

M. P. OSBOURN.
VACUUM STEAM HEATING SYSTEM.
APPLICATION FILED MAR. 2, 1908.

1,075,490.

Patented Oct. 14, 1913.

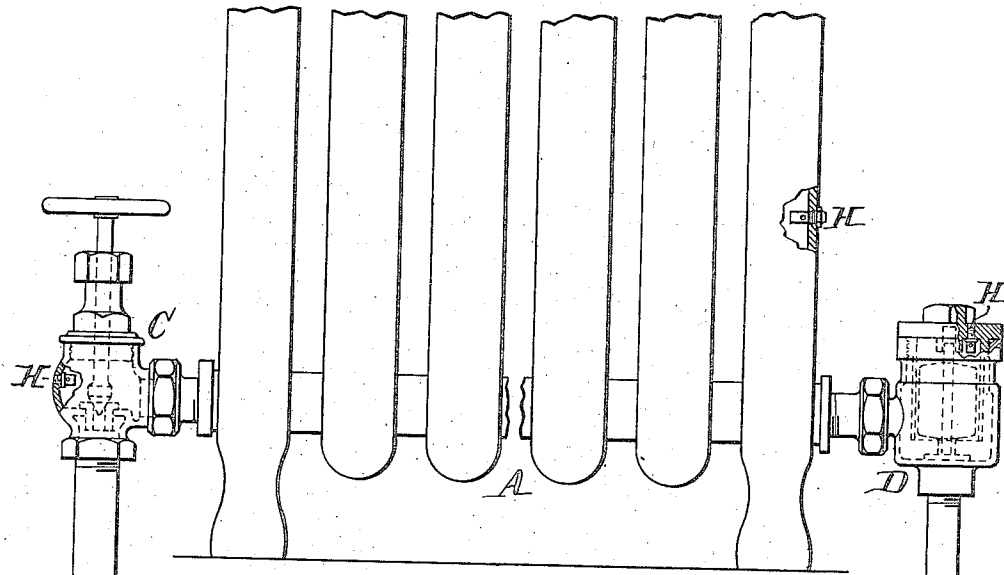


FIG. 1

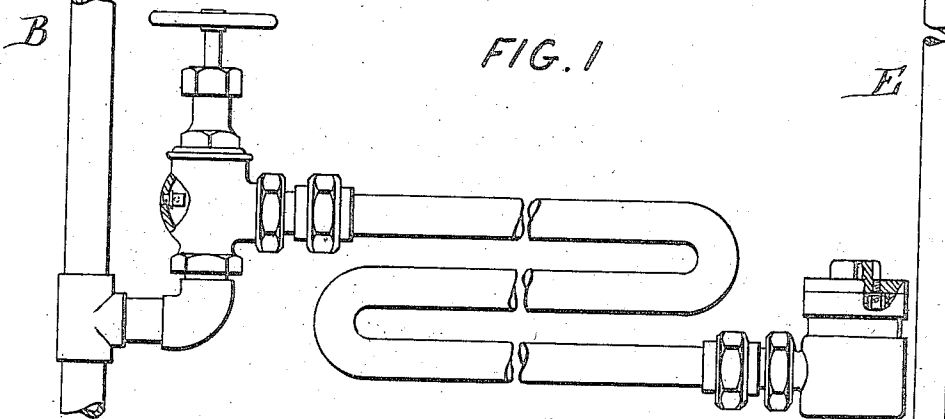


FIG. 2

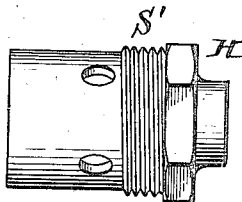
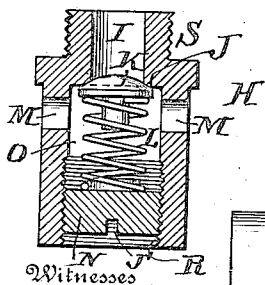
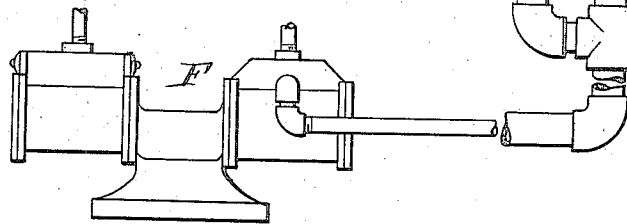


FIG. 3



Daniel Webster, Jr.
S. T. Driscoll

Inventor
Mellard P. Osbourn

By *[Signature]*

Attorney

UNITED STATES PATENT OFFICE.

MILLARD P. OSBOURN, OF MERCHANTVILLE, NEW JERSEY, ASSIGNOR TO WARREN WEBSTER & COMPANY, A CORPORATION OF NEW JERSEY.

VACUUM STEAM-HEATING SYSTEM.

