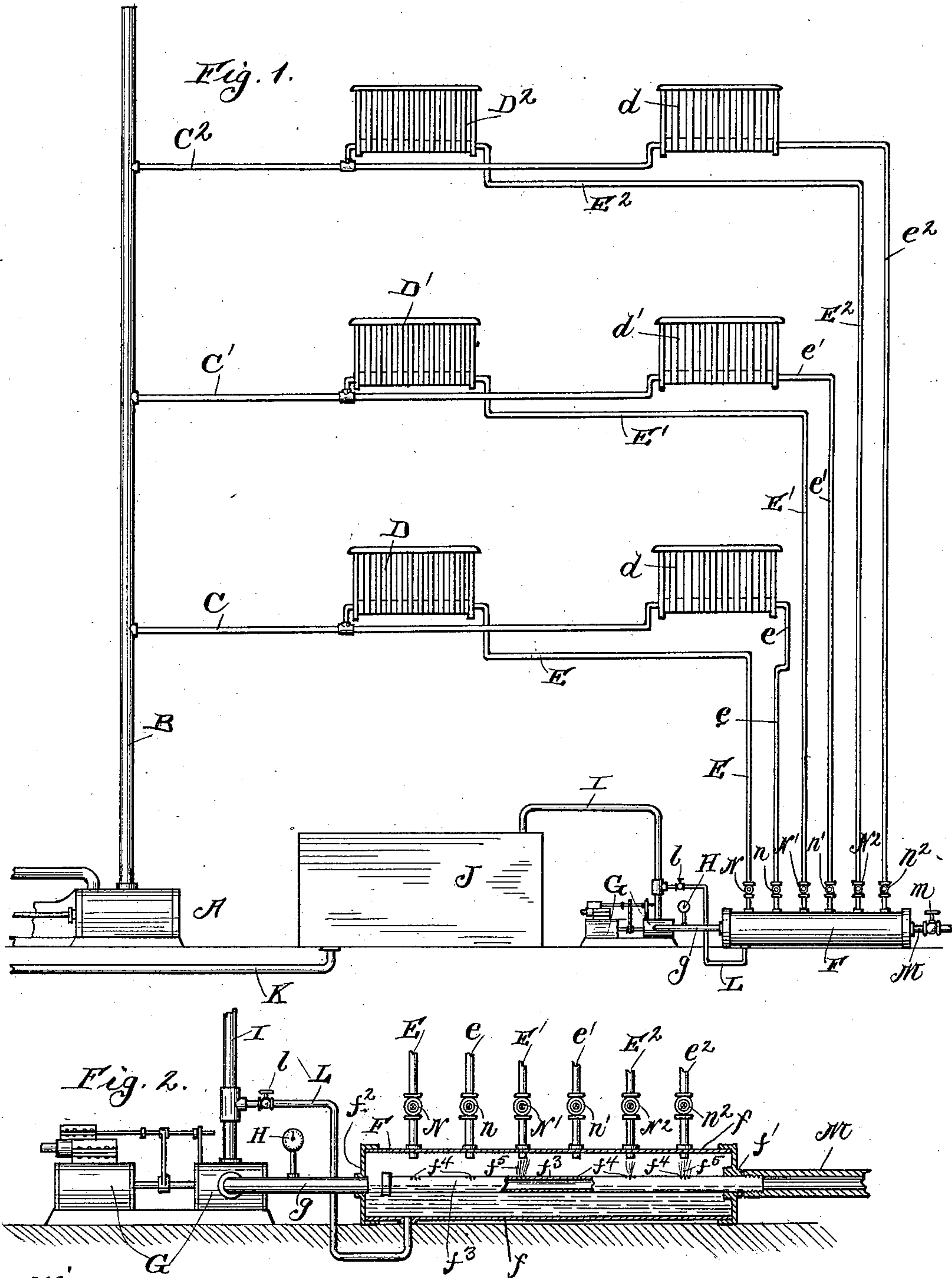


(No Model.)

E. A. FIELD.
STEAM HEATING APPARATUS.

No. 557,530.

Patented Mar. 31, 1896.



Witnesses:

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UNITED STATES PATENT OFFICE.

EDWARD A. FIELD, OF CHICAGO, ILLINOIS.

STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 557,530, dated March 31, 1896.

Application filed July 8, 1895. Serial No. 555,197. (No model.)

To all whom it may concern:

Be it known that I, EDWARD A. FIELD, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam Heating Apparatus, of which the following, when taken in connection with the drawings accompanying and forming a part hereof, is a full and complete specification.

The invention relates particularly to steam heating apparatus for buildings wherein the steam used, or a portion thereof, is delivered to the pipes and heating-coils of the system from the exhaust-ports of one or more engines, although the invention can be advantageously employed in a steam heating apparatus to which the steam used is delivered directly from the boiler in which it is generated; and the invention consists in the mechanisms by which the steam which has passed through the heating apparatus is reduced to water of condensation and delivered to the hot-water tank of the boiler and the manner in which such mechanisms are connected to the steam heating apparatus and to the hot-water tank.

The object of the invention is to obtain mechanisms so constructed and connected to the steam heating apparatus that a vacuum or a partial vacuum is produced in the hot-well or "header," as I term it, into which the return-pipes (bleeders) of the steam heating apparatus deliver their contents, and thereby a suction secured and a forced circulation created in the radiators and bleeder-pipes of the heating apparatus with certainty and at small cost.

