B. W. McCLYMONT.

HEATING SYSTEM AND HYDRAULIC VACUUM GENERATOR.

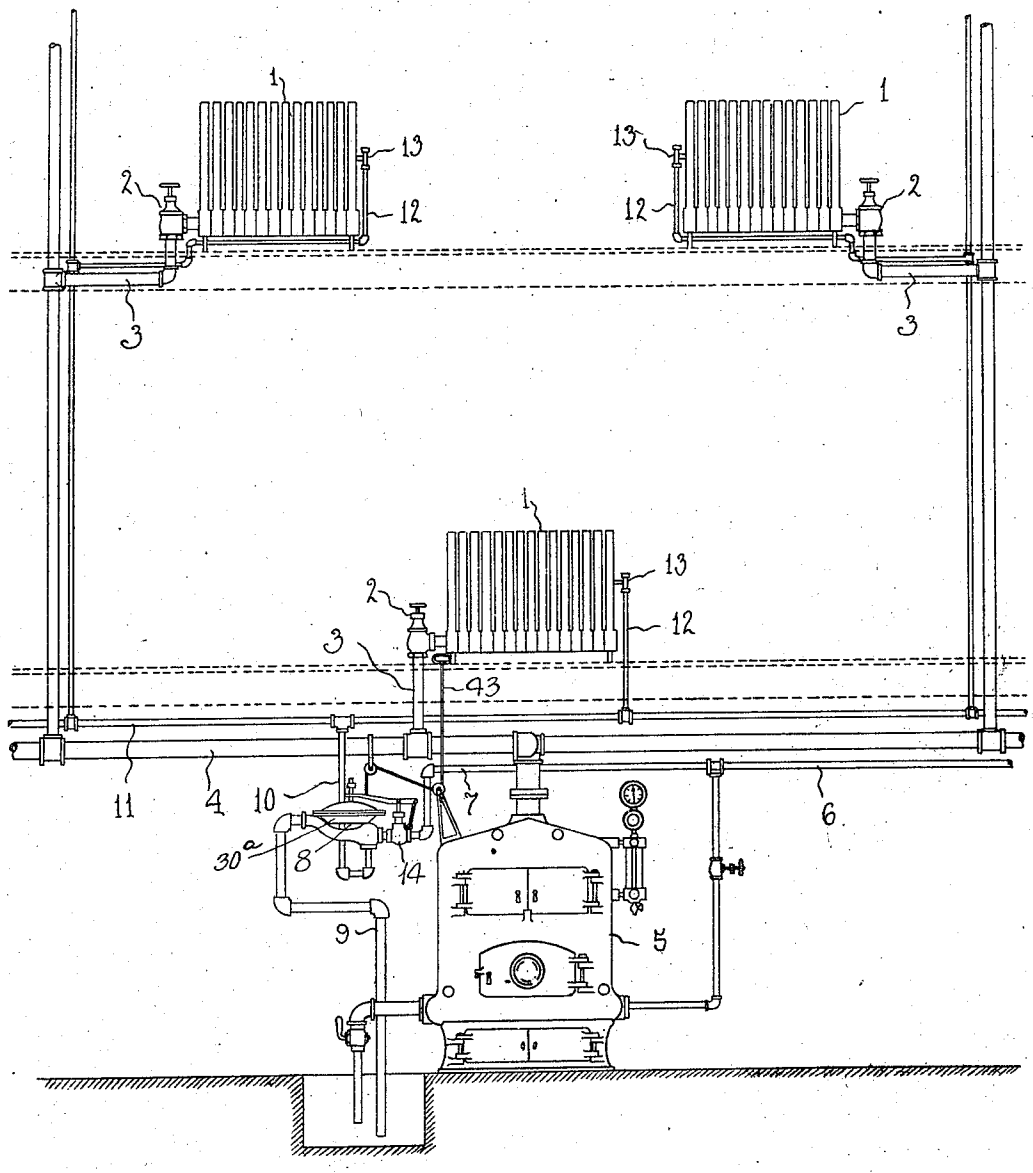
APPLICATION FILED JULY 24, 1916.

1,265,928.

