

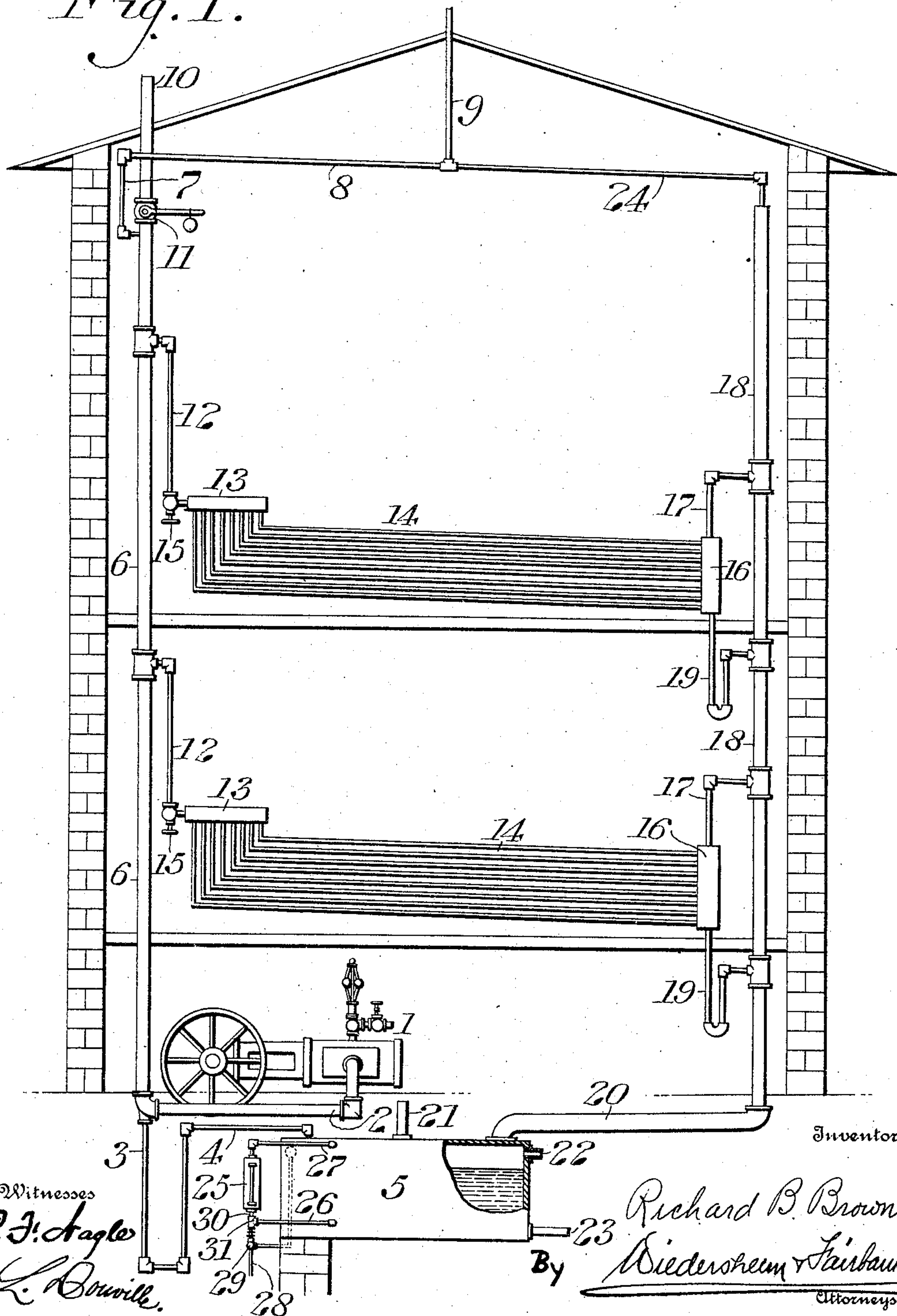
R. B. BROWN.

EXHAUST HEATING OR LOW PRESSURE SYSTEM.

APPLICATION FILED MAR. 9, 1903.

2 SHEETS—SHEET 1.

Fig. 1.