In the drawings referred to as forming a part of this specification, Figure 1 is an elevation of a steam heating apparatus having mechanisms placed therein and connected thereto embodying my invention, and Fig. 2 is a vertical longitudinal section of the header invented by me and forming an element in the steam heating apparatus illustrated in Fig. 1 and an elevation of the vacuum-pump attached thereto with the connections between the pump and the discharge-pipe thereof and header.

A reference-letter applied to a given part is used to designate such part throughout both figures of the drawings wherever the same appears.

A is a steam-engine.

B is the riser of the steam heating apparatus and the pipe into which engine A exhausts.

C C' C² are branch pipes extending from riser B to the respective radiators D d D' d' D² d², and E e E' e' E² e² are bleeder-pipes extending from such radiators, respectively, into header F.

G is a vacuum-pump by means of which a vacuum or partial vacuum is obtained in header F.

g is a pipe extending between and communicating with header F and pump G.

H is a vacuum-gage communicating with header F (by being placed on pipe g) and by means of which the vacuum in header F is indicated.

I is the discharge-pipe of pump G, extending from such pump to hot-water tank J.

K is a pipe extending from hot-water tank J to the boiler of the plant.

L is a pipe extending between and communicating with header F and discharge-pipe I, and l is a valve in pipe L.

M is a cold-water pipe secured to header F, and m is a valve in such pipe M.

N n N' n' N² n² are valves in the respective bleeder-pipes E e E' e' E² e².

Header F consists of cylinder f, having heads f' f² and pipe f³, having perforations f⁴ f⁴. Pipe f³ is secured in head f' and may extend through and project beyond such head, so as to have attached thereto cold-water-supply pipe M. The suction-pipe g extends through head f². Pipes f³ and g, respectively, are concentric with cylinder f. Pipe L, extending from discharge-pipe I to and into the header F, passes through the under side of cylinder f, so as to discharge into the body of the water in such cylinder whatever water is allowed to pass therethrough and into such header. The several bleeder-pipes of the system which enter the header are directly over the holes f⁴ f⁴, so that the steam (if any) delivered into the header from such bleeders is delivered into the spray of cold water extending upward through such holes f⁴ f⁴ from pipe f³.

In the operation of the apparatus for heating purposes cold water is admitted to the header in sprays from holes f⁴ f⁴ by opening the valve m. Steam passing from the ex-

haust-port of engine A (or directly from a steam-generator, if preferred) passes through the riser or risers of the system, through the several steam-coils or radiators of the system, and from thence through the bleeder-pipes (valves $N n N' n' N^2 n^2$ being opened) into the header F, and being there met by the spray of cold water $f^5 f^5$ from holes $f^4 f^4$ is condensed. The pump G being started, as soon as the water of condensation (combined with the cold water delivered through holes $f^4 f^4$) rises to flow into pipe g , the level of such water may be maintained. The sprays $f^5 f^5$ are thus at all times maintained in the header F, and, too, water is supplied at all times to the pump G. After the desired vacuum is obtained in the header F and indicated by gage H the valve I is opened, or partially so, and the valve m partially closed, proper adjustment being obtained between such valves, so that the desired vacuum in header F is maintained by the operation of the pump G and sprays $f^5 f^5$, and at the same time some water is at all times supplied to the pump. The water discharged from the pump G and not returned through pipe L to header F is delivered from discharge-pipe I into tank J, from which it is taken as required and forced into the boiler of the system. By a header of this construction, attached, as described, to the bleeder-pipes, the pump, and the discharge-pipe of the pump, a very economical use of cold water through pipe M is possible. The water delivered from the discharge-pipe I into the hot-water tank for storage until required in the boiler is heated to the highest possible temperature, and uniform action of the heating apparatus is obtainable.

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

1. In a heating apparatus for buildings, the combination of bleeder-pipes, a header into which the bleeder-pipes and a cold-water-sup-

ply pipe extend, a vacuum-pump connected with the header, a discharge-pipe from the pump to a hot-water tank, a pipe connecting the header and the discharge-pipe, such connecting-pipe having a valve therein, and a valve in the cold-water-supply-pipe; substantially as described.

2. In a heating apparatus for buildings, a condensing-header interposed in the system, into which header the bleeder-pipes discharge, such header consisting of a closed horizontal cylinder, a discharge-pipe from the cylinder and a cold-water-supply pipe into the cylinder, the discharge and supply pipes being on the same level, and the supply-pipe having holes therein arranged to spray water against steam entering the cylinder by the bleeder-pipes; with means for withdrawing water and vapor from the header through the discharge-pipe and means for returning back thereinto a portion of the water so withdrawn from the header, thereby heating the portion of the water withdrawn from the header and not returned thereinto as much as possible and continuously maintaining a given quantity of water and the desired vacuum in the header with the least possible supply of cold water; substantially as described.

3. In a heating apparatus for buildings, the combination of a steam-main into which steam is fed, steam-heaters connecting to the main, a condensing-header, means for withdrawing water from the header and for creating a partial vacuum in the header, connecting-pipes from the steam-heaters to the header, means for supplying cold water to the header means for varying such supply and means for returning a determined part of the water drawn from the header back thereinto; substantially as described.

EDWARD A. FIELD.

In presence of—

L. BALLARD WAPLES,
CHARLES T. BROWN.