(No Model.)

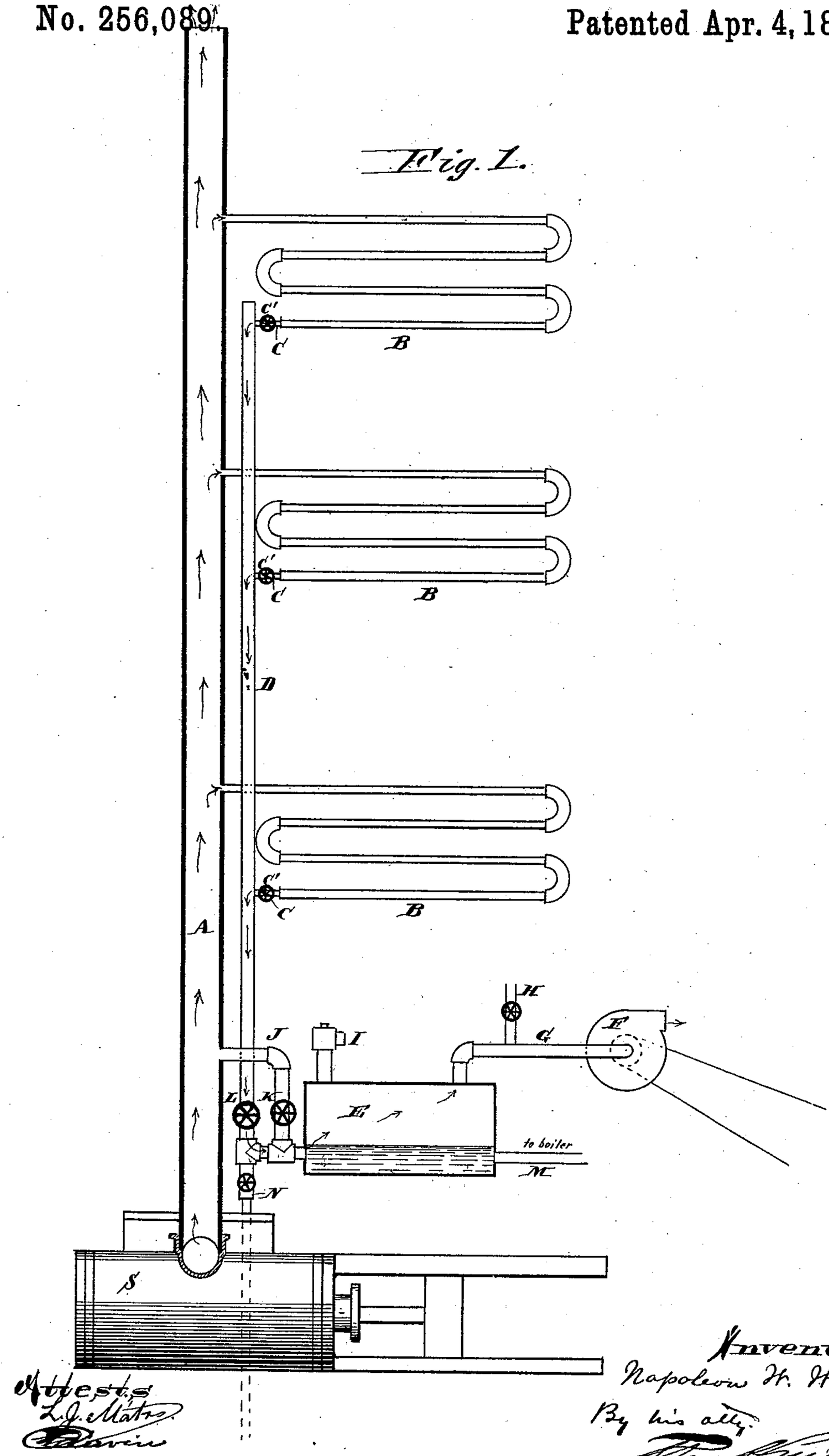
N. W. WILLIAMES.

2 Sheets—Sheet 1.

HEATING APPARATUS.

No. 256,089. Patented Apr. 4, 1882.

Fig. 1.



Witnesses:
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(No Model.) 2 Sheets—Sheet 2.

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HEATING APPARATUS.

