Feb. 5, 1952 E. S. PATERNOSTER 2,584,914

RADIATOR DESIGNED TO PERMIT REGULATION OF ACTIVE HEAT RADIATION SURFACE THEREOF

Filed Dec. 21, 1949 2 SHEETS—SHEET 1

FIG. 1.

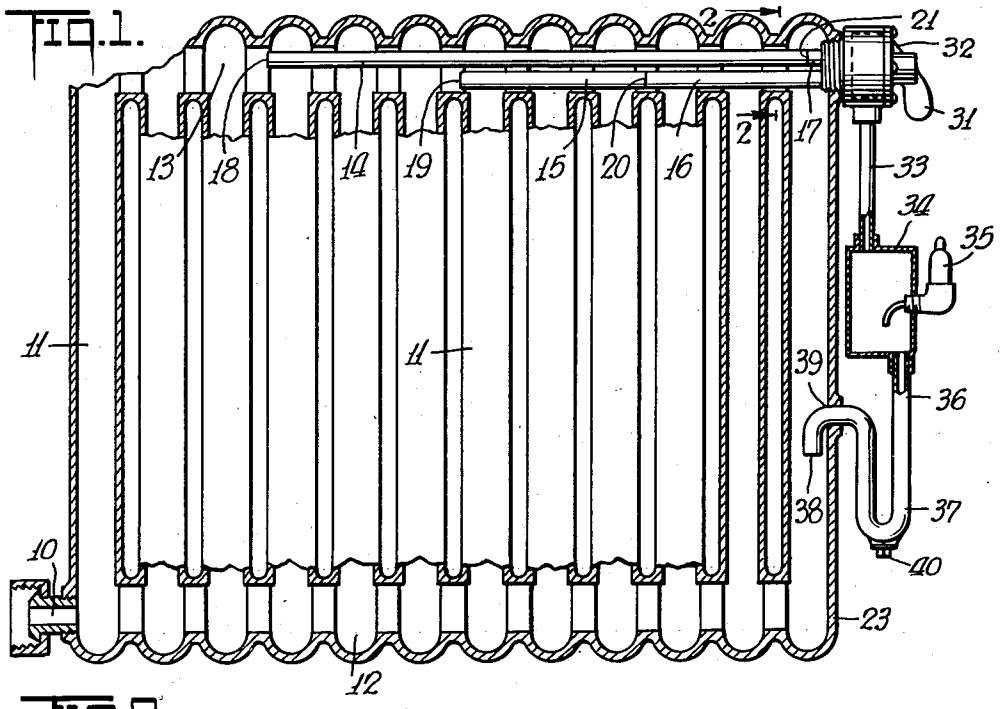


FIG. 2.

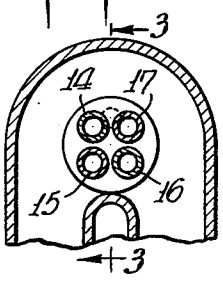
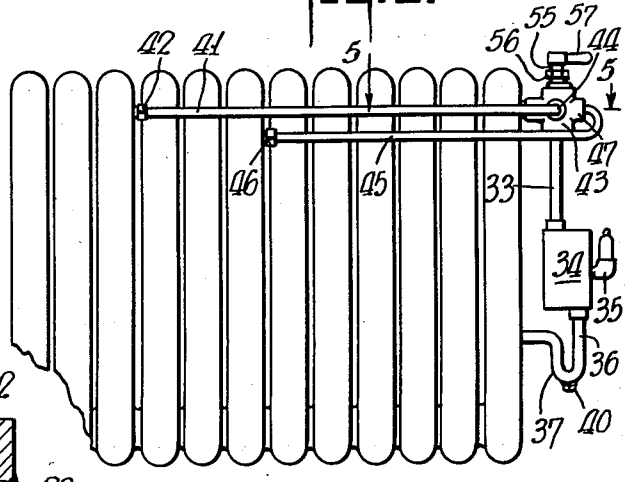


FIG. 4.



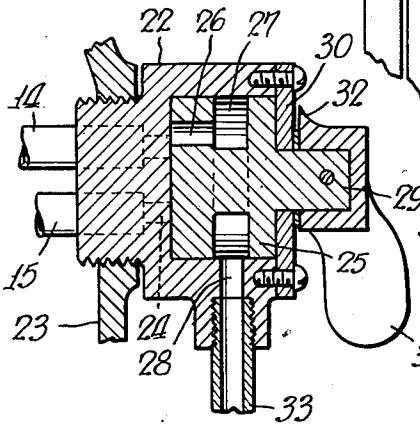


FIG. 3.

