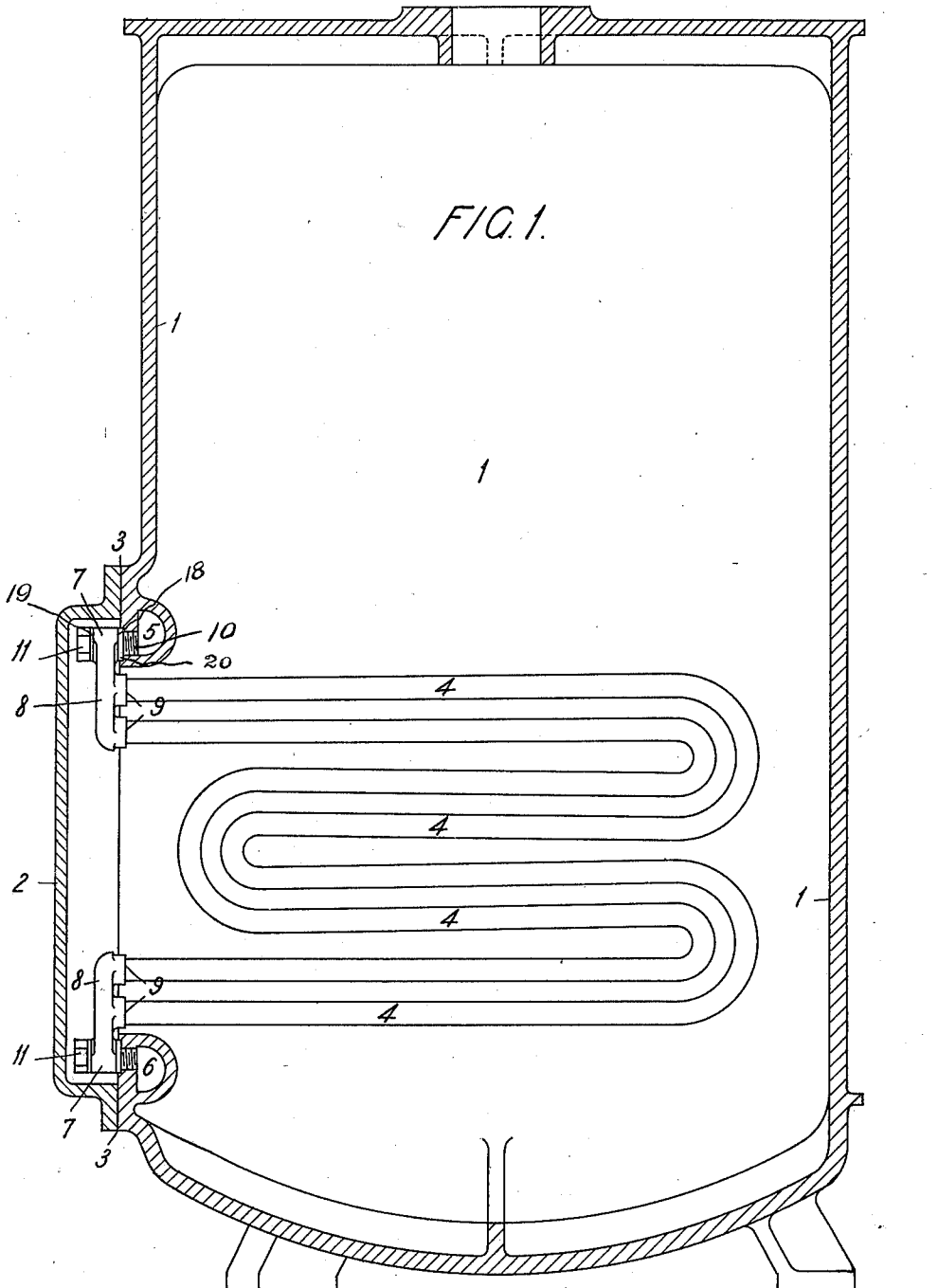


D. A. QUIGGIN.
 APPARATUS FOR EVAPORATING OR HEATING WATER BY STEAM.
 APPLICATION FILED SEPT. 3, 1909.

1,029,631.

Patented June 18, 1912.