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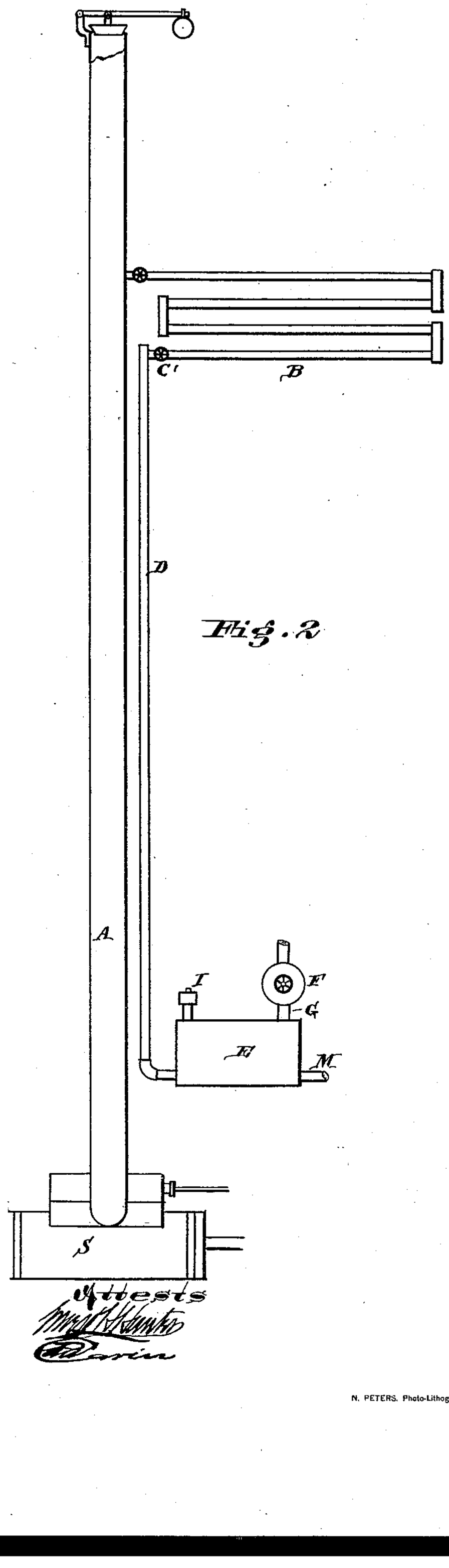

Fig. 2

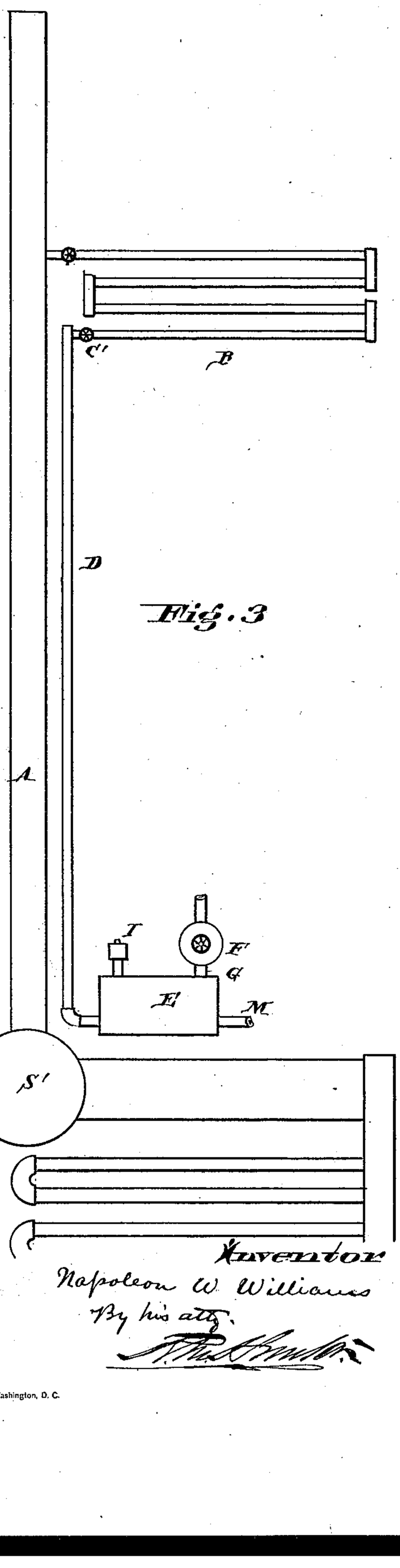

Fig. 3

Witnesses

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UNITED STATES PATENT OFFICE.

NAPOLEON W. WILLIAMES, OF PHILADELPHIA, PENNSYLVANIA.

HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 256,089, dated April 4, 1882.

Application filed December 31, 1881. (No model.)

To all whom it may concern:

Be it known that I, NAPOLEON W. WILLIAMES, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improvement in Heating Apparatus, of which the following is a specification.

My invention has reference to heating apparatus for buildings; and it consists in tapping an ordinary unobstructed exhaust-pipe from a steam-engine and connecting it through said taps with ordinary heating-coils; further, in connecting the outlet or bleeder pipes from said heating-coils with a main which communicates with a tank or hot-well in which a partial vacuum is maintained; further, in combining said hot-well and bleeder-main with a vacuum-pump; further, in means by which the heating-coils may be cut out of operation and the exhaust-steam, or part of it, may be drawn through the hot-well to heat the feed-water for the boiler; further, in a hot-well, in combination with heating-coils for steam and bleeder pipes, with their main to return the part of the exhaust-steam and condense the same and return it to the boiler as feed-water; and, finally, in details of construction, all of which are fully set out in the following specification, and shown in the accompanying drawings, which form part thereof.

