

(No Model.)

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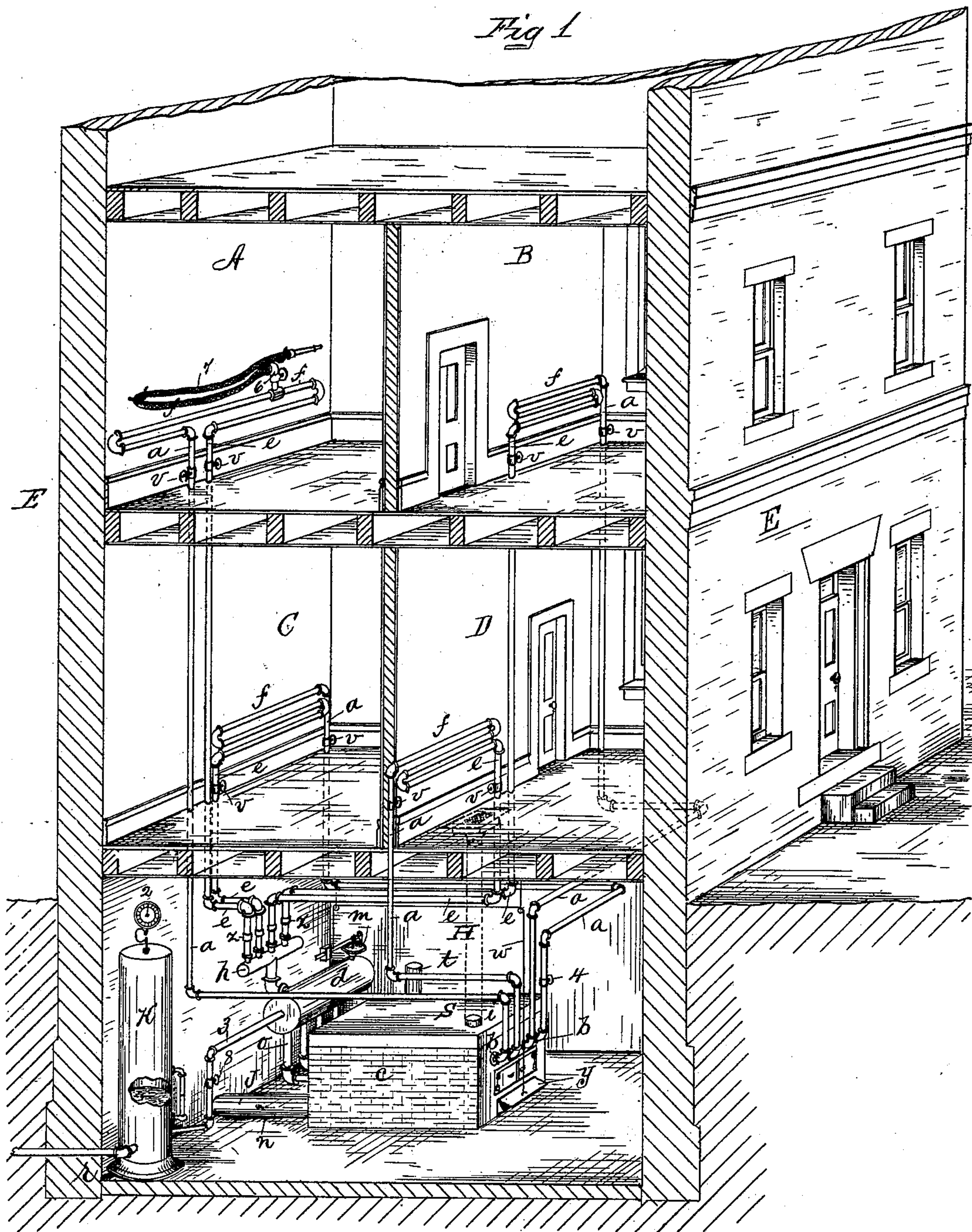
E. N. GATES.

HEATING APPARATUS FOR BUILDINGS.

