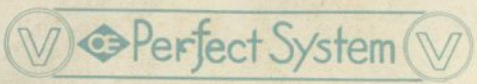


VAPOR SYSTEM	*"O-E" PERFECT SYSTEM*
Must have radiation enough to warm rooms in coldest weather under Vapor or low temperature.	Can increase temperature instantly under slight pressure, during the few extremely cold days, which admits of less radiation. (Why occupy valuable space with superfluous radiation merely to cover the few extremely cold days of winter?)
Open to atmosphere at all times. Wastes vapor and fuel.	Open to atmosphere only when there is air in the system, after same is expelled the Automatic Exhauster closes against Vapor, so that none is wasted. Saves fuel.
Special and expensive Damper Regulator necessary.	Can use ordinary Damper Regulator, that is supplied with boiler. Without extra cost.

Better than Straight Vacuum System, because:

WITH STRAIGHT VACUUM HEAT	*WITH "O-E" PERFECT SYSTEM*
Numerous complicated parts including Pumps, Traps, Floats, etc., which are usually out of order.	Obtain same results without the complicated parts named.
Costs more to install, costs more to maintain.	Costs less to install, costs less to maintain.

The "O-E" Perfect System is *better than any other* because of its extreme simplicity, great efficiency and reasonable cost.

Architects, Builders and Property Owners:

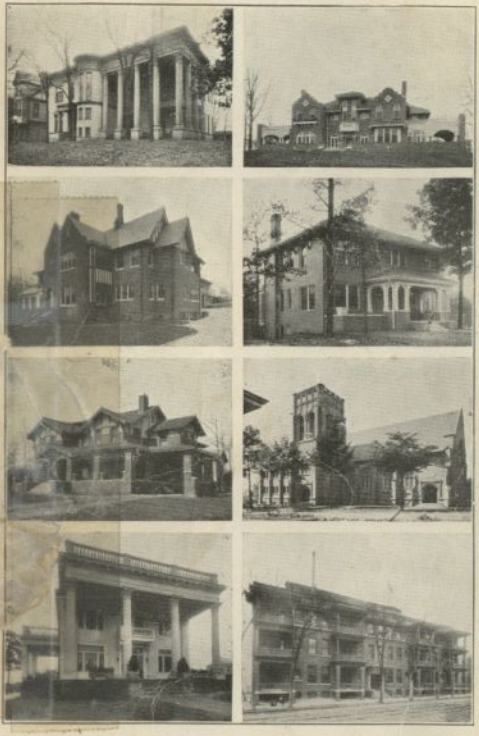
THE "O-E" PERFECT VAPOR-VACUUM-PRESSURE SYSTEM is not only "up-to-date" and perfect, as its name implies, but owing to its simplicity, durability, ease of operation, flexibility and low cost of maintenance, it will make friends for the Architect and Builder, and help rent or sell the building in which it is used. This alone should be sufficient inducement to specify and have the "O-E" PERFECT SYSTEM installed, but when you consider the further fact that we ask ***no royalties,*** as some do, and that the cost of installation is little more than the cost of the ordinary steam heating system what reason could you have for using any other system?

If the "O-E" PERFECT SYSTEM is used we will furnish a Guaranty with each installation that fully protects you.

When making your next specification for a heating system why not specify the "O-E" PERFECT SYSTEM when you have all the advantages named, and it will do more than the complicated and high priced systems on the market?

GUARANTY

We guarantee the O. E. System and fittings to do all that is claimed for them in our printed matter if properly installed. Should any fittings prove defective in any way, we will cheerfully supply new and perfect fittings to replace them without charge.



Note the Type of Buildings in which O-E System has been installed.

Perfect System

Simply Perfect and Perfectly Simple

THE inventors of the "O-E" Perfect VAPOR-VACUUM-PRESSURE SYSTEM, have probably had more experience with this type system than any other Manufacturers, and from their long experience know just what is required for a Perfect system of Heating. Before offering the "O-E" System to the trade the inventors gave it the most thorough, exhaustive and rigid tests possible, in fact, much more severe than the system would ever have in use, and in every test each and every part of the system proved ***absolutely perfect.***

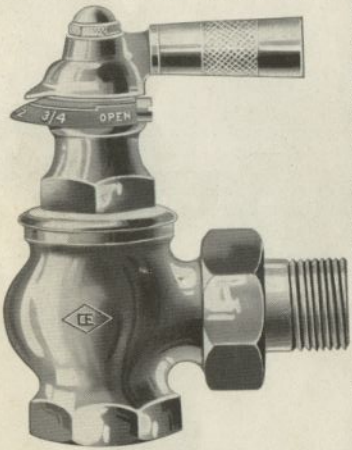
There has always been a demand for a ***simple system*** of heating, one that could be operated by the inexperienced as well as the experienced with good results. The "O-E" Perfect system can be operated by a child and just as good results obtained as if an expert handled it. Most systems heretofore sold have had numerous parts that are constantly out of order, and the inventor or manufacturer of same is often at a loss to account for the many troubles that arise, in fact, the most of them are experimenting at the customers expense. The "O-E" Perfect system has fewer parts than any other and still accomplishes more. All we ask is a trial and we know you will be convinced of the superiority of the "O-E" system. Our broad guarantee will protect you and one must admit that we would hesitate to offer such guaranty had we the least bit of doubt relative to the merits of our system.

How it Operates The operation of the "O-E" Perfect System is very simple: vapor generated at the boiler passes up through the main supply pipe and is distributed to the several radiators located in the rooms above by a small individual supply pipe from the main, pitching up to each radiator, and is admitted to the radiator at the top of same by means of the "O-E" Packless Graduated Valve, (see description page 3). As the Vapor condenses in the radiator the water of condensation falls to the bottom of same and is returned to the boiler through a ¼-inch "O-E" Elbow into a ½-inch pipe thence into the main return pipe in basement. In passing through the Elbow the water is first trapped by means of a wall or diaphragm, cast in the Elbow, ***outside of the radiator,*** making a water seal which holds the vapor in the radiator and prevents it from short circuiting into the return main. Should the Supply Valve at the top of the radiator be closed condensation will naturally take place in the radiator as it cools, thus forming a Vacuum which would be annoying if an ordinary Elbow was used on the return, as any water that might be in the return pipes would be drawn back into the radiators, producing a crackling or pounding noise so familiar to users of the ordinary steam heating systems; this trouble is entirely avoided by use of the "O-E" Patent Elbow, which is equipped with a small brass ball operating on a smooth guide or track, and so arranged that when the Vacuum takes place in the radiator the ball will immediately roll against the port and prevent water being drawn into the radiator from the return pipe. This Elbow is noiseless in operation, as the water seal is below the ball, which is a big feature. As soon as the Supply Valve on top of the radiator is again opened the ball in the elbow rolls off of the seat allowing condensation and air to pass easily and freely into the return main. An air vent is tapped in the adjustable screw stop of the return elbow which answers two purposes; it not only allows the air to escape freely into the return system when the Supply Valve is open, but also equalizes the pressure on both sides of the Water Seal, thus preventing it syphoning out, which it might otherwise do. All air and condensation passes through the main return pipe in basement to a point above the boiler where the air is separated from the water, the former being lighter passes up and through the "O-E" Patent Air Exhauster into the flue, or any place desired, and the water returns to the bottom of the boiler to be again heated for use. (See description of Exhauster page 5 and Elbow page 4.)

V O-E Perfect System V

"O-E" Improved Perfect Packless Graduated Valve

This valve is ***absolutely packless*** and will never have to be packed, as some so-called packless valves have to be, and is tested by air and water test therefore will never leak. It is quick opening, little more than one-half turn fully opens or closes it. It is admitted to be the handsomest valve on the market, sand blasted and nickel plated. The handle being made of hard rubber, will not crack and is always cool and easy to operate. The graduated dial and pointer admit of partial opening so that just the amount of heat desired can be obtained. This dial being cast on an angle is easily read from a distance. All valves are fitted with genuine "Jenkins" discs on a swivel seat without extra charge. Graduation Supply Discs will be attached when specified at slight additional cost.



This Valve is placed at the top of the radiator which not only prevents the radiator filling with water, as often occurs with the old style systems, but also obviates the necessity of stooping to an uncomfortable position when closing or opening the valve, and the hammering and pounding or cracking noise one is accustomed to hear, when using the old style systems, is absolutely impossible with this Valve at the top of the radiator.

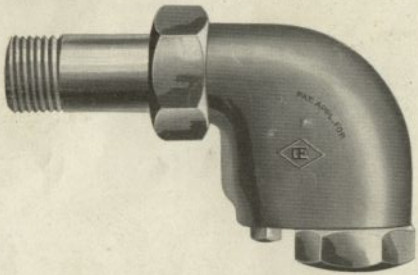
P S

Standard Size

¾" ..... Each $5.00

"O-E" Perfect Ball-Check Water Seal Union Elbow with Adjustable Air Vent.

