

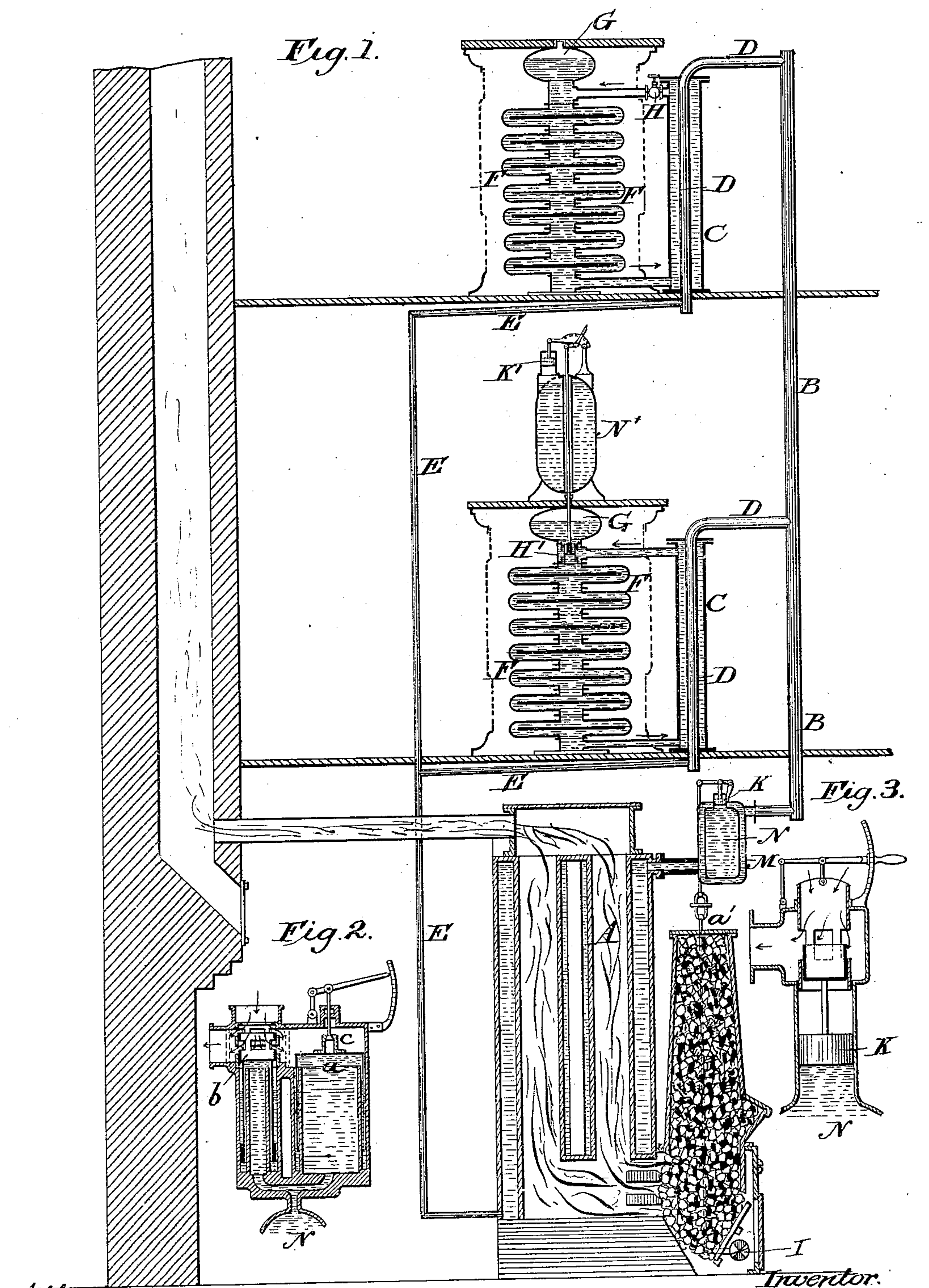
(No Model.)

