No. 776,475. PATENTED NOV. 29, 1904.

F. W. LEUTHESSER.

AIR VALVE FOR RADIATORS.

APPLICATION FILED APR. 21, 1902.

NO MODEL.

Fig. 1.

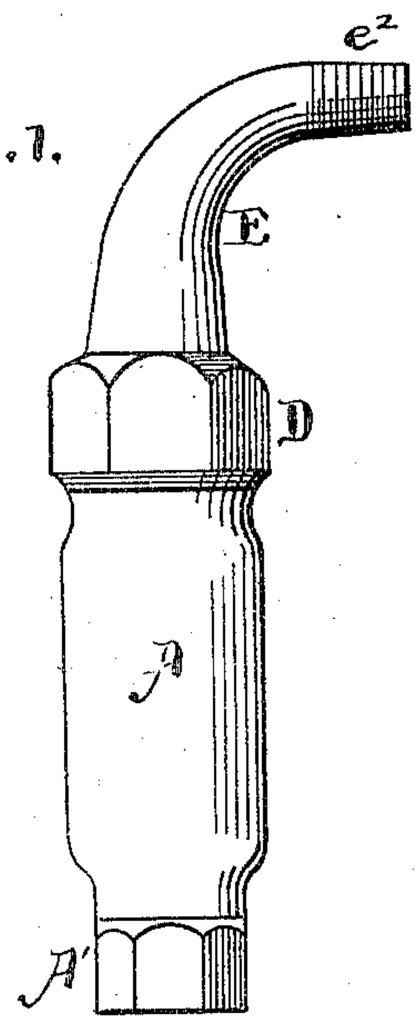


Fig. 2.

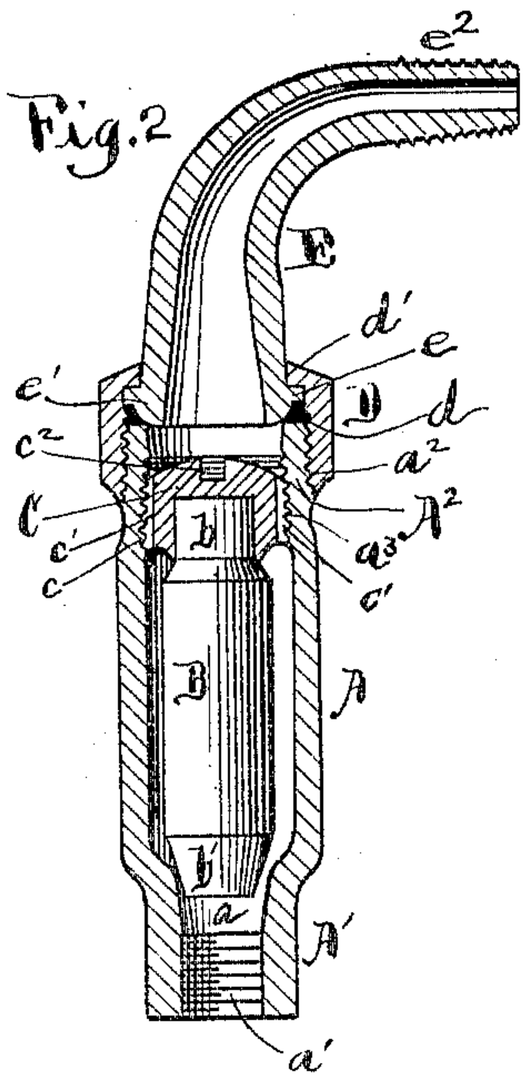


Fig. 3.