This Elbow is almost human is entirely automatic and never fails to work properly. The neatest and most compact fitting of the kind made. All of the working parts are outside of the radiator so that standard radiators with eccentric tapping may be used. This is a big improvement over the old way which necessitates special tappings. The Diaphragm being cast integral with the body of the Elbow makes a sure water seal, utilizing nature's seal which will not stick as a mechanical seal is apt to do, and one never has to guess as was necessary with the trap or seal in the radiator. Another improvement is the cleanout plug below water seal, which admits of easily removing any sediment that one often finds in the system when it is first put in operation. An air vent



(Patent Pending)

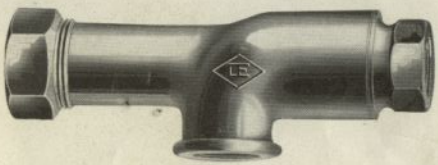
is tapped into the adjustable screw stop, which not only allows all air in the radiator to escape freely and quickly, but also equalizes the pressure on both sides of the water seal, preventing the water syphoning out. This Elbow is extra heavy, sand blasted and heavily nickel plated, with special ground Semi-Ball joints. Adjustable stops are also made with various size vents for use when close regulation is desired or for straight vapor work.

P Made in one size only, ½"....Each $3.00
Capacity 250 Square Feet S

"O-E" Improved Air Exhauster and Vacuum Valve

This Valve is the most simple and still does more work than any similar valve on the market. It is very sensitive, and operates as follows:

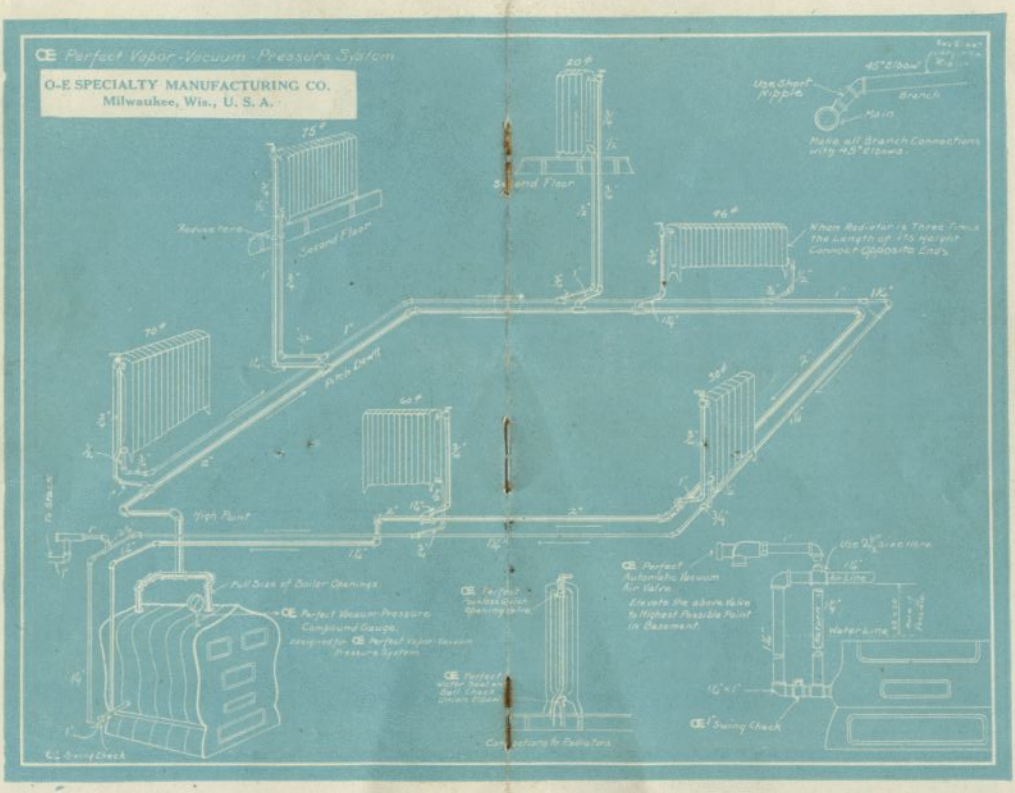
Being connected at a high point above where the return main drops to return opening in boiler, all air in the system naturally seeks outlet at the point of least resistance, which, in this instance is the Air Exhauster, which is open when there is any air in the system, and as soon as all air is exhausted and the least bit of heat comes in contact with the Carbon Post in



(Patented)

Exhauster, same expands and forces the Hollow Brass Ball against the seat, closing the port. When closed the system will cool slightly causing a vacuum to take place, which will hold the ball on the seat of Exhauster as long as there is a vacuum in the system; as soon as the vacuum is lost, on account of air getting in the system, the ball will roll away from the seat in Exhauster and permit the air to escape freely and quickly. This Exhauster is "Fool Proof" and should some careless employee tamper with it and screw the post down against the seat when cool no harm will result as a heavy Brass Shell or reinforcement is

P Made in one size only
1 inch.....Each $10.00
Capacity 5000 Square Feet S



Typical Pipe Plan for "O-E" Perfect System for Small Installation.

Ask for Plans for Larger Installations.

placed around the Carbon Post, and a Brass Cap over the end of same, which prevents the post getting out of shape. The Improved cap locks the expansion post after it is properly adjusted and prevents its getting out of adjustment. Also holds post in a rigid horizontal position. All Exhausters are set for ordinary use, but can be adjusted to suit any particular system to which they are attached. Directions accompany each Exhauster.

All Exhausters are threaded for 1-inch I. P. both inlet and outlet.

NOTE:—The Carbon Post used in this Exhauster is manufactured expressly for our particular use, and much time and money was expended in developing a Post that would suit our requirements. The best experts admit that nothing excels a Carbon Post for quick action, but heretofore none have been made that would "hold up" and that would not soften at the end under high temperature or "buckle" out of shape, until our "O-E" Special Post was developed, therefore, we claim to have the most sensitive, durable and most practical Valve of the kind ever placed on the market. Each and every Exhauster is thoroughly tested before shipment is made and our guaranty card attached to same.

We make the following claims, and guarantee to prove them on any system installed according to our instructions:

1. The system is "SIMPLY PERFECT AND PERFECTLY SIMPLE.
2. Great economy in fuel (the saving in the fuel alone will soon pay for the system).
3. Temperature can easily be regulated in each room, as desired.
4. Noiseless in operation, absolutely no pounding in pipes or radiators.
5. More rapid circulation than with the ordinary system.
6. Positively no danger of leaks or flooding of building.
7. Much smaller pipes, fittings and valves than with an ordinary system.
8. Mild low temperature in warm weather.
9. Temperature can be ***almost instantly*** increased to suit the most extremely cold weather.
10. Eliminates Automatic Air Valves, which have caused more annoyance than anything ever attached to a radiator.

Perfect System

11. No complicated mechanical apparatus, such as floats, traps, pumps, receivers, special damper regulators, etc., to get out of order and cause expense and annoyance.
12. Easier to install than either steam or water; on referring to our typical plan you will be convinced of this.
13. The "O-E" Quick-Opening Graduated Packless Supply Valve being connected at the top of the radiator is much more convenient than the old way at the bottom, and one does not have to stoop to an uncomfortable position when adjusting the valve.
14. "Three systems in one": operates under Vacuum most of the time, Vapor part of the time, and can be instantly put under Pressure when desired. This latter feature is important and will be appreciated should the weather suddenly become extremely cold and it is necessary to obtain ***quick results;*** with the ordinary Vapor or Vacuum System it is impossible to carry a pressure without danger of blowing water out of the system or the receiving tank and breaking the boiler.
15. More flexible than any other system.
16. Will hold a steady water line under all three systems, Vapor, Vacuum or Pressure.
17. Can be installed for less or not more than the ordinary Hot Water System.

Better than Gravity Steam, because:

WITH STEAM HEAT	*WITH "O-E" SYSTEM*
Air Valves must be used which are usually out of order, leak and damage walls, and floors, are expensive and seldom work at all.	No Air Valves necessary.
Will not heat until pressure is generated.	Will heat without pressure.

STEAM HEAT	*"O-E" PERFECT SYSTEM*
Must have 212 degrees temperature before obtaining the least bit of heat.	Will heat much below 212 degrees.
Unless carefully piped will pound, snap, crack and hammer.	Absolutely noiseless.
Supply Valves must be either fully open or tightly closed at all times.	Supply Valve may be partially opened as required to heat or cool room.
Steam escapes into room through air valve, or leaky stuffing boxes.	Absolutely no chance for steam or vapor to escape into room.
Slow acting.	Responds more quickly.
Large pipe and fittings.	Small pipe and fittings.
Unhealthy heat.	Very healthful heat.