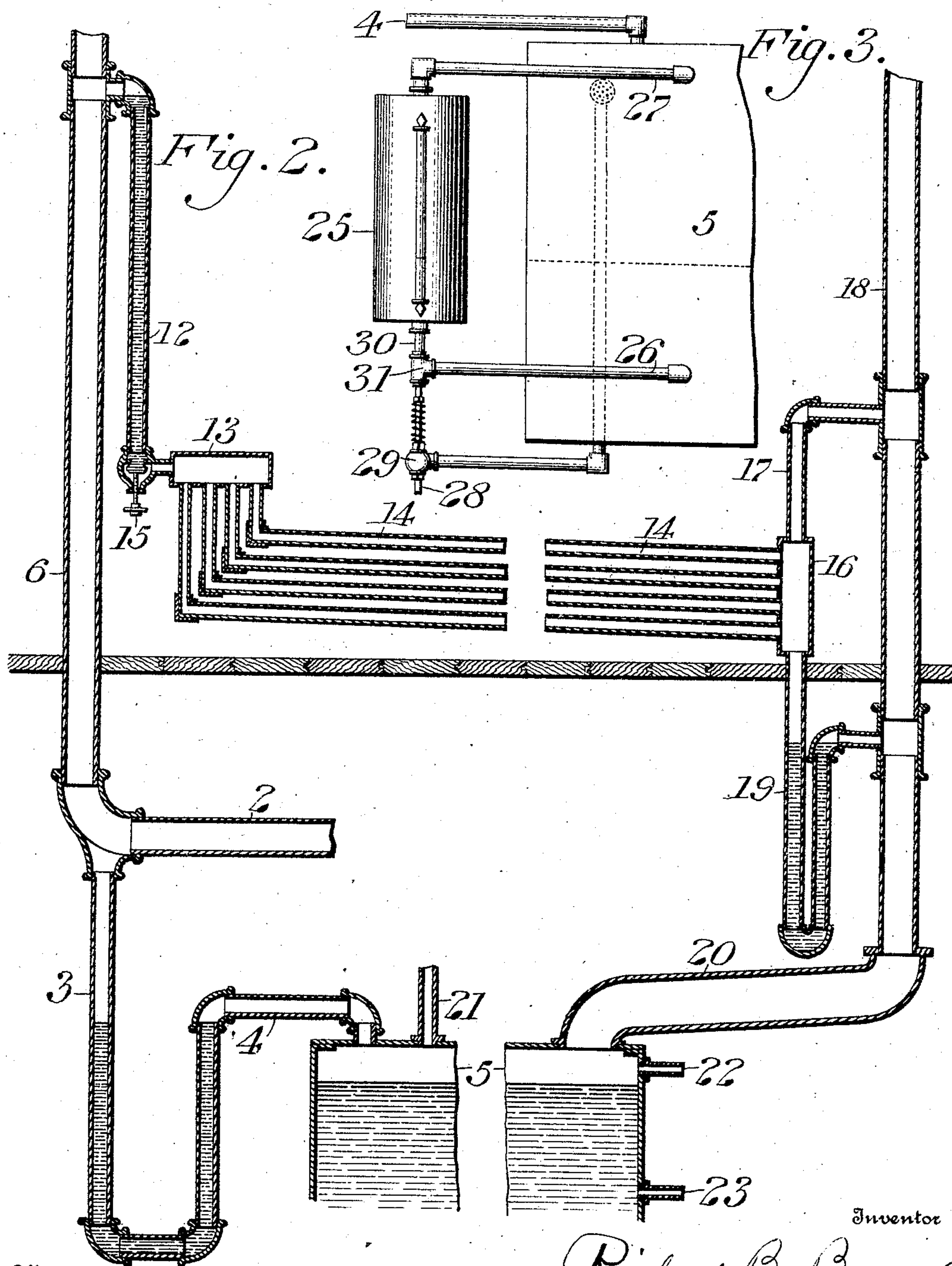
No. 785,473.

PATENTED MAR. 21, 1905.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

RICHARD B. BROWN, OF PHILADELPHIA, PENNSYLVANIA.

EXHAUST HEATING OR LOW-PRESSURE SYSTEM.

SPECIFICATION forming part of Letters Patent No. 785,473, dated March 21, 1905.

Application filed March 9, 1903. Serial No. 146,803.

To all whom it may concern:

Be it known that I, RICHARD B. BROWN, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Exhaust Heating or Low-Pressure Systems, of which the following is a specification.

My invention consists of a novel exhaust heating or low-pressure system wherein I provide means for preventing pounding in the coil or radiators or pipes.

It further consists in providing a water-column for each coil or radiator.

It further consists in forming a suction to assist in drawing steam into a coil or radiator.