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Filed Dec. 21, 1949 2 SHEETS--SHEET 2

FIG. 5.

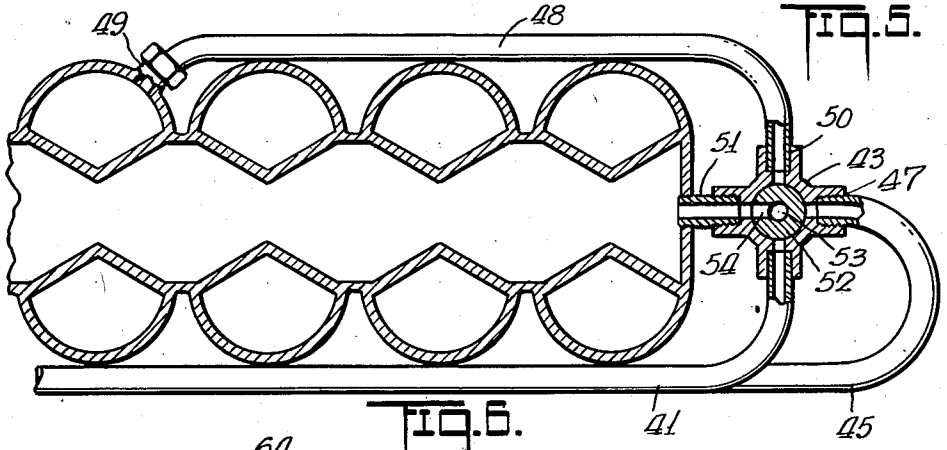


FIG. 6.

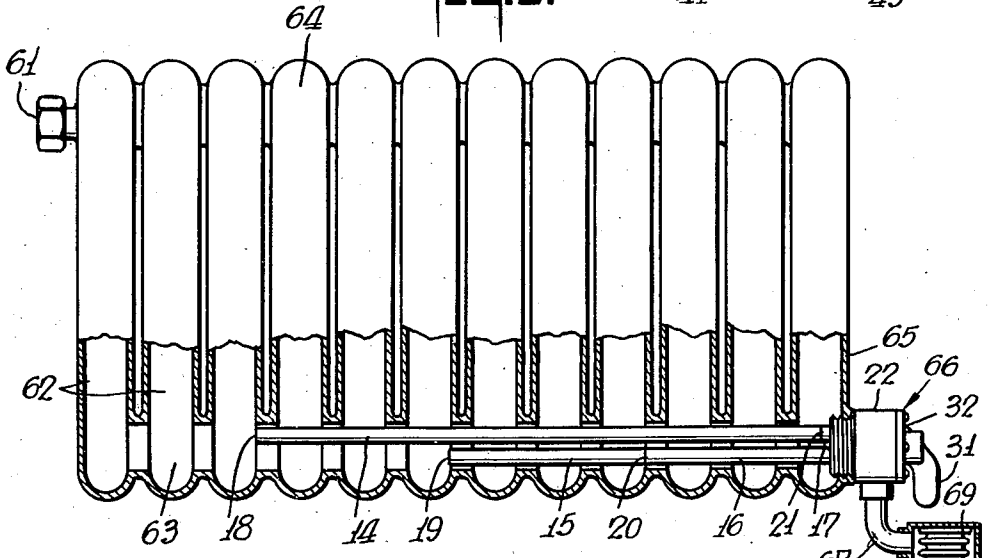
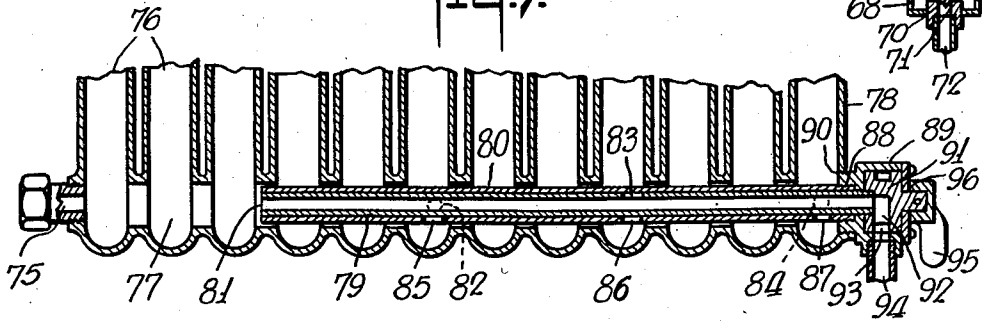


FIG. 7.