Better than Water Heat, because:

WITH HOT WATER HEAT:	*WITH "O-E" PERFECT SYSTEM*
Much more radiation required.	Over 40% less radiation required.
Water must be heated to high temperature before it will circulate through the system.	Will heat almost as soon as the fire is started in the boiler.
Air Valves required which often leak and get out of order and must be opened often to permit escape of air.	No Air Valves used.
Hours required to heat rooms after fire is allowed to go down.	Responds quickly and heats almost instantly.
Hours required to cool room after radiator valve is turned off.	Will cool quickly or to temperature desired.

WATER SYSTEM	*"O-E" PERFECT SYSTEM*
Has from 10 to 20 lbs. pressure on all pipes, radiators and valves at all times.	No pressure necessary.
Fuel costs more.	Saves fuel on account of easy regulation.
System must be drained if building is to be left without heat for any length of time. Otherwise water will freeze and burst radiators, pipe valves or fittings, and damage building and decorations.	Can leave system at any time and for any length of time without danger of freezing.
Expansion Tank necessary.	No Expansion Tank necessary.

Better than Straight Vapor System, because:

WITH VAPOR SYSTEM	*WITH "O-E" PERFECT SYSTEM*
Must have a pressure before obtaining heat.	Heats without pressure.
Pressure must be carefully regulated, as too much will blow water out of the receiver, or waste Vapor into the atmosphere and is apt to burst the boiler.	Any pressure desired may be carried with equally good results, and a perfect circulation. Absolutely no danger of bursting boiler.
If fire is banked at night temperature will drop and radiators become cold and remain so until pressure is again generated.	If fire is banked Vacuum takes place which holds heat over night.
50 to 60% more radiation necessary than with the "O-E" system.	On account of the Pressure feature much less radiation necessary.

FOR SALE BY

HAVERHILL HOUSE HEATING CO.

Haverhill, Mass.

V V

PERFECT SYSTEM

"A"

VAPOR VACUUM PRESSURE

3 SYSTEMS IN ONE

O-E Specialty Manufacturing Co.

General Offices and Works

MILWAUKEE, WIS., U. S. A.

P S

Patented Mar. 9, 1926. 1,575,862

UNITED STATES PATENT OFFICE.

LEWIS F. OSTRANDER, OF MILWAUKEE, WISCONSIN.

RETURN FITTING FOR VAPOR-HEATING SYSTEMS.

Application filed July 22, 1920. Serial No. 398,228.

To all whom it may concern:

Be it known that I, LEWIS F. OSTRANDER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Return Fittings for Vapor-Heating Systems, of which the following is a specification, reference being had to the accompanying drawing, forming a part thereof.

This invention relates to vapor heating systems and more particularly to a return fitting for such systems.

Referring to the drawings which accompany this specification and form a part hereof, which drawings illustrate an embodiment of this invention, and on which drawings the same reference characters are used to designate the same parts wherever they may appear in each of the several views, Fig. 1 is a perspective view of a vapor heating system; Fig. 2 is an elevation of part of a radiator and connections on an enlarged scale; Fig. 3 is a sectional elevation on an enlarged scale of a fitting; Fig. 4 is a transverse section on the line 4—4 on Fig. 3, looking in the direction indicated by the arrows; and Fig. 5 is an end elevation of an element.

Referring to the drawings, the reference numeral 1 designates a boiler for generating vapor and which is also capable of generating steam at a pressure of a few pounds above the pressure of the atmosphere. A supply pipe 2 is connected with the top of the boiler and is looped back and connected with the boiler below the water level therein. The supply pipe 2 should be carried to a high point 3 and then pitch downwardly throughout its length to conduct water of condensation back to the boiler. This construction also results in any water flowing in the direction of movement of the vapor and facilitates the flow of vapor instead of tending to retard the flow of vapor. Three radiators of different sizes, 4, 5 and 6 are illustrated by the drawings to make the construction and operation of the system and apparatus perfectly clear. The radiators 4 and 5 are illustrated as located on the same level or floor of a building while the radiator 6 is illustrated as located on a higher level or an upper floor of a building. The radiators are connected with the supply pipe 2 by the delivery pipes 7, 8 and 9 and the flow of vapor or steam to radiators and the heating effect of individual radiators are controlled by valves 10. The delivery pipes 8 and 9 are illustrated as leading directly upward from the supply pipe 2 so that there will be good drainage for any water of condensation back into the supply pipe 2. The radiator 4 is illustrated as offset from the supply pipe 2 and the part of the delivery pipe 7 which is designated by the reference numeral 11 should pitch up from the supply pipe 2 to insure good drainage. The point to be observed is that water of condensation in the pipes shall not be permitted to enter the radiators nor to impede the flow of vapor to the radiators. The radiators are illustrated as receiving the vapor at their tops and this is the construction which I prefer for the ordinary constructions of radiators on the market. The lower ends of the radiators are connected with a pipe 12 which serves the dual function of an air relief pipe and a return pipe to return water of condensation to the boiler. The pipe 12 should be pitched down towards the boiler, as well as all connections thereto except where the air is separated, to insure good drainage. It is provided with a check valve 13 which opens towards the boiler and the lowest radiators should be high enough above the boiler so that the water column in the pipe 12 will be sufficient to open the check valve 13 to return water of condensation to the boiler. An automatic, thermal valve 14 permits air to escape from the pipe 12 while preventing the escape of vapor or steam. This valve should be placed as high as the installation will permit and a pipe 15 may be led outside the building or into a chimney flue. If the pipe be led into a chimney flue in which there is a current of air or gases, an exhaust created which tends to aid the removal of air from the pipe 12. An enlarged section of pipe 16 may be interposed between the pipe 12 and the valve 14 as a water separator. Such a construction affords an inexpensive water separator and prevents water being carried out of the system by the current of air as the velocity of flow of the air is reduced and the water is no longer carried with the air current.

The radiators illustrated are of the self draining type, that is, the nipples 17 are set so low that no appreciable quantity of water of condensation can accumulate or remain in a radiator to freeze or otherwise interfere with the action of the system or apparatus.

The nipples 17 for radiators 4 and 6 are illustrated as connected to the same ends of the radiators as the delivery pipes 7 and 9, while the nipple 17 for the radiator 5 is illustrated as connected with the end of the radiator to which the delivery pipe 8 is not connected. The reason for this construction is because the radiator 5 is long as compared with its height and, when the length of a radiator exceeds three times the height of the radiator, the nipple should be at the opposite end from the delivery pipe to obtain the best results from the radiator.

Interposed between each radiator and the pipe 12 is a trap 18 with which, as a matter of convenience in construction, installation and use, certain other parts are associated.

The trap is illustrated as provided with a well 19, the capacity of which is determined by a dam 20. A horizontal branch 21 is screwthreaded for connection with a nipple 17 by means of a union 22. A ball valve 23 can move back and forth in the branch 21 and is guided by ribs 24 to insure accuracy of movement and to keep the ball valve above the bottom of the branch 21 away from water passing therethrough, as clearly shown by Fig. 4 of the drawings. The function of the ball valve 23 is to act as a check valve to prevent air or water, or both air and water, from entering a radiator when the vapor pressure in a radiator is diminished. The nipple 17 is provided with a valve seat 25 for the ball valve 23. The top of the dam 20 is below the bottom of the branch 21 so that the water in the well 19 will not reach the ball valve 23 when the well is full of water. A wall 26 depends from the upper part of the trap and extends below the top of the dam 20. The wall 26 is provided with an aperture 27 located above the top of the dam 20 for permitting air to pass from the branch 21 to the outlet 28 and thence through pipe 12 to the separator 16 and pipe 15. Means are provided for restricting or adjusting the aperture 27 to the requirements of individual radiators or in connection with other radiators of the system. A larger radiator requires a larger aperture than a smaller radiator and, because of difference in location, one or more radiators may not be freed of air as quickly as others. A simple means for restricting or adjusting the size of the aperture 27 is illustrated by the drawings. The aperture is partly closed by a member 29 which is illustrated as a screw, with a hole 30 through it, screwed into the aperture 27 which is screwthreaded to receive it. The hole 30 can be made originally of the required size, or can be enlarged, or partly plugged up according to particular requirements. As a practical proposition, different screws with different sized holes can be supplied. The trap can be made as a standard unit for all sizes of radiators and each trap can be separately adapted to its particular radiator by adjusting the size of the aperture 27. By using a screw for adjusting the thoroughfare through the aperture 27, the screw can also be used as an adjustable stop for the ball valve 23 without requiring one or more additional parts. As will be apparent, in the normal operation of the trap the ball valve is open and rests against the adjustable member or screw 29, as shown in Fig. 3, the ball valve acting to protect aperture 27 against stoppage due to accumulation of foreign matter at this point while permitting restricted flow of air through the aperture from the inlet to the outlet opening of the trap. The ball valve 23 thereby performs the double function of preventing backward flow of water and air through the inlet opening of the trap and also protecting aperture 27 against stoppage due to accumulation of foreign matter at this point. By removing the plug 31 the well 19 can be drained and cleaned.

The trap 18 is separate from the radiator, is self discharging, and is readily accessible for thawing the water in the well 19 if it should be frozen, and can be readily removed for inspection, adjustment or repair.

