged valve may be employed. The outer shell or case (A) of the valve is shown of "oil cup" configuration and may be made of any suitable metal or material but preferably one that is a poor non-conductor of heat; it is shown with a screw thread cut on its stem or lower end (a) for the purpose of conveniently attaching it to a branch of the steam heating pipes or to a radiator connected therewith. A cap (b) having a central air outlet and inlet (c) is fitted on the top of the outer case. A perforation (d)—one or more them—is provided the stem or lower end (a) of the case for the admission of steam into the body of the case as will be hereinafter shown.

Within the bell portion (e) of the case, is a smaller bell or cup (B) leaving an annular space all around and above it, between it and the outer case. This bell or cup (B), which should be made of copper or some good conductor of heat, is closed at its sides and top, but has a hollow open stem (f) at its bottom fitting into in any light manner the stem or lower portion of the body of the outer case. This inner stem forms a cylinder or tube as it were for the up and down play or action of a piston (g) which, accordingly as it passes over or below or above a perforation or series of perforations (h) in said stem communicating with the annular space between the inner and outer bell, shuts or opens communication between the said annular space separating the bells and the interior of the stem below the piston.

The piston rod (s) is extended above as well as below the piston, the upper portion serving by striking the cap or top of the inner bell to arrest the movement of the piston when at its proper top stroke, and the lower portion of said rod serving as a guide if desired to steady the play of the piston and as a support or guide to a spiral spring

(*x*) wrapped around it to press the piston upward.

The inner closed bell or cup (B) is partly, say one-third, filled with water, and the remainder, say two thirds, filled with oil which being the lightest of course swims on the top of the water. Now supposing steam to be turned on into the pipes and radiator (if the latter be used in addition) it will pass through the perforations (*d*) in the lower portion of the stem into the stem, out through the side opening or openings (*h*) into the annular space separating the two bells, expelling the air through the perforation (*c*) in the cap and heating the inner bell (B) all around will cause the oil and water in the inner bell to be expanded and to press upon the piston and force it downward till it closes the side opening or openings (*h*), and thus the valve is automatically closed. But upon the steam being cut off and allowed to cool or condense in the pipes or escape therefrom, the continuance of heat being withdrawn from the instrument, the oil and water in cooling gradually resume the original space they occupied which admits of the piston being forced upward by the spring (*x*) from below till the piston moves above the side openings (*h*) when air from the outside freely entering the top aperture (*c*) passes through the cock and out through the bottom apertures (*d*) into the radiators or pipes, and in this manner is the valve made self-opening.

Now, as it is well known that, while copper expands but one five hundred and eighty second ($\frac{1}{580}$) part of its bulk at a given temperature, fixed oils expand one twelfth ($\frac{1}{12}$)

part of their bulk. This arrangement will then necessarily, for a like complication of parts, be much more prompt as regards the action of the valve than the automatic rod arrangements referred to, while the other defects of such arrangements referred to will be avoided. And as the water contained in the lower portion of the cup or globe expands as compared with the oil but one twenty second ($\frac{1}{20}$) part of its bulk, it forms a solid, as it were, intermedium between the piston and oil; and as water, as well known to coopers and others, is less prone to pass or work through a joint than oil which is even more penetrating than steam or vapor, the piston (*g*) will remain durably tight against leakage when having only water in its liquid form to exclude which is the medium immediately above it.

What we claim as new and useful herein, and desire to secure by Letters Patent, is—

1. The employment when combined substantially as specified of oil and water or their equivalents for the automatic closing or moving of the valve by expansion of the said fluids in their liquid state essentially as set forth.

2. And we further claim the arrangement essentially as specified of the inner and outer bells (*e*, B) tubes, perforations or passages (*c*, *d*, *h*) and interior piston or valve (*g*) for operation in the manner and as set forth.

In testimony whereof, we have hereunto subscribed our names.

WILLIAM REYNOLDS. [L. s.]
EARL PARKER.

Witnesses:

H. H. BARBOUR,
JOHN H. WHITE.