(No Model.)

G. STIFF.

EVAPORATOR.

No. 589,553. Patented Sept. 7, 1897.

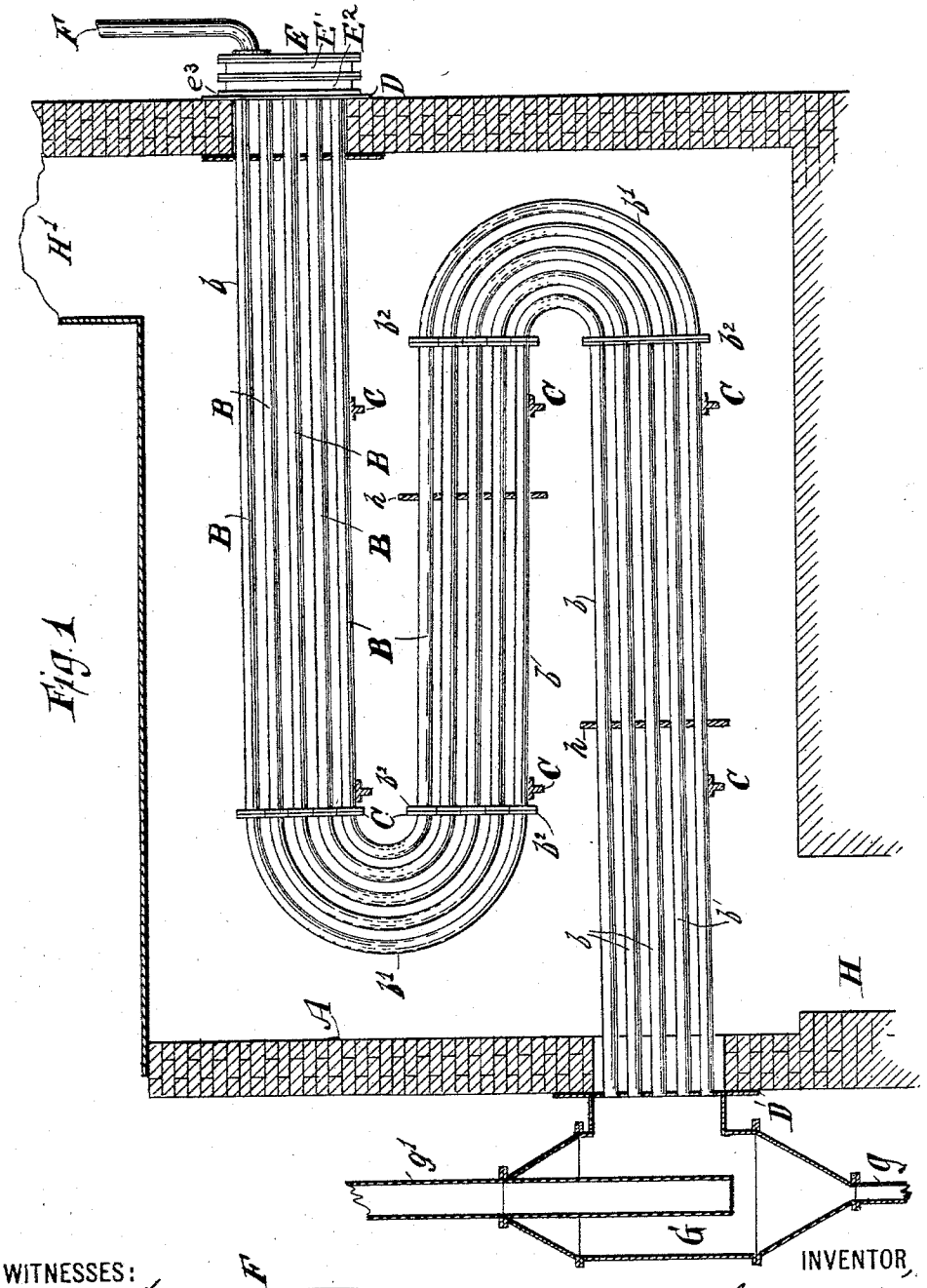


Fig. 1.

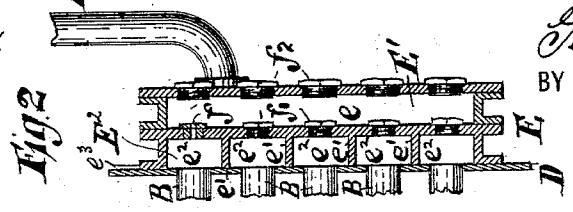


Fig. 2.

WITNESSES:

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UNITED STATES PATENT OFFICE.

GEORGE STIFF, OF LONG ISLAND CITY, NEW YORK, ASSIGNOR OF ONE-HALF TO FRANCIS J. OAKES, OF SAME PLACE.

EVAPORATOR.

