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AUTOMATIC AIR EJECTING APPARATUS FOR HEATING SYSTEMS.

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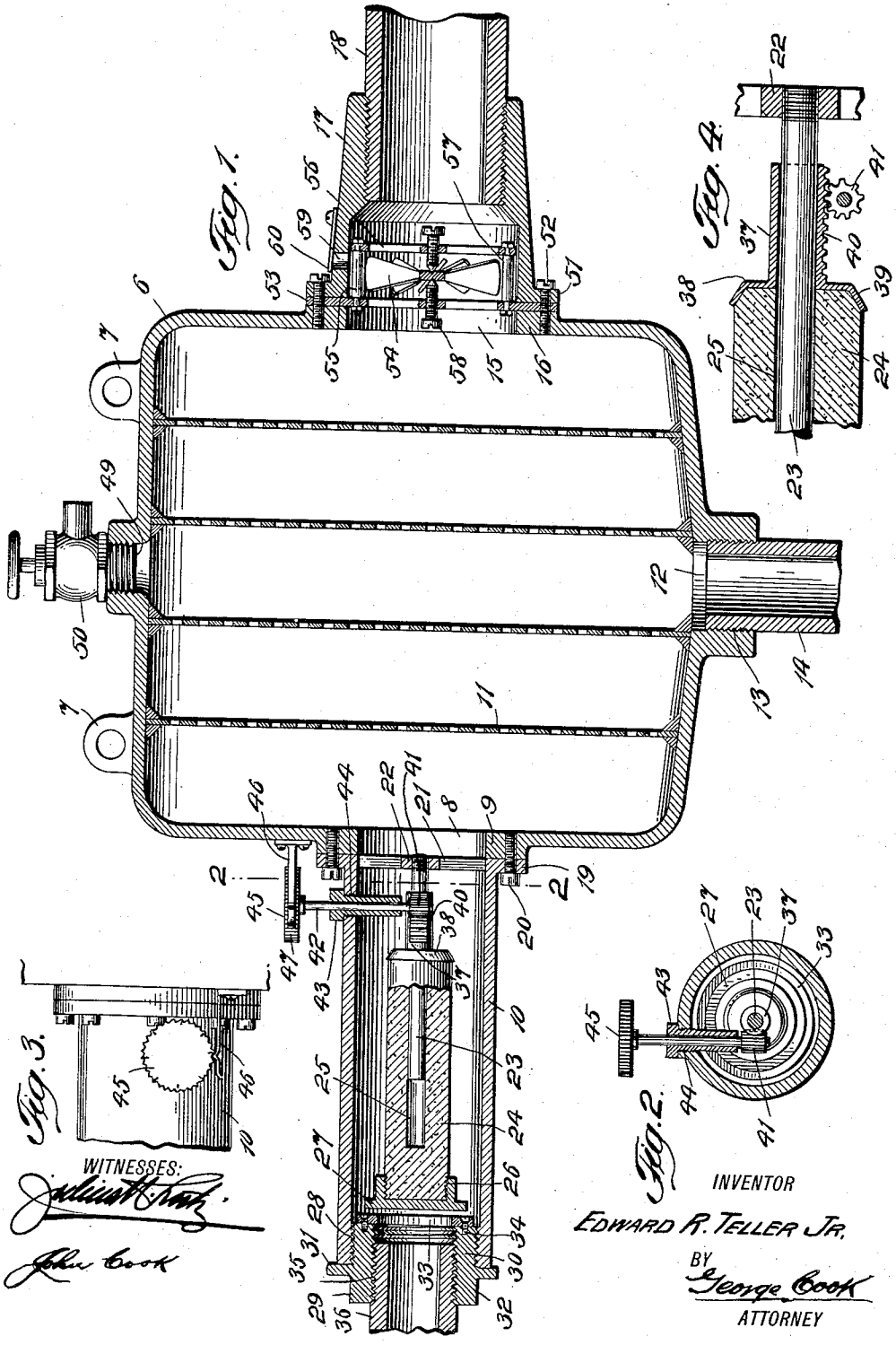


Fig. 1.

Fig. 4.

Fig. 3.

Fig. 2.

WITNESSES:

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AUTOMATIC AIR-EJECTING APPARATUS FOR HEATING SYSTEMS.

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To all whom it may concern:

Be it known that I, EDWARD R. TELLER, Jr., a citizen of the United States, and a resident of Westwood, in the county of Bergen and State of New Jersey, have made and invented certain new and useful Improvements in Automatic Air-Ejecting Apparatus for Heating Systems, of which the following is a specification.

