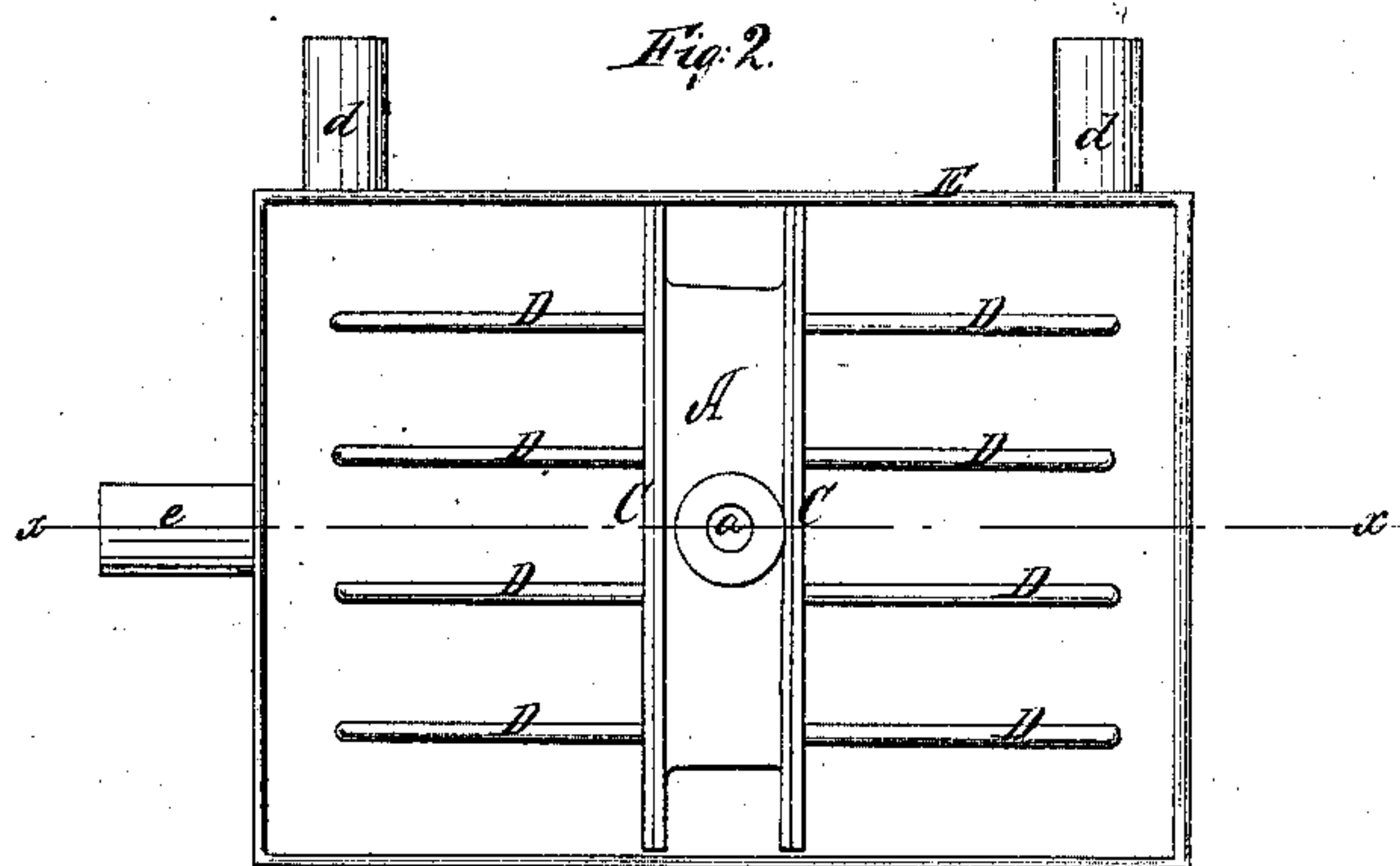
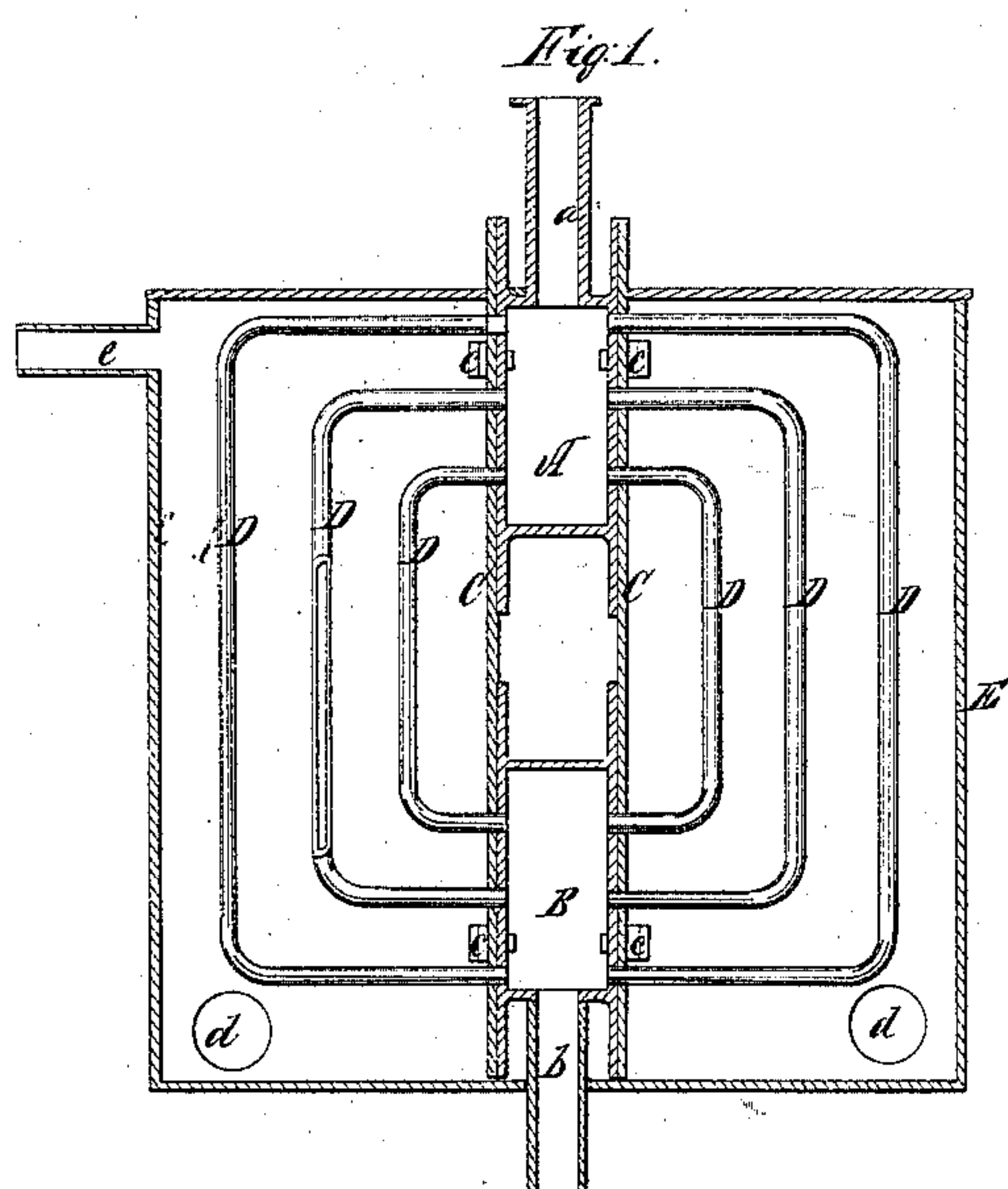


