

No. 681,746.

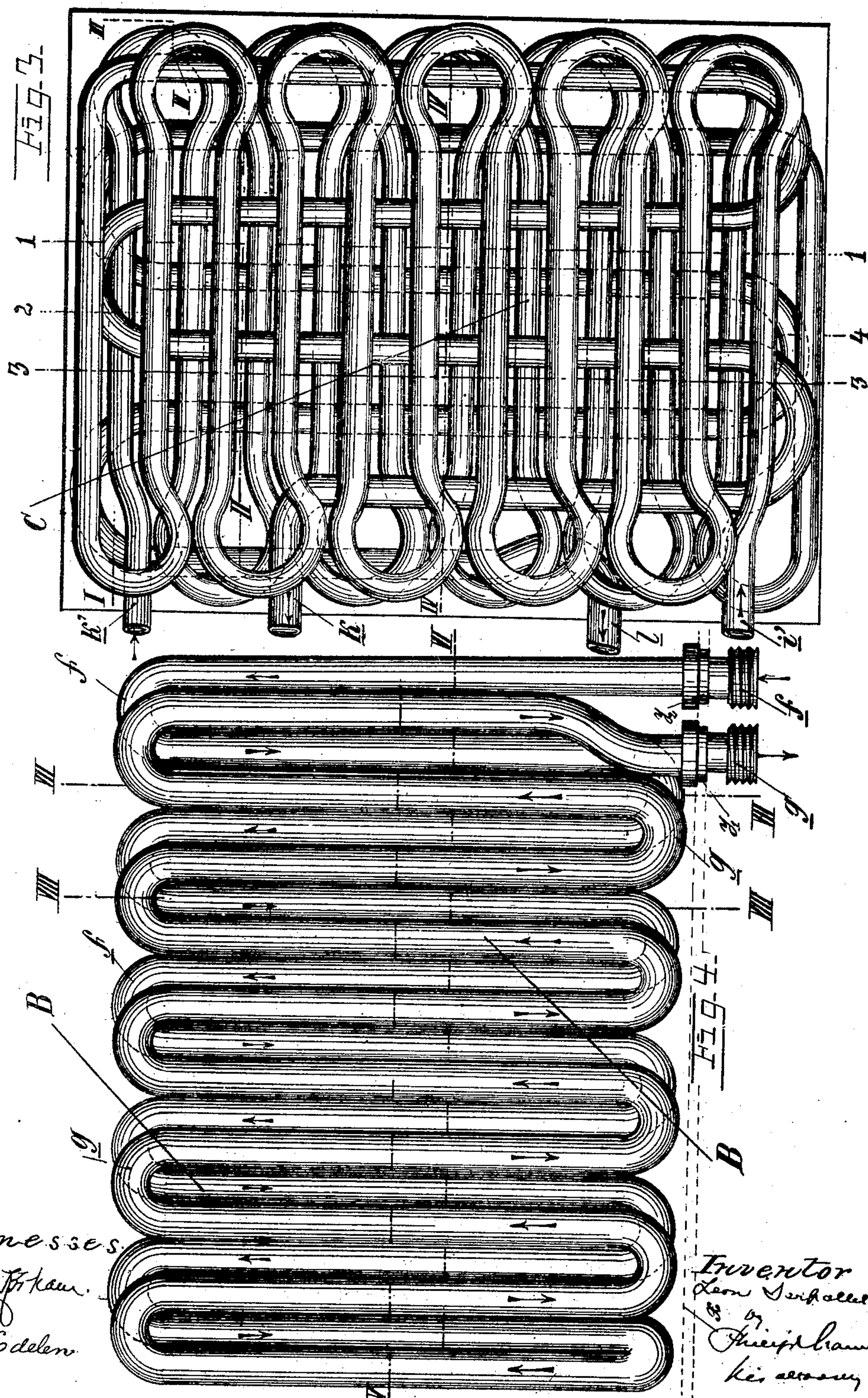
Patented Sept. 3, 1901.

L. SERPOLLET.
TUBE BOILER.

(Application filed May 11, 1900.)

(No Model.)