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RADIATOR DESIGNED TO PERMIT REGULATION OF ACTIVE HEAT RADIATION SURFACE THEREOF

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Application December 21, 1949, Serial No. 134,317

6 Claims. (Cl. 237—70)

1

This invention relates to heat radiators, such as the well known steam and hot water radiators, and more particularly to such radiators designed to permit regulation of the amount of active heat radiation surface thereof. Thus with the radiators of my invention, only a predetermined selected portion of each radiator in each room may be radiating heat, depending upon temperature conditions in the room in which the radiator is disposed, with consequent saving in fuel and the maintenance of more comfortable temperature conditions.

It is an object of this invention to provide a novel radiator design permitting ready control of the amount of active heat radiation surface, which design is applicable to existing types of radiators including steam radiators of the so-called "hot water" pattern in which the vertical passes of the radiator are interconnected both at their tops and bases, steam radiators of the so-called "steam" pattern in which the vertical passes of the radiator are interconnected at their bases only; steam radiators employed in a single or double line system, hot water radiators and radiators employed in a two pipe vapor or vacuum system.

It is another object of this invention to provide such radiators which are simple and inexpensive to manufacture and efficient in operation in that the control of the amount of active radiation surface can readily be effected by simply turning a valve handle.

It is still another object of this invention to provide such radiators in which the air therein may be vented without carrying excessive amounts of moisture into the atmosphere.

Other objects and advantages of this invention will be apparent from the following detailed description thereof.

In accordance with this invention as applied to a steam radiator, the radiator is equipped with a series of vent outlets through which air in the radiator may escape to the atmosphere, the vent outlets being spaced at predetermined points relative to the steam inlet to the radiator and constructed and arranged so that the amount of active heat radiation surface is dependent on the particular vent inlet rendered effective. As applied to radiators employed in a two pipe vapor or vacuum system, or in a hot water system, the radiators are constructed and arranged so that the point at which the flow of heating fluid from the radiator takes place may readily be changed, depending upon atmospheric conditions, etc., and thus the relative amount of active heat radiation surface of the radiator may be readily controlled.

In the accompanying drawings forming a part of this specification and showing, for purposes of exemplification, preferred forms of this invention without limiting the claimed invention to such illustrative instances:

2

Figure 1 is a vertical section through a steam radiator of the "hot water" pattern type and in a one pipe heating system, which radiator embodies my invention;

Figure 2 is a fragmentary vertical section taken in a plane passing through line 2—2 of Figure 1;

Figure 3 is a vertical section taken in a plane passing through line 3—3 of Figure 2;

Figure 4 is a front elevational view of a radiator of the "steam" pattern type and in a one pipe heating system, which radiator embodies my invention;

Figure 5 is a horizontal fragmentary section through the right hand end of the radiator of Figure 4;

Figure 6 is a front elevation, the lower portion being shown in section, of a radiator embodying my invention, which radiator is of the type used in a two pipe vapor or vacuum system; and

Figure 7 is a vertical section of still another form of radiator embodying my invention, which radiator is of the type used in a hot water system.

In the drawings, referring to Figure 1, 10 indicates a steam inlet to a steam radiator of the so-called "hot water" pattern comprising a plurality of vertical chambers or passes 11 interconnected at their bases by a horizontally extending channel 12 and at their tops by a horizontally extending channel 13. The radiator, as customary, may be cast or otherwise formed in one piece of suitable heat conducting material, preferably metal. While Figure 1 of the drawing shows a radiator provided with twelve vertical heat radiating passes, it will be understood the radiator may be formed with any desired number of such passes or chambers.