2 SHEETS—SHEET 1.



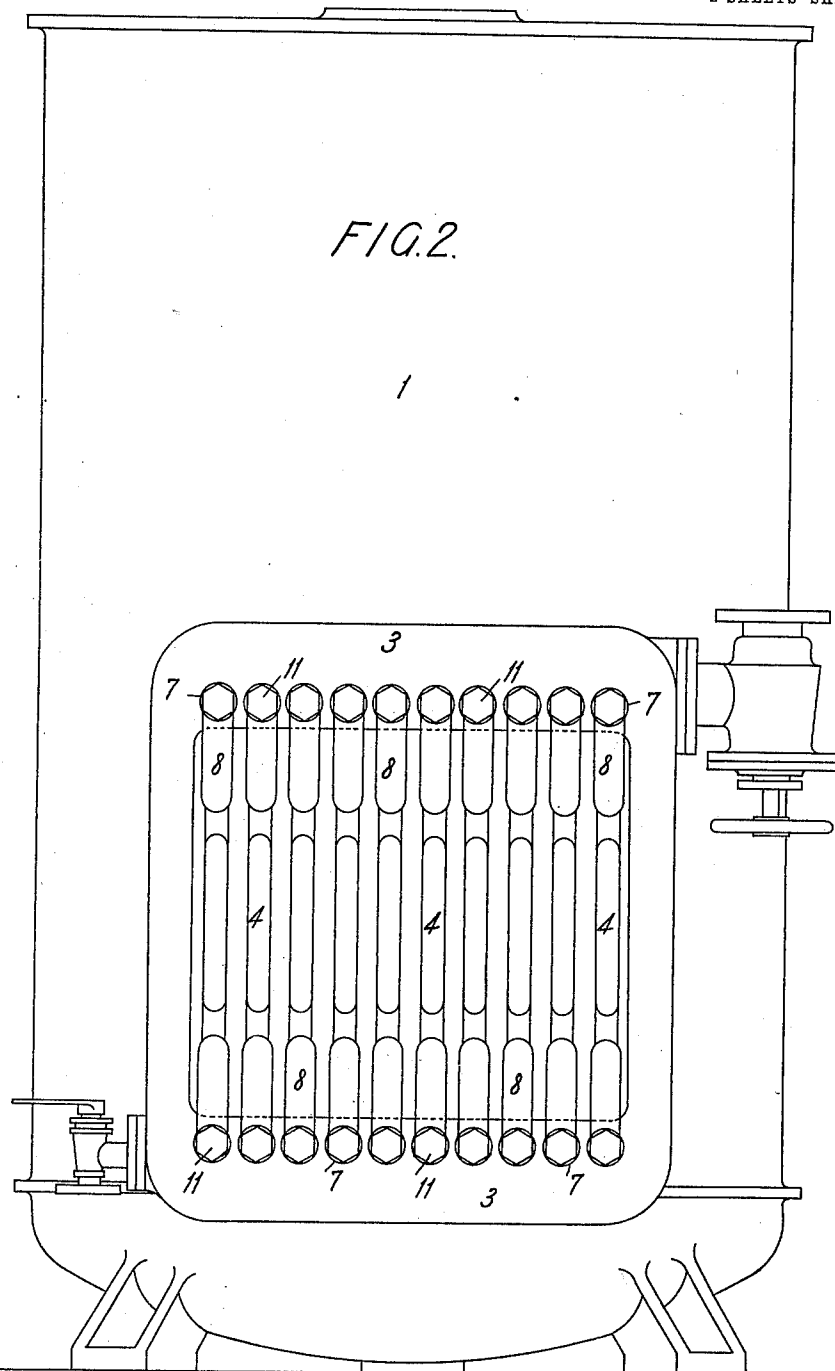
Attest:
Edw. A. Tolson.
Edward H. Sata.

Inventor:
Daniel A. Quiggin.
 By *Spear, Middleton & Spear*
 Attys.

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2 SHEETS—SHEET 2.



Attest:

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Inventor:

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UNITED STATES PATENT OFFICE.

DANIEL ARTHUR QUIGGIN, OF LIVERPOOL, ENGLAND.

APPARATUS FOR EVAPORATING OR HEATING WATER BY STEAM.

1,029,631.

Specification of Letters Patent.

Patented June 18, 1912.

Application filed September 3, 1909. Serial No. 516,112.

To all whom it may concern:

Be it known that I, DANIEL ARTHUR QUIGGIN, a subject of the King of Great Britain, and residing in Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements in Apparatus for Evaporating or Heating Water by Steam, of which the following is a specification.