The object of my invention is to construct suitable mechanism by which the usual back-pressure to the steam-engine due to loading the exhaust for the purpose of creating a forced circulation in the heating-coils is dispensed with, this mechanism being substantially means to create a suction through the heating-coils to draw steam from a free or open exhaust-pipe, and thereby perform the double function of heating the building without back-pressure to the engine and reducing the normal pressure by creating a partial vacuum in the exhaust-pipe.

In the drawings, Figure 1 is a skeleton view of the arrangement of pipes and their relation to the engine and vacuum apparatus. Fig. 2 shows my invention as applied to a weighted exhaust, and Fig. 3 shows same as applied to a boiler direct and when no steam-engine is used other than to drive the vacuum-pump.

S is the steam-engine.

A is the exhaust-pipe, which is free and unobstructed. At various places it is tapped by the heating-coils B, which are arranged through the building. These heating-coils open into the bleeder-main D by pipes C, provided with valves C′. This bleeder-main D is closed at the top, and opens at the bottom into a hot-well, E, near its bottom, and is provided with a valve, L, by which all of the heating-coils may be shut off from the hot-well. This hot-well is connected to an exhaust-fan, F, by pipe G, by which a partial vacuum is maintained in the hot-well and its communicating pipes.

M is a feed-water pipe to the steam-boiler. The exhaust-pipe A connects with the hot-well near the bottom by a pipe, J, provided with a valve, K.

N is a water-pipe adapted to supply water to the hot-well to take the place of that lost by the exhaust-steam which passes off.

The operation is as follows: The engine being in motion and the exhaust-fan in action, a partial vacuum is maintained in the hot-well. The valve K being shut and the valve L open, the steam from the exhaust-pipe is sucked through the heating-coils, "bleeder-pipes," and main into the hot-well, where it is condensed into feed-water, and also heats any additional water admitted by pipe N. Any condensed steam from the coils will run down the bleeder-main into the hot-well.

To use my apparatus in summer, I close valve L and open valve K, when exhaust-steam will be sucked directly from exhaust-pipe A to the feed-water in hot-well E and raise it to a high temperature.

Any other heating apparatus may be used in place of coils B—as, for instance, steam-drums—and if a loaded exhaust were used, my invention would still operate, only not with such good results.

A pipe, H, may be arranged to admit cold water in spray or otherwise to cool the heated vapor or air before passing it to the vacuum-pump, and I prefer to use an ordinary vacuum-valve, I, to the hot-well to produce the proper circulation by controlling the amount of vacuum in said hot-well.

In some buildings a steam-engine is not required, and live steam taken direct from the heating-boilers is passed through the heating-coils under pressure, and in many cases of

large buildings it has been found difficult to get proper circulation. If a steam-engine is not required, then I pass the live steam directly into the pipe A, which may be closed at the top, if desired, and by creating a suction in the bleeder-main I am enabled to heat a building thoroughly with only one-half the steam capacity which was required before, and I am enabled to use low-pressure steam, which has greater heating effect.

My invention may be applied to the loaded exhaust-heaters now in common use by simply attaching an exhaust or vacuum pump to the bleeder-main and creating a suction therein; but I prefer in all cases to use an open exhaust-pipe.

It is immaterial to my invention whether the exhaust is unobstructed or weighted, or whether an engine is used or not, as my invention comprehends broadly a main to supply steam when arranged with steam-heaters, and means to create a suction through said heaters.

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

1. In apparatus for heating buildings, the unobstructed exhaust-pipe and heating-coils opening from it, in combination with a bleeder-pipe connecting with said coils and opening at the bottom into a hot-well in which a partial vacuum is maintained, substantially as and for the purpose specified.

2. In apparatus for heating buildings, the unobstructed exhaust-pipe and heating-coils opening into it, in combination with a bleeder-pipe connecting with said coils and means to create a suction in said bleeder-pipe, substantially as and for the purpose specified.

3. In apparatus for heating buildings, the unobstructed exhaust-pipe A, heating-coils B, bleeder-main D, hot-well E, suction or exhaust fan F, and feed-water pipe N, substantially as and for the purpose specified.

4. In apparatus for heating buildings, the combination of an exhaust-pipe with heating-coils B, or their equivalent, bleeder pipe or main D, provided with valve L, hot-well E, pipe J, with its valve K, exhaust-fan F and its pipe G, and feed-water pipe N, substantially as and for the purpose specified.

5. In apparatus for heating buildings, an exhaust-pipe and steam-heating apparatus, in combination with means to suck steam from said exhaust into or through said heating apparatus, substantially as and for the purpose specified.

6. The combination of exhaust-pipe A, heaters B, bleeder-main D, hot-well E, vacuum-valve I, and vacuum-pump F, substantially as and for the purpose specified.

7. In apparatus for heating buildings, a steam-main into which steam is fed, in combination with steam-heating apparatus and means to create a suction through said heating apparatus to draw steam from the main into said heating apparatus.

In testimony of which invention I hereunto set my hand.

NAPOLEON W. WILLIAMES.

Witnesses:

LOUIS J. MÁTOS,

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