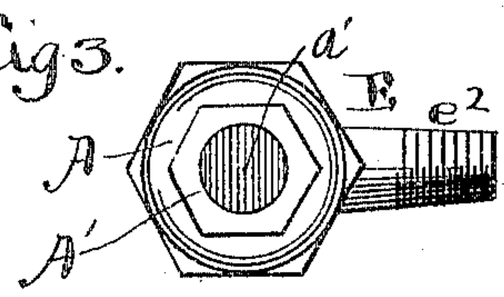
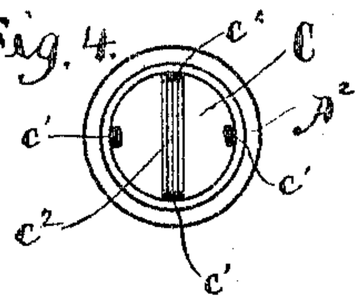


Fig. 4.



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No. 776,475. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

FRED W. LEUTHESSER, OF CHICAGO, ILLINOIS, ASSIGNOR TO MONASH-YOUNKER COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

AIR-VALVE FOR RADIATORS.

SPECIFICATION forming part of Letters Patent No. 776,475, dated November 29, 1904.

Application filed April 21, 1902. Serial No. 103,956. (No model.)

To all whom it may concern:

Be it known that I, FRED W. LEUTHESSER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Air-Valves for Radiators, of which the following is a specification.

This invention relates to that class of air-valves for radiators in which an expansible stem having a seating end is employed for opening and closing the port or passage for the escape of air and the water of condensation when the valve is open and for preventing the escape of steam when the valve is closed. It is desirable in valves of this class to locate the discharge port or passage for escaping the air and the water of condensation at the lower end of the valve and have the expansion-stem suspended from the head or upper end of the valve to operate downwardly for opening and closing the discharge port or passage.

Valves of the class named are employed in connection with what is known as the "vacuum" system for radiators, and it is necessary for the purpose of properly adjusting the acting end to have access to the opposite end of the expansion-stem, which is adjustably mounted in the shell or casing of the valve. It is therefore desirable in attaching the valve to the radiator and the return or discharge pipe to so connect the valve in position as to enable the connection to be broken for access to the expansible stem for adjusting purposes and at the same time have the breaking operation performed without injurious or detrimental effects in the attachment of the valve to the radiator and to the return or discharge pipe.

The primary object of the present invention is to construct a valve of the class named with an induction-passage thereinto at the top or upper end of the shell or casing of the valve and with a connection for the shell or casing and the eduction-tube from the radiator, which can be broken to enable access to be had to the expansible stem for adjusting purposes without materially affecting the connection of the valve to the radiator and the waste or discharge pipe; to locate the eduction from the radiator for the air, water, and water of condensation into the chamber of the valve at the upper end or top of the valve shell or casing and have the discharge for the air and the water of condensation at the lower end or bottom of the valve shell or casing; to suspend the expansion-stem for opening and closing the discharge port or passage of the valve from the upper end or head of the shell or casing, with a provision between the carrier or support for the upper end of the stem and the shell or casing for the admission of water from the eduction-tube of the radiator into the chamber of the valve, and to improve generally the construction and operation of the valve as a whole.

In the drawings, Figure 1 is an elevation of the valve complete; Fig. 2, a sectional elevation of the same; Fig. 3, a bottom or lower end plan view of the valve, and Fig. 4 a top or plan view with the eduction tube or nipple for attachment to the radiator removed.

The valve is constructed of a continuous shell or casing A, including as a part of the casing a neck A' at the lower or discharge end and a head A^2 at the upper or attaching end of the shell or casing to the connecting tube or nipple for attachment to the radiator and from which head the expansible stem is suspended. The lower end of the shell or casing at the juncture of the neck and extending through the neck has a discharge port or passage a, which for a portion of its length is screw-threaded, forming a screw-thread a' on the interior of the neck for attachment of the shell or casing to the end of the return or discharge pipe, and, as shown, the exterior of the neck is formed with flat faces for the reception of a wrench by means of which the valve can be screwed onto the end of the return or discharge pipe. The head end of the shell or casing, as shown, has on its exterior a screw-thread a^2 and has on its interior a screw-thread a^3 for the reception of a coupling-nut on the exterior screw-thread and the reception of the carrier or holder of the expansible stem on the interior screw-thread.

