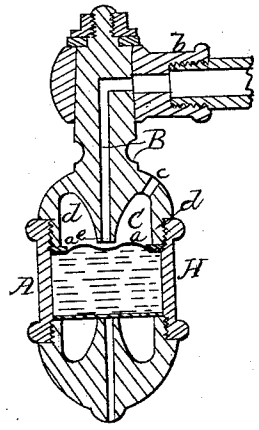
Whitaker & Cope,

Steam Trap.

No. 17,401. Patented May 26, 1857.



UNITED STATES PATENT OFFICE.

S. H. WHITAKER AND EZRA COPE, OF CINCINNATI, OHIO.

THERMOPNEUMATIC SAFETY-VALVE.

Specification of Letters Patent No. 17,401, dated May 26, 1857.

To all whom it may concern:

Be it known that we, S. H. WHITAKER and EZRA COPE, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and Improved Self-Acting Air-Valve for Steam-Heating Apparatus; and we do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, said drawing representing a vertical central section of the valve.

All properly constructed steam heating apparatus have, on every radiator, what is termed an air valve, to admit air thereinto, to prevent collapse when the steam condenses in consequence of the cooling of the radiator by reason of the fire going out or the radiator being shut off from the boiler; such valve requiring to be closed again to prevent the escape of steam when the radiator is again filled with steam.

This invention consists in an expanding valve, composed of a chamber whose top is composed of a flexible diaphragm filled with bees-wax or other fusible substance that is expansible by heat and that solidifies at atmospheric temperatures; said valve being so applied with its flexible diaphragm in contiguity with the mouth of the air-escape passage of the radiator, that when the radiator cools, the contraction and solidification of the bees-wax or other substance in the chamber draws down the diaphragm away from the mouth of the air passage and allows air to enter the radiator, but that when steam is let into the radiator, after it has expelled the air therefrom, the melting and expansion of the bees-wax or other substance in the chamber forces the diaphragm against the mouth of the escape passage and closes it.

To enable others to make and use our invention, we will proceed to describe its construction and operation.

A, is the chamber containing bees-wax, and *a*, is the flexible diaphragm forming the top thereof, made of copper or other flexible metal.

B is the air escape passage, made in the form of an inverted elbow, the upper part of which is attached by a screw *b*, to the radiator, and the lower part is made with a screw flanch *d*, to which the chamber A, is screwed; and within this flanch surrounding the mouth *e*, of the passage B, there is a small air chamber C, in which there is an opening *c*, communicating with the atmosphere.

When the bees-wax in the chamber A, is melted by the heat of the steam, the diaphragm is raised by the expansion thereof to the position shown in dotted outline, closing the passage B, and preventing the escape of steam; but when the radiator cools by the steam being shut off or the fire going down, and the bees-wax in consequence cools and contracts, the latter subsides to the bottom of the chamber A, by gravitation, and, by its cohesive attraction, draws down the diaphragm, as shown in bold outline, and opens the passage B, for the admission of air to the radiator through the opening *c*, and chamber C, and leaves the said passage open till the steam has again entered the radiator, and expelled the air through the passage B, chamber C, and opening *c*, after which it heats and melts the bees-wax, by the expansion of which the diaphragm is again raised and the passage closed.

The chamber A is represented in the drawing with a thin bottom, and an air passage below it; but this is not essential, as the bottom may be solid.

A piston may be substituted as the equivalent of the diaphragm; but we consider the diaphragm preferable.

We do not claim, generally, the operation of an air-valve for steam-heating apparatus by the expansion of fluid bodies by heat; as we are aware that the thermo-expansive properties of quicksilver, air, and other fluid bodies have been employed for this purpose with partial success. Neither do we claim the use of bee's-wax or other substance of similar character for the purposes described. But

What we claim as our invention, and desire to secure by Letters Patent, is:

The within-described self-acting air valve,

consisting of a chamber whose top is composed of a flexible diaphragm, or its equivalent, filled with bees-wax or other fusible substance that solidifies at atmospheric temperatures, but is expansible by heat, and that will act upon the diaphragm to open and close the passage through the combined agencies of expansion and contraction by heat, gravitation, and cohesive attraction, as herein specified.

S. H. WHITAKER.
EZRA COPE.

Witnesses:
J. B. GREEN,
H. R. BALDRIDGE.