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HEATING APPARATUS FOR BUILDINGS.

No. 246,790.

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Attest.

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UNITED STATES PATENT OFFICE.

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HEATING APPARATUS FOR BUILDINGS.

SPECIFICATION forming part of Letters Patent No. 246,790, dated September 6, 1881.

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To all whom it may concern:

Be it known that I, ERNST KORTING, of Brunswick, Germany, have invented certain Improvements in Heating Apparatus for Buildings, of which the following is a specification.

This invention relates to that system of heating buildings wherein steam is conducted from a generator and applied to heat water in local heaters, which are in turn connected by circulating-pipes with hot-water radiators located in the various apartments to be heated, the water and steam apparatus being each closed or shut off from communication with the external atmosphere.

In a system such as above described, the temperature of the various apartments is controlled principally by graduating the circulation of the water between the local heaters and radiators. It is also desirable, in order to secure the best results, to render the steam-pressure and circulation as nearly uniform as possible.

The object of my invention is to produce a system of the character above named, by which a fixed temperature may be secured in the apartments automatically; and to this end it consists in the application of automatic devices to regulate the circulation of the water between the local heaters and radiators, and to regulate the generation of the steam.

Referring to the accompanying drawings, Figure 1 is a sectional elevation representing my system of heating apparatus located in three floors of a building. Figs. 2 and 3 are sectional elevations of modified devices for regulating the circulation and the draft.

A represents the steam boiler or generator, which may be of any approved construction, and which should be located at the foot of the system, in order that the water from condensation may return thereto.

B is the main steam-pipe, extending from the generator to the various floors or apartments of the building, and connected through return-pipes with the base of the boiler.

The pipes B and E constitute a continuous closed circuit, through which steam is distributed from the boiler, and the water resulting from condensation is returned thereto.

C C are the local water-heaters, located in the apartments to be heated, or otherwise distributed conveniently about the building.

These heaters may be of any suitable character; but in the present instance they consist simply of vertical columns, through which branches of the steam-pipe descend, the water being heated by radiation from the latter.

F F are the water radiators or heaters proper, located in the apartments to be heated, and connected by top and bottom pipes with the local water-heaters C in such manner that a free circulation of water is permitted from the top of the local heaters C downward through the radiators and backward into the foot of the local heaters.

The radiators may be of any suitable or approved construction, the apparatus represented in the drawings being considered an advantageous one.

The heaters C and radiators F are sealed or closed from communication with the external atmosphere, and the radiators are provided at the top with an enlarged partially-filled chamber or air-vessel, G, to allow for the expansion of the heated water. Between each local heater C and the radiator connected therewith I apply an automatic device for regulating the circulation of the water, and thus maintain a uniform temperature in the apartment. This automatic regulator may be of any suitable form or construction.

The regulator represented in Fig. 1 of the drawings consists, essentially, of a closed vessel, N', containing a liquid or fluid, and provided on one side with a neck or pipe containing a piston, K', which is connected by levers and rods or other suitable means with the valve or throttle H', located in the top of the radiator. The contents of vessel N' being subjected to the heat from the regulator causes the water and contained air to expand and contract according to the variations in the temperature, and as a result of the expansion and contraction the piston K' is caused to operate the valve H', thus regulating automatically the circulation of the water between the local heater and the radiator, an increased circulation being permitted when it falls below the fixed limit, and vice versa.

The controlling of the circulation is a simple and positive means of regulating the temperature of the radiator, as the water in the local heater may be heated above the boiling-point,

while the water in the radiator will remain cold if the circulation between them is stopped. This regulation of the heat independently of any regulation in the steam-heater pipe is of great importance, as it obviates any necessity for the introducing of traps or cocks in any part of the steam-circuit, permitting a substantially uniform pressure to be maintained throughout the entire steam system.