The expansion-stem B can be made of vulcanite or other material which will expand

freely under heat and contract under cold. This stem or plug is solid and its body is circular in cross-section and, as shown, its upper or attaching end *b* is of a less diameter than the diameter of the body and its lower end *b'* is tapered and forms a plug or seating end to enter the discharge port or passage *a* when the stem is expanded by heat, closing the port or passage against outflow from the chamber of the shell or casing and when the stem is contracted or shortened by cold opening the port or passage *a* for the escape or outflow of the air and water of condensation from the chamber of the shell or casing.

The expansible stem or plug, as shown, is carried by an adjustable holder or plug C, having a rim or wall *c*, into which the end *b* of the stem is forced and secured firmly in place against becoming detached or loosened from the holder or plug. The holder or plug C has an exterior screw-thread fitting the interior screw-thread a^3 of the head of the shell or casing, so that by turning the holder or plug forward or backward the acting or seating end *b'* of the stem can be advanced and receded as required for proper coöperation with the wall or seating-face of the port or passage *a* to close and open such port or passage. The holder or plug has a series of passages *c'* in its exterior face, which passages furnish a communication from the space above the holder or plug into the chamber of the shell or casing, permitting air, water of condensation, and steam to enter or flow into the chamber. The top of the holder or plug C has therein a slot or nick c^2 for the reception of the end of a screw-driver to turn the holder or plug in making the necessary adjustments for locating the acting end of the expansible stem in correct coacting relation with the wall or seating-face of the discharge port or passage *a* from the chamber of the shell or casing; but instead of a slot or nick other means could be provided for manipulating the holder or plug.

The tampering with the valve by unauthorized persons after the stem has been correctly adjusted is to be prevented as far as possible, and to this end the holder or plug carrying the expansible stem is entered wholly within and below the upper end of the head of the shell or casing and is protected against ready access thereto by the coupling-nut for the connecting tube or nipple to the radiator and the connecting tube or nipple when in place. The coupling-nut D, as shown, has its exterior formed with flat faces for the reception of a wrench to screw the nut onto the head end of the shell or casing and has an interior screw-thread on its depending wall *d*, which coacts with the exterior screw-thread a^2 on the head end of the shell or casing, and the end wall of the coupling-nut has therein an opening for the stem of the connecting tube or nipple to the radiator, leaving a rim or flange *d'* to abut against a rim or flange *e* on the exterior of the coupling end of the connecting tube or nipple E, which tube or nipple in the construction shown has a curved body and is of a tapered formation with the outer end smallest. The inner end of the connecting tube or nipple below the circumferential rim or flange *e*, as shown, has a curved face *e'*, which when the coupling-nut is fully entered onto the head end of the shell or casing is forced against the edge of the head, making a close tight joint between the shell or casing and the connecting tube or nipple, and, as shown, the tapered outer end of the connecting tube or nipple has a screw-thread e^2 on its exterior for attaching the tube or nipple to the radiator and furnish a communication between the radiator and the chamber of the shell or casing for the outflow of air, water of condensation, and steam from the radiator into the chamber of the shell or casing, the air, water of condensation, and steam entering the space above the carrying holder or plug of the expansion-stem and flowing through the passages in the exterior face of the holder or plug.

The expansible stem is entered into the chamber of the shell or casing and properly adjusted for its acting end to be in correct coacting relation with the wall or seating-face of the discharge-port by turning the holder or plug to advance or recede the acting end, and when the stem is adjusted the valve is in condition for attachment to the radiator and the return or discharge pipe. The valve is attached to the radiator and the return or discharge pipe by screw-threading the shell or casing at the neck end A' onto the end of the return or discharge pipe. The connecting tube or nipple, with the coupling-nut thereon, leaving the nut on the connecting tube or nipple, is then screw-threaded at its outer end into the radiator, its inner end brought into alinement with the upper end of the shell or casing, and the connection is completed by entering the coupling-nut onto the head end of the shell or casing and screwing it thereonto until the neck end of the connecting tube or nipple abuts snugly against the edge of the wall of the head of the shell or casing, as shown in Fig. 2, and when the valve is thus set up and attached it is ready for operation.