5 Sheets—Sheet 2.



Witnesses
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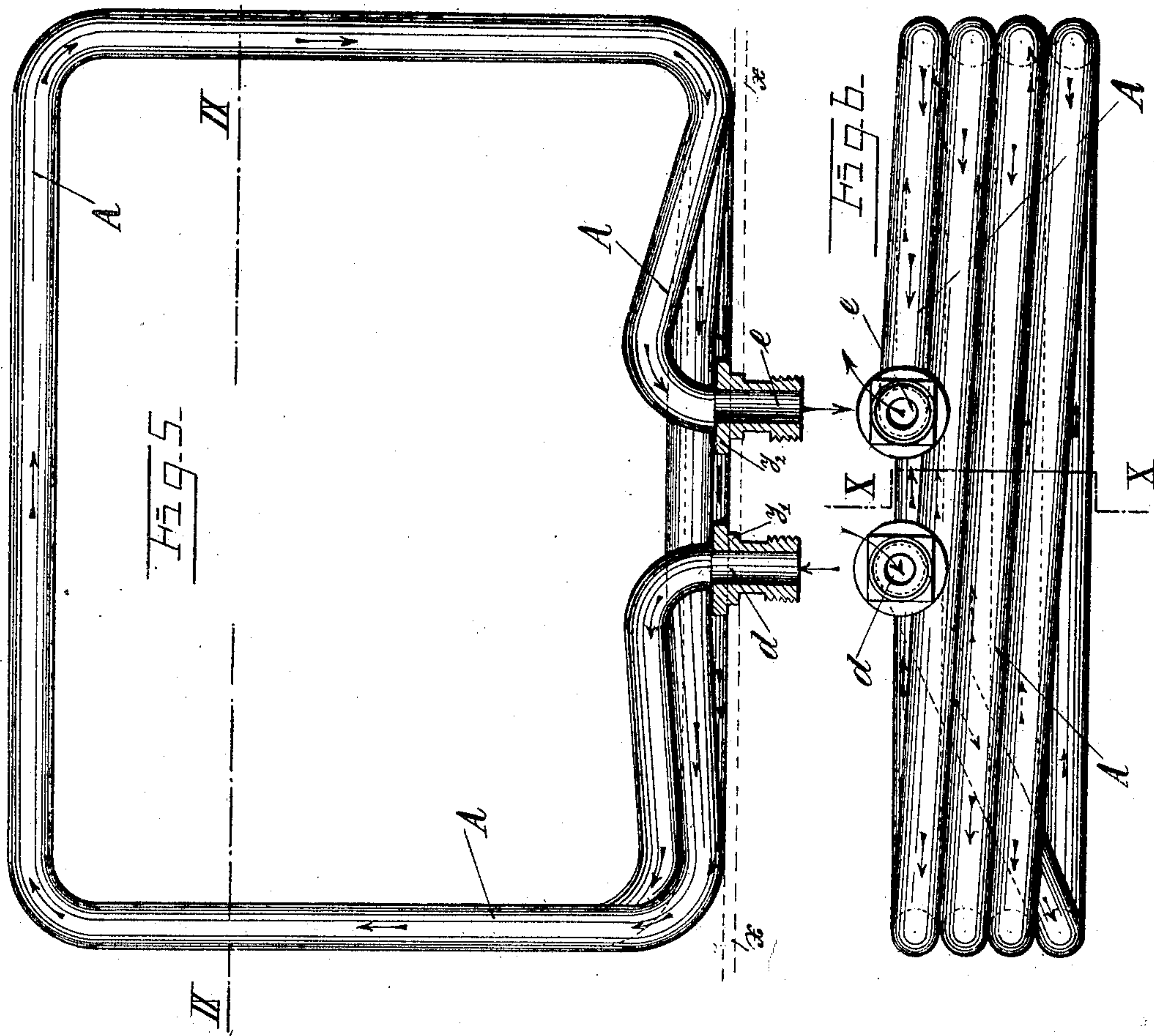
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5 Sheets—Sheet 3.



