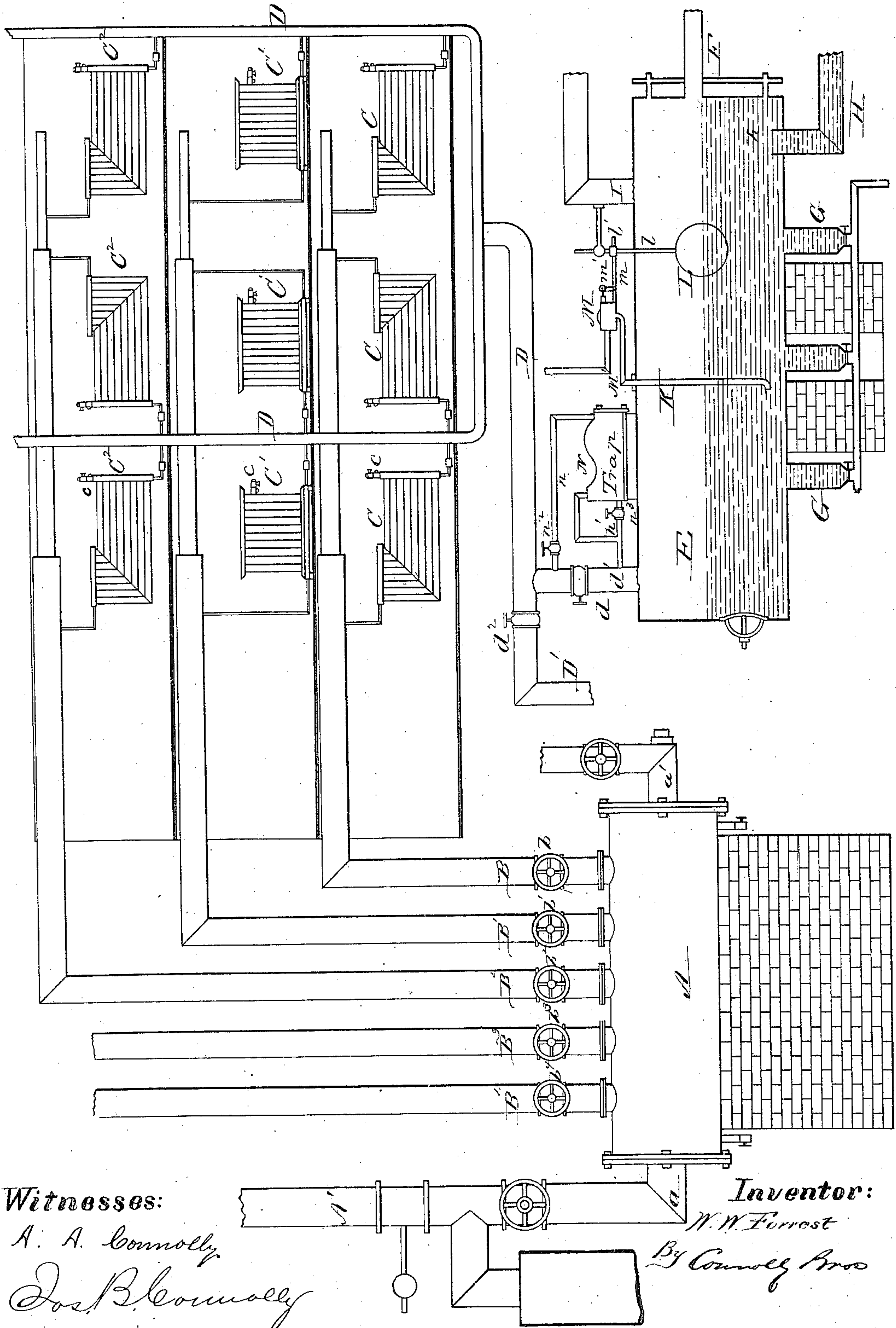


(No Model.)

W. W. FORREST.
STEAM HEATING APPARATUS.

No. 307,384.

Patented Oct. 28, 1884.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM W. FORREST, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF
ONE-HALF TO ORLANDO KELSEY, OF SAME PLACE.

STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 307,384, dated October 28, 1884.

Application filed July 11, 1883. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. FORREST, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Steam Heating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawing, which forms a part of this specification, in which the figure is an elevation, partly in section, of my heating apparatus.

My invention has for its object to provide means for utilizing exhaust-steam for heating buildings, &c., without producing back-pressure on the engine.

A further object of my invention is to utilize the water of condensation from heating apparatus for feeding the boiler.

A still further object of my invention is to provide means whereby the circulation of steam in the heating apparatus will be entirely and solely under the control of the engineer, so that the volume and temperature of steam admitted to any and every compartment or portion of a building will be regulated by the engineer alone from his position in the engine or boiler room.

A still further object of my invention is to provide means whereby the temperature or volume of exhaust-steam used for heating apparatus may be elevated or increased by the admixture of live steam without producing any increase of back-pressure.

A still further object of my invention is to provide means whereby, in an apparatus or plant primarily designed and adapted for heating by exhaust-steam, or by exhaust and live steam conjointly, live steam alone may be employed (on occasions where no exhaust-steam is obtainable) without involving a too free circulation or incurring risk from overpressure.

My invention consists in the novel construction, arrangement, and combination of devices hereinafter described, and specifically set forth in the claims.