In operation with the valve cold the air forced from the radiator and the water of condensation will pass through the tube or nipple E into the space in the head end of the shell or casing above the holder or plug carrying the expansible stem and will flow from such space through the side openings in the holder or plug into the chamber of the shell or casing and be discharged from the chamber through the port or passage *a* into the return or discharge pipe, the port or passage being open by reason of the contraction of the expansion-stem from the cold. The steam following the

air and water of condensation will pass through the tube or nipple E into the space above the holder or plug and flow through the side passages in the holder or plug into the chamber, and with the entrance of steam into the chamber of the shell or casing heat will be imparted to the member or stem, causing such member or stem to expand for its acting end to seat against the wall or seating-face of the discharge port or passage, closing the same and shutting off the outflow of steam from the chamber. The reduction of the temperature in the chamber of the shell or casing by the non-admission of steam thereinto allows the valve to cool, which causes the expansible member or stem of the valve to contract and again open the port or passage for the discharge, allowing the air and water of condensation to escape until the steam again enters the chamber and by its heat causes the expansible member or stem to expand and again close the discharge port or passage, and these operations will alternate and continue as the valve becomes cold and hot.

The coupling constituting the connection between the valve shell or casing and the eduction nipple or tube from the radiator is free to be broken by withdrawing the coupling-nut, and when broken the shell or casing by flexing or bending the return-pipe can be swung to one side, so as to enable access to be had to the holder or plug of the expansion member or stem by a screw-driver or other instrument to change the adjustment of the expansion member or stem as to the relation of its acting end with the wall or seating-face of the discharge port or passage, and when the necessary adjustment has been made the shell or casing by releasing the return-pipe and allowing it to spring back can be returned into position to aline with the coupling-nut and the connection be again made by entering the coupling-nut onto the end of the shell or casing. The breaking of the coupling by withdrawing the nut and the adjustment of the expansible member or stem can be made without disturbing or impairing the joint between the entering end of the tube or nipple E into the radiator or the joint at the neck end of the shell or casing with the end of the return or discharge pipe, as in breaking the connection the only part disturbed will be the coupling-nut, which will not affect the joints between the radiator and the tube or nipple and between the neck end of the shell or casing and the end of the return or discharge pipe, which joints remain intact, and therefore will not need attention when the connection is replaced. This breaking of the connection between the radiator and the valve by reason of not disturbing the joints except at the coupling-nut will not be followed by disastrous results in causing a leakage and breaking the vacuum, as the only joint disturbed will be that of the coupling-nut, which is restored by again entering the coupling-nut onto the end of the shell or casing. Access can also be had to adjust the expansion member or stem by uncoupling the tube or nipple and swinging it to one side, and when the adjustment has been made the tube or nipple can be returned to aline with the shell or casing and be again coupled thereto.

The locating of the discharge at the bottom of the shell or casing and employing an expansible member or stem suspended from the upper end or head of the shell or casing for its acting end to coact with the seat or wall of the discharge port or passage locates the discharge port or passage at the bottom and entering the induction tube or nipple from the radiator into the upper end of the shell or casing results in the production of a valve which can be easily broken for adjusting purposes and which will receive the air, the water of condensation, and the steam at its upper end and discharge the air and water of condensation at the lower end without impediment.

The coupling-nut not only serves as a means for connecting the shell or casing of the valve with the eduction tube or nipple to furnish a breakable connection, but also serves as a guard or protecting-cap against ready access to the expansion member or stem and prevents tampering with the member or stem except by the removal of the coupling-nut. The expansible member or stem operates downwardly instead of upwardly, and the adjustment thereof can be attained without disturbing the attachment of the valve to the radiator or to the return or discharge pipe, thus insuring the maintenance of the joints at these points against impairment and leakage.