SPECIFICATION forming part of Letters Patent No. 589,553, dated September 7, 1897.

Application filed January 9, 1896. Serial No. 574,922. (No model.)

To all whom it may concern:

Be it known that I, GEORGE STIFF, of Long Island City, Queens county, and State of New York, have invented a new and useful Improvement in Evaporators, of which the following is a specification.

This invention relates to apparatus used for the evaporation of water or other liquid. It embodies a construction possessing a large area of heating-surface and one having a series of passages for the liquid to be heated which severally extend backward upon themselves at different portions of their length.

A prominent feature of the construction is freedom from a tendency to leakage in consequence of strains imposed by expansion or contraction.

I will describe an evaporator embodying the features of my invention, and then point out the novelty in the claims.

In the accompanying drawings, Figure 1 is a vertical longitudinal section through an evaporator embodying the features of my invention. This figure shows the separator attached to the outlet end of the evaporator in partial section. Fig. 2 is a similar section, on an enlarged scale, of a distributing-chamber forming a part of the invention.

Similar letters of reference designate corresponding parts in both figures.

The casing in which the evaporator is inclosed is shown at A. It is here represented as being formed of brickwork, but obviously could consist of a metallic shell having a heat-insulating material applied to it, if so desired.

Through the interior space of the casing A extend a number of tubes B for conveying the liquid to be evaporated. The number and size of these liquid-conveying tubes will be proportioned to the amount and character of the liquid to be evaporated or heated. Fig. 1 shows a number of these tubes arranged and forming a series in a vertical plane. There may be as many of these series as found desirable.

Each tube B comprises a number of straight portions b, the adjacent ends of which communicate with each other through return-bends b'. The several straight portions b are inclined downwardly from inlet to outlet to facilitate the gravitation of the liquid. Preferably for purposes of repair and accessibility the several straight portions and return-bends will be made of independent pieces secured together by flange or other couplings b^2. The tubes constituting the evaporator may rest on cross-beams C, stretching from wall to wall of the casing A.

The inlet and outlet ends of the tubes B are secured in the respective tube-sheets D D′ in any appropriate manner—as, for instance, by expanding the same in place.

Referring now more particularly to Fig. 2, E designates the casing of the distributing-chamber, from which liquid passes to the several tubes. It may conveniently be made as a casting and is divided by a partition e into two chambers, an outer one E′, or the distributing-chamber proper, and an inner chamber E^2, divided by cross-partitions e' into spaces or pockets e^2, each of which is open to a tube B.

The casing E may be secured in place by any convenient means. For instance, the same may be provided with a flange e^2, through holes in which pass securing-bolts. The chamber E′ will in the operation of the apparatus be kept constantly charged.

F is a supply-pipe entering the distributing-chamber E′. From this latter chamber the liquid passes into a space or pocket e^2 through an aperture f, and thence into the corresponding pipe B. Preferably the construction will be such that the size of the aperture f may be varied to adjust the amount of liquid entering a pipe B. To this end I have shown each aperture as being formed in a removable exteriorly-threaded bushing f'. Access is had to the bushings f' for their removal or replacement through suitable openings in the outer wall of the casing E, which are closed by removable plugs f^2.

The fluid after having passed through the tubes B is discharged into a separator G, which consists of a suitable vessel whose lower portion is tapered downwardly and extended as a discharge-pipe g for the unevaporated liquid, while the vapor generated passes out through an uptake g', whose open inner

end extends, preferably, for some distance into the vessel G.

An appropriate heat-carrying medium may be used for the purpose of heating the pipes B and be led into and discharged from the interior of the casing A by suitable induction and eduction pipes H and H′, respectively. Exhaust or live steam or hot air may be used, and baffle-plates *h* provided for more effectually dividing up and distributing the heated gases.

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

1. In an evaporator, the combination with the casing provided with induction and eduction passages, of inclined tortuous conveying-tubes within the casing, a distributing-chamber provided with a perforated partition having upon one side a series of pockets with which the conveying-tubes communicate, and a separator at the discharge end of said tubes, substantially as described.

2. In an evaporator, the combination with the casing, of conveying-tubes within the casing, and a distributing-chamber provided with a perforated partition having upon one side a series of pockets with which the conveying-tubes communicate, substantially as described.

3. In an evaporator, the combination with the casing, of conveying-tubes within the casing, a distributing-chamber provided with a perforated partition having upon one side a series of pockets with which the conveying-tubes communicate and detachable perforated plugs in the perforations of the partition, substantially as described.

4. In an evaporator, the combination with the casing of conveying-tubes within the casing, a distributing-chamber provided with a perforated partition having upon one side a series of pockets with which the conveying-tubes communicate, detachable perforated plugs in the perforations of the partitions and removable plugs in openings in the casing which aline with the plugs in the partition, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE STIFF.

Witnesses:
FRANCIS J. OAKES,
THO. NASH.