Witnesses.
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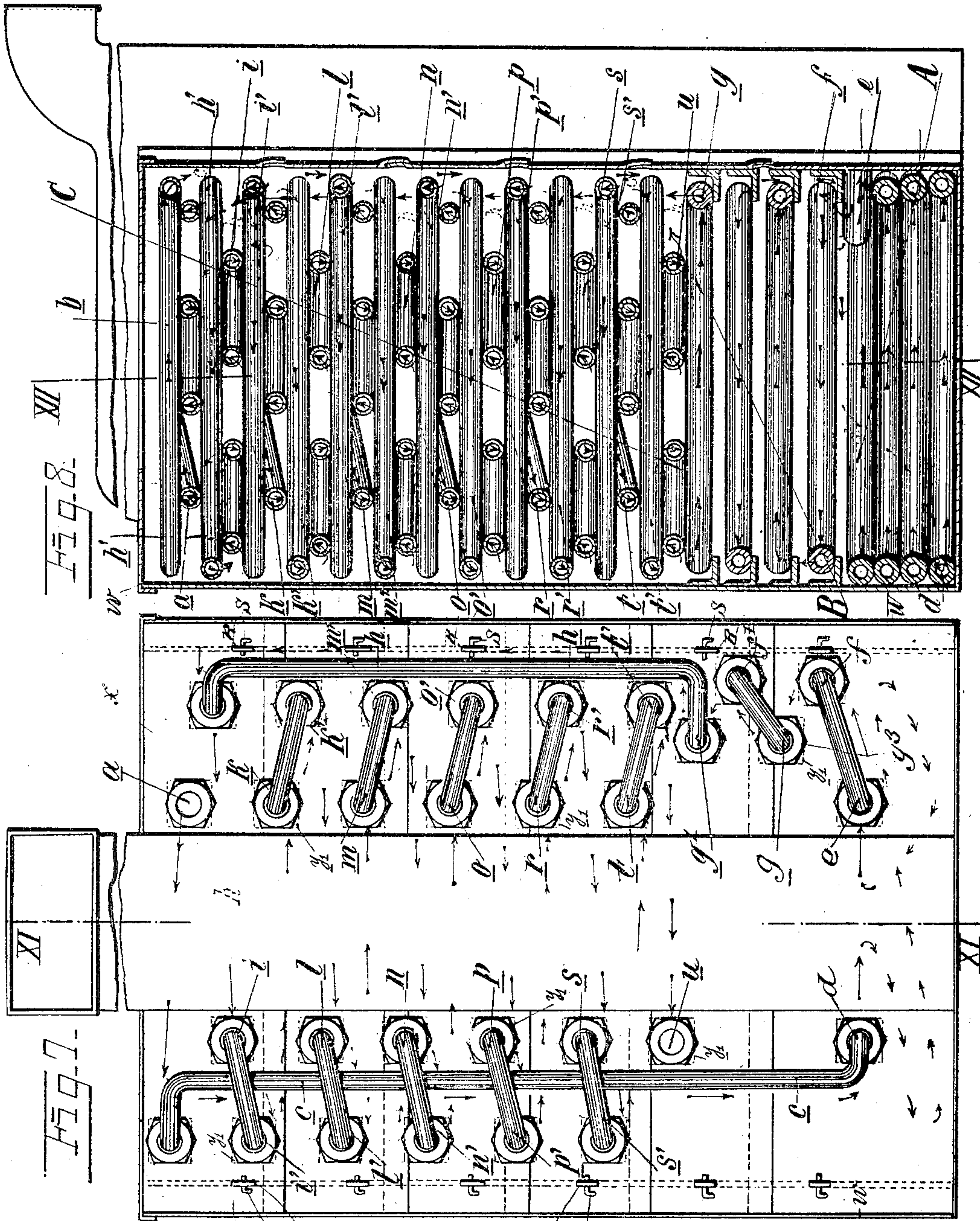
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5 Sheets—Sheet 4.