1,075,490.

Specification of Letters Patent.

Patented Oct. 14, 1913.

Application filed March 2, 1908. Serial No. 418,676.

To all whom it may concern:

Be it known that I, MILLARD P. OSBOURN, a citizen of the United States, and a resident of the city of Merchantville, county of Camden, State of New Jersey, have invented an Improvement in Vacuum Steam-Heating Systems, of which the following is a specification.

My invention has reference to vacuum steam heating systems, and consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings, which form a part thereof.

The object of my invention is to prevent "back lash" or drawing into the radiator or heating coils of hot vapors, air and water from the return pipe at such times as those when the supply valve is closed or almost closed and excessive condensation within the radiator or heating coils results whereby a partial vacuum is created therein greater than the normal partial vacuum existing in the return pipe. The objection to the drawing in of such hot vapors and water from the return under this abnormal action or "back lash", lies in the fact that it tends to maintain the radiator or heating coil in a heated condition for a considerable period after attempt has been made to reduce its temperature by reducing or cutting off its steam supply; also in the fact that it seriously interferes with the proper drainage of the heating unit when the steam is again turned on fully or only partially as when a modulated heating effect is required, because of the presence of the said water and air which has accumulated within the heating unit under the influence of said "back lash"; also in the fact that as the extent of vacuum within the heating unit is greater than that in the return pipe, it causes a flow of the vapor, air and water through the automatic return valve of the heating unit in the opposite direction to the usual or normal flow and an objectionable tapping or chattering noise is produced.

All of the foregoing defects or objections are overcome by the employment of the method and means specified hereinafter.

My invention may be embodied in commercial vacuum steam heating systems by providing means for automatically admitting a proper amount of air within the radiator

or heating unit whenever the internal pressure of the radiator or heating unit becomes, from any cause, less than the internal pressure existing within the return pipe, it being understood that said internal pressure in the radiator or heating unit under the conditions stated is less than atmospheric pressure, the air so admitted operating to raise the internal pressure until it equals or becomes greater than the pressure within the return pipe adjacent to the radiator or heating unit.

The means employed for accomplishing the above specified control may be a small check valve arranged to admit the regulating air directly into the body of the heating unit or through the bodies of its supply or return valve or connections between said valves and the heating unit itself. In the preferred form of automatic vacuum controlling valve for thus admitting air to reduce the partial vacuum within the heating unit, I provide means for resisting its opening so as not to make it too sensitive, and said means is preferably adjustable so that the valve may be so adjusted that it cannot open at any pressure greater than that which properly exists in the return pipe.

In the commercial application of my invention to a two pipe vacuum system, employing "motor" or "float" valves in the return ends of the radiators or heating units, I prefer to place the automatic vacuum controlling valves in the body of the "motor" or "float" valves and immediately above air vents therein so as to affect the differential condition existing above and below the discharge valve controlled by the "motor" or "float" element and thereby at once prevent a condition capable of producing tapping or chattering of said discharge valve, notwithstanding that the change in pressure conditions within the radiator or heating unit may proceed more slowly.

My invention also comprehends other features which, together with those above specified, will be better understood by the following explanations taken in connection with the accompanying drawings, in which:—

Figure 1 is a general view in elevation showing a vacuum system of steam heating embodying my invention in its construction and operation; Fig. 2 is a sectional elevation on an enlarged scale showing one of

my improved vacuum control valves shown in Fig. 1; and Fig. 3 is an elevation of a modified form of the same.

A is the radiator or heating unit and may be of any ordinary or suitable construction, B is the steam supply pipe, and C is the steam supply valve for regulating the supply of steam to the radiator. E is a return pipe leading to the vacuum pump or device for maintaining a partial vacuum in the return, and D is the return valve interposed between the radiator and the return. In practice, this return valve may be of any suitable construction, automatic or otherwise, but preferably of the construction known as "motor" or "float" valves, which are provided with vents or restricted passages for the escape of air and with discharge valves for permitting the intermittent escape of accumulated quantities of water of condensation under control of the "motor" or "float" elements of the valve. All of these elements are well known to those skilled in the art and will require no further description.

H indicates the vacuum control valves, and while one only will be necessary for ordinary radiators or heating units, I have shown three of said valves located in different positions by way of illustration of the application of my invention. One of these valves H has been placed in the body of the supply or modulation valve C, one has been placed on the body of the radiator above the water level, and the third has been placed in the cap of the body of the return valve in the immediate vicinity of the air vent above referred to. Any one or more of these vacuum control valves may be employed at any one time, or the valves may be placed in any other convenient position so long as they are between the valve seats of the supply and return valves and in communication with the contents of the radiator or heating unit.