Disposed in the top horizontally extending channel 13 are four vent pipes 14, 15, 16 and 17, communicating with different selected portions of the interior of the radiator. Thus in the embodiment of the invention shown in Figure 1, vent pipe 14 has at one end thereof a vent outlet 18 communicating with the interior of the radiator at a point between the third and fourth vertical passes 11 considering the extreme left-hand pass shown in this figure as pass No. 1. Hence, in the construction shown in Figure 1 approximately the first 25% of the volumetric capacity of the radiator relative to the point where the steam or other heating fluid is introduced, is vented through vent outlet 18. Vent pipes 15, 16 and 17 have at one end thereof vent outlets 19, 20 and 21 communicating with the interior of the radiator at a point between the sixth and seventh, ninth and tenth and at the twelfth vertical pass, respectively. In this way the vent outlets 18, 19, 20 and 21 vent, respectively, the first quarter, half, three-quarters and the entire radiator relative to the point of heating fluid introduction into the radiator. It will be understood that the points of location and

number of vent pipes shown in Figure 1 represent only one embodiment of the invention, that the vent outlets may be otherwise located and a larger or smaller number of vent pipes may be used, if desired.

As shown in Figures 2 and 3 the other end of the vent pipes are suitably threaded into openings in the valve casing **22** which may be threaded or otherwise fitted into an opening in the end wall **23** of the radiator so as to provide a gas tight joint between valve casing **22** and end wall **23**. Valve casing **22** is provided with four openings **24**, each in longitudinal alignment with one of the discharge outlets of the vent pipes **14, 15, 16** and **17**. Rotatably mounted within the valve casing **22** is a cylindrical plug **25** (Figure 3) having a bore **26** therein communicating with an annular channel **27**. This channel **27** communicates at all times with the vertically extending passageway **28** in the valve casing **22**.

Plug **25** is provided with a protruding portion **29** extending through cover **30** of the valve casing. Keyed to portion **29** is a handle **31** for rotating the plug **25**. Desirably, handle **31** is provided with a pointer **32** for indicating which of the vent pipes **14, 15, 16** and **17** is in communication with bore **26** and through annular channel **27** with passageway **28**. For example, cover **30** may be provided with indicia, say ¼, ½, ¾ and 1 spaced 90° apart and positioned to indicate the position of valve plug **25** when vent pipes **14, 15, 16** and **17**, respectively, are disposed to communicate with bore **26**.

A pipe **33** connects channel **28** of valve casing **22** with a separating chamber **34**. This separating chamber has in a side wall thereof a thermostatic air valve **35** of any well known type which permits air to pass therethrough but prevents the flow of steam therethrough. Leading from the base of separating chamber **34** is a pipe **36** provided with a liquid seal portion **37** and having the terminal end thereof **38** extending through end wall **23** of the radiator, as at **39**. Liquid seal portion **37** is provided with a drain plug **40** for draining this seal whenever desired. The liquid seal **37** seals the radiator in the locality where liquid is returned to the radiator from the separating chamber and thus prevents venting of the radiator in this locality, i. e., in the construction shown in Figure 1 it prevents venting of entrapped air from the radiator through pipe **36**, communicating separating chamber **34** and thermostatic air valve **35**.

In operation, assuming it is desired to have only 25% of the radiator active, handle **31** is turned so that vent pipe **14** communicates through bore **26**, annular channel **27**, passage **28** and pipe **33** with the separating chamber **34**. The air in the first four vertical chambers **11**, which, as customary, are in the form of vertically elongated annular chambers, flows through vent pipe **14**, opening **24** aligned therewith, bore **26**, annular channel **27**, passage **28**, pipe **33** into separating chamber **34**, escaping through thermostatic air valve **35**. Steam flowing with the air, condenses and collects in separating chamber **34**. The condensate flows therefrom through pipe **36** forming liquid seal **37**; as the condensate accumulates it flows from the liquid seal through discharge end **38** of pipe **36** into the radiator.

The liquid seal **37**, as above noted, prevents escape of air through pipe **36** into the separating chamber **34** and thus prevents by-passing of the vent outlets **18, 19** and **20**. With the valve plug **25** positioned so that vent outlets **19, 20** and **21**

are closed, escape of air from the radiator can only take place through vent outlet **18**. The trapped air in the portion of the radiator beyond vent outlet **18** prevents effective heating of the radiator beyond outlet **18**; thus, only approximately 25% of the active heating surface of the radiator is rendered effective. In a similar manner if vent outlet **19** is placed in communication with the separating chamber **34** only about 50% of the radiator is rendered effective. When vent outlet **20** is in communication with the separating chamber, about 25% of the radiator is effective and when vent outlet **21** is in communication with the separating chamber the entire surface area of the radiator is effective.

