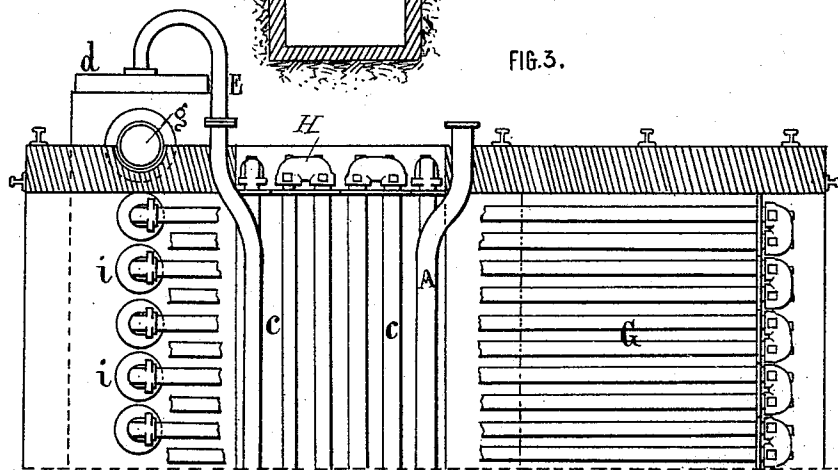
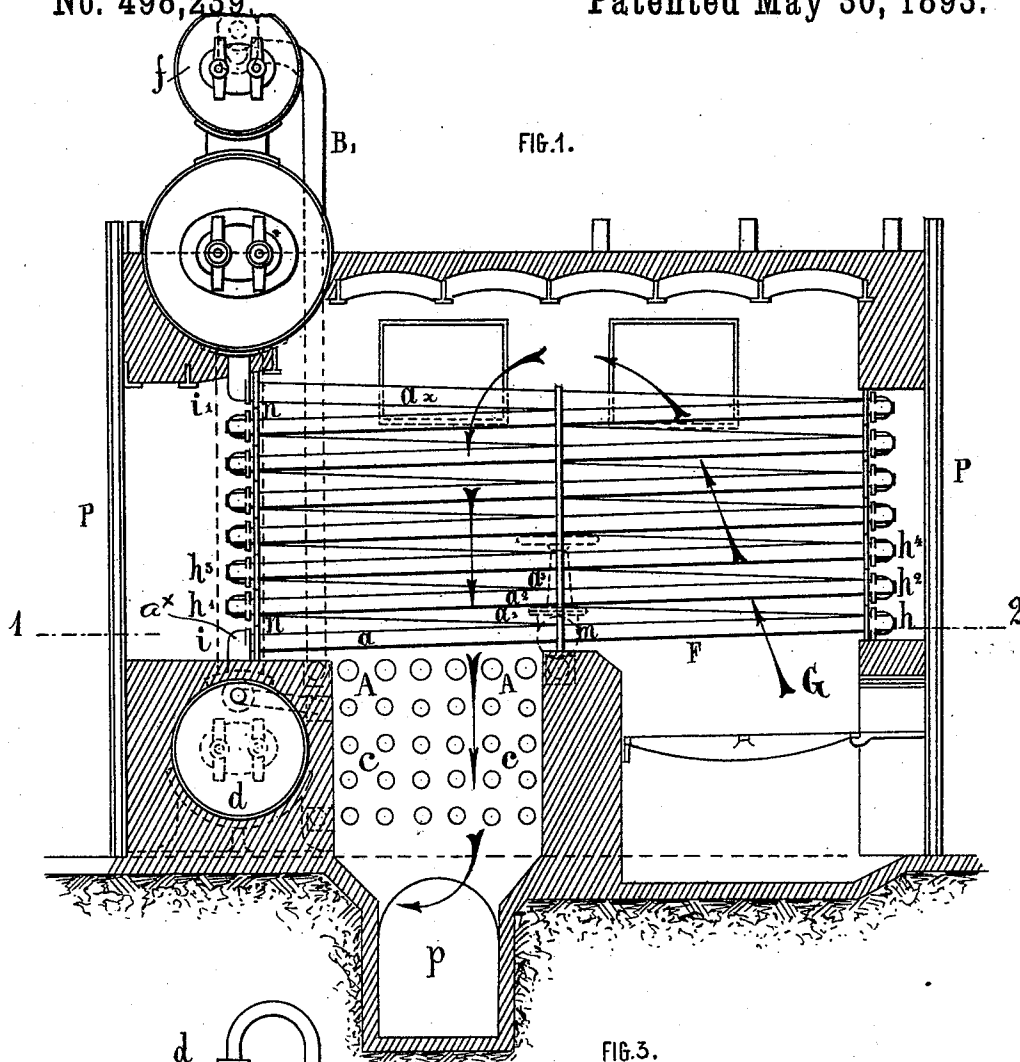