This invention relates to an apparatus for automatically ejecting air from steam and vapor heating systems, the object being to provide an apparatus of this character which will dispense with the use of separate automatic air outlet valves at each radiator, and in addition, will provide for a continuous vacuum, materially facilitating the removal of air from the heating systems.

A further object is to provide an automatic thermal-controlled valve mechanism which may be easily and quickly adjusted, so that the temperature at which the valve closes, may be changed, and with the various parts so arranged that they may be readily removed, and other parts substituted therefor, should it be so necessary. The thermal-controlled valve mechanism is further arranged, so that all danger and likelihood of high compressive strains arising within the expanding member, due to abnormal temperatures or pressures, are eliminated, and the long life of the mechanism is therefore assured.

Another object is to provide an apparatus of the class mentioned, wherein a continuous vacuum is maintained by a connection which leads into the chimney flue, the presence of the vacuum being made more continuous and positive by an automatic exhausting fan, which, having once attained a high speed of rotation, occasioned by the drafts within the chimney, provides for the maintenance of a vacuum within the system and which results in the continuous ejection of air therefrom.

A further object is to so arrange and design the various parts that the entire apparatus can be economically manufactured, and the various parts easily accessible and may be removed and replaced in an expeditious manner, and with these and other objects in view, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, wherein it is to be understood that changes can be made in the precise embodiment of the invention, within the scope of what is claimed, without departing from the spirit of the invention.

The preferred form of my invention is disclosed in the accompanying drawings, wherein:—

Figure 1 is a view in longitudinal section of the apparatus as embodying the characteristic features of my invention; Fig. 2 is a view in cross-section taken on the line 2—2 of Fig. 1; Fig. 3 is a fragmental view in top plan of the valve chamber adjacent to and including its connection with, the condensing chamber; and Fig. 4 is an enlarged sectional view of the rear extremity of the expansible member and accompanying parts, and by means of which the temperature at which the valve automatically closes, may be easily adjusted.

Referring specifically to the several views, the air removing apparatus includes the main condensing chamber 6, which is provided with the apertured lugs 7, whereby it may be supported in a rigid manner without bringing undue strains to bear upon the parts which are connected thereto. The condensing chamber is provided with the inlet opening 8, preferably located about the center of one of its sides, and has the adjacent walls of the chamber reinforced, as at 9, whereby it is adapted to support a valve chamber 10.

The air which is allowed to escape through the valve chamber or which is drawn therethrough by the vacuum which is maintained within the condensing chamber, strikes against the perforated baffle-plates 11, so that any moisture or steam, which may be present therein will be condensed and will gravitate to the central and lowered outlet opening 12 with which the bottom wall of the condensing chamber is provided. This outlet opening 12 is internally threaded, as at 13, providing for the reception of the water delivery pipe 14, by means of which the water of condensation is returned to the boiler, it being understood that a suitable check valve or analogous mechanism is employed in connection with the delivery pipe 14 preventing the occurrence of back pressures within the condensing chamber, and at the same time, allowing for the passage of the water of condensation therefrom.

The side wall of the condensing chamber, which is located opposite to that provided with the opening 8, is provided with a similar opening 15, the edges of which are reinforced, as at 16, and to which the exhaust chamber 17 is secured. Leading from the exhaust chamber is the pipe 18, the far extremity of which communicates with the chimney flue, providing for the occurrence of a vacuum within the exhaust chamber and which results in the removal of the air from the condensing chamber 6, and from the entire heating system to which the valve chamber 10 is connected, and in connection with which the present apparatus is used.

The valve chamber 10 is provided, at its one extremity, with the outwardly projecting flange 19 through which extend the securing bolts 20, the latter engaging suitable threaded openings formed in the reinforcing side walls 9 of the condensing chamber. Projecting inward and located at the flanged extremity of the valve chamber is the spider or perforated bracket 21, the center of which is provided with the threaded aperture 22, and by means of which a rod 23 is supported so as to extend axially of the valve chamber. The rod 23 receives the expansible member 24 thereon, the same being provided with the longitudinally extending opening 25, which nicely receives the supporting rod 23 therein. The expansible member is preferably formed of carbon or analogous material possessing the requisite thermal co-efficient of expansion and other properties rendering it especially adapted for the purposes in hand.