G. Stump,
Steam-Boiler Condenser,
No 39,688. *Patented Aug. 25, 1863.*



Witnesses

W. S. Partridge
Daniel Robertson

Inventor:

George Stump

UNITED STATES PATENT OFFICE.

GEORGE STUMP, OF NEW YORK, N. Y.

IMPROVEMENT IN CONDENSERS.

Specification forming part of Letters Patent No. 39,688, dated August 25, 1863.

To all whom it may concern:

Be it known that I, GEORGE STUMP, of the city, county, and State of New York, have invented a new and Improved Condenser and Heater; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 represents a longitudinal vertical section of my invention, taken in the plane indicated by the line *xx*, Fig. 2. Fig. 2 is a plan or top view of the same.

Similar letters of reference in both views indicate corresponding parts.

To enable those skilled in the art to make and use my invention, I will proceed to describe it with reference to the drawings.

A represents the receiving-chamber of a condenser or heater, and B its discharging-chamber, steam being admitted through the pipe *a*, and the condensed water or spent steam being carried off through the pipe *b*. The chambers A and B are secured between two sheets, C, by means of screws *c* or by any other suitable means, each chamber being cast separate.

D D represents several ranges of tubes, which are bent in the form of the letter C. Their ends are secured in the tube-sheets C in such a manner that each of said C-shaped tubes communicates with both chambers A B, as clearly shown in Fig. 1 of the drawings. These tubes ought to be placed as close together as the strength of the tube-sheets will admit, and they are curved so that the condensed water accumulating in the same will readily find its way to the lower or discharging chamber, B.

The chambers A B, with the tubes D, are introduced into a tank, E, to which water or other suitable liquid is admitted through pipes *d*, and which is provided with an overflow-pipe, *e*, so that the condenser or heater is or may be completely submerged under water, or other liquid, if desired.

The steam which passes from the chamber A through the tubes D D condenses in said tubes, and the condensed water readily flows off to the chamber B, from which it is discharged through the pipe *b*. By reason of their peculiar shape the tubes D D offer a large

condensing or heating surface, and they can be inserted perfectly rigid into the tube-sheets C.

When it is desired to clean the tubes, the tube-sheets are removed and free access can now be had to all the tubes.

If it should be desirable to repair one of the tubes or tube-sheets, it can easily be removed and replaced, if desired, by another, without disturbing the chambers A B or any other part of the condenser.

In my condenser the tubes D, it will be noticed, are of curved form, which permits them to expand or contract without affecting the joints. Each tube, when it expands, curves out a little more than before, and when it contracts its curvature is reduced without effecting its own joints, and, furthermore, each tube can expand and contract independent of any of the others. The inner tubes, for instance, may be liable to greater changes than the outer tubes, and in ordinary tubular condensers the joints become leaky from this very reason, because the inner tubes expand and contract more than those near the edges of the tube-sheets, and consequently the joints must work loose.

By my condenser or heater a very large condensing or heating surface is produced, and when once properly fixed the joints are not liable to work loose. It is particularly adapted for marine-engines, where it is peculiarly objectionable if the condensing liquid is mixed with the condensed water; but it may be used with equal advantage on engines of every description, or for heating water or any other kind of liquid.

By having the chambers A B made separate and independent, they can be removed separately for repair or renewal at pleasure, and at the same time they strengthen and preserve the tube-sheets C from injury.

What I claim as new, and desire to secure by Letters Patent, is—

Having the chambers A B made separate and independent of each other and of the tube-sheets C, as and for the purpose herein shown and described.

GEORGE STUMP.

Witnesses:

M. S. PARTRIDGE,
DANIEL ROBERTSON.