A. COIGNET.
MULTITUBULAR BOILER.

No. 498,239

Patented May 30, 1893.



Attest
Malcolm A. M.
J. L. Middleton

Inventor
Alphonse Coignet
by Richards & Co.
Attys.

(No Model.)

3 Sheets—Sheet 2.

A. COIGNET.
MULTITUBULAR BOILER.

No. 498,239.
FIG. 6.

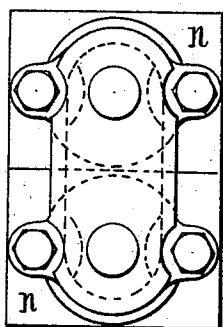


FIG. 5.

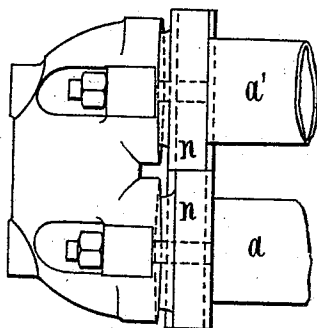


FIG. 4.

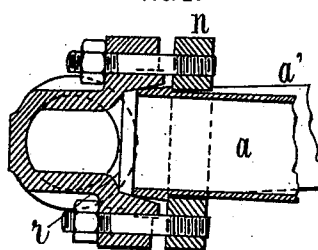
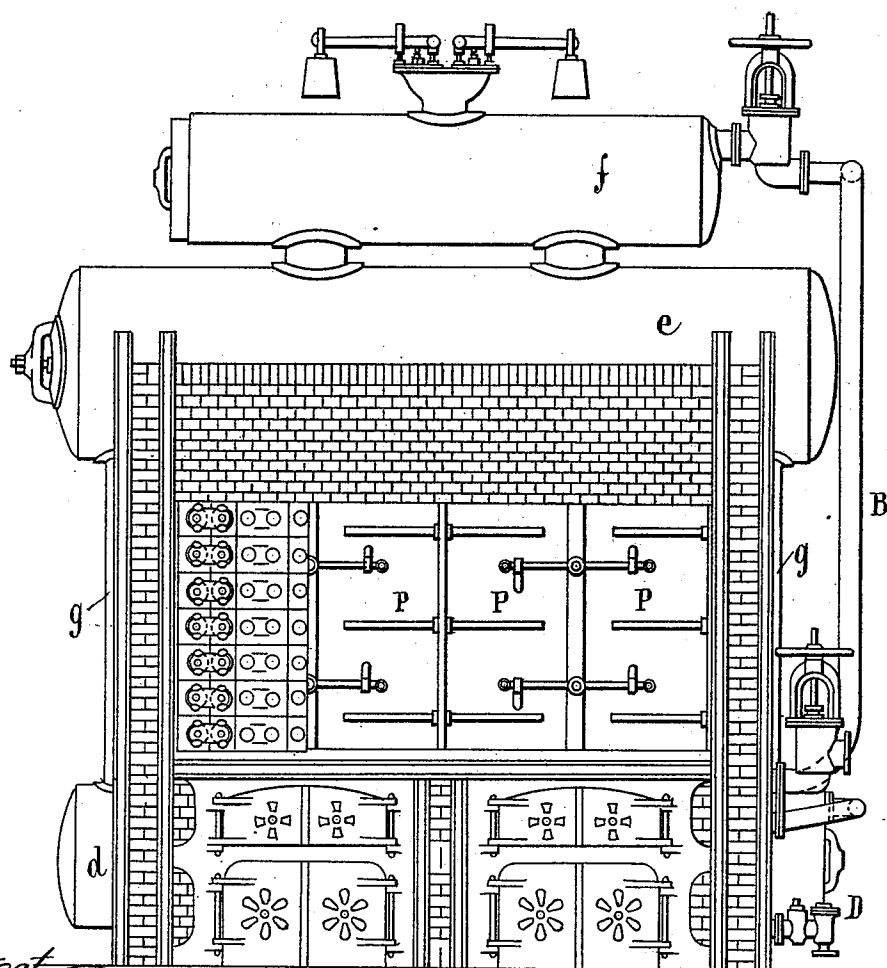


