

(No Model.)

J. E. HOWARD & J. C. TAITE.
AUTOMATIC DRAIN VALVE.

No. 568,684.

Patented Sept. 29, 1896.

Fig. 1.

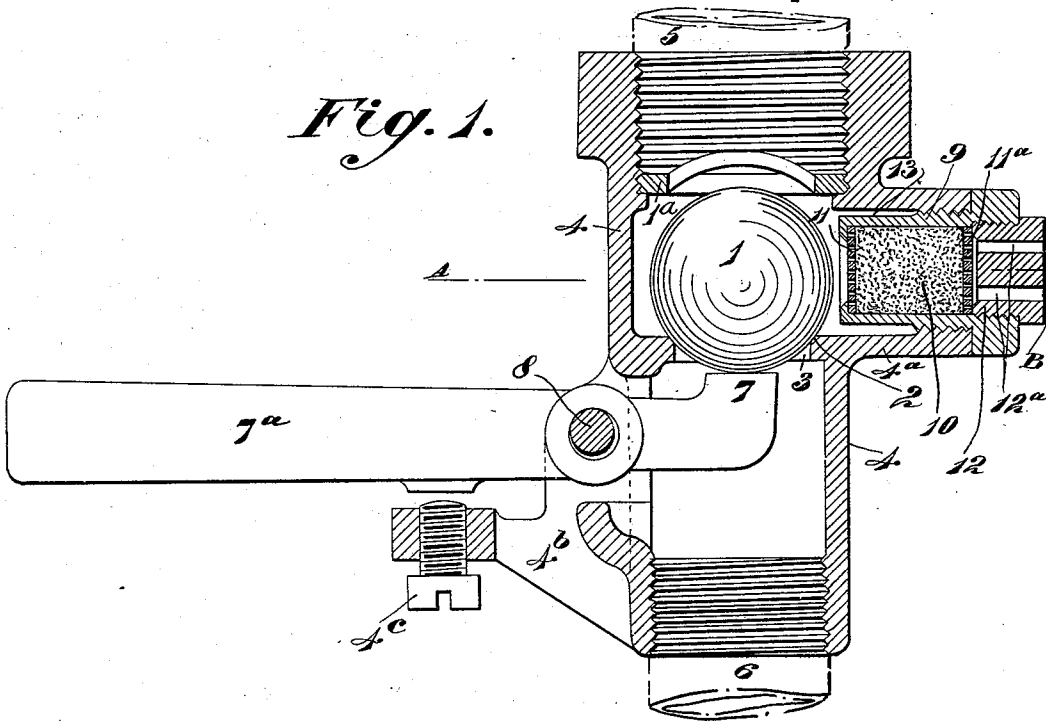


Fig. 2.

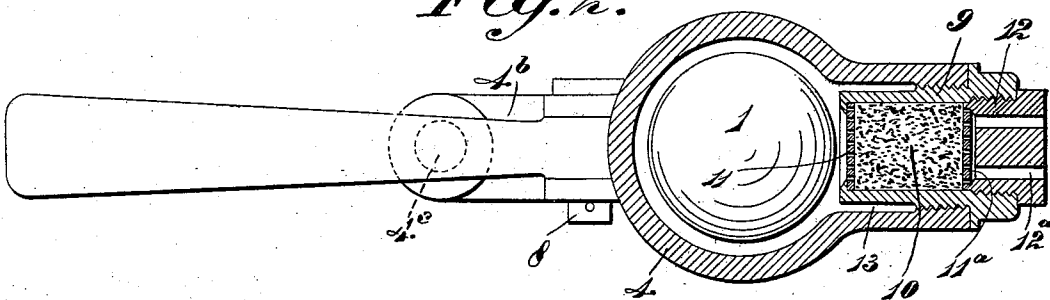
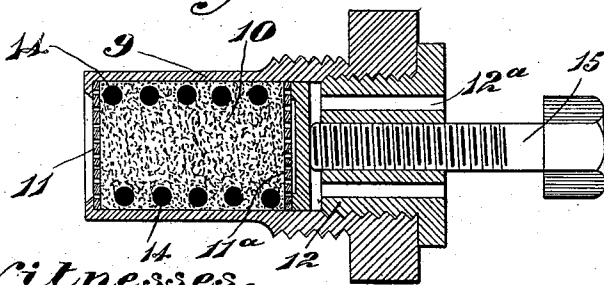