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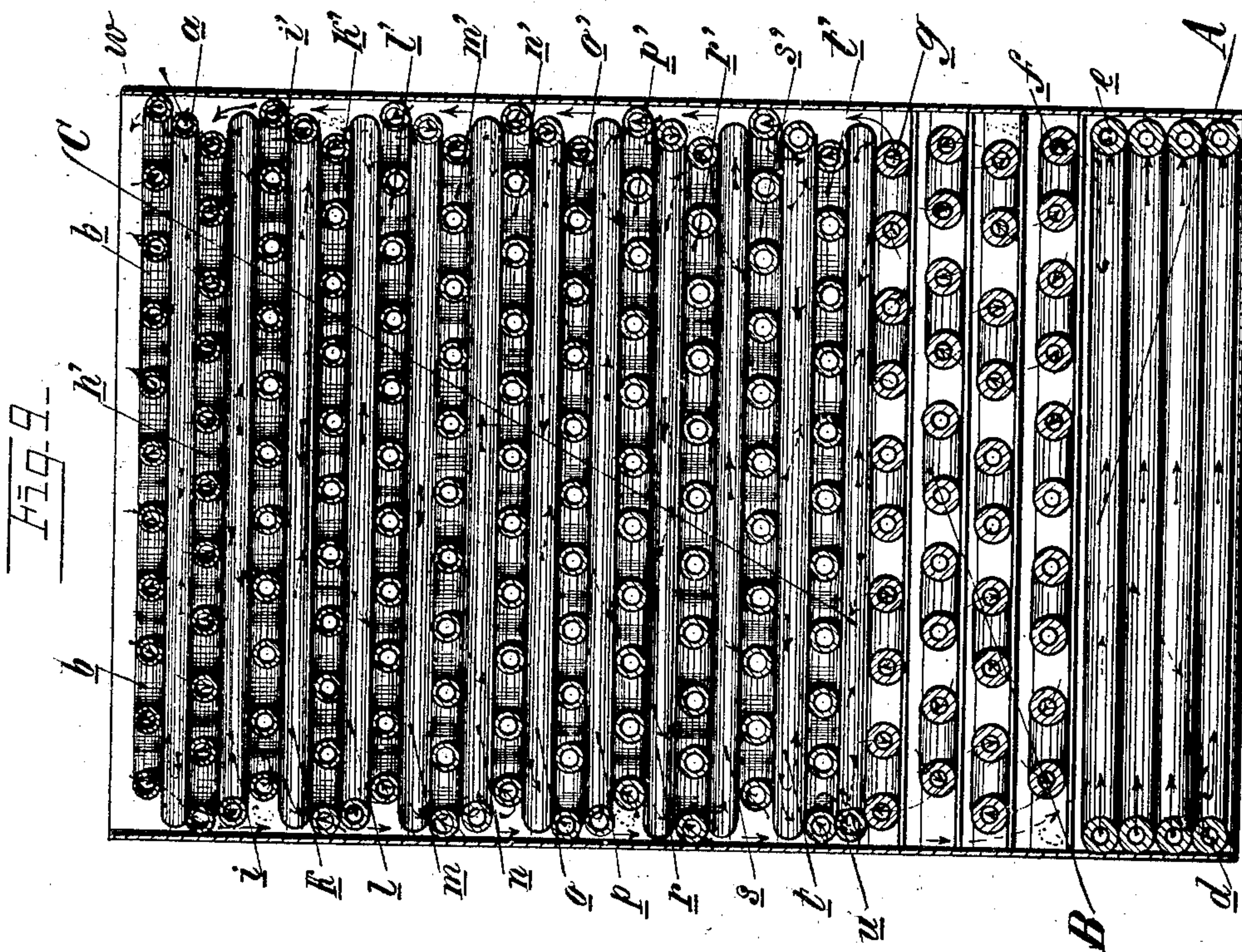
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TUBE BOILER.

(Application filed May 11, 1900.)

(No Model.)

5 Sheets--Sheet 5.



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UNITED STATES PATENT OFFICE.

LEON SERPOLLET, OF PARIS, FRANCE.

TUBE-BOILER.

SPECIFICATION forming part of Letters Patent No. 681,746, dated September 3, 1901.

Application filed May 11, 1900. Serial No. 16,350. (No model.)

To all whom it may concern:

Be it known that I, LEON SERPOLLET, engineer, residing at Paris, France, have invented new and useful Improvements in and
5 Connected with Tube-Boilers, which improvements are fully set forth in the following specification.

The present invention relates to tube-boilers in which three groups of bent and
10 spiral-formed tubes, the side walls of which are of different thickness, are superposed in such a manner as to ascertain an instantaneous evaporation of the water.

My invention will be fully understood with
15 reference to the accompanying drawings, in which, as an example, I have illustrated a tube-boiler with three groups of tubes bent in the particular form which hereinafter will be described.

20 In the drawings, Figure 1 illustrates a plan view of a series composing the upper group of tubes. Fig. 2 is a plan view of another series of the same group of tubes. Fig. 3 is a plan view showing series illustrated in Figs.
25 1 and 2 when superposed. Fig. 4 is a plan view of the second group, illustrating the general arrangement and the terminals. Fig. 5 shows in plan view the third or lower group, the tubes being bent rectangularly. Fig. 6
30 is an elevation view of the preceding figure, showing the terminals of the tubes. Fig. 7 shows an elevation view of the whole boiler, composed of three groups of tubes. Fig. 8 is a vertical section through line XI XI of Fig.
35 7. Fig. 9 is a transverse section through the axis of Fig. 7—viz., through line XII XII of Fig. 8.

In the rectangular box *w* surrounding the boiler and on the bottom thereof I have ar-
40 ranged the first group A of boiler-tubes, consisting of several superposed series of spiral-formed tubes communicating with the second group placed at the top of the first one. All of the tubes are similar to one another; but they
45 are arranged in such manner that their axes never are superposed correctly. At the top of the second group B, I have arranged the third group C. These three groups are connected in a manner as to allow of a good cir-
50 culation of the water. (See Figs. 7, 8, and 9.) In order to explain the construction of my

boiler, I am going to describe the several groups separately.

The branches or spirals of the lower group A, Figs. 5, 6, 8, and 9, consist of a continuous
55 tube, the exterior diameter of which is equal to that of the tubes composing the groups B and C, but the side walls of which are thicker, so that the interior diameter of the tubes of the group A is smaller than that of the tubes
60 forming the groups B and C. The branches being bent rectangularly form side walls of the fire-box, in which I preferably arrange hydrocarbon-burners. The direction in which
65 the water is circulating within the tubes is illustrated by arrows.

