J. B. MORGAN & C. R. WEBSTER.

RADIATOR VALVE.

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940,182.

Patented Nov. 16, 1909.

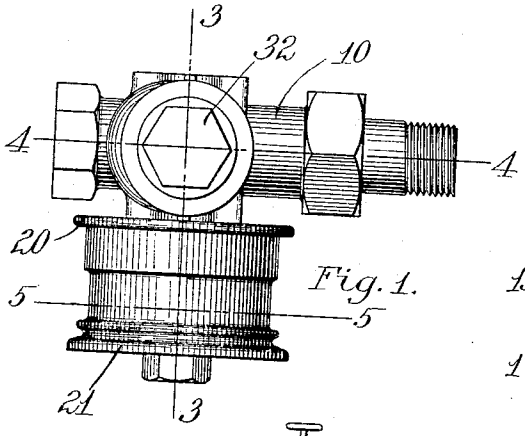

Fig. 1.

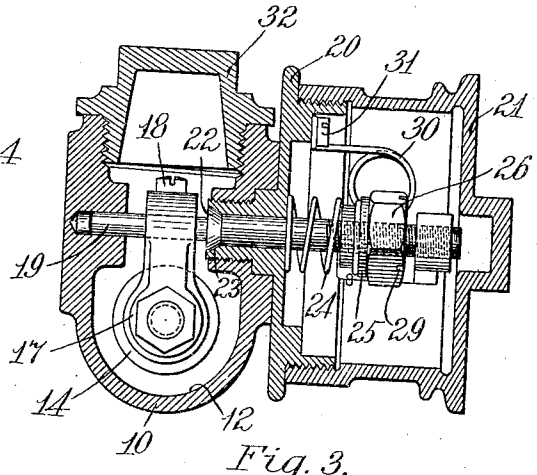

Fig. 3.

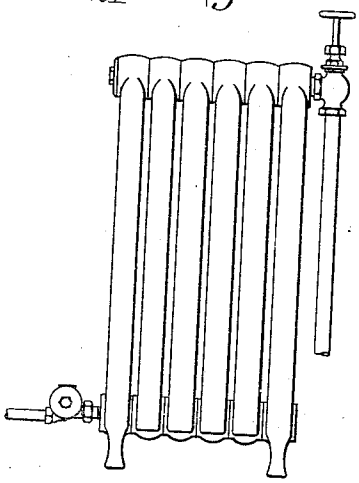

Fig. 2.

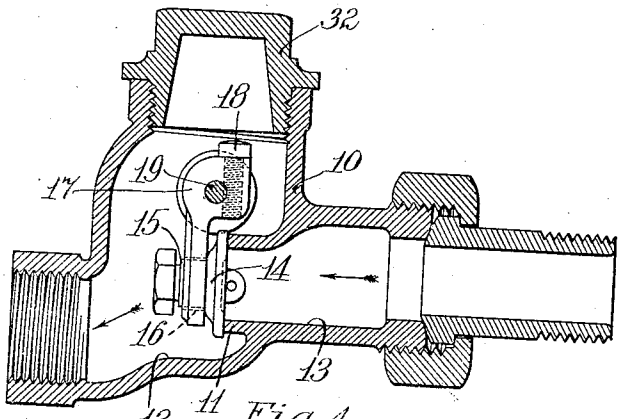

Fig. 4.

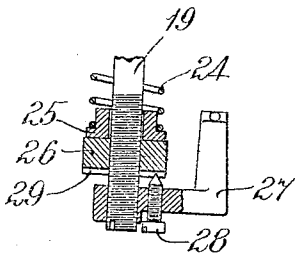

Fig. 6.

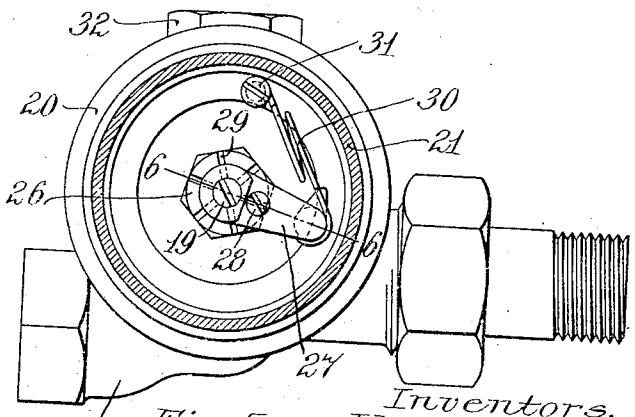

Fig. 5.

Witnesses.
Franklin E. Low.
Sydney E. Taft.

Inventors.
John B. Morgan.
Charles R. Webster.
by their Attorney Charles J. Goodwin

UNITED STATES PATENT OFFICE.