I will premise a detailed description by remarking that my steam heating apparatus or system is designed specially or singly for cases

where a boiler, engine, and pumps are employed, and that the paramount feature of my invention is the utilization, in the special manner hereinafter set forth, of the exhaust from said engines and pumps.

Referring to the accompanying drawing, A indicates a combining-chamber, which in practice may consist of a steam-tight cylinder or pipe. Said chamber has two inlets, *a* and *a'*, for the admission, respectively, of exhaust and live steam, *a'* being the live-steam pipe, and *a* the exhaust-steam-inlet pipe. Said inlet-pipes are provided with valves or cocks, whereby they may be closed or opened alternately or together, or wholly or partially, as occasion may require. Ordinarily the live-steam inlet is completely closed, and the exhaust-steam from the engine (not shown in drawing) admitted to the chamber A. From said chamber branch pipes B B' B², &c., lead upwardly, there being one such branch supply-pipe for each story of the building to be heated, so that each story receives its supply of steam by a direct connection from the chamber A, without outlet from its supply-pipe for any other story. Each of the supply-pipes B B' B², &c., has a valve just above its connection with the chamber A, and therefore under direct control of the engineer, who can, by manipulation of said valves, (shown at *b* *b'* *b*², &c.,) regulate the supply of steam to each story. By this arrangement, and by omitting all valves (except automatic drip and air valves) in the pipes outside of the engine-room, the control of the steam-supply is kept wholly under the control of the engineer, and tampering, leakage, and waste are avoided.

The pipes B B' B², &c., that lead separately, as described, to each story, are in each story duly connected with radiators, coils, or manifolds C C' C², &c., of any suitable construction for heating by radiation, either direct or indirect. These radiators are each supplied with an automatic air-valve, *c*, which allows the air to escape without permitting steam to escape, but have no other valves or traps, so that the circulation of steam is free and unimpaired, and leakage and tampering with or waste of steam by occupants of the rooms, compartments, or passages where said radia-

tors are located are prevented. From the radiators C C' C'', &c., waste-pipes for the waste water of condensation lead direct to a return-pipe, D, which latter pipe leads to a collecting or condense chamber, E. Said chamber consists of a pipe or cylinder into one end of which said return-pipe D discharges. At the opposite end of said chamber an oil-overflow, F, is located, through which the oil, grease, and light impurities which rise to the surface of the water pass off to the sewer or other receptacle. Two or more sediment-outlets, G G', proceed from the bottom of chamber E, and a pipe, H, which supplies water to the boiler-feed pump, also passes through the bottom of said chamber, and has its opening *h* some distance above said bottom, so as to avoid drawing off sediment with the feed-water.

I is a pipe for leading vapor from the surface of liquids in the chamber E to the boiler-chimney.

K represents a cold-water-supply pipe passing into chamber E, and opening therein a short distance above the bottom of said chamber.

L is a float in chamber E, having a stem, *l*, which projects upwardly through the top of said chamber, and connects at *l'* with a lever, *m*, attached to the stem *m'* of a valve, M, in a cold-water pipe or connection, M', from main. When the water in chamber E descends in height, by reason of use, waste, or evaporation, the float L falls, and thus causes valve M to open and admit a supply of fresh water from main. This causes float to rise and close valve M; but as the water of condensation is used over and over again the supply from main is very slight, and is really only enough to atone for what is lost by leakage or waste.

On occasions when no exhaust-steam is being made—as, for example, when the engine is not running—and yet it is desired to heat the building from the boiler by live steam, the live-steam inlet to chamber A may be opened and the exhaust-inlet to said chamber closed. To prevent a too free circulation of such steam, or danger or injury from the unrestrained pressure thereof, owing to there being no traps or valves (except the air-valves) on the radiators or on the supply-pipes outside of the en-

gine-room, I provide a steam-trap, N, connected with the return-pipe D and chamber E, respectively, by branch pipes *n n'*. By closing cock *d* in main return-branch *d'*, and opening cocks *n²* and *n³* in said pipes *n* and *n'*, the return live steam is led into chamber E through the trap N. A branch or extension, D', of return-pipe D, having a valve, *d²*, leads to sewer, and from chamber A a free-exhaust pipe, A', proceeds to the roof.

The supply-pipes B B' B'' may, if desired, be of uniform diameters or capacities, or they may vary according to the exigencies of particular cases.

In practice, where buildings having as many as six stories are heated, I prefer to make the pipe for the supply of steam to the upper story slightly larger than the supply-pipes for the lower stories.

What I claim as my invention is as follows:

1. In a system or apparatus for steam heating, a combining-chamber having inlets for live and for exhaust steam, respectively, and two or more outlets for mingled steam, and independent pipes, heaters, and connections for each floor, whereby exhaust-steam having its temperature elevated and controlled in the engine-room may be supplied by separate pipes to different floors of a building, substantially as shown and described.

2. In a system or apparatus for steam heating, a combining-chamber having inlets for live and exhaust steam, and two or more outlets for mingled steam, substantially as described.

3. The feed-water or condensing tank having connection with an exhaust-steam return or drip pipe, and with a cold-water-feed pipe, the latter having a valve external to the tank connected with a float inside the tank, and having also a grease-outlet, whereby the water is maintained on a level with the outlet for grease and the latter floated off, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of July, 1883.

WILLIAM W. FORREST.

Witnesses:

M. D. CONNOLLY,
ISAIAH MATLACK.