It further consists in providing means whereby the air and water are separately discharged from each coil or radiator and from the system.

It further consists in providing a trap for each coil or radiator.

It further consists of novel details of construction, all as will be hereinafter set forth.

Figure 1 represents an elevation showing an exhaust heating or low-pressure system embodying my invention. Fig. 2 represents a sectional view of a portion thereof, and Fig. 3 represents a view showing a water-regulator employed in connection with the latter.

Heretofore in many heating systems great difficulty has been experienced from the fact that an excess back pressure on the engine occurs, the bad effects of which are evident, and in addition considerable force is required at varying times in order to properly direct the exhaust to the various parts of the system, while at the same time pounding occurs in the pipes and considerable difficulty has been met with in removing water which accumulates in the system, this being heretofore accomplished by the use of a suction-pump. My system overcomes these difficulties by providing a main riser from the engine, providing a drain therefor with a trap therein leading to the hot-well, said main riser being suitably connected with the various coils or radiators of the system and having an air-vent open at all times to the atmosphere, said main riser being also pro-

vided with a valve controlling the outlet of the said riser, said valve being adjustable to the desired pressure—that is, can be set at any predetermined pressure to exhaust to the atmosphere. In practice this valve is set a few pounds above the pressure intended to be carried in the riser. Between each of the coils or radiators and the main riser is a water-column formed by condensation, which communicates with a manifold which is suitably connected with pipes of the coils or radiators, while at the opposite end of said pipes is a drip-manifold, from the upper portion of which leads a pipe serving as an air-exhaust, while from the lower portion of said drip-manifold is a drip-pipe for the water, which connects with the main drip. This latter is in communication with the hot-well, while it will be seen that the air from each radiator can pass upwardly through the main drip-pipe and out of the air-vent while the water of condensation passes from the drip-pipe to the main drip, whence it is conducted to the hot-well, it being noticed that the system has a slight pitch toward the main drip, whereby all the water of condensation will be conducted thereunto and to the hot-well by gravity, it being further understood that by the employment of the water-column, which has a suitable valve, the water serves a double purpose of driving before it any air which may be collected in the radiators and at the same time reduces the pressure in said columns to draw or suck in the steam from the main riser.

To the above end, therefore, 1 designates the engine of my system and from which leads the pipe 2, said pipe being connected, by means of a trap 3 and pipe 4, with the interior of the hot-well 5. The pipe 2 connects with the main riser 6, which has a pipe 7 in communication therewith at a point above the topmost coil or radiator, said pipe being in communication with the pipe 8, which is also in communication with the pipe 9, which discharges to the atmosphere, the main riser 6 being also open to the atmosphere at its end and has a valve 11, which can be adjusted to operate at any predetermined pressure, so that the steam can exhaust directly to the atmosphere, it be-

ing understood, however, that the air-vent is always open.

12 designates a pipe which is in suitable communication with the interior of the main riser at a point some distance above that with which it communicates with the manifold 13 of a coil or radiator 14, said manifold being in direct communication with the pipes of said coil or radiator, while the valve 15 is provided in said pipe 12 in order to open and close the same, it being understood that the said pipe 12 serves to hold a water-column when the valve 15 is closed, which will also serve to assist in preventing any steam from passing therethrough to the valve 15.

16 designates a drip-manifold suitably connected with the opposite ends of the pipes of the coil or radiator 14, said drip-manifold 16 having a pipe 17 of small size leading therefrom at substantially its upper portion and communicating with the main drip 18, a suitable pipe 19 leading from the substantially lower portion of the drip-manifold and having a trap and being in communication also with the main drip 18, the latter having a pipe 20 communicating with the interior of the hot-well 5. The hot-well is likewise provided with the air-outlet 21 and with an overflow 22 and also with a pipe 23, which leads to a suitable pump (not shown) for the purpose of pumping water into the boilers.

The operation of the parts as described will be readily understood, and as the operation of all of the coils or radiators is the same it has only been deemed necessary to describe one of these. I have shown two coils or radiators in different stories of a building; but it will be evident, however, that any number of coils or radiators may be employed and that the system may be extended to any height or extended over any area, as desired.