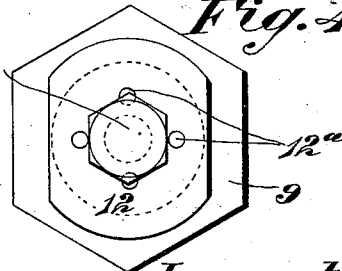
Fig. 3.



Witnesses.

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Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN ELIOT HOWARD AND JOHN CHARLES TAITE, OF LONDON, ENGLAND.

AUTOMATIC DRAIN-VALVE.

SPECIFICATION forming part of Letters Patent No. 568,684, dated September 29, 1896.

Application filed May 3, 1895. Serial No. 548,042. (No model.)

To all whom it may concern:

Be it known that we, JOHN ELIOT HOWARD, residing at Hampstead, and JOHN CHARLES TAITE, residing at Queen Victoria Street, in the city of London, England, subjects of the Queen of Great Britain and Ireland, have invented Improvements in Automatic Drain-Valves, of which the following is a specification.

This invention relates to an improved leakage device for enabling water of condensation, with, it may be, a small quantity of steam, to escape continuously from steam-pipes or other apparatus in which it may be formed. Such leakage devices may in particular be advantageously used in connection with the drain-valves of steam heating apparatus of the kind specially suitable for heating railway-carriages, in which steam passes from a main steam-pipe to a system of heat-radiating pipes, vessels, or chambers located on or in the carriages or other places to be heated, and connected with a drain pipe or pipes which, as well as certain parts of the main steam-pipe, if required, is or are provided with one or more drain-valves which are normally closed, but are open when the heating apparatus is out of operation, to allow free communication between the interiors of the pipes and the external atmosphere. Each drain-valve in such apparatus has heretofore been usually constructed with two passages—viz., a small passage and a large passage—and a handle has been provided whereby the valve can be moved into such a position that water of condensation and a small quantity of steam will be permitted to escape through the small passage continuously while the apparatus is in action, and afterward, when the apparatus is not in use, into such a position that the large passage will be in communication with the drain-pipe and the atmosphere, so that the pipe system can drain itself, and thus prevent any water from lying in the pipes and becoming frozen in cold weather. In some cases the drain-valve has been arranged to move automatically at the proper times into the positions just mentioned. Now the small passage referred to, which has frequently consisted merely of a single small hole, has been found too liable to become choked by

dirt, with the result that the water of condensation, being prevented from flowing away, is liable to accumulate, and, in consequence of its preventing the circulation of steam, to become cooled and ultimately frozen in wintry weather.

A leakage device according to this invention is free from this drawback. It comprises a porous or permeable layer or mass of material which is arranged within a suitable holder, and the interstices in which are such as to act collectively as a small outlet-passage, which, while permitting of the continuous escape of water of condensation and the small quantity of steam necessary to maintain the apparatus or the part thereof to which it is applied in effective action, will not be liable to become readily choked by dirt. As will be obvious, the porous or permeable layer or mass of material and the holder within which it is held can be constructed in various forms.

In the accompanying drawings, Figure 1 shows, partly in central vertical section and partly in side elevation, an automatic drain-valve provided with a leakage device according to this invention. Fig. 2 is a sectional plan taken on the line A B of Fig. 1. Fig. 3 is a longitudinal central section, and Fig. 4 an end elevation, showing a modified form of leakage device.

In Figs. 1 and 2 of the drawings, 1 is the drain-valve proper, in the form of a ball arranged to close upon an annular seat 2, surrounding a large outlet-passage 3, formed in the valve-case 4, which is provided with internal screw-threads for attachment at its upper end to a pipe 5, in connection with steam heating apparatus of the kind hereinbefore mentioned, and at its lower end to receive a drain-pipe 6.