Referring more specifically to Fig. 2, H is the vacuum control valve and has a tubular body O having a valve seat J and a screw-threaded boss S through which the inlet port I extends in communication with the said valve seat J. The body O is also provided with air outlet ports M adjacent to the valve seat and an internal screw-thread R at its lower part. K is the check valve arranged within the body O and pressed against its valve seat J by the spring L whose tension may be adjusted by the bushing or plug N which is screwed into the screw-threaded part R of the body and adapted for adjustment by provision of a slot J' for receiving a screw driver for turning it. By this means, the proper degree of pressure may be put upon the valve to make it resist opening until a definite difference between the internal and atmospheric pres-

sure has been reached, and consequently also until a substantially definite differential in pressure between the pressure in the return and in the part of the heating system in which the valve H is located, is also reached as hereinbefore explained. This valve H is secured upon the inside bodies of the supply and return valves by the threaded bosses being screwed into threaded holes through said bodies or caps thereof. In the case of attaching the valves H to the radiator direct they may have their body made as in Fig. 3, in which the threaded portion S' would be used instead of the threaded boss.

In the operation of the above described apparatus, when the normal operation of the heating system is taking place, steam is admitted by the supply valve C and the water of condensation and air are caused to pass into the return E through the return valve D. Should the supply valve C be shut off wholly or to such an extent as to prevent steam passing into the radiator or to reduce the volume of steam to such an extent that it condenses with the production of a partial vacuum within the radiator or heating unit, the said partial vacuum would be greater than the partial vacuum in the return E and the flow through the valve D would be reversed, and the vapor, air and water from the return E would flow back into the radiator F. This action, if not prevented, would produce the tapping or chattering of the valve piece in the return valve D upon its seat; but by the provision of the vacuum control valves H above described the possibility of the creation of a vacuum within the radiator or heating unit greater than the partial vacuum in the return E is prevented, and consequently the objectionable operation above referred to is avoided. Where the valve H is located in the return valve D or immediately adjacent thereto on the right side, it is evident that a partial vacuum might be temporarily maintained in the radiator F or some portion thereof greater than the partial vacuum in the return pipe, but its effect would be nullified upon the return valve D, because of the close proximity of the vacuum control valve H to the valve piece of the return valve D. It will also be understood that as an excess of vacuum within the radiator is either prevented or rendered inefficient to suck hot vapors from the return E into the radiator because of the presence of the control valve H adjacent to the return valve, it will be apparent that the radiator A will not be capable of heating up after the supply valve C has been closed. Another objection which my improvement overcomes is that where a series of radiators are coupled in parallel between the supply and return pipes, any excessive vacuum within any radiator would, if not otherwise prevented, in-

crease the partial vacuum in the return and would modify the differential existing on the other radiators immediately adjacent, but this is entirely overcome by the use of my improved system herein described.

I have described my invention in a form adapted for general use and adapted to be used in connection with present steam fittings and return valves of ordinary steam heating apparatus, but I do not limit or restrict myself to the details thereof, as they may be varied or modified without departing from the spirit of the invention.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. The herein described method of operating a vacuum system of steam heating which consists, in supplying steam to a plurality of radiators or coils and independently regulating or shutting off the supply of said steam in accordance with the requirements, simultaneously therewith maintaining a partial vacuum in a return pipe and exhausting thereby the air and water of condensation from the plurality of radiators and each of them, and automatically admitting air from the room outside of the return pipe to the radiators or coils and each of them immediately when the internal pressure therein becomes lowered below atmospheric pressure approximately equal to the pressure in the return pipe adjacent to said radiators or coils.

2. The herein described method in a heating system of preventing back circulation from the return pipe into the heating unit and resulting noise from back lash, which consists in normally maintaining a differential in pressure within the heating unit and return at all times during the operation of the heating system whereby the circula-

tion will be from the supply pipe through the heating unit into the return, varying the steam supply to any extent desired to vary the heating effect of the heating unit, and preventing a reversal of the differential in pressure between the heating unit and return by automatically admitting air from the atmosphere outside of the return pipe into the heating unit immediately after reducing or shutting off the steam supply thereto to maintain an internal pressure in said heating unit adjacent to the return equal to or greater than the pressure in the return.

3. The herein described method of preventing back lash in a vacuum steam heating system employing return valves between the radiators and vacuum return pipe, which consists in lowering the internal pressure in the radiator by hand control of the steam supply thereto until it is below atmospheric pressure and then automatically checking the further lowering of the pressure on the inlet side of the return valve by admitting air into the radiator from the atmosphere outside of the return pipe, whereby the internal pressure within the radiator shall not be permitted to become lower than the internal pressure of the return pipe adjacent to the radiator, and drawing any surplus air so admitted to the radiator into the return pipe after the radiator has cooled to maintain the pressure in the radiator when cold approximately the same as that in the return pipe.

In testimony of which invention, I have hereunto set my hand.

MILLARD P. OSBOURN.

Witnesses:

R. M. HUNTER,
R. M. KELLY.