The carbon post is provided with the threaded front extremity 26, to which the valve head 27, preferably formed of metal, is threadedly secured. The adjacent extremity of the valve chamber is internally threaded, as at 28, and receives the valve seat member 29 therein, the latter being provided with the externally threaded extremity 30, which engages the valve chamber and effects a tight juncture therewith through the instrumentality of the upstanding flange 31. The forward or exposed extremity of the valve seat member 29 is provided with the wrench-engageable surface 32, allowing the valve seat member to be readily removed and replaced, and providing for the inspection and renewal of the valve seat proper 33. The valve seat proper is of the nature of a resilient gasket held in place by the countersunk screws 34, which engage suitable openings provided therefor in the valve seat member. The valve seat member is in the form of a reducing nipple, in that it is provided with the threaded opening 35, extending therethrough, and to which the air trunk line 36, leading from the various radiators is connected.

In order that the temperature at which the valve will close may be adjusted, the rod-like support 23 is provided with the sleeve 37 slidably mounted thereon, the forward extremity of which is provided with the face plate 38 having the beveled rim 39. The face plate, with its beveled rim, abuts against the rear extremity of the expansible post or member 24 and is adapted to advance it toward or allow it to retract from the valve seat 33. In order to effectually carry out this last-mentioned operation, the sleeve is provided with the rack teeth 40, and with which the rack gear or pinion 41 is in constant mesh. The gear 41 is carried by a shaft 42, the latter extending up through the externally threaded sleeve-like gland member 43. The gland member extends through a threaded opening 44 in the side wall of the valve chamber and is of such size as to allow it to be removed together with the shaft and pinion 41, rendering the various parts easily accessible. An indexed or graduated wheel 45 is carried at the upper and exposed extremity of the shaft 42, and by means of which the gear 41 may be manually rotated to thereby adjust the temperature at which the valve will close. The wheel 45 is held in adjusted position by the spring retainer 46, which engages the successive notches or serrations 47, provided upon the outer periphery of the wheel. In this connection, attention is called to the fact that should the expansible member 24 be exposed to abnormal pressures or temperatures, undue compressive strains will be prevented from arising therein, due to the fact that the spring retainer or pawl 46 will allow for the forced rotation of the wheel, and the rearward movement of the sleeve 37 and parts connected therewith. By thus eliminating any chance of undue compressive strain bearing upon the expansible member, its long life and efficient operation is assured.

An outlet opening 49 is provided at the upper extremity of the condensing chamber and to which a pet cock 50 is threadedly secured. By means of this pet cock, the accurate adjustment of the automatic valve mechanism contained within the valve chamber 10 may be easily accomplished. By opening the pet cock 50, the quantity of steam passing through the valve chamber can be observed, and with the pet cock so positioned, the wheel 45 can be turned and held into such position as will allow only a minute quantity of vapor to escape, or it may be so adjusted as to allow a considerable amount of steam to pass therethrough providing for the operation of the entire heating system under high temperatures, it being noted however, that with the pet cock 50 in its closed position, the steam or vapors which pass through the automatic and thermal-controlled valve mechanism, upon

striking the baffle-plates 11, the moisture will be condensed and returned to the heating system through the delivery pipe 14.

The exhaust chamber 17 is provided with the flange 51 at its one extremity and through which the holding bolts 52 pass, the latter engaging the reinforced sides 16 of the condensing chamber. Interposed between the flange 51 of the exhaust chamber and the adjacent sides of the condensing chamber is a disk 53, the same being provided with perforations, allowing the free passage of air therethrough. The flue connection 18, which communicates with the flue of a chimney, is exposed to the drafts which occur therein, and in order to provide for the more efficient formation of a vacuum within the condensing chamber, due to such drafts, an exhaust fan 54 is provided, the same being located within the exhaust chamber and supported by the fan carrying frame 55. The fan carrying frame includes the disk 53, aforementioned, and a second and perforated disk 56, which is held in spaced relation thereto by the posts 57; the said disks carry suitable stud screws 58 which engage suitable bearings upon the exhaust fan 54 and support the fan for free and practically frictionless rotation.

An opening 59 is provided in the upper wall of the exhaust chamber directly above the fan and is closed by the cap plate 60 providing for the introduction of a lubricant into the exhaust chamber and upon the bearings of the fan, a single oiling sufficing for a considerable length of time.

The drafts within the chimney naturally create a vacuum within the flue connection 18 and provide for the removal of such air as may be present within the condensing chamber, the action being materially facilitated by the rapid rotation of the fan 54, which, having once attained a high rotation, provides for the continuous removal of air from the condensing chamber, even though the drafts within the chimney be of a fluctuating or intermittent nature.