It will be appreciated that there will be some heating of the radiator beyond the vent outlet which is in communication with the separating chamber **34** and that by positioning the vent outlets **18, 19, 20** and **21** as shown, the division of the active heat radiation surface approximates the values above noted, due to the fact that with the passage of time, steam will creep into vertical passes of the radiator beyond the vent outlet in communication with the separating chamber and will cause the air in such vertical passes to gradually escape through the open vent outlet. For all practical purposes, however, disposition of the vent outlets as shown in the drawings will give a reasonably satisfactory division of the active heat radiation surface. By providing more vent outlets properly positioned more accurate control of the extent of active heat radiation surface can be effected.

In the modification of Figures 4 and 5, in which like parts are identified by the same reference characters, the vertical passes of the radiator are not interconnected at their tops but only at their bases. Accordingly, in this construction the vent pipes are installed externally of the radiator and not internally, as shown in Figure 1.

In Figures 4 and 5 vent pipe **41** has one end passing through a suitable gas tight packing gland **42** positioned at the top of the third vertical pass of the radiator and the other end leading into a valve casing **43**, as at **44**. Vent pipe **45** has one end passing through a gas tight packing gland **46** at the top of the sixth vertical pass of the radiator and the other end leading into a valve casing **43** at **47**. Vent pipe **48** (Fig. 6) similarly has one end passing through a packing gland **49** in the ninth vertical pass and the other end leading into valve casing **43** at **50**. A pipe **51** provides a gas tight connection between the last vertical pass **14** and valve casing **43**.

Rotatably mounted within valve casing **43** is a cylindrical valve plug **52** provided with an axial passage **53** communicating with a radially extending passage **54** leading from the axial passage **53** to the periphery of the cylindrical plug. Depending upon the position of the plug **52**, one of the vent pipes **41, 45, 48** and **51** communicates through the passages **54, 53** in the valve plug **52** with the pipe **33** (Figure 4) leading into separating chamber **34**. Rotation of the valve plug **52** is effected through a stem **55** passing through a packing gland **56** and carrying a handle **57**.

The operation of the radiator of Figures 4 and 5 is substantially the same as that of Figures 1 to 3, inclusive, and will be understood from the above detailed description of the radiator of Figures 1 to 3.

Figure 6 shows a radiator of the type used in a two pipe vapor or vacuum system. In this figure 61 indicates the heating medium inlet of the radiator comprising a plurality of vertical passages 62 interconnected at their bases by a horizontally extending passage 63 and at their tops by a horizontal passage 64. Disposed in end wall 65 of the radiator opposite the end containing the outlet 61 and at the base thereof is a valve 66. A plurality of vent pipes is disposed in the horizontal passage 63, and communicates with the valve 66.

Since the construction of valve 66 and the communicating vent pipes are substantially the same as that of the vent pipes 14, 15, 16 and 17 leading into the valve casing 22 of Figures 1 to 3 corresponding parts have been identified by the same reference characters.

Leading from the base of valve casing 22 is a discharge pipe 67 which communicates with a thermostatic valve housing 68 having therein a bellows 69 for actuating a conical valve member 70 adapted to be seated on a seat 71. A return line 72 leads from the valve housing 68.

In the operation of the radiator of Figure 6, steam or other heating fluid is admitted to the radiator through inlet 61. Assuming it is desired to utilize only 25% of the active heat radiating surface of the radiator, valve handle 31 is actuated to place vent outlet 18 into communication with valve housing 68 through vent pipe 14, bore 26, annular channel 27 (Figure 3) and discharge pipe 67 (Figure 6). The other vent pipes 15, 16 and 17 are closed by valve 66. Entrapped air in, and condensed steam formed by flow of steam through, the first three vertical passes escape through vent pipe 14, discharge pipe 67, valve housing 68, the open valve 70, 71 and discharge pipe 72. Valve 70 and 71 remains open as long as no heating fluid contacts the bellows 69 to effect closure of this valve. Once the first three passages 62 are filled with the heating fluid, e. g., steam, the heating fluid flows through vent pipe 14, valve 66 and discharge pipe 67 and actuates bellows 69 to close thermostatic valve 70, 71. When valve 70 and 71 is closed, the air in the remainder of the radiator cannot escape and prevents effective heating of the radiator beyond the third passage 62. Thus, only the first 25% of the heating surface of the radiator is utilized when vent pipe 14 through valve 66 is placed in communication with the valve housing 68. If it is desired to utilize 50% of the radiator, valve handle 31 is moved to place vent pipe 15 in communication through valve 66 with discharge pipe 67 and thermostatic valve 70, 71. Similarly by placing vent pipes 16 and 17, respectively, in communication with thermostatic valve 70, 71, 75% or the entire heating capacity of the radiator may be utilized.