1^a is a guard to prevent the valve 1 from falling before the case 4 is in its proper position. Against the under side of the valve 1 acts the short arm 7 of a lever that is pivoted to the valve-case at 8, and the long arm 7^a of which extends outward beyond the valve-case and is made of sufficient weight to overcome the weight of the valve 1 when the valve is not subjected to steam-pressure or only to a small steam-pressure. The motion of the lever 7 7^a may be limited by means

of an external stop 4^b, cast on the valve-case 4, and provided, it may be, with an adjusting-screw 4^c.

The leakage device forming the small outlet-passage for water of condensation and steam comprises a screw-plug 9, adapted to be readily screwed into place in a lateral branch 4^a of the valve-case 4 and formed with an internal chamber charged with a compressed porous or permeable mass of material 10, that is held in place between transverse perforated plates or walls 11 11^a, or, it may be, plates of porous or permeable material, the outer end of the chamber being provided with a plug 12, formed with a number of perforations 12^a. The inner end of the plug 9 may with advantage be reduced in cross-section, so that when in place, should the water naturally remaining in the mass 10 when the apparatus is put out of use freeze, steam will, on again putting the apparatus into use, enter the annular steam-space 13, formed around the said reduced inner end of the plug, and thaw the frozen water therein, thus enabling the leakage device to again act in the required manner.

The material constituting the porous or permeable mass 10 may be of various kinds—as, for example, felt, asbestos fiber, unglazed earthenware, and pumice-stone. Satisfactory results have been obtained with ordinary fibrous asbestos compressed in place within the screw-plug 9.

With the construction described, when steam is admitted to the pipe 5, to which the valve-case 4 is connected, it will press the valve 1 upon its seat 2 in opposition to the weight of the lever-arm 7^a and so close the large outlet-passage 3, while leaving open the small one, so as to allow sufficient steam and water of condensation to escape to maintain the heating apparatus in working order. When the steam-pressure falls, upon cutting off the supply of steam to the said apparatus, the lever-arm 7^a will, owing to its weight, automatically move the valve from its seat and so open the large outlet-passage 3 and permit of the free escape of the steam and water of condensation remaining in the system of pipes.

In the modified form of leakage device shown in Figs. 3 and 4 a coiled spring 14 is embedded in the porous or permeable mass of material 10, and a set-screw 15 is screwed through the plug 12, so as to act against the plate 11^a, the arrangement being such that on turning back the set-screw the spring will

open or expand the material 10 and permit of a greater flow of steam and water of condensation therethrough, and on tightening up the set-screw the said material can be compressed so as, by reducing the size of the interstices therein, to reduce the flow of steam and water of condensation therethrough, thereby enabling the leakage device to be adjusted to suit varying requirements.

What we claim is—

1. A leakage device for steam-pipes and the like, comprising a casing provided internally with transverse perforated or permeable walls, a porous or permeable layer or mass of material compressed by and between said walls, and means for varying the degree of compression of said layer or mass, substantially as herein described.

2. A leakage device for steam-pipes and the like comprising a casing provided internally with transverse perforated or permeable walls one of which is movable lengthwise of the casing, a porous or permeable mass of material compressed by and between said walls, a perforated closure in the discharge end of said casing, and a screw for adjusting the position of said movable wall, substantially as described.

3. A leakage device for steam-pipes and the like comprising the hollow externally-screw-threaded plug 9 with transverse perforated walls 11, 11^a arranged therein, a porous or permeable mass of material 10 compressed in place between said walls, and a perforated plug 12 secured in the outer end of said plug 9 substantially as described.

4. A leakage device for steam-pipes and the like, comprising a casing open at both ends and provided internally with transverse perforated or permeable end walls one of which is movable, a porous or permeable mass of material located within said casing between said walls, a coiled spring embedded in said mass, a perforated plug secured in the discharge end of said casing, and an adjusting-screw arranged to work through said plug and act against said movable wall, substantially as herein described for the purpose specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN ELIOT HOWARD.
JOHN CHARLES TATTE.

Witnesses:

EDMUND S. SNEWIN,
PERCY E. MATTOCKS.