The valve 15 being closed and the engine 1 started, the exhaust therefrom will pass into the pipe 2, and any water of condensation will pass into the trap 3 and after filling same to the hot-well 5, the trap acting as a seal to prevent passage of steam thereinto. The steam passes into the main riser 6 and upwardly, the air passing through the pipes 7, 8, and 9 to the atmosphere. The pipes 8, 24, and 9 are ordinarily of relatively small size. In practice the loss of heat therethrough is negligible. By opening the valve 15 the water which is in the pipe 12, forming the water-column, will pass into the manifold 13 and from thence into the pipes of the coil or radiator 14 and will force the water which is remaining therein before it, while at the same time the passage of the water from the pipe 12 will reduce the pressure therein, which will draw or suck in the steam from the main riser. Thus the water and the air before it will be forced from the pipes of the coil or radiator 14 without occasioning any pounding, the pitch of said pipes assisting in this operation. It is evi-

dent that the flow of steam thus set up in the radiator 14 will be maintained in the usual manner by the pressure of steam in the circulating system. The water of condensation will pass into the pipe 19, in which there is a trap which prevents the escape of the steam therethrough, the water, however, passing into the main drip 18 and through the pipe 20 back to the hot-well 5, the air which is in the pipes 14 passing upwardly through the pipe 17 into the main drip 18 and will pass upwardly therethrough and out through the pipe 24 to the pipe 9 into the atmosphere, it being seen that the main drip serves the double purpose of carrying off the air from the coils or radiators and carrying down the water of condensation therefrom. Attention is also called to the fact that the pipes 8 and 24, which communicate with each other, as well as all the substantially horizontal pipes of the system, have a slight pitch toward the main drip 18, so that all the water of condensation will be directed to the hot-well. In this way the pure water is collected in the hot-well 5 and conducted therefrom through the pipe 23 by the suitable pump (not shown) back to the boiler 1 and which can be used over again. In order to provide or keep a uniform or substantially uniform level of liquid in the tank 5, I provide means connected with the said hot-well or water-tank 5 for this purpose. As the device is fully described in United States Patent No. 407,991, granted to me July 30, 1889, it is unnecessary to herein particularly explain it.

By the term "low pressure" wherever used I desire to be understood as meaning a pressure somewhat above that of the atmosphere and such as is commonly produced by the exhaust of a steam-engine.

It is obvious that the pipes 8, 9, 17, and 24, which I have described as air-pipes, are of relatively small diameter, so that they are not adapted to pass steam, at least in any noticeable or disadvantageous volume. It is found in practice that the pipes 8 and 9, which lead directly from the main riser 6, permit the exit of air, and thereby secure a rapid passage of steam to all the radiators when the engine is started up after an interval, whereby a building is quickly heated. After the risers and the radiators are full of steam no perceptible amount escapes from the pipe 9, it being possibly held in check by the globules of water of condensation which collect in the air-pipes and prevent escape of steam.

It will be evident that various changes may be made by those skilled in the art which may come within the scope of my invention, and I do not, therefore, desire to be limited in every instance to the exact construction herein shown and described.

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

1. In an exhaust or low-pressure heating system, a main riser, a radiator, a pipe forming a communication between said riser and said radiator, said pipe opening into said riser some distance above said radiator and means for closing the same adjacent said radiator whereby the water of condensation is collected in said pipe and will act to reduce the pressure in said pipe, to draw in the steam, when said closing means is opened.

2. In an exhaust or low-pressure heating system, a drip-pipe, a radiator, an air-exit pipe leading from the upper portion of said radiator and adapted to discharge into said drip-pipe above said radiator and a water-exit pipe having a trap therein, said water-pipe leading from the lower portion of said radiator and adapted to discharge into said drip-pipe below said radiator, whereby the air and water are positively discharged separately, from said radiator and from the system.

3. In an exhaust or low-pressure heating system, a main riser, a radiator, a pipe forming a communication between said riser and said radiator, means for closing said pipe adjacent said radiator whereby the water of con-

densation is collected in said pipe and will act to reduce the pressure in said pipe and draw in the steam when said closing means is open, a drip-pipe, an air-exhaust pipe leading from 30 the upper portion of said radiator adapted to discharge into said drip-pipe above said radiator and a water-exit pipe having a trap therein, said water-pipe leading from the lower portion of said radiator and adapted to 35 discharge into said drip-pipe below said radiator.

4. In an exhaust or low-pressure heating system, a radiator, steam-admission means substantially at one end thereof, a drip-pipe, 40 separate air and water exit pipes from said radiator to said drip-pipe, said air-pipe leading upward from the upper portion and said water-pipe leading downward from the lower portion of said radiator whereby the air and 45 water are separately discharged from said radiator and the system, and a trap in said water-pipe.

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