The radiator of Figure 7 is of the type employed in a hot water system and in general may be similar to the radiators of Figures 1 and 6. It comprises a base hot water inlet 75, a plurality of vertical passes 76 for flow of hot water therethrough, which passes are interconnected at their bases by a horizontal passage 77 and at their tops also by a horizontal passage (not shown). Disposed in the horizontal passage 77 extending through the end wall 78 is a pair of concentric pipes 79, 80, inner pipe 79 being mounted for rotation within pipe 80. Pipe 79 is open at its end 81 and is provided at spaced points with openings 82, 83 and 84. Pipe 80 is also open at its end and provided with openings 85, 86 and 87. Openings 82, 83 and 84 are so arranged relative to openings 85, 86 and 87 in the outer pipe 80 that in one position of this outer pipe none of these openings register and flow can take place only through the open end 81, in another position only openings 82 and 85 register so that flow can take place through these two openings; in still another position openings 83 and 86 register permitting flow through these registered openings into and through inner pipe 79 and in still another position openings 84 and 87 register.

Outer pipe 80 is threaded as at 88 into a valve casing 89 which is in turn threaded into the base of the radiator, as at 90. Rotatably mounted within this valve casing is a cylindrical plug 91. Inner pipe 79 is threaded into the face of this plug for movement therewith. The plug is provided with a central passage 92 communicating with pipe 79 for flow from the pipe 79 into the passage. The latter communicates with an annular passage 93 in the plug which in turn communicates with the return line 94. Rotation of the plug 91 is effected by a handle 95 keyed to a projection which extends from the valve plug 91 through the cover 96 for the valve casing 89.

In the operation of the radiator of Figure 7 hot water is admitted through 75 and rises through the vertical passes, the colder water settling to the bottom. Assuming it is desired to utilize only 25% of the effective heating capacity of the radiator, handle 95 is operated to position the inner and outer pipes 79 and 80 as shown in Figure 7. In this position water is discharged from the radiator through 81, inner pipe 79, passages 92, 93 and return line 94. Only the first three passes of the radiator are thus heated resulting in the utilization of only 25% of the capacity of the radiator in the embodiment shown in Figure 7.

If it is desired to utilize 50% of the capacity of the radiator valve handle 95 is actuated to place openings 82 and 85 in registry. Discharge of water thus takes place through the registered openings 82, 85, the flow being otherwise the same as noted above. This results in flow of hot water through the first six passes with consequent utilization of 50% of the heating surface of the radiator. If it is desired to use 75% of the heating surface handle 95 is actuated to place openings 83 and 86 in registry. For 100% of the heating surface openings 84 and 87 are placed in registry.

It will be noted this invention provides a radiator design, applicable to existing radiators such as the well known steam radiators of the "hot water" and "steam" patterns for use in one or two pipe systems, in which the amount of active heating surface rendered effective can readily be controlled. Accordingly, with this invention, notwithstanding the use of standard size radiators throughout the room of a home, each radiator may readily be adjusted to give the desired amount of heat thus taking into account different temperature conditions in various rooms of the home. Thus, for example, the same size rooms on the sunny side of a home require less heat than those on the non-sunny side. With this invention, by simply turning a valve handle necessary adjustments can be made so that each radiator supplies the desired amount of heat.

This invention therefore results in a substantial saving in fuel and maintenance of desired temperature conditions in each room. It will be further noted that in the embodiments of the invention involving venting of the air to the atmosphere, the separating chamber functions to

collect any moisture or other liquid carried by the air or escaping from the radiator and functions to return such moisture to the radiator. Hence, such moisture or liquid does not escape into the atmosphere. In radiators now used from which air is vented it is not uncommon for steam or moisture to escape into the atmosphere and damage floors, floor coverings and furniture in the room in which the radiator is located. Such damage can not take place when employing the radiator embodying my invention.