As a means of controlling the heat in the boiler I provide an automatic apparatus for controlling the admission of air to the fire, or for controlling the draft. As shown in Fig. 1, this regulator is connected to the steam-pipe near the boiler. It is composed, essentially, of a vessel, N, containing water and surrounded by an enlarged part, M, of the steam-pipe, so that the steam passing upward will envelop the vessel N, and communicate a corresponding temperature to the contents of the latter, causing the same to expand or contract according to the temperature.

The piston K, mounted in a neck or cylinder on one side of the vessel N, is connected by means of levers and rods with the damper I, through which air is admitted to the boiler-furnace.

The device being properly adjusted, any increase in the temperature of the steam beyond the limit fixed causes the fluid in vessel N to actuate its piston, and the latter, through the intermediate devices, to check the admission of air to the boiler. As the temperature falls the contraction of the fluid permits the piston to fall and the damper is again opened.

To permit the adjustment of the automatic regulator to act at different temperatures, I provide the damper-operating rod with an adjustable link or screw-coupling, as represented at *a'*, Fig. 1, whereby the rod may be lengthened or shortened at will.

Figs. 2 and 3 show, on an enlarged scale, the two different ways of setting the valves to act at different temperatures, both of which plans are applicable to the valves for regulating the steam, as well as to those for regulating the circulation of the water. In Fig. 2, two bell-shaped vessels are substituted in place of the piston K, both vessels dipping into and being sealed by mercury or other heavy fluid. As the water expands in vessel N' the bell *a*, being lighter than the bell *b*, will rise and operate the valve H' in the water or steam circuit. Should outside influences cause a further increase in temperature and an increased expansion in vessel N, after the bell *b* has entirely closed the valve H', the increased volume is taken up by an additional elevation of the bell *a*, carrying the stop which is constructed as a weight, upward. In the arrangement represented in Fig. 3 a single piston is employed, and the adjustment is effected by making the valve throat or passage adjustable in height by means of a hand-lever, sufficient margin being allowed in the length of the slide containing the passage, and also in the length of the piston, to allow of adjust-

ment for variations in temperature. The valve, being connected by rod or otherwise with the piston K, is raised and lowered thereby, the temperature at which the passage or throat is closed being determined by the height to which the valve-throats are adjusted. In place of the regulating-valves shown, other suitable regulators may be employed, provided they are controlled by the temperature of the steam or the water.

I am aware that steam has been conducted from a boiler to a local water-heater which was connected by circulating-pipes with a radiator.

I am also aware that closed steam-circulating pipes have been used in various systems of heating apparatus.

I am also aware that automatic valves controlled in their action by changes in the temperature of the surrounding atmosphere and of fluid bodies have been used for different purposes; but I am not aware that any one has hitherto constructed a heating system in which the various elements used by me were combined for joint operation to produce a complete automatic heating system.

By means of my new combination of elements I am enabled to produce a system which, considered as a whole, is highly advantageous, being, as I believe, superior to any other system yet devised.

Having thus described my invention, what I claim is—

1. The combination of a steam-generator, a closed steam-circulating pipe, a local water-heater heated by a steam-pipe which passes therethrough, a hot-water radiator connected by circulating-pipes with the local heater, and an automatic valve controlling the circulation between the local heater and the radiator, said valve being controlled by means of a fluid body, substantially as described and shown.

2. The combination of the steam-pipe, the local heater, the hot-water radiator connected by circulating-pipes with the local heater, a valve controlling the circulation between the local heater and the radiator, and a closed vessel containing a fluid body and provided with a piston or float operated by the expansion and contraction of the fluid body and connected with the valve for controlling the circulation, substantially as described and shown.

3. A heating system consisting of a steam-generator, closed steam-circulation pipe, a local water-heater connected with the steam-pipe, a radiator connected by circulating-pipes with the local heater, and automatic valves constructed and arranged to be operated by changes in the temperature of a fluid body, applied one to regulate the admission of air to the generator and the other to regulate the circulation between the local heater and the radiator.

ERNST KORTING.

Witnesses:

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