The ball valve 23 is located above the level of the water in the well 19 and does not corrode and stick.

The construction and operation of the system and apparatus will be readily understood from the foregoing description. The well 19 will permit any water of condensation to flow from a radiator the same as an ordinary trap but the water in the well on the side of the wall 26 adjacent the radiator will continuously condense vapor in contact with its surface and maintain a flow of vapor through a radiator even when the radiator temperature and the temperature of the air in a room are substantially the same. This is so because the temperture of the water in a well 19 is always lower than the temperature of the water in the boiler from which the vapor is being given off.

What is claimed is:

1. In a vapor heating system, the combination with a radiator and a return pipe therefor, of a trap interposed in said return pipe near said radiator, said trap having a well formed therein, a wall depending into said well, a check valve on the radiator side of said wall, the wall being provided with an aperture for the passage of air, and means for restricting said aperture.

2. In a vapor heating system, the combination with a radiator and a return pipe therefor, of a trap having a well formed therein, a wall depending into said well, and a ball check valve on the radiator side of said wall and located above the water level

in said well, the said wall being provided with an aperture for the passage of air at a point above the water level in said well.

3. A trap of the class described having an inlet and an outlet, a dam intermediate said inlet and outlet forming a well, a depending wall extending into the well below the top of the dam, said wall being provided with an aperture above the top of the dam, means to restrict said aperture, guides in the inlet above the top of the dam, and a ball valve operable between said guides.

4. A trap of the class described having inlet and outlet openings and a well therebetween, a wall extending into said well and forming with the water therein a seal to prevent the flow of air through said trap, a check valve at said inlet opening adapted to prevent flow of air and water through said trap in a direction toward said inlet opening, said valve being normally open and opening upon movement thereof toward said wall, said wall being provided at a point above said well with an aperture to permit restricted flow of air through said trap, the apertured portion of said wall providing a stop for said valve and being so related with respect to the latter that the same acts to obstruct access to said aperture to thereby prevent the accumulation of foreign matter therein.

5. A trap of the class described having inlet and outlet openings and a well therebetween, a wall extending into said well and forming with the water therein a seal to prevent the flow of air through said trap, a check valve at said inlet opening adapted to prevent flow of air and water through said trap in a direction toward said inlet opening, said valve being normally open and opening upon movement thereof toward said wall, said wall being provided at a point above said well with an opening, an apertured member secured in said opening, the aperture in said member providing for restricted flow of air through said trap, said member providing a stop for said valve and being so related with respect thereto that the same acts to obstruct access to said aperture to thereby prevent the accumulation of foreign matter therein.

In witness whereof I hereto affix my signature.

LEWIS F. OSTRANDER.

March 9, 1926. 1,575,862

L. F. OSTRANDER

RETURN FITTING FOR VAPOR HEATING SYSTEMS

Filed July 22, 1920

Fig. 2.

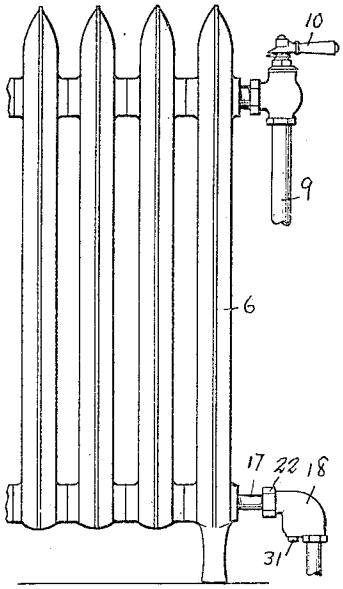


Fig. 3.

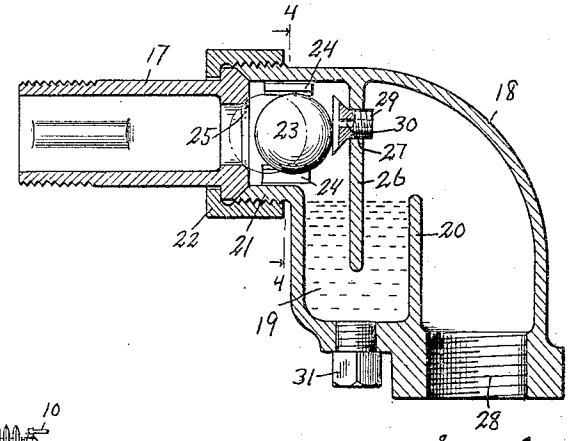


Fig. 4.

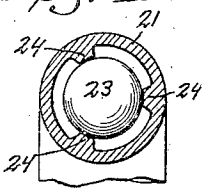


Fig. 1.

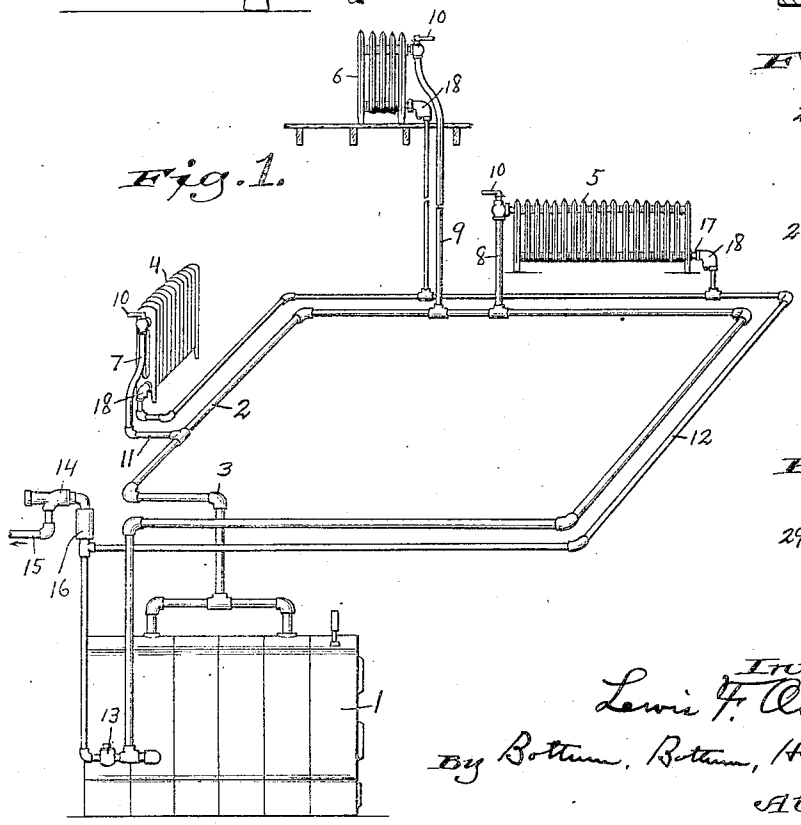
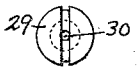


Fig. 5.



Inventor
Lewis F. Ostrander.
By Bottum, Bottum, Hudnall & Becker
Attorneys.

L. F. OSTRANDER.

SUPPLY VALVE FOR VAPOR, VACUUM, AND STEAM HEATING SYSTEMS.

APPLICATION FILED NOV. 20, 1916.

1,297,229.

Patented Mar. 11, 1919.

FIG. 1

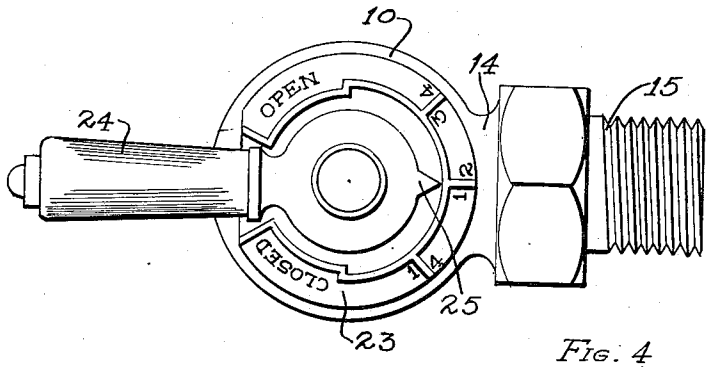


FIG. 4

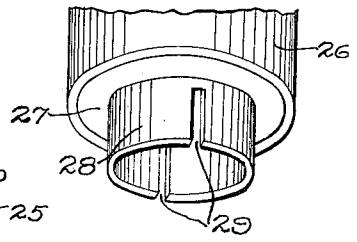


FIG. 2.