JOHN B. MORGAN AND CHARLES R. WEBSTER, OF ROCHESTER, NEW YORK.

RADIATOR-VALVE.

940,182. Specification of Letters Patent. Patented Nov. 16, 1909.

Application filed March 25, 1909. Serial No. 485,572.

To all whom it may concern:

Be it known that we, JOHN B. MORGAN and CHARLES R. WEBSTER, citizens of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented new and useful Improvements in Radiator-Valves, of which the following is a specification.

This invention relates to improvements in radiator check valves of that class employed in connection with systems using exhaust steam and in which a vacuum pump is employed to draw the air and water of condensation outwardly from the radiator through a check valve controlled by a spring or weight arranged to oppose or balance the vacuum which tends to open the valve, the arrangement being such that when the water reaches a certain height its pressure will be sufficient to open the valve against the action of the spring or weight so that the water is allowed to pass outwardly through the valve into the vacuum pipe at intervals.

The object of our invention is to provide a valve of the class described which shall be simple in construction, sensitive in operation and which may be conveniently adjusted to suit varying conditions.

The object is further to provide a valve of this class in which the valve seat shall be so constructed and arranged as to present no obstruction to the flow of the water from the inlet passage through the valve seat to the outlet passage so that clogging of the valve by sediment and scale is prevented.

The object is further to provide a valve of this class in which the valve proper shall be loosely mounted so as to find its seat and bear firmly thereagainst throughout so that leakage is prevented.

The object is still further to provide simple and convenient means for adjusting the spring which closes the valve and independently adjusting the spring which seats an annular flange surrounding the stem or shaft of the valve.

The invention consists in the novel features of construction and in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the appended claims.

Referring to the drawing: Figure 1 is a plan of a radiator valve embodying our invention. Fig. 2 is an elevation of a radiator showing our improved valve mounted thereon. Fig. 3 is an enlarged sectional view taken on line 3—3 of Fig. 1, looking toward the right. Fig. 4 is an enlarged sectional view taken on line 4—4 of Fig. 1. Fig. 5 is an enlarged sectional view taken on line 5—5 of Fig. 1. Fig. 6 is a detail sectional view taken on line 6—6 of Fig. 5.

Like numerals refer to like parts throughout the several views of the drawing.

In the drawing, 10 is the main casing of the radiator valve, the same having therein a valve seat 11 and being provided with an outlet passage 12 and with an inlet passage 13, said inlet passage being so formed and arranged as to offer no obstruction to the flow of fluid from said inlet passage through said valve seat into said outlet passage, this being accomplished by having the valve seat located wholly within the outlet passage. The outlet passage 12 preferably slopes downwardly from the valve seat toward the outlet orifice. It will be evident that by thus constructing the valve casing any sediment or scales passing therethrough will not lodge therein since there is no obstruction to the free flow of the water either at the valve seat or in the outlet passage beyond said valve seat. A disk valve 14 is provided with a shank 15 loosely mounted in a hole 16 formed in an arm 17, whereby said valve is adapted to find its seat by moving relatively to said arm and is adapted to be firmly pressed against its seat throughout.

The arm 17 is secured by means of a screw 18 to a rock shaft 19 journaled in suitable bearings formed in the main casing 10 and in a secondary casing 20 provided with a cap or cover 21 having screw-threaded engagement therewith, the casing 20 for convenience of manufacture being formed separate from the casing 10 and having screw-threaded engagement therewith. The rock shaft 19 is provided with an annular flange 22 which in this instance is frusto-conical in form, said flange bearing against a corresponding conical seat 23 formed in the casing, the arrangement being such that internal pressure tends to hold said flange against said seat to prevent leakage outwardly around the rock shaft 19 into the interior of the secondary casing 20. As a further provision for maintaining the flange 22 against its seat there is provided a helical compression spring 24 bearing at one end against the interior of the casing 20 and at

its other end against a flanged collar 25 surrounding the rock-shaft 19, said collar abutting against a nut 26 having screw-threaded engagement with said rock shaft, whereby the tension of said spring may be adjusted to cause said flange to bear with greater or less pressure against its seat.

An arm 27 having screw-threaded engagement with the rock shaft 19 is held in fixed position thereon by means of a pointed screw 28 having screw-threaded engagement therewith, the pointed end of which screw is located in one of a series of radial grooves 29 formed in the nut 26, said screw when rotated in the proper direction tending to force the arm 27 and nut 26 away from each other and thereby acting to cause the screw-threads of each of said parts to bear with sufficient friction upon the screw-threads of the rock shaft 19 to hold both said arm and said nut against rotation on said rock shaft. It will be evident that the nut 26 may be moved longitudinally upon the rock shaft 19 by rotating the same thereon and the arm 27 may be placed in any desired angular relation with the arm 17 after which the set screw 28 is screwed against said nut to lock both said nut and said arm in their adjusted positions.