No. 359,561.

Patented Mar. 15, 1887.

Fig 1



WITNESSES:

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(No Model.)

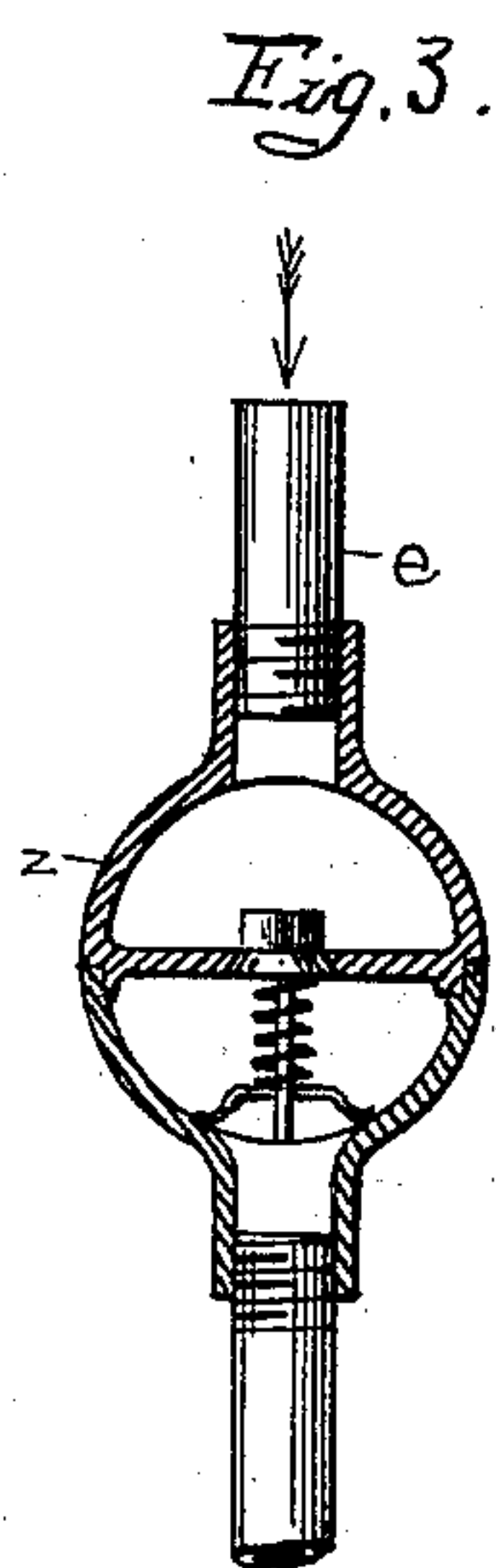
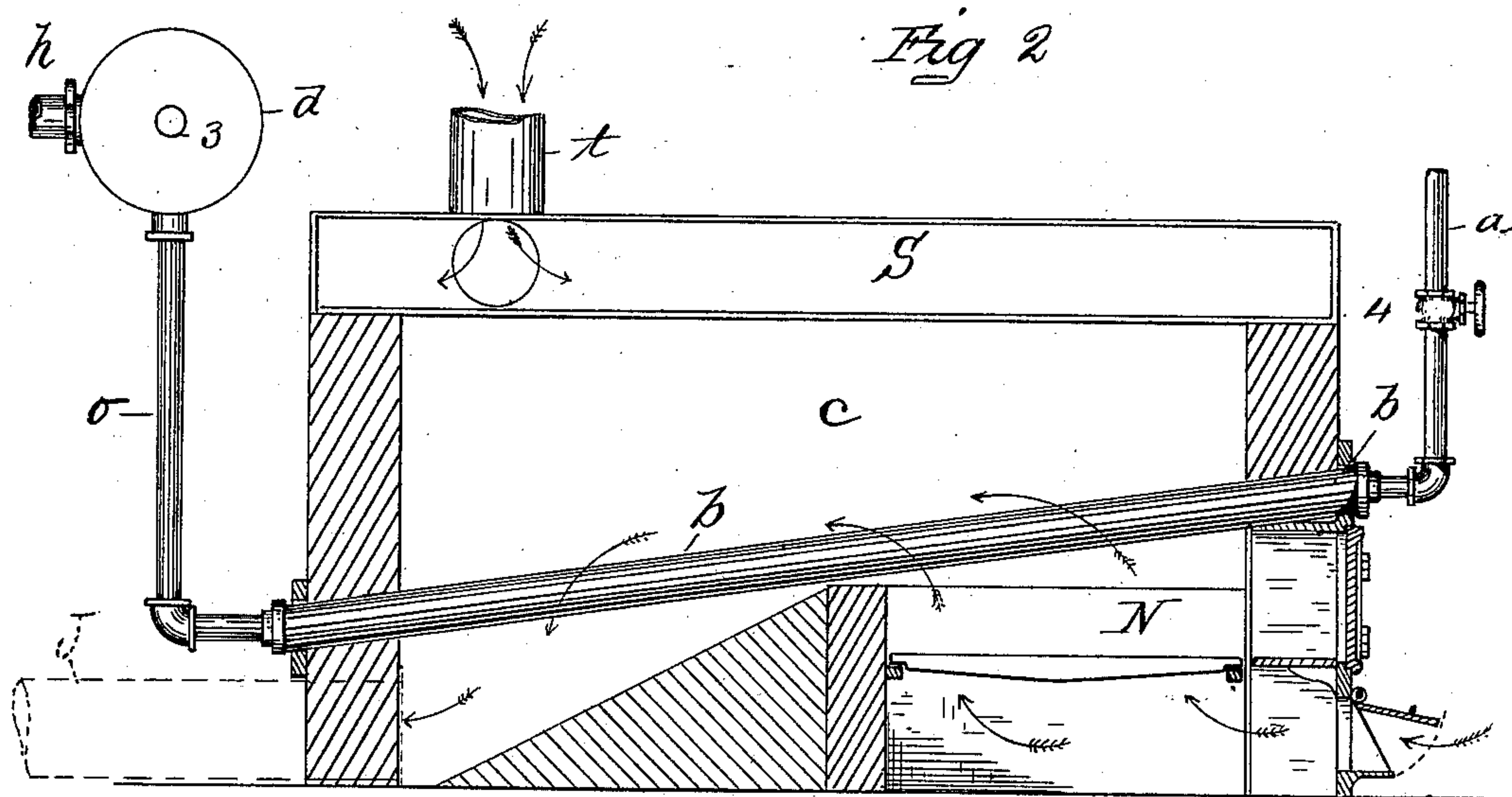
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UNITED STATES PATENT OFFICE.