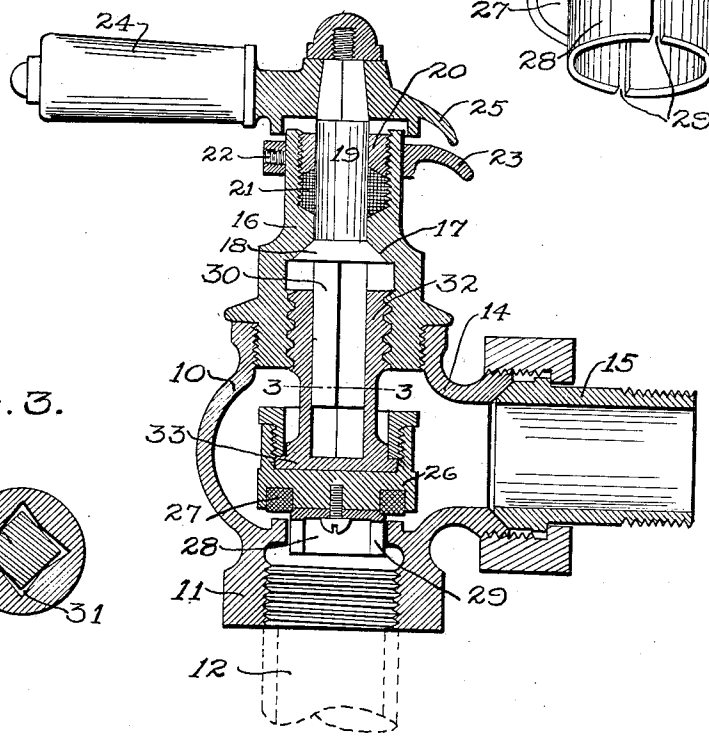


FIG. 3.

INVENTOR

LEWIS F. OSTRANDER

BY

F. C. Ormsby

ATTY.

UNITED STATES PATENT OFFICE.

LEWIS F. OSTRANDER, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO J. F. ESPERON, OF INDIANAPOLIS, INDIANA.

SUPPLY-VALVE FOR VAPOR, VACUUM, AND STEAM HEATING SYSTEMS.

1,297,229. Specification of Letters Patent. Patented Mar. 11, 1919.

Application filed November 20, 1916. Serial No. 132,379.

To all whom it may concern:

Be it known that I, LEWIS F. OSTRANDER, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Supply-Valves for Vapor, Vacuum, and Steam Heating Systems, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates generally to vapor, vacuum and steam heating systems and more particularly to a valve for controlling the flow of steam or vapor from the supply pipe to the radiator, the principal objects of my invention being to provide a comparatively simple inexpensive supply valve which can be utilized in connection with practically all vapor, vacuum and steam heating systems now in general use; to provide a valve which can be accurately regulated and set so as to accurately control the flow of vapor or steam to the radiator; to provide a valve which is quick acting in its opening and closing movements, and to provide a valve having a tapered ground joint between the valve stem and valve housing, which joint is absolutely air and water tight under all conditions, thereby doing away with the necessity of packing the valve at intervals for the purpose of overcoming leaks which invariably develop where valves are packed with leather, rubber, fibrous material or the like.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described, claimed and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of a supply valve of my improved construction.

Fig. 2 is a vertical section taken through the center of my improved valve.

Fig. 3 is an enlarged horizontal section taken on the line 3—3 of Fig. 2.

Fig. 4 is a perspective view of the underside of the valve head or body.

As illustrated in the accompanying drawings, the housing of my improved valve is formed in two parts, the lower part 10 being hollow and provided with a depending tubular portion 11 which is connected in any suitable manner to a vapor or steam supply pipe 12.

Formed within the hollow body 10 immediately above the member 11 is a horizontally disposed annular flange 13, the top of which forms a valve seat. Leading from one side of the hollow body 10 is a tubular member 14 and connected thereto in any suitable manner is a nipple 15, the outer end of which is adapted to be connected to a radiator. The upper end of the hollow body 10 is internally threaded and receives the lower end of a vertically disposed member 16, the same forming the upper portion of the valve housing. The upper end of this member 16 terminates in a hollow cylindrical portion upon which is adjustably positioned a disk, hereinafter more fully described.

Formed within the upper member 16 of the valve housing is a tapered opening 17, the surface of which is preferably ground so as to serve as a seat for a conical member 18, which latter is formed on the central portion of a valve stem 19. The upper portion of this valve stem extends through a gland nut 20 which is screw-seated in a chamber formed in the upper end of member 16 and located in said chamber below the gland nut is suitable packing 21.

Positioned on the hollow cylindrical portion at the upper end of member 16 of the valve housing and removably held thereupon by means of a set screw 22 is a disk 23, the outer portion of which curves gradually downward toward its edge and appearing on top of this disk on opposite sides of the set screw 22 are the words "Closed" and "Open," and between these words appear the designations $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$. These words and designating numerals serve as guides for positioning the valve handle so that the valve within the housing 10 and hereinafter more fully described, may be set in open or closed position or at predetermined points between full open or closed positions.

By curving the top of the disk 23, the designating marks on the top thereof can be read from a considerable distance to the side

of the valve. Consequently, it is not necessary for a person manipulating the valve to get in position where the eyes are directly above the disk as would be the case if the top of said disk were made perfectly flat.

The upper end of valve stem 19 receives an operating handle 24, the inner end of which is provided with a downwardly bent finger 25, the lower end of which travels in a path directly above the designations on the top of disk 23.

The head or body of the valve comprises a cup-shaped member 26, in the underside of which is seated a ring 27 of comparatively soft metal, composition or fiber, and when the valve is closed, the underside of this ring rests directly upon valve seat 13.

Fixed in any suitable manner to the underside of valve head 26 is an inverted cup-shaped member 28, in the wall of which is formed one or more vertically disposed slots 29. When valve 26 is raised, ring 27 is lifted from seat 13 and the upper ends of the slots 29 in member 28 serve as ports through which vapor or steam passes from the chamber below the valve seat into the chamber above said seat.

That portion of the valve stem below the conical body 18 is made square or non-circular as designated by 30, and this portion fits in a recess or opening 31, the latter being formed in a vertically disposed member 32. The upper end of this member is provided with a double or quick-acting thread which engages a corresponding thread formed in the lower end of upper member 16 of the valve housing. The lower end of member 32 is provided with a flange 33 which is loosely positioned in valve head 26 and held therein by a ring 34, the latter being screw-seated in said valve head 26.

The non-circular opening or recess 31 in member 32 is slightly larger than the portion 30 of the valve stem, thus permitting said stem to be shifted a short distance before engaging and imparting movement to said part 32.

I have demonstrated in practice that this construction causes the valve to operate easily and without any tendency to stick at the beginning of either opening or closing movements.

As handle 24 is shifted so as to move finger 25, from the point marked "Closed" on the disk 23 to the point marked "Open" or vice versa, valve stem 19 will be rotated in the upper member 16 of valve housing, and as the lower non-circular portion 30 of said stem is thus rotated, corresponding rotary motion will be imparted to member 32 with the result that the latter will move vertically simultaneously with its rotary movement, which vertical movement is due to the threaded engagement which said member 32 has with the lower portion of housing 16.

As valve head or body 26 is connected to lower member 32, said head or body will be moved vertically corresponding to the movement of handle 24, and when said valve head or body moves upwardly, ring 27 will move away from seat 13 and member 28 will be elevated a sufficient distance to permit the upper portions of slots 29 to establish communication between the chamber below the valve seat and the chamber above said seat, with the result that steam or vapor will pass from supply pipe 12 through the lower portion of the housing and discharge through nipple 15 into the radiator.

A reverse movement of handle 24 will bring about a downward movement of valve head or body 26, with the result that the upper ends of slots 29 pass below seat 13 and ring 27 reëngages upon the valve seat, thus cutting off the passage of steam or vapor through the valve.

Conical member 18 always fits snugly on its conical seat 17 and this construction, together with the construction involving the threaded engagement of member 32 with the lower end of housing 16 effectually prevents leakage of steam or vapor upwardly through the valve housing.

The handle 24 can be shifted in position to various points between the full open and closed positions, thereby accurately regulating and controlling the flow of steam or vapor through the valve.

A valve of my improved construction is comparatively simple, can be easily and cheaply manufactured, can be readily assembled or taken apart, is constructed so as to entirely eliminate packing from time to time to overcome leakage, and can be advantageously and effectively used in connection with all forms of vapor, vacuum and steam heating systems.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved valve can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claim.

I claim:

The combination with a supply valve housing having a vertically disposed cylindrical portion at its upper end, of a disk mounted on said cylindrical portion near the upper end of the latter and capable of being moved vertically or rotated upon the cylindrical portion of said housing so as to be adjusted in position, a set screw passing through said disk and adapted to engage the cylindrical portion of the housing for locking said disk in its adjusted position, the outer portion of which disk is curved gradually downward, the top of said disk being provided with guiding marks, a valve operating handle arranged above and close to said disk, and a

short guide finger formed integral with the inner end of said handle, which guide finger is curved gradually downward so that its lower outer end travels in a path directly above the guiding marks on the top of the disk, but leaves said marks always exposed.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 1st day of November, 1916.

LEWIS F. OSTRANDER.

Witnesses:
M. P. SMITH,
M. A. HONDEL.

L. F. OSTRANDER.

AIR EXHAUST AND VACUUM SEAL VALVE.