Since different embodiments of the invention could be made without departing from the scope of this invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. Thus, for example, the type of control valve shown in Figure 7 may be used in lieu of that shown in Figure 1 or Figure 4 and vice versa. Also the the control valve may be operated automatically instead of manually responsive to a desired condition, e. g., temperature or pressure. Moreover, the chambers or passes of the radiator may be of other shapes than the vertically elongated chambers of annular form shown in the drawings, e. g., they may be cylindrical or polygonal in shape, if desired.

What is claimed is:

1. A steam radiator comprising a plurality of interconnected passes, the first of said passes being provided with a steam inlet, a plurality of air vent pipes constructed and arranged so that progressively increasing volumes of said radiator may be vented to the atmosphere, depending upon which of said vent pipes is placed in communication with the atmosphere, and a single multi-way valve for placing one of said vent pipes in communication with the atmosphere and preventing communication between the other of said vent pipes and the atmosphere.

2. A steam radiator comprising, a plurality of interconnected vertically elongated annular passes, the first of said passes being provided with a steam inlet, a plurality of air vent pipes, each communicating with a different pass of said radiator, a valve casing into which said vent pipes lead, a valve member in said valve casing for permitting flow through one of said vent pipes into said casing and preventing flow from others of said vent pipes into said casing, a separating chamber communicating with said valve casing, a line provided with a liquid seal leading from said separating chamber to said radiator, and a thermostatic air valve on said separating chamber for flow therethrough of air vented from said radiator into the separating chamber .

3. A steam radiator comprising a plurality of interconnected vertically elongated annular passes disposed in side by side relation and connected at their tops and bases by horizontally extending chambers, one end pass being provided with a steam inlet, a plurality of air vent pipes in the top horizontally extending chamber, each vent pipe communicating with a different pass of said radiator, a valve casing extending through the opposite end pass at the top thereof, said vent pipes leading into said valve casing, a valve member in said valve casing for permitting flow through one of said vent pipes into said casing and preventing flow from others of said vent pipes into said casing, a separating chamber communicating with said valve casing, a line provided with a liquid seal leading from said separating chamber to said opposite end, and a thermostatic air valve on said separating chamber for flow therethrough of air vented from said radiator into the separating chamber.

4. A steam radiator comprising a plurality of interconnected vertically elongated annular passes disposed in side by side relation and interconnected at their bases by a horizontally extending chamber, one end pass being provided with a steam inlet, a plurality of air vent pipes, each communicating with a different vertical pass of said radiator and arranged so that progressively increasing volumes of said radiator may be vented to the atmosphere depending upon which vent pipe is placed in communication with the atmosphere, a valve casing extending through the opposite end pass at the top thereof, said vent pipes leading into said valve casing, a valve member in said casing for permitting flow through one of said vent pipes into said valve casing and preventing flow from other of said vent pipes into said valve casing, a separating chamber communicating with said valve casing, a line provided with a liquid seal leading from said separating chamber to the opposite vertical pass, and a thermostatic air valve on said separating chamber for flow therethrough of air vented from said radiator into the separating chamber.

5. A heat radiator comprising a plurality of interconnected chambers disposed in side-by-side relationship, one end chamber having a heating fluid inlet, means on the opposite end chamber for controlling the amount of active heat radiating surface of said radiator, said means comprising a valve housing, a plurality of air vent pipes, each communicably connecting a different one of said chambers with said valve housing, and a valve in said valve housing for opening one of said air vent pipes to permit flow of air therethrough while closing the remaining vent pipes, said valve being constructed and arranged to open any desired one of said vent pipes.

6. A heat radiator comprising a plurality of interconnected passes, one of said passes being provided with a heating fluid inlet, a plurality of air vent pipes extending horizontally from an end pass towards the opposite end pass and each communicating with a different pass of said radiator so that progressively increasing volumes of said radiator may be vented to the atmosphere through said vent pipes depending upon which of said vent pipes is placed in communication with the atmosphere, a valve housing into which all of said vent pipes lead, and a valve in said housing for placing one of said vent pipes in communication with the atmosphere and preventing communication between the other of said vent pipes and the atmosphere.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
505,136	Smith	Sept. 19, 1893
773,388	Gerken	Oct. 25, 1904
1,076,444	Ord	Oct. 21, 1913
1,076,704	Rosen	Oct. 28, 1913
1,161,877	Nelson	Nov. 30, 1915
1,229,917	Durr	June 12, 1917
2,098,830	McElgin	Nov. 9, 1937