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HEATING APPARATUS FOR BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 359,561, dated March 15, 1887.

Application filed December 7, 1885. Serial No. 184,874. (No model.)

To all whom it may concern:

Be it known that I, EUGENE N. GATES, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Heating Apparatus for Buildings, of which the following is a specification.

This invention relates to improvements in heating apparatus for buildings, the object being to provide for said purpose, to be used in conjunction with a radiator or coil of pipe in each room of a building, an improved heating-furnace and connections between the latter and said coils or radiators, whereby water or other heat-carrying fluid is unobstructedly circulated from said furnace through said radiators, and vice versa; and, furthermore, to provide, by the aforesaid, pipe-circulation in a building, improved water-supply connections between the water-main and said furnace.

In the drawings, Figure 1 is a perspective view of a portion of a building in vertical section, showing the upper part thereof broken off and the basement and several rooms above the latter provided with a heating apparatus and water-supply connections embodying my invention. Fig. 2 is a longitudinal sectional view of the furnace, showing therein one of the heating-pipes and its front and rear end connections, and the return-water reservoir in end view. Fig. 3 is a sectional view of one of the check-valves connected with the apparatus below referred to, showing parts of the connecting-pipes.

In the drawings, A B C D indicate the several rooms in the house E, each of which is supplied with a radiating-coil, *f*; and H is the basement in which the furnace is located. Each of said coils *f* is provided with a supply-pipe, *a*, which connects with the higher end of one of the heating-pipes *b* in the furnace *c*, and with a return-pipe, *e*, which is connected indirectly with the lower ends of said heating-pipes through the receiving-reservoir *d*, to which is connected the T-connection *h*, into which said several return-pipes discharge the returning water from the coils *f*, the said reservoir *d* being connected with the heating-pipes *b* by a separate pipe, *o*, from the lower end of each of said heating-pipes. Near the

junction of each of said return-pipes *e* with said T-connection *h* a check-valve, *z*, of the ordinary construction, as shown in Fig. 3, is connected in said pipes to prevent any upward flow of water from the reservoir *d* through said return-pipes to the coils *f*; and stop-valves *v* of the usual description are located in said supply and return pipes under said coils.

The water-supply for the apparatus is introduced into the basement H by the ordinary supply-pipe, *r*, and is received in the cylindrical air-chamber K, whose side is represented as broken away to show about the height to which water is allowed to rise therein. A pressure-gage, 2, is attached to the upper end of said air-chamber, and on its side is attached the ordinary glass water-gage, to show the height of the water therein. A pipe, 3, conducts water from the air-chamber K to the reservoir *d*, under the normal water-pressure of the water-main with which the pipe *r* may be connected, and from said reservoir the water is supplied to the heating-pipes *b* in the furnace *c*, and thence to the coils *f* by the pipes *a*, a stop-valve, 4, being placed in the latter near the furnace, as shown in one thereof in Figs. 1 and 2.

An ordinary diaphragm damper-regulator, *m*, of the class shown and described in Patent No. 16,664, of 1857, or of other suitable construction, is located on and connected with the interior of reservoir *d*, and is operated by the pressure within the latter to cause its lever to be swung upward, and a counter-weight on the latter moves it in the opposite direction. A cord or chain, *w*, has one end thereof attached to the lever of said damper-regulator and its other end attached to the damper-door *y* of the furnace, whereby the latter is opened and closed by varying pressure in the reservoir *d*.

The furnace *c* is constructed of brick or other suitable material, in the form shown, and is provided with the fire-box N, and suitable doors at the front end of the latter. A smoke-pipe, J, on which is shown a damper-arm, *n*, connects the furnace with any suitable chimney-flue of the house. The furnace extends considerably beyond the rear end of said fire-box, in order to provide for such a length thereof as will adapt it to inclose heating-

pipes of suitable length, and to produce in effect a species of oven of considerable area, to the heat of which said heating-pipes are exposed and whereby provision is made for a large metallic hot-air chamber, S, over the furnace, which constitutes the top of the latter. An air-pipe, *t*, conducts cold air into the chamber S, and from the latter one or more pipes, *i*, conduct the warm air into a room or rooms above in the usual manner, as shown by dotted lines in Fig. 1, thus utilizing the heat of the furnace, as far as practicable, for air-warming purposes, in addition to its use for heating the water in the pipes *b* and the coils connected therewith.

To provide means for utilizing the water-circulation of the within-described heating apparatus for extinguishing fires in the rooms of a house which is furnished therewith, a suitable hose-connection, 6, (see room A,) is attached to the heating-coil or supply-pipe *a* of any or all of the rooms, with which is connected a hose-pipe, 7, and at all times, during summer or winter, when the water-supply connections between the pipe *r* and the coils *f* are open, water in sufficient quantity to extinguish an incipient conflagration may be thrown from said hose-pipe.

The hereinbefore-described apparatus is designed, principally, for heating buildings by hot-water circulation; but it may be employed, if desired, for heating by steam, for by limiting the supply of water to the pipes *b* to about the quantity evaporated the latter become a series of separate steam-generators, sending steam to the coils *f*, and the water of condensation returning by pipes *e* to reservoir *d* and thence to said pipes *b* again. The aforesaid limited supply of water to pipes *b* is obtained by means of the stop-valve 8 in the pipe 3, between the air-chamber K and reservoir *d*, as said valve may be only sufficiently opened to cause the water in pipes *b* to maintain such a level as would facilitate the production of steam.