Patented May 14, 1918

2 SHEETS—SHEET 1.

Fig. 1



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Witnesses

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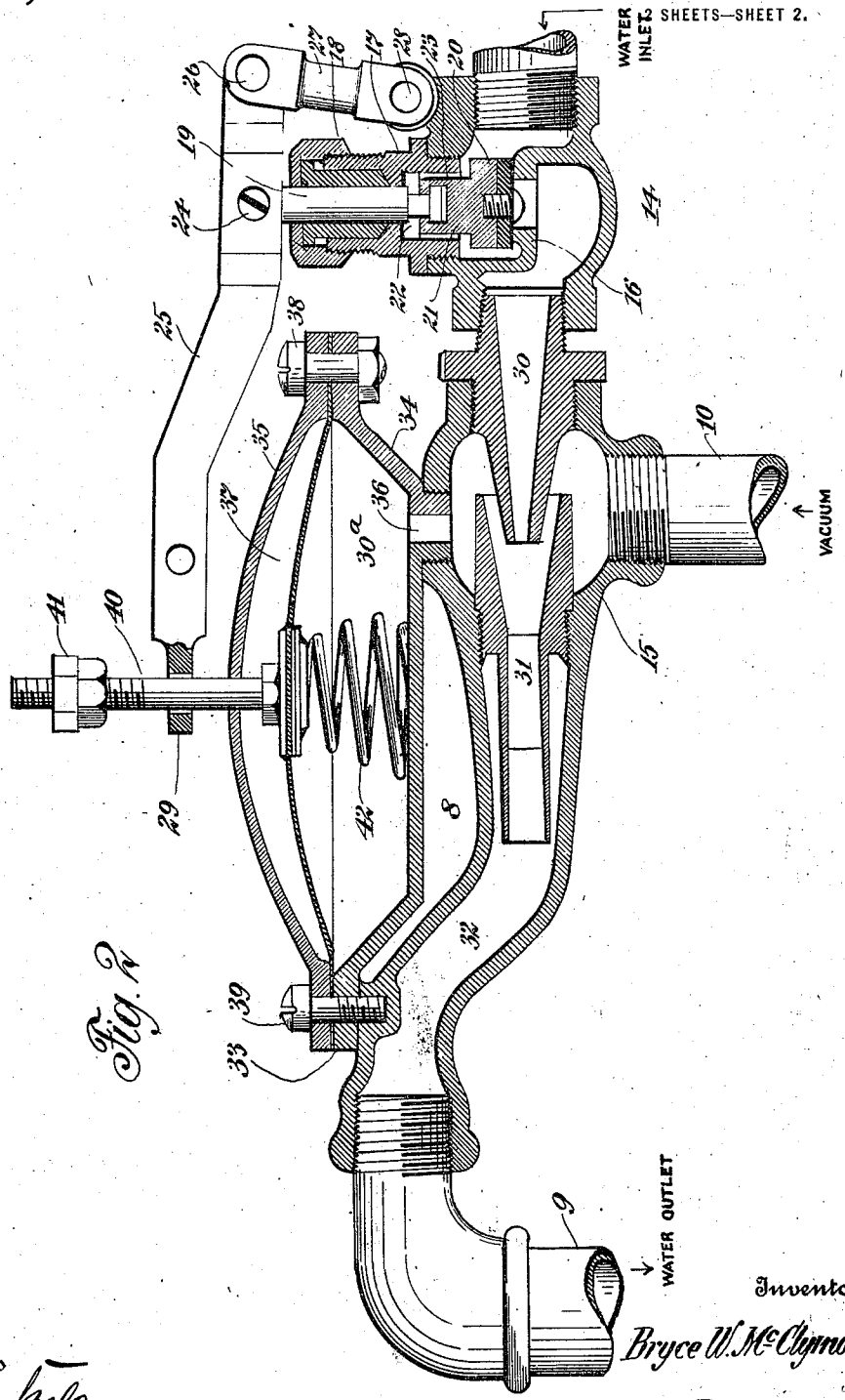


Fig. 2.

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UNITED STATES PATENT OFFICE.

BRYCE W. McCLYMONT, OF DETROIT, MICHIGAN.

HEATING SYSTEM AND HYDRAULIC VACUUM-GENERATOR.

1,265,928. Specification of Letters Patent. Patented May 14, 1918.

Application filed July 24, 1916. Serial No. 110,905.

To all whom it may concern:

Be it known that I, BRYCE W. McCLYMONT, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Heating Systems and Hydraulic Vacuum-Generators, of which the following is a specification, reference being had therein to the accompanying drawings.

To produce vacuum at predetermined times in connection with a heating system, it is the present practice to utilize electrically driven pumps or similar devices necessitating an expensive installation and constant attention. Since there is necessarily a water supply in connection with a heating system, I have discovered that the water supply can be used as a motive fluid, in connection with a vacuum generator for producing vacuum or suction which will positively withdraw air from a heating system, and it is the installation of a hydraulic vacuum generator in connection with a heating system to which this invention relates.

To meet all requirements, it is necessary that the vacuum system in connection with a heating apparatus be manually placed in operation and automatically controlled after the apparatus has been placed in operation, and in order that my invention may be fully understood, reference will now be had to the drawing, wherein—

Figure 1 is a diagrammatic view of a heating system or apparatus provided with a hydraulic vacuum generator in accordance with my invention, and

Fig. 2 is a longitudinal sectional view of a hydraulic vacuum generator provided with a diaphragm control.

In the drawings, 1 denotes a series of radiators or a steam circulating medium having valves 2 adapted to be manually opened and closed. The valves are connected by branch pipes 3 to a feed pipe 4 in communication with a suitable source of steam or hot water 5, as a steam or hot water boiler or a central steam heating system. For the purposes of explaining my invention, the source of steam will be hereinafter referred to as a steam boiler, and as with all steam generators, there is necessarily present a water supply as an agent of the heating system, which in the present instance is represented by a pipe 6 supplied with water under city pressure. The pipe 6 is provided with a branch 7 and connected thereto is a hydraulic vacuum generator generally designated 8. The generator is provided with a drain or discharge pipe 9 and is connected by a pipe 10 to a main air pipe 11. This main air pipe is connected by branches 12 to air valves 13 of the radiators 1 adapted to be closed by steam.