FIG. 2.



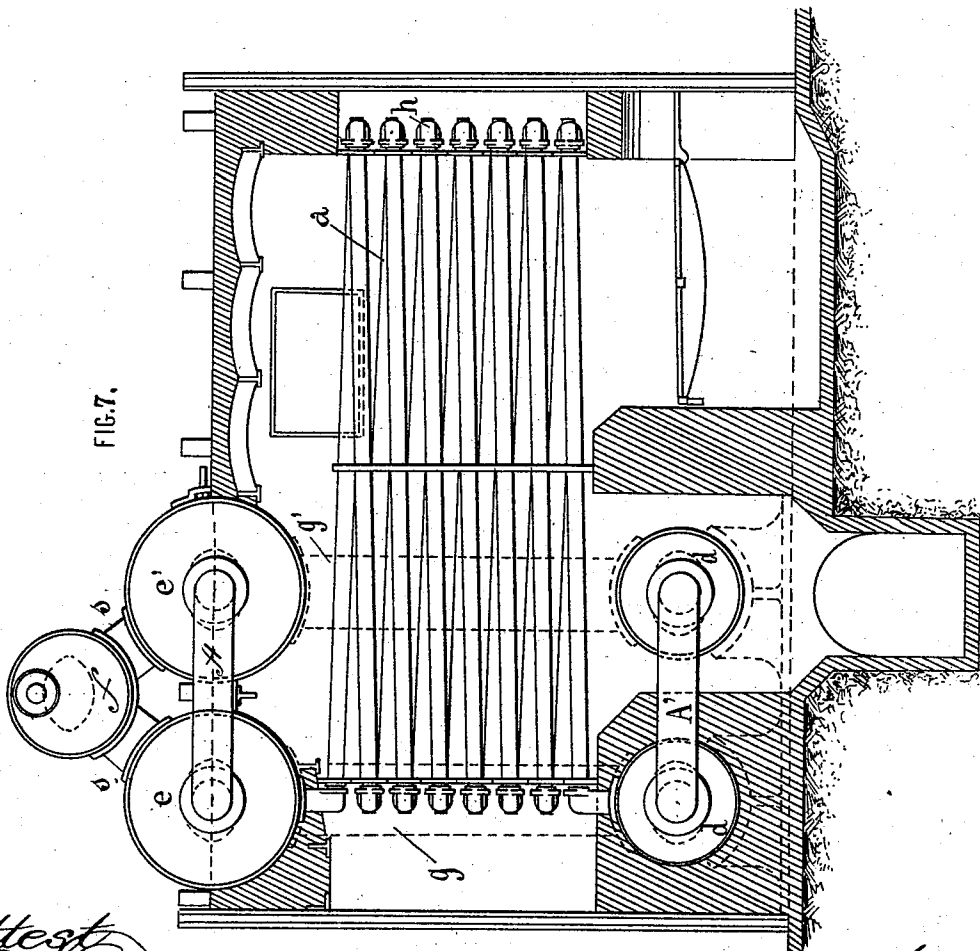
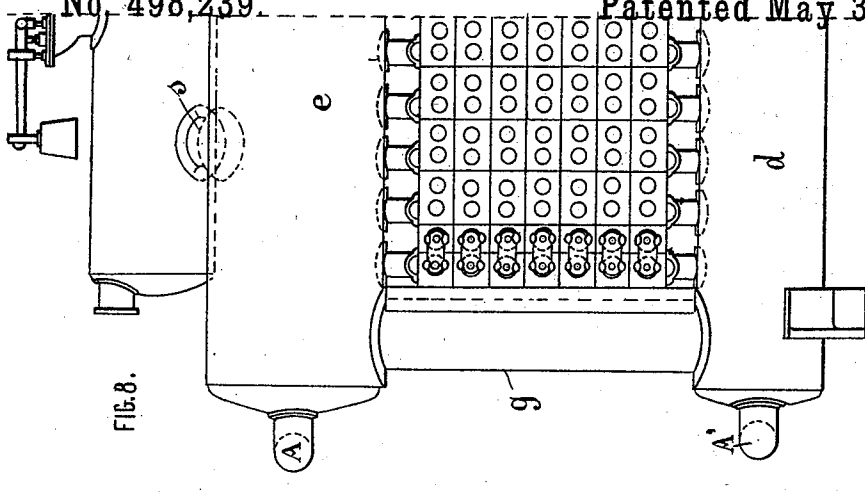
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A. COIGNET.
MULTITUBULAR BOILER.