In heating apparatus heretofore made for warming by hot-water circulation it has been the practice to employ a single boiler, or substantially that, from which all the supply-pipes for the rooms to be warmed run, and to which the return-pipes reconduct the water which has served its warming purpose; but with such a boiler and pipe-connection it is found that the circulation of the water from the boiler to the rooms of a building on the different floors thereof—some higher and some lower—is very sluggish and unreliable, and so much so that the use of hot-water warming apparatus for houses is comparatively little known; but when a proper circulation of hot water can be had it is preferred to steam, for the reason that in mild weather a degree of heat much below boiling, or 212° Fahrenheit, can be had, and the desired temperature in a house can more easily be maintained. To this end the construction herein described and shown is provided, whereby the above-de-

scribed inconveniences are obviated, and means are provided for properly and economically warming a house by hot-water circulation.

It will be observed that instead of employing one boiler and connecting all the different coils to it, the water-heating devices consist of one furnace inclosing practically a series of separate boilers, (the pipes *b* constituting the latter,) and that each of said pipe-boilers is connected by its high or outlet end only with the radiator of a certain room or floor of a house, thus insuring a flow or circulation of hot water directly to each radiator, the return-flow being by the pipes *e* to reservoir *d* and thence to the receiving end of said pipe-boilers, the latter consisting, in practice, of single pieces of wrought-iron tubing about three inches in diameter and about nine feet long, all set at a uniform incline in the furnace, as shown. The fire-box N is located under the higher ends of said pipe-boilers, and the heat from the fire follows the course of the arrows in Fig. 2—first upward against and between said pipes, and then downward against them toward the smoke-pipe J, which is located at the rear end of the furnace. In consequence of the said arrangement of the pipes *b* relative to the fire-box a proper water-circulation is maintained through each pipe-boiler and its radiator or radiators, as, if desired, there may be more than one radiator in each room; but in every case all should be connected with the same pipe-boiler.

The air-chamber K provides an air-cushion between the water-level therein and its upper end, to prevent any unpleasant hammering of the water in the pipes.

In practice the apparatus is run under the water-pressure of the street-mains with which it is connected—that is to say, the stop-valve in the supply-pipe *r* is not ordinarily closed, and therefore, if by reason of excessive heat in the furnace steam be generated and excessive pressure created in the apparatus, relief is had for the latter through said pipe *r* into the street-mains.

What I claim as my invention is—

1. A heating apparatus for buildings, consisting of a furnace provided with a fire-box, substantially as described, several metallic water-heating pipes located in said furnace in an inclined position, several radiating-coils, a supply-pipe connecting each of the said coils with the higher end of one of said heating-pipes, a receiving-reservoir having the lower ends of the heating-pipes connected therewith, and a return-pipe connecting each of said coils with said receiving-reservoir, the latter being connected by a suitable pipe with the usual street-main, whereby water is supplied thereto, combined and operating substantially as set forth.

2. The furnace *c*, several water-heating pipes located in said furnace in an inclined position, several radiating-coils, a supply-pipe connecting each of said coils with the higher

end of one of said heating-pipes, a receiving-reservoir having the lower ends of the heating-pipes connected therewith, a return-pipe connecting each of said coils with said receiving-reservoir, a water-supply, and an air-chamber in the same, combined and operating substantially as set forth.

3. A hot-water heating apparatus, consisting of a furnace, substantially as described, provided with a series of heating-pipes extending therethrough connected by one end with a receiving-reservoir common to all and hav-

ing their outlet ends each separated from the other, extending outside the furnace, several radiating-coils, a supply-pipe connected to the outlet end of each of said heating-pipes leading to one of said coils, and a return-pipe from each of the latter to conduct water back to said reservoir, substantially as set forth.

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Witnesses:

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