APPLICATION FILED NOV. 20, 1916.

1,291,099. Patented Jan. 14, 1919.

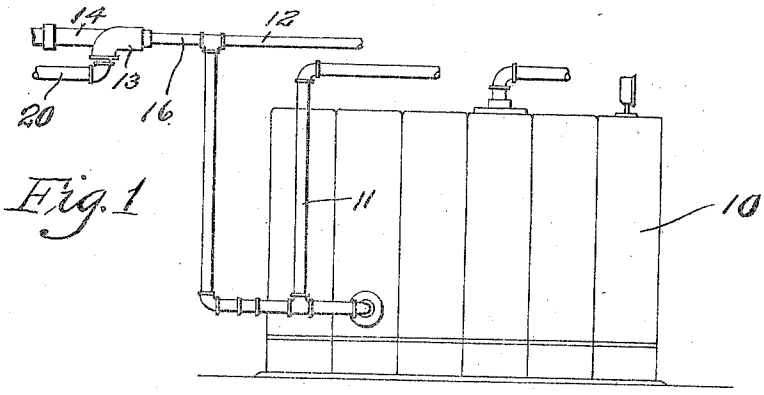


Fig. 1

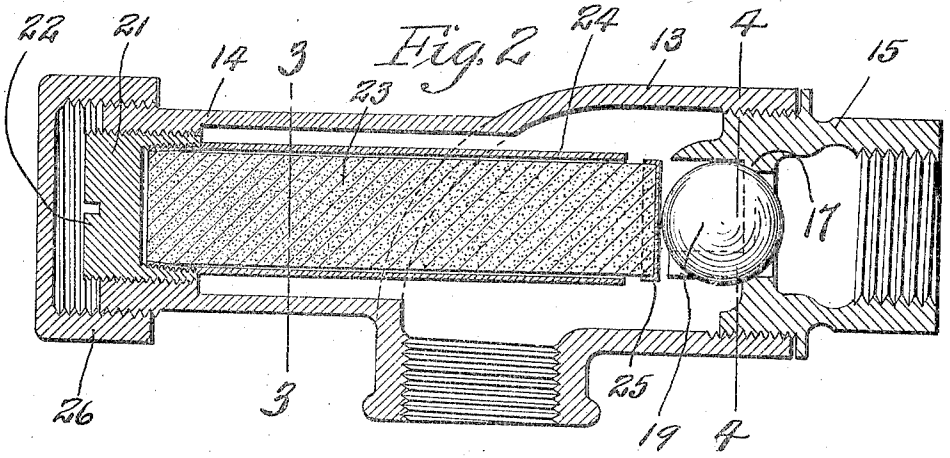


Fig. 2

Fig. 3

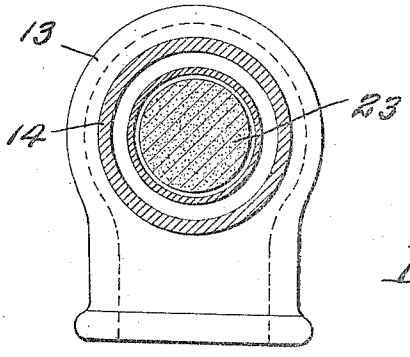


Fig. 4

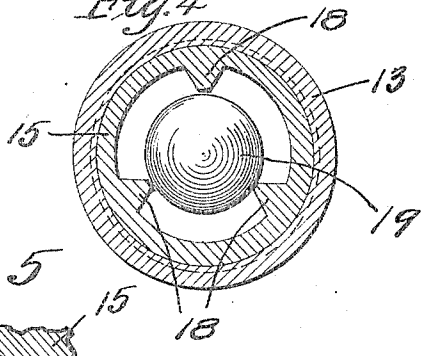
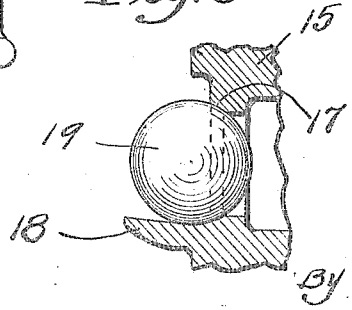


Fig. 5



Inventor
Lewis F. Ostrander
By F. C. Fernaes
Atty.

UNITED STATES PATENT OFFICE.

LEWIS F. OSTRANDER, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO J. F. ESPERON, OF INDIANAPOLIS, INDIANA.

AIR-EXHAUST AND VACUUM SEAL VALVE.

1,291,099. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed November 20, 1916. Serial No. 132,378.

To all whom it may concern:

Be it known that I, LEWIS F. OSTRANDER, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Air-Exhaust and Vacuum Seal Valves, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates generally to vapor, vacuum and steam heating systems and more particularly to a valve or fitting which is connected at a suitable point to the main return pipe of the system for the purpose of permitting air in the heating system to escape or exhaust, and which valve is closed by means under influence of heat of the vapor in the system, and further said value maintaining its closed position by reason of a partial vacuum which is established in the radiators and circulating pipes of the system.

The principal objects of my invention are to produce a comparatively simple, inexpensive and automatically operating air exhausting valve which can be advantageously employed with practically all the vapor, vacuum and steam heating systems now in general use; to provide a valve which is positive in action and highly effective in use; and further to provide an air exhaust valve with a member which will readily expand under heat of vapor within the system to which the valve is applied, to cause said valve to close, said heat actuated valve closing member being adjustable so that its action can be regulated to various degrees of temperature.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts, hereinafter more fully described, claimed and illustrated in the accompanying drawings, in which—

Figure 1 is an elevational view of an ordinary form of heater used in connection with steam heating systems and showing my improved exhaust and vacuum valve connected to the main return pipe leading to said heater.

Fig. 2 is a vertical section taken lengthwise through the center of my improved valve.

Fig. 3 is a cross sectional view taken approximately on the line 3—3 of Fig. 2.

Fig. 4 is a cross sectional view taken approximately on the line 4—4 of Fig. 2.

Fig. 5 is a detail view of a portion of my improved valve and showing one of the ribs on which the ball valve travels, the inclination of the rib in this view being exaggerated.

Referring by numerals to the accompanying drawings, 10 designates the heater of an ordinary steam heating system, 11 the main return pipe of the system, and 12 the air line to which latter is connected the outlet pipes from the radiators.

My improved air exhaust and vacuum valve is connected to this air pipe 12 a substantial distance above the water line in the boiler and preferably at a point near the latter. As illustrated in Fig. 2, the valve includes a substantially hollow elbow shaped body portion 13 with which is formed integrally a horizontally disposed tubular extension 14, the outer end of the latter being threaded internally and externally. The outer end of the horizontally disposed portion of body 13 is internally threaded and screw seated therein is a tubular member 15, the outer end of which is internally threaded to receive a short tubular member 16, which latter connects the device to the air line 12. Formed at the inner end of this tubular member 15 is a vertically disposed annular valve seat 17, and extending inwardly from the member 15, and around this valve seat are three or more ribs 18, the inner faces of which are slightly inclined downwardly toward the valve seat 17. This inclination of the face of one of the ribs is illustrated in Fig. 5, it being understood that the degree of inclination is greatly exaggerated in said illustration. The valve 19, preferably in the form of a hollow metal ball, is adapted to move backwardly and forwardly upon the ribs 18 and when said valve rests upon the seat 17, the passage-way from the chamber within the body 13 to the chamber within the tubular member 15 is closed. The lower end of the vertical portion of the member 13 is internally threaded in order to receive the end of tube 20, the same serving as an exhaust pipe for the air which escapes through the valve. Screw-seated in the outer end of tubular member 14 is a plug 21, the outer end of which is provided with a slot 22 which is adapted to receive a screw driver

or like tool, and removably seated in the inner end of said plug is an expansible composition member 23, preferably in the form of a cylinder, the same being inclosed by a protective shield 24, preferably of metal. This member terminates at a point adjacent to the ends of the ribs 18 and positioned on the inner end of said member is a metal cap 25. Screw-seated on the outer end of member 14 is a cap 26. Under normal conditions, or while the expansible member is subjected to normal temperatures, said member is contracted and consequently the cap 25 on the free end thereof occupies a position a short distance away from the ball valve 19. The air in the system to which my improved device is connected naturally seeks outlet at the point of least resistance which, in this instance, is through the exhaust valve, and in escaping, said air will move the ball valve away from the seat 17.