A coil spring 30 fast at one end to the arm 27 is secured at its other end to the casing 20 by means of a screw 31, said spring acting through said arm and through the rock shaft 19 and arm 17 to normally hold the valve 14 against its seat, it being obvious that by varying the angular position of the arm 27 the tension of said spring may be varied to cause said valve to bear with greater or less pressure against its seat. The casing 10 is provided with a removable cap 32 having screw-threaded engagement therewith, the removal of which allows access to the screws 18 and arm 17 in assembling the valve parts. The valve as a whole is in practice connected to an outlet orifice of a radiator or pipe coil, as shown in Fig. 2, the outlet passage of said valve being connected to a vacuum pump, not shown, exhaust steam being supplied to the radiator or coil by an engine, not shown.

In operation the strength of the spring 30 is very delicately adjusted to balance the vacuum tending to move the valve 14 away from its seat, it being possible to vary the pressure of said spring by the pressure which said spring exerts from an ounce or two to several pounds according to the conditions under which the valve is to operate. The spring 24, it will be noted, is used solely to maintain the flange 22 against its seat 23 and this spring may be adjusted entirely independently of the spring 30, it being desirable that said flange shall bear against its seat with only what pressure is necessary to prevent leakage around the rock shaft 19. By this construction the valve is rendered very sensitive in operation and regular in its action. As exhaust steam enters the radiator, the same gradually condenses and when a sufficient amount of water has accumulated therein to overcome the tension of the spring 30 the valve 14 opens and allows said water to escape, said valve then closing tightly to prevent any of the steam within the radiator from passing through the valve into the vacuum pipe, it being understood that a sufficient height of water may be maintained within the inlet passage 13 of the valve to constitute a water seal.

Having thus described our invention, what we claim and desire by Letters Patent to secure is:

1. A radiator valve having, in combination, a casing having therein a valve seat and provided with an inlet passage and an outlet passage located on opposite sides, respectively, of said valve seat, a check valve adapted to contact with said seat, an arm adapted to carry said valve, a rock shaft to which said arm is fast, said casing being provided with an annular seat and said rock shaft being provided with an annular flange contacting with said annular seat, a spring acting to hold said annular flange against said annular seat, a spring adapted to hold said valve against said valve seat, means whereby the tension of said springs may be adjusted independently of each other, and a secondary casing within which both of said springs and said adjusting means are located.

2. A radiator valve having, in combination, a casing having therein a valve seat and provided with an inlet passage and an outlet passage located on opposite sides, respectively, of said valve seat, a check valve adapted to contact with said seat, an arm adapted to carry said valve toward and away from said seat, a rock shaft to which said arm is fast, an arm having screw-threaded engagement with said shaft, a nut having screw-threaded engagement with said shaft, a screw having screw-threaded engagement with said second arm and bearing against said nut, and a spring connected to said second arm and adapted to hold said valve in contact with said seat.

3. A radiator valve having, in combination, a casing having therein a valve seat and provided with an inlet passage and an outlet passage located on opposite sides, respectively, of said valve seat, a check valve adapted to contact with said seat, an arm adapted to carry said valve toward and away from said seat, a rock shaft to which said arm is fast, said casing being provided with an annular seat and said rock shaft being provided with an annular flange contacting with said annular seat, a spring adapted to hold said flange in contact with said annular seat, a nut having screw-

threaded engagement with said shaft and adapted to be rotated thereon to adjust the tension of said spring, an arm having screw-threaded engagement with said shaft, a screw having screw-threaded engagement with said second arm and bearing against said nut, and a spring connected to said second arm and adapted to hold said valve in contact with said seat.

4. A radiator valve having, in combination, a main casing having therein a valve seat and provided with an inlet passage and an outlet passage located on opposite sides, respectively, of said valve seat, a check valve adapted to contact with said seat, an arm on which said valve is supported, a rock shaft to which said arm is fast, a secondary casing into which said rock shaft extends, a second arm located in said secondary casing and fast to said rock shaft, and a spring connected to said second arm and arranged to normally hold said valve against said seat, said spring being located in said secondary casing.

5. A radiator valve having, in combination, a main casing having therein a valve seat and provided with an inlet passage and an outlet passage located on opposite sides, respectively, of said valve seat, a check valve adapted to contact with said seat, an arm on which said valve is supported, a rock shaft to which said arm is fast, said rock shaft being arranged with its axis in a plane parallel to the plane of said valve seat, a secondary casing into which said rock shaft extends, and a spring located in said secondary casing connected to said rock shaft and arranged to normally hold said valve against said seat.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOHN B. MORGAN.
CHARLES R. WEBSTER.

Witnesses:
F. M. BREWSTER,
A. FRANK WARREN.