The diaphragm type of vacuum generator includes a shut off valve 14, an ejector 15, and a diaphragm casing 30^a which are installed at such a point in the heating system as to be easily controlled from any compartment heated by the system.

The shut off valve 14 comprises a conventional valve body having a horizontal apertured partition 16 affording a valve seat, and connected to said valve body is a bonnet 17 having a stuffing box 18 for a valve stem 19. The valve stem 19 has the inner end thereof provided with a rotatable valve 20 and a cylindrical portion 21 of said valve extends into a cushion chamber 22 in the inner end of the bonnet 17. The walls of the valve portion 21, are longitudinally scored or grooved, as at 23, whereby a quantity of water may enter the chamber 22 and serve as a cushioning agent, also the grooves 23 allow a sufficient quantity of water to enter the chamber 22, under pressure, whereby, the pressure of water will close the valve.

The outer end of the valve stem 19 is pivotally connected, as at 24, to an operating lever 25 and the short end or arm of said lever is pivotally connected, as at 26, to a link 27 pivotally mounted, as at 28, upon the body of the shut off valve 14. The long arm of the operating lever 27 extends over the diaphragm casing 30^a and is formed with an apertured lug 29, the purpose of which will hereinafter appear.

The ejector 15 comprises a casing or chamber connected to the air pipe 10 and provided with a jet 30, a nozzle 31, and an ogee water seal 32. The jet 30 has the outer end thereof connected to the shut-off valve 14 and the inner end of said jet extends into the nozzle 31, which is mounted in the inner end of the ogee water seal 32. This ogee water seal has the outer end thereof connected to the water discharge or drain pipe 9 and adjacent the connection is a boss 33 constituting one of the supports for the diaphragm casing 30^a. The diaphragm casing 30^a is preferably made of two sections 34

and 35, with the section 34 provided with a nipple 36 mounted in the ejector body 15 and establishing communication between the vacuum chamber of said ejector and the section 34 of the diaphragm casing. Between the sections 34 and 35 of the diaphragm casing there is mounted a flexible diaphragm 37, said diaphragm being held by a fastening means 38 connecting the sections 34 and 35, also a fastening means 39, which besides connecting the sections 34 and 35 retains said sections in engagement with the ogee water seal 32. Connected to the diaphragm 37 is a plunger 40 extending out of the casing section 35 and through the apertured lug 29 of the operating lever 25. The outer end of the plunger 40 is provided with an adjustable head or nut 41 adapted to impinge upon the lug 29 when the diaphragm 37 is flexed in one direction. Between the diaphragm 37 and the casing section 34 is a coiled compression spring 42 having a predetermined expansive force holding the diaphragm normally in the position shown in Fig. 2.

In order that the shut-off valve 14 may be manually opened, the operating lever 25 has a suitable connection 43 whereby it may be actuated from any compartment served by the heating system.

When the lever 25 is raised and the valve ened, water or other motive fluid is discharged by the jet 30 into the nozzle 31 and pressure is reduced in the ejector casing or body 15 and a vacuum or suction produced therein which immediately draws air from the pipes 10, 11 and 12, valves 13 and radiators 1, the exhaust of air allowing steam to rapidly circulate throughout the heating system and close the air valves. As the vacuum increases in the ejector, caused by the closing of the air valves 13, the expansive force of the spring 42 is gradually overcome and the diaphragm 37 is actuated against the action of the spring to shift the plunger 40 inwardly, thereby automatically closing the valve 14, and causing a cessation in the operation of the vacuum generator.

When the diaphragm 37 is shifted inwardly, the head or nuts 41 moves the operating lever 25 of the shut-off valve 14 and imparts sufficient movement to the valve 20 whereby the water within the chamber 22, under pressure, positively seats the valve 20 and shuts off the supply of water to the jet 30. The spring 42 flexes the diaphragm 37 to normal position and the vacuum generator is in condition for another operation.

What I claim is:—

A hydraulic vacuum generator comprising an injector casing adapted to receive motive fluid, a sectional diaphragm casing mounted on said injector casing, a nipple connecting the lower section of said diaphragm casing to said injector casing to have pressure reduced therein by the passage of motive fluid through said injector casing, fastening means for connecting the sections of said diaphragm casing with one of said fastening means attaching said diaphragm casing to said injector casing, a diaphragm between the sections of said diaphragm casing, a valve connected to said injector casing and controlling the supply of motive fluid thereto, an operating lever for said valve extending above said diaphragm casing, means connected to the top of said diaphragm and extending out of said diaphragm casing adapted to actuate said operating lever to close said valve when said diaphragm is flexed in a downward direction, and means in said diaphragm casing adapted to restore said diaphragm and said lever actuating means to normal position.

In testimony whereof I affix my signature in the presence of two witnesses.

BRYCE W. McCLYMONT.

Witnesses:

KARL H. BUTLER,

ANNA M. DORR.