It will be understood that the ball rests very lightly against its seat, which condition is due to the very slight inclination of the inner faces of the ribs 18 and consequently very little air pressure is required to unseat said valve. As soon as all of the air in the system has exhausted or discharged through the device, the vapor following said air will heat the expansible composition member 23, thereby expanding and lengthening the same with the result that the ball valve 19 will be forced onto its seat, thereby closing the passageway through the device. After the system is thus closed and the radiators have cooled slightly, a partial vacuum will be established in said radiators and in the circulating pipes of the system, and this partial vacuum maintains the ball valve in position upon its seat, even after the expansible member has contracted and drawn away from said ball valve due to low temperatures. As soon as the partial vacuum within the system is broken by air getting into the system, the ball valve will be free to move away from its seat, thereby permitting the air to escape freely and quickly. The normal relative position of the expansible member with respect to the ball valve can be regulated by unscrewing the cap 26 at the outer end of member 14 and adjusting the position of plug 21 in the end of said member. Under normal conditions ball valve 19 rests with very slight pressure against seat 17; consequently very little air pressure is required to move the ball away from its seat to permit the escape of air and likewise a relatively small degree of vacuum is required to maintain the ball upon its seat. These results, which are brought about by the very slight inclination of the ribs 18 toward the seat 17, are decidedly advantageous in a device of this character, by reason of the fact that said device is very sensitive and comparatively slight variations in temperature will cause the valve to open and close.

An air exhaust and vacuum valve of my improved construction is very simple, can be easily and cheaply manufactured, is entirely automatic in its action, can be readily adjusted to suit different conditions and can be advantageously employed in connection with practically all of the vapor, vacuum and steam heating systems now in general use.

It will be readily understood that minor changes in the size, form and construction of the various parts of my improved valve can be made and substituted for those herein shown and described, without departing from the spirit of my invention, the scope of which is set forth in the appended claims.

I claim:

1. A housing provided with a valve seat, ball valve supports disposed in front of said seat and declining gradually toward the same, a ball valve positioned on said supports and adapted to rest upon said seat and close the passageway through the housing, an expansible member within the housing, which member is adapted to engage the valve and force the same to its seat, and a shield for the body of said expansible member.

2. A housing provided with a valve seat, ball valve supports disposed in front of said seat and declining gradually toward the same, a ball valve positioned on said supports and adapted to rest upon said seat and close the passageway through the housing, an expansible member within the housing, which member is adapted to engage the valve and force the same to its seat, a shield for the body of said expansible member, and a cap on the end of the member that engages said ball valve.

3. A device of the class described comprising a horizontally disposed housing, a valve seat therein, a ball valve adapted to engage said seat and close the passageway through said housing, a support for said ball valve, which support declines toward the seat, and an expansible member within the housing, which member is adapted to engage the ball and force the same to its seat.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this 1st day of November, 1916.

LEWIS F. OSTRANDER.

Witnesses:
M. P. SMITH,
M. A. HANDEL.

July 26, 1927. 1,637,158

L. F. OSTRANDER

VENT VALVE

Filed May 22, 1926

Fig. 1.

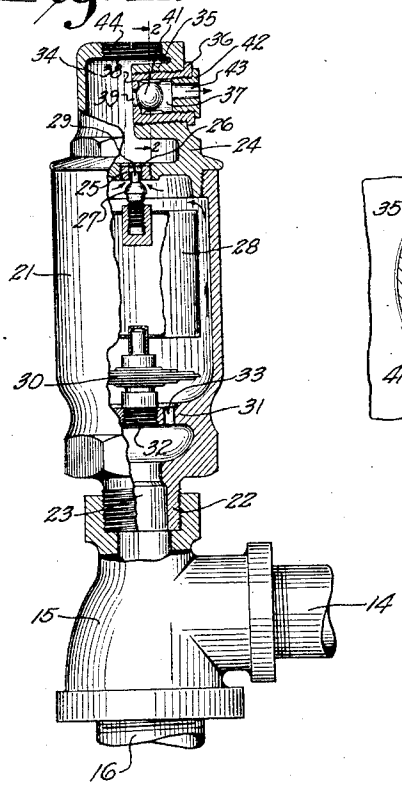


Fig. 2.

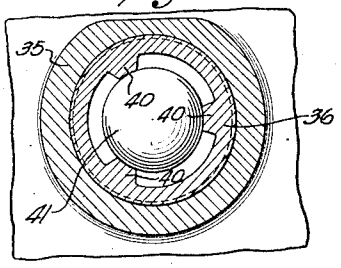
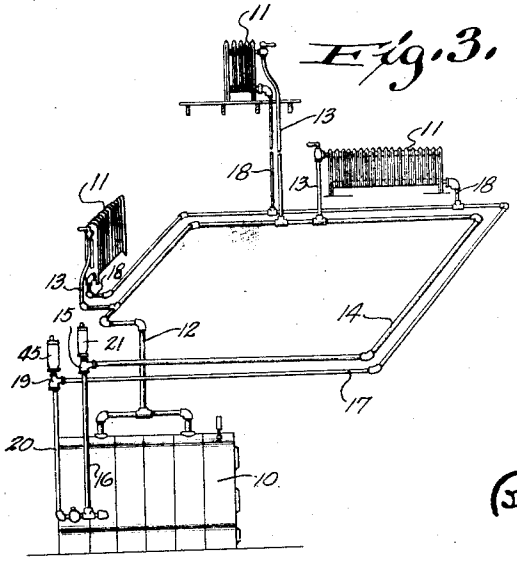


Fig. 3.



INVENTOR.
Lewis F. Ostrander
BY
Bottum, Hudnall, Fecher & Bowers
ATTORNEYS

Patented July 26, 1927. 1,637,158

UNITED STATES PATENT OFFICE.

LEWIS F. OSTRANDER, OF MILWAUKEE, WISCONSIN.

VENT VALVE.

Application filed May 22, 1926. Serial No. 111,044.

This invention relates to improvements in venting devices of the type used in the boiler return lines of low pressure heating systems.

In low pressure or vapor heating systems, wherein vapor is generated in a suitable boiler and piped to the radiators and the condensate and excess vapor returned to the boiler by way of suitable return lines, a venting device is generally placed in each of the return lines at a point near the boiler for the purpose of venting the air from these lines while preventing the escape of the condensate and excess vapor and permitting return of the latter to the boiler. Various types of these venting devices have been constructed and comprise, in general, a casing or chamber provided with an outlet opening and a controlling valve therefor, a float arranged in the chamber for closing the valve upon partial filling thereof by the condensate, a thermostatic element arranged in the chamber and responsive to a rise in temperature due to the entrance of vapor into the chamber to also close the valve, and a check valve arranged on the atmosphere side of the outlet opening and opening with the pressure in the chamber, this check valve permitting escape or venting of air from the return line while preventing air from being drawn into the system from the outside. While these venting devices constructed heretofore have been more or less satisfactory, they are open to the objections that it requires an appreciable amount of pressure to open the air vent valve and, further, that the latter has a tendency to freeze or stick to its seat and in some cases, as, for instance, when the system has been shut down for a comparatively long period of time, is only dislodged upon jarring of the device or disassembly thereof. This sticking of the air vent valve to its seat permits air to be trapped in the boiler return line, which condition interferes with the free circulation of vapor from the boiler to the radiators and materially decreases the efficiency of the entire system.

One of the objects of the present invention is to provide an improved venting device of the type referred to which has all the advantages of those constructed heretofore as regards closing of the vent or outlet passage against the escape of condensate or excess vapor, and wherein the air vent valve is so constructed and mounted as to be balanced with the normal pressure in the return line whereby this latter valve opens readily upon a rise in the pressure in the boiler return line a relatively slight amount above atmospheric, and wherein the air vent valve is so constructed and mounted as to prevent sticking or freezing thereof to its seat even under conditions where the system is shut down for a relatively long period of time.

Other objects and advantages will hereinafter appear.

For the purpose of illustrating the invention, one embodiment thereof is shown in the drawings, in which:

Figure 1 is an elevational view of the improved venting device, partly in section and partly broken away;

Fig. 2 is an enlarged section on the line 2—2 of Fig. 1; and

Fig. 3 is a perspective view of a vapor heating system, showing one manner in which the improved venting device may be embodied therein.

Referring first to Fig. 3, vapor is generated in the boiler 10 and is conducted to the radiators 11 by way of supply pipe 12 and the branch pipes 13, the excess vapor being returned to the boiler by way of the return line 14 which is connected to and is in effect a continuation of supply line 12, the elbow 15 and pipe 16, the latter being connected to the boiler at a point below the water level therein. For the purpose of providing for circulation of the vapor through the radiators and for returning the condensate from the radiators back to the boiler, a second return line 17 is connected to the radiators by branch pipes 18 and leads back to the boiler by way of an elbow 19 and the pipe 20 also connected to the boiler at a point below the water level therein.

Referring now to Fig. 1, the casing 21 is provided at its lower end with a nipple 22 threaded into elbow 15, as shown, and providing an inlet opening 23 for the device communicating with elbow 15 and the return line 14 connected to the latter. A cap 24 is threaded into the upper end of casing 21 and is provided with a central opening into which a plug 25 is screwed, the latter being apertured to provide an outlet opening 26 for casing 21 and providing a seat at its lower end for the valve 27. The valve 27 is threaded into the upper end of a float 28 arranged in casing 21 and is provided with a guiding stem 29 extending loosely through outlet opening 26.