With the apparatus, as thus constructed, it may be used for various purposes, but is primarily intended to be connected with the air return from the radiators of a steam or vapor heating system, and, when so used, dispenses with separate automatic thermal-controlled valves at each radiator or heating coil. Furthermore, the use of the present apparatus allows a heating system to be operated at pressures ranging from a few ounces to many pounds. Adjusting the one valve, attained by rotating the wheel 45, thus suffices for each and all radiators, and provides for the removal or withdrawal of air from the entire heating system, and prevents the escapement of steam or vapors therefrom. Should it be so desired, a slight amount of steam or vapors may be allowed to constantly escape through the thermal-controlled and automatic valve mechanism, a nicety of adjustment being possible by opening the pet cock 50 and regulating the wheel 45 until the desired effect is obtained.

The apparatus, as thus constructed, may be used in connection with a number of different styles of heating systems, for example, it may be inserted within the trunk air line which leads from the various radiators, or it may be connected to the return main from the radiators without special piping therefor.

Having thus described my invention, what I claim is:—

1. A valve mechanism of the class described, comprising a casing, a perforated support at one extremity thereof, a rod carried by said perforated support and extending axially of said casing, an expansible post mounted upon said rod, a valve head and seat carried by the adjacent extremities of said casing and expansible post, a sleeve slidably mounted upon said rod abutting against the extremity of said expansible post and adapted to advance the same along said rod support.

2. An automatic air outlet valve comprising a casing, an expansible member slidably mounted therein, a valve head and seat carried by the adjacent and front extremities of said casing and said expansible member, a rack member abutting against the rear extremity of said expansible post, a gear meshing with said rack member, and means extending through said casing engaging said gear providing for the manual rotation thereof and controlling the adjustment of said valve.

3. An automatic air outlet valve comprising a casing, an expansible member slidably mounted therein, a valve head and seat carried by the adjacent and front extremities of said casing and said expansible member, a rack member abutting against the rear extremity of said expansible post, a gear meshing with said rack member, and means extending through said casing engaging said gear providing for the manual rotation thereof and controlling the adjustment of said valve, and resilient means adapted to hold the aforementioned-gear-rotating-means in adjusted positions.

4. An automatic thermal-controlled air outlet valve comprising a casing, a spider carried thereby, a rod support extending axially of said casing and carried by said spider, an expansible post provided with an axial opening extending in one end thereof, slidably mounted upon and supported by said rod, a sleeve slidably mounted upon said rod and provided with rack bar teeth, a gear meshing with said rack bar teeth and adapted to move said sleeve longitudinally

of said rod, a wheel connected to said gear, positioned external of said casing, and a valve head and seat carried by said casing and expansible member.

5. An automatic thermal-controlled air outlet valve comprising a casing, a spider carried thereby, a rod support extending axially of said casing and carried by said spider, an expansible post provided with an axial opening extending in one end thereof, slidably mounted upon and supported by said rod, a sleeve slidably mounted upon said rod and provided with rack bar teeth, a gear meshing with said rack bar teeth and adapted to move said sleeve longitudinally of said rod, a wheel connected to said gear, positioned external of said casing, and a valve head and seat carried by said casing and expansible member, said externally exposed wheel provided with notches, and a spring retainer engaging said notches and resiliently holding said sleeve in adjusted positions.

6. An automatic thermal-controlled valve comprising in part, a rod, an expansible member provided with an opening extending therein, slidably mounted on said rod, a sleeve slidably mounted on said rod to the rear of said expansible member, said sleeve provided with a face plate with a beveled rim adapted to abut against the beveled rear extremity of said expansible member, and means adapted to move it longitudinally of said rod.

7. An automatic thermal-controlled air outlet valve comprising a casing, a perforated support extending transversely thereof, a rod extending axially of said casing and carried by said perforated support, a wrench engageable valve member carried at one extremity of said valve casing, an expansible member slidably mounted upon said rod, a valve head carried at one extremity of said expansible member and co-acting with the aforementioned valve member to allow air and prevent steam from passing through said casing, a flanged sleeve mounted upon said rod to the rear of and abutting against said expansible member, a gland extending through the side wall of said valve casing, a shaft extending through said gland, a gear wheel mounted upon the inner extremity of said shaft co-acting with said sleeve adapted to move it longitudinally of said rod, and a thumb-engageable wheel carried at the exposed extremity of said shaft.

8. A device of the class described, comprising a condensing chamber, a valve casing removably secured thereto, and communicating therewith, a perforated support at the supported extremity of said casing, a rod carried by said perforated support and extending axially of said casing, an expansible post mounted upon said rod, a valve head and seat carried by the adjacent extremities of said casing, an expansible post, a sleeve slidably mounted upon said rod and abutting against the extremity of said expansible post and adapted to advance the same along said rod support, a rack member associated with said sleeve, a gear meshing with said rack and resilient means carried by said condensing chamber adapted to hold said gear against turning.

Signed at Westwood in the county of Bergen and State of New Jersey.

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Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."