The discharge for the valve is at the bottom, so that the valve can be cleared of sediment, scale, or dirt by blowing off, which operation can be easily performed, it only being necessary to turn the expansible member or stem backward, so as to recede its acting end and leave a clear opening between the acting end and the wall or seat of the discharge port or passage.

What I regard as new, and desire to secure by Letters Patent, is—

1. In an air-valve for radiators, the combination of a shell or casing having a chamber therein and provided at its lower end with a discharge port or passage, the port or passage having at its inlet end a curved seating-face in the plane of and coincident with the curvature of the face of the wall at the bottom of the chamber around the head or passage, an expansion-stem suspended from its upper end within the chamber of the shell or casing and having an acting or seating lower end coacting with the seating-face around the inlet end of the discharge port or passage, and an inlet-tube coupled to and discharging into the upper end of the shell or casing in the space

of the chamber above the suspending means for the upper end of the expansion-stem, the inlet-tube having a lateral extension for connecting and disconnecting the shell or casing at the inlet end and non-affecting the adjustment of the expansion-stem, substantially as described.

2. In an air-valve for radiators, the combination of a shell or casing having a head at its upper end and a neck at its lower end, the shell or casing having a chamber therein with a discharge port or passage leading from the chamber through the neck and the discharge port or passage having its inlet end tapered inwardly with a seating-face coincident with and in the plane of the taper of the face of the wall at the bottom of the chamber, an expansion-stem adjustably suspended within the shell or casing from the head end thereof and having a tapered acting or seating lower end to coact with the tapered seating-face of the inlet end of the discharge port or passage to open and close the discharge port or passage, a screw-threaded holder or plug entered into the head end of the shell or casing and adjustably carrying the expansion-stem, and an inlet-tube coupled to and discharging into the upper end of the shell or casing in the space in the chamber above the holder or plug, the inlet-tube having a lateral extension for connecting and disconnecting the shell or casing at the inlet end and non-affecting the adjustment of the expansion-stem, substantially as described.

3. In an air-valve for radiators, the combination of a shell or casing having a head at its upper end and a neck at its lower end, the shell or casing having a chamber therein with a discharge port or passage leading from the chamber through the neck, the discharge port or passage having its inlet end tapered inwardly with a seating-face coincident with and in the plane of the taper of the face of the wall at the bottom of the chamber, an expansion-stem adjustably suspended within the shell or casing from the head end thereof and having a tapered acting or seating lower end to coact with the tapered seating-face of the inlet end of the discharge port or passage to open and close the discharge port or passage, a screw-threaded holder or plug entered into the head end of the shell or casing and adjustably carrying the expansion-stem, and having in its body a passage furnishing communication between opposite sides of the holder or plug, and an inlet-tube coupled to and discharging into the upper end of the shell or casing in the space in the chamber above the holder or plug, the inlet-tube having a lateral extension for connecting and disconnecting the shell or casing at the inlet end and non-affecting the adjustment of the expansion-stem, substantially as described.

4. In an air-valve for radiators, the combination of a shell or casing having a head at its upper end and a neck at its lower end, the shell or casing having a chamber therein with a discharge port or passage leading from the chamber through the neck, the discharge port or passage having its inlet end tapered inwardly with a seating-face coincident with and in the plane of the taper of the face of the wall at the bottom of the chamber, an expansion-stem adjustably suspended within the shell or casing from the head end thereof and having a tapered acting or seating lower end to coact with the tapered seating-face of the inlet end of the discharge port or passage to open and close the discharge port or passage, a screw-threaded holder or plug entered into the head end of the shell or casing and adjustably carrying the expansion-stem, and having in its body a passage furnishing communication between opposite sides of the holder or plug, an inlet-tube coupled to and discharging into the upper end of the shell or casing in the space in the chamber above the holder or plug, the inlet tube having a lateral extension for connecting and disconnecting the shell or casing at the inlet end and non-affecting the adjustment of the expansion-stem, and a coupling-nut detachably connecting the inlet-tube with the head end of the shell or casing, substantially as described.

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