A thermostatic element 30 is arranged in casing 21 between float 28 and a partition 31 which may be formed integrally with the casing, element 30 being provided on its underside with a supporting nipple 32 screwed into partition 31 to provide for adjustment, the partition being provided with suitable openings 33 providing communication between opposite sides of the same.

The cap 24 is hollow to provide an air exhaust chamber 34 and is provided with an inwardly extending horizontally inclined boss 35 into which a bushing 36 is screwed, the latter being provided with an axial recess 37 extending from one end thereof to within a short distance of the other end 38, end 38 being provided with an air exhaust or vent opening 39. The boss 35 and bushing 36 screwed therein are inclined a relatively small amount with respect to the horizontal, this arrangement placing venting opening 39 on a relatively small pitch with respect to the vertical. The longitudinal axis of the bushing is therefore disposed to the longitudinal axis of casing 21 at an angle a relatively small amount in excess of ninety degrees. Bushing 36 is provided with inwardly and longitudinally extending lugs 40 arranged concentrically of the vent opening 39 and providing guiding means for the ball valve 41 adapted to close the air vent opening 39 upon decrease in the pressure in air exhaust chamber 34 to a point slightly below atmospheric. It is important to note that by reason of the construction just explained wherein the seat of the vent opening 39 is on a relatively small pitch with respect to the vertical and wherein the ball valve guiding means or ribs 40 are inclined a relatively small amount with respect to the horizontal, the ball valve opens readily upon the slightest rise in pressure in the air exhaust chamber 34, the slight pitch or incline of ribs 40 being sufficient to cause the ball valve 41 to rest normally against its seat 38 very lightly under the action of gravity. A plug 42 is screwed into the open end of bushing 36 to provide a stop for valve 41 and to hold the same in recess 37, plug 42 being provided with an opening 43 eccentric with respect to valve 41 to prevent the latter from closing this opening whereby the same provides communication at all times between recess 37 and the atmosphere.

A plug 44 is screwed into the upper end of cap 24 and may be removed to permit insertion of a suitable tool into engagement with the slotted upper end of plug 25 for the purpose of adjusting the latter with reference to valve 27 so that the seating of the valve may be accurately regulated.

In the operation of the heating system, any air in the boiler return line 14 will be permitted to escape therefrom by way of openings 23 and 33, outlet opening 26, air exhaust chamber 34, the air exhaust or vent opening 39, and opening 43, the horizontally pitched guiding ribs 40 permitting the air vent valve 41 to open readily under an air pressure in chamber 34 slightly above atmospheric. Upon decrease of the pressure in the system to a point below atmospheric, due to sudden chilling of one of the radiators to cause condensation of the vapor, or for other reasons, the ball check valve 41 will be readily seated under the slightly greater atmospheric pressure as well as the tendency for the valve to seat under the action of gravity, as explained above. When all of the air has been vented from the return line 14, and the excess vapor begins to flow back to the boiler by way of elbow 15 and pipe 16, part of this vapor will flow into casing 21 by way of inlet opening 23 and openings 33 and heat up the thermostatic element 30 to cause expansion thereof whereby the same operates to close valve 27, thus preventing escape of the vapor by way of the air vent opening 39. Upon return of the water of condensation to the boiler by way of elbow 15 and pipe 16, some of the condensate will enter casing 21 by way of openings 23 and 33, float 28 then rising to close valve 27 and prevent escape of the condensate by way of the air vent opening 39. The thermostatic element 30 therefore operates to close valve 27 to prevent the escape of vapor, while float 28 operates to close valve 27 to prevent the escape of condensate. A vent trap 45, identical in construction with that shown in Fig. 1 and described above, is connected to elbow 19 for the boiler return line 17, as shown in Fig. 3.

Bushing 36, valve 41 and plug 42 are assembled as a unit and screwed into cap 24 as shown, but of course the bushing may be omitted and the valve seat 38 and the valve guiding ribs 40 formed integrally with boss 35.

From the foregoing it will be seen that an improved venting device of the character described has been provided wherein the air vent or exhaust check valve is balanced with the normal pressure in the boiler return line and seats upon a seat pitched a relatively small amount with respect to the vertical whereby this valve is opened upon slight rise in pressure in the return line to a point slightly above atmospheric, and that by reason of the improved construction and manner of mounting this valve, there is no tendency of the latter to stick or freeze to its seat, or collect foreign matter.

While one embodiment of the invention has been shown and described, of course various changes may be made, such as in the size, shape and arrangement of the parts, without departing from the spirit of the invention or the scope of the claims.

The invention claimed is:

1. In a venting device of the character described including a casing having an outlet opening and valve mechanism for opening and closing said opening, an auxiliary air exhaust chamber communicating with the interior of said casing by way of the outlet opening thereof, a ball valve associated with said chamber and opening upon a predetermined rise in the pressure therein to provide a communication between the same and the atmosphere, and guiding means for said ball valve, said means being inclined upwardly in the direction of the opening movement of said ball valve a relatively slight amount with respect to the horizontal.

2. In a venting device of the character described, including a casing having an outlet opening and valve mechanism for opening and closing said opening, an auxiliary air exhaust chamber communicating with the interior of said casing by way of the outlet opening thereof, a hollow bushing screwed into said chamber and inclined a relatively small amount with respect to the horizontal with the end thereof interior of said chamber below the horizontal, said end being apertured to provide a vent for said chamber to the atmosphere, the other end of said bushing being open to the atmosphere, and a ball valve arranged in said bushing to seat over said vent and being operable to open the latter upon rise in pressure in said chamber to a point above atmospheric and to close said vent upon drop in pressure in said chamber to a point below atmospheric.

3. In a venting device of the character described including a casing having an outlet opening and valve mechanism for opening and closing said opening, an auxiliary air exhaust chamber communicating with the interior of said casing by way of the outlet opening thereof, a hollow bushing screwed into said chamber with its longitudinal axis disposed to the longitudinal axis of said casing at an angle a relatively small amount in excess of ninety degrees, the end of said bushing interior of said chamber being apertured to provide a vent for the latter to the atmosphere, the other end of said bushing being open to the atmosphere, and a ball valve arranged in said bushing to seat over said vent and to open the latter upon increase in the pressure in said chamber to a point above atmospheric.

4. In a venting device of the character described including a casing having an outlet opening and valve mechanism for opening and closing said opening, an auxiliary air exhaust chamber communicating with the interior of said casing by way of the outlet opening thereof, said chamber being provided with an inwardly extending recess and a valve seat providing communication between said chamber and recess, said recess being open to the atmosphere, and a ball valve arranged in said recess to seat upon said seat upon drop in the pressure in said chamber to a point below atmospheric and for movement away from said seat upon rise in the pressure in said chamber to a point above atmospheric.

5. In a venting device of the character described including a casing, a vertically-pitched valve seat providing an air vent for said casing, and a ball valve arranged to normally seat over said vent and to open upon a predetermined rise in the pressure in said casing.

6. In a venting device of the character described including a casing, a hollow horizontally inclined bushing threaded into said casing and provided at the end thereof interior of said casing with a vertically-pitched valve seat providing an air vent for said casing, the other end of said bushing being open to the atmosphere, and a ball valve arranged in said bushing to normally seat over said vent and to open the latter upon rise in the pressure in said casing to a point above atmospheric.

7. In a venting device of the character described, a casing provided with an inwardly extending recess open at one end to the atmosphere, a vertically disposed valve seat at the other end of said recess providing an air vent for said casing, and a ball valve arranged in said recess to seat over said vent and to open upon a predetermined rise in the pressure in said casing.

8. A venting device of the character described comprising a casing provided at its lower end with an inlet opening and an apertured partition, a hollow cap secured to and closing the upper end of said casing, a bushing screwed into the underside of said cap and provided with an axial opening extending therethrough, the interior of said cap being open to the atmosphere, a pair of superimposed members arranged in said casing and supported by said partition, a valve carried by and extending upwardly from the upper end of the uppermost member and arranged to seat against the lower adjacent end of said bushing to close said axial opening, one of said members being responsive to a given change in temperature in said casing to close said valve, the other of said members being responsive to high water level condition in said casing to close said valve, said cap being provided with a valve seat communicating with said axial opening, and a ball valve arranged in said cap and operable under the action of gravity to seat against said seat, said valve opening upon a predetermined rise in the pressure in said casing to permit venting of air therefrom by way of said cap.

9. An air venting device for low pressure heating systems comprising a vertically dis-

posed casing, a valve therein near the upper end thereof providing communication with the atmosphere, said valve including a seat uprightly disposed and slightly inclined from the vertical, a ball cooperating with said seat, and a runway for said ball disposed at right angles to the plane of the seat.

10. A venting device of the character described comprising a casing provided with an outlet opening, valve means for controlling fluid flow from said casing by way of said opening, a vertically-pitched valve seat on the outlet side of said opening providing an air vent for said casing, and a ball valve arranged to normally seat over said vent and to open upon a predetermined rise in the pressure in said casing.

In witness whereof, I hereto affix my signature.

LEWIS F. OSTRANDER.