This invention relates to evaporators or feed water heaters in which the heat is derived from steam which is passed through tubular heating surfaces immersed in the water, and is specially applicable to cases in which the steam to be utilized is low in pressure and temperature and large in volume, and where consequently a comparatively large area of steam path from inlet to outlet is necessary.

In the accompanying drawings which illustrate an apparatus constructed in accordance with my invention, Figures 1 and 2 show the general arrangement, Fig. 1 being in vertical medial section, and Fig. 2 being an elevation with the door 2 removed.

Referring in the first instance to Figs. 1 and 2, the main casing 1 which contains the water and the heat transmitting surfaces 4, is usually of general cylindrical form and arranged with its axis vertical, and it is provided with a door 2 sufficiently large to give access to the heating surfaces and to permit of their withdrawal; the joint face 3 of the door is preferably a plane surface and disposed vertically.

The heat transmitting surfaces 4 are in the form of tubular zig-zags connecting the steam inlet passage 5 and the outlet passage 6. These passages are formed transversely in the body of the main casing, the one just below the upper margin of the door opening, and the other just above the lower margin of the door opening.

In order to provide the necessary large area of steam path from inlet to outlet, within a casing of comparatively small bulk, I arrange the tubular zig-zags in pairs, with their successive lengths lying parallel to each other in the same vertical plane. The ends of each pair are brazed into junction pieces 8 by which the attachments to the steam inlet passage 5 and outlet passage 6 are made; the junction pieces provide a common inlet and outlet to both zig-zags, so that each pair forms a single unit with two paths in parallel for the steam from inlet to outlet.

The tubular units so formed are all similar and interchangeable, and adapted to be individually disconnected and withdrawn as a whole. Each junction piece has a vertical extension 8, with a pair of horizontally disposed nozzles 9 into which the ends of the tubular zig-zags constituting a pair are brazed, and with a transverse tubular head 7 having lateral jointing faces 18 and 19 at each end. The stud 10 is screwed tightly into the front wall of the passage 5 or 6 as the case may be, and it has a flange or collar 20, the outer face of which makes joint with the face 18 of the junction piece. The stud passes freely through the tubular head of the junction piece, and the whole is secured by the capped nut 11. The abutting joint faces are preferably serrated after the manner described in U. S. Patent No. 434,804, granted to me August 19, 1890. The stud is in part tubular with a side passage giving the necessary steam or water way.

It will be seen that the heat transmitting units 4 extend in vertical planes between the passages 5 and 6, the zig-zags extending across into the body of water in the main casing. Detachable tube connections necessarily occupy considerable space, and by gripping pairs of tubes into units as described, with a single junction piece at each end for each unit, space is economized on the steam passages and the tubes can be assembled more snugly; and of course there is a saving of cost from the saving in the number of detachable connections. As all the joints are on the front side, close to the door and readily accessible when the latter is opened, all the joints can be readily inspected or tightened, and any of the units can be readily detached and withdrawn individually. Suitable inlets and outlets for the water and vapor, as well as the various mountings common to apparatus of this class are provided on the main casing.

While I have shown each tubular unit as consisting of two zig-zags arranged in parallel, obviously it might consist of more than two such zig-zags, the junction pieces being made with a corresponding number of nozzles.

Having now fully described my invention, I declare that what I claim, and desire to secure by Letters Patent is:—

1. In apparatus for evaporating or heating water by steam, in combination; a casing with an opening and a door therefor

with a plane joint face, transverse steam inlet and outlet passages on the casing adjacent to the margins of the door opening, and a series of heating units individually
5 and detachably connected at their ends to said passages by joint faces substantially in the plane of the door joint face, each unit consisting of a number of parallel tubular zigzags permanently fixed to a single inlet
10 and to a single outlet, substantially as described.

2. In apparatus for evaporating or heating water by steam, a tubular heating unit consisting of a pair of parallel tubular zig-
15 zags with their adjacent ends facing in the

same direction and permanently fixed to junction pieces forming a single inlet and a single outlet for the pair of tubes and also facing in the same direction; said inlet and outlet being adapted to be detachably connected to the steam supply and discharge, substantially as described. 20

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DANIEL ARTHUR QUIGGIN.

Witnesses:

ROBERT A. SLOAN,
JOSEPH E. HIRST.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