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UNITED STATES PATENT OFFICE.

ALPHONSE COIGNET, OF LYONS, FRANCE.

MULTITUBULAR BOILER.

SPECIFICATION forming part of Letters Patent No. 498,239, dated May 30, 1893.

Application filed September 10, 1892. Serial No. 445,580. (No model.) Patented in France June 28, 1892, No. 222,627.

To all whom it may concern:

Be it known that I, ALPHONSE COIGNET, a citizen of the French Republic, and a resident of Lyons, France, have invented a new and useful Improvement in Multitubular Boilers, (for which I have obtained a French patent, dated June 28, 1892, No. 222,627;) and I declare the following to be a full, clear, and exact description.

The boiler which is the subject matter of the present application consists essentially of two superposed reservoirs or collectors connected on one side by large vertical communications, and on the other side by a tubular cluster used as vaporizer. According to the applications, the collectors can contain a larger or smaller volume of water and each of them can be constructed so as to consist of two or more cylindrical bodies connected by a sufficient number of communications.

Figures 1, 2 and 3 of annexed drawings show the type for a small volume of water, called inexplusive represented: Fig. 1, in a longitudinal cut; Fig. 2, in a front view; Fig. 3, in a half plan and a half section through 1 and 2 of Fig. 1. Figs. 4, 5 and 6 show the clustering of the tubes. Figs. 7 and 8 show supplementary boilers.

The lower collector *d* occupies the inferior part of the furnace in the rear; it is connected with the superior collector *e*, which is located above it, by two vertical tubular columns *g g* which support the collector *e* at the same time.

The tubular cluster, which connects the two collectors, consists of similar tubes alternately inclined in opposite direction and united two by two at each extremity so as to form a series of serpentine pipes in a broken line, beginning at the lower collector to end at the superior collector; each of these serpentine pipes consists of two vertical contiguous rows of tubes bent in opposite direction in each row. The lower tube *a* of the first row, which is connected in the rear by a joint *a^x* to the collector *d*, is coupled in front to the inferior tube *a'* of the second row by a box *h*; the latter is coupled in the rear by a box *h'* to the second tube *a²* of the first row, which, by the box *h²* is coupled in the front to the second