The spiral-formed tubes composing the second group, Figs. 4, 8, and 9, are arranged at the top of the group A.

Above the group B is placed the third group
70 C, forming the upper part of the boiler and being the most important of the three groups. Fig. 9 being a section through lines 4 4, 3 3 of Fig. 2 and 2 2, 1 1 of Fig. 1 shows the arrangement of this group, which is composed of a
75 greater number of tubes than the two lower groups A and B. Fig. 8 being a section through lines IV IV, III III of Fig. 2 and II II, I I of Fig. 1 also shows the arrangement of the interchangeable tubes composing the up-
80 per group C. As can be seen, the interior diameter of the tubes composing the group C is greater than that of the tubes B and A. In consequence of this fact the bends at the ex-
85 tremities are larger than those of the tubes B, for instance.

The particular combination of the bent tubes communicating with one another and of the three groups superposed, the whole being in-
90 closed in a box *w*, serving simultaneously as fire-box and as smoke-box, ascertains an instantaneous evaporation of the water circulating within the said tubes.

The working of my improved tube-boiler is the following: The water coming from a res-
95 ervoir, pump, or the like enters the upper parts of the boiler at *a*, Figs. 7, 8, and 9, passes through the pipe *b*, descends in the pipe *c*, Fig. 7, enters the lower group of tubes A at *d*, and circulates through said tubes,
100 which have thick side walls. The run of the water is indicated by arrows. Arriving at

the end of the tubes A the water leaves this group at *e* and enters the two superposed groups B at *f*, leaves the first of these groups at *g*, and passing through short pipes *g f'* enters the second group at *f'*, leaves the uppermost group B at *g'*, and ascends in the tube *h* of the upper group C, having more tubes than the lower groups. The side walls of this upper group are thinner. Consequently their interior diameter is larger. The water then passes through the tubes *h' i i' k k' l l' m m' n n' o o' p p' r r' s s' t t'* and transformed into steam leaves the boiler through the aperture *u*.

15 The group C consisting of a certain number of bent tubes connected together it is easy to interchange them, if necessary. The different tubes composing said group C are fixed in the following manner: As clearly

20 shown in Figs. 7 and 8, the front wall of box *w* is composed of a plurality of overlapping plates *x*, the ends of which extend a short distance beyond the side walls of the box. Lugs R on said side walls project through corresponding openings in plates *x*, and pins S

25 are passed through perforations in said lugs to secure the plates *x* in place. The ends of the tubes constituting the several groups are each provided with a flange *y*², (see Fig. 5 with reference to group A, for example,) adapted to bear against the inner face of plate *x*, a square part *y'*, adapted to engage a corresponding opening through the plate, and a screw-threaded extremity beyond said square part

30 adapted to be engaged by a nut *y*³, Fig. 7, on one of the short exterior pipe connections, (such as *g f'*, Fig. 7, for example.) To remove any of the boiler-tubes, it suffices after disconnecting the short outside tube connections thereof to loosen the plate *x* corresponding to said tube by removing pins S and then

40 withdraw the plate and corresponding coil of tube.

Having now fully described and ascertained

the nature of my invention, I declare that 45 what I claim is—

1. In a tubular boiler, a casing, three superposed groups of differently-arranged coils of tubes, the tubes of all of the groups having the same exterior diameter, the upper group 50 being composed of a greater number of coils and tubes of larger interior diameter than the lower groups.

2. In a tubular boiler, a casing, three superposed groups of differently-arranged coils 55 of tubes, the upper group being composed of a greater number of coils than the lower groups and the tubes composing said upper group being of different interior diameter from the tubes composing the lower groups, 60 removable supporting-plates in which the ends of the tubes of the several groups are adapted to be secured, and removable connecting-tubes through which the ends of the several coil-tubes communicate. 65

3. In a tubular boiler, a casing, a plurality of superposed coils of tubes, removable supporting-plates in which the ends of the tubes of the several groups are adapted to be secured, and removable connecting-tubes 70 through which the ends of the several coil-tubes communicate.

4. In a tubular boiler, a casing, a series of tubes bent to rectangular form and surrounding the fire-box, a second series of tubes bent 75 in spiral form placed above and connected with the first series of tubes, a third series of spirally-formed tubes superposed above each other in the form of a grate said series being placed above the second series and connected therewith, substantially as described. 80

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

LEON SERPOLLET. [L. s.]

Witnesses:

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