tube *a³* of the second row and so on up to the top where the last tube *a^x* is connected to the superior collector *e* by the joint *i'*. The boxes *h h' h²* are all the same; they are disposed as is shown in Figs. 4, 5 and 6. The tubes *a a'* provided with conical bosses at their extremities are introduced into two tubulures of same shape *r* the axles of which are bent in opposite directions according to the direction of the tubes and are kept there by curbings *n* which rest upon the rear part of the bosses and are connected with the box by the means of pins the hollow screws of which are fastened from outside. The communication between two tubes is established through the inside of the box. The joints *i i'*, which connect the serpentine tubes to the boilers *d* and *e* are disposed in the same way except that they hold only one tube and that they carry a bridle tubulure in order to be fixed to the boilers. The curbings *n* which connect the tubes to the boxes *h* and to the joints *i i'* are of flat iron and of a rectangular shape so that by their juxtaposition two partitions *n. n.* (Fig. 1) are formed at the extremities of the tubular cluster which limit the heating box to the smooth part of the tube, leaving the joints, the pins and the hollow screws outside. At the middle of the length of the tubes, other dilatable rectangular bridles are fixed, whose juxtaposition form another partition *m. m.*, separating the furnace *F* of the return of the flame; these bridles strengthen moreover the tube in its middle part. The grate being put in front at *G*, the flames follow the direction indicated by the arrows passing twice through the tubular cluster; hence they go to the chimney by the way of the flue *p* after having passed through a new cluster transverse to the first used as drying superheater of steam, and as heater of alimentation. The superior row or the superior rows of that cluster are constructed out of large tubes *A A* connected by communication boxes similar to those shown in Figs. 4 and 6 so as to form horizontal serpentine pipes. The steam coming into the tube *B'* from the steam magazine *f*, passes through those serpentine pipes where it dries and becomes overheated before going to pro-

duce its effect into the motors. The inferior tubes *c, c*, connected in the same way by the boxes *H* (Fig. 3) form a second system of serpentine tubes through which the alimentation water passes which after having come at *D*, flows out by the pipe *E* to the inferior collector *d*. The result of that disposition is, a very active circulating of the water which, issuing from the collector *d*, rises in the tubular cluster to arrive into the superior collector *f*, while the water of the latter flows down to the lower collector through the large vertical pipes *g, g*. These two pipes of which one is sufficient for the circulation is especially useful for the navigation where the boiler continues to work normally even under a great inclination. At the two extremities of the boiler the joints are shut off by two doors *P. P.* which it is sufficient to open to examine or repair a joint or to change or clean the tubes. It will be noticed that the furnace being located under the free part of the tubes nothing will prevent the dilatation which might occur. All the tubes as well as the joining boxes being rigorously similar it will be easy to meet any accident by having a few spare pieces.

It is well understood that according to the application it will be possible to substitute a metallic covering lined or not with bricks or another fireproof material, for the masonry furnaces.

If a greater volume of water is desired, I think it better to add supplementary boilers as shown in Figs. 7 and 8, than to increase the size of the collectors. These supplementary boilers *d' e'* are located parallelly with the former, *d* and *e* and are also connected by two tubular columns *g g'*. The two superior boilers are connected by large tubulures *A, A*, and they are in connection with the steam magazine *f* by the tubulures *S, S*. The two inferior boilers are also connected by the tubulures *A' A'*. The inferior boiler *d'* which has taken the place previously occupied by the serpentine pipe heater of alimentation is still used for the same purpose; it receives the alimentation water which runs into the inferior collector *d* at a high temperature.

This apparatus possesses all the advantages

of the preceding as far as the working and the keeping in repair are concerned.

I claim as my invention—

1. A boiler consisting of two superposed collectors, constructed out of one or more bodies connected on one side by tubular columns *g, g'* which support the superior collector, and on the other side by a tubular cluster used as vaporizer and forming a series of substantially horizontal serpentine pipes whose joints in the front and in the rear consist of the partitions *n, n*, which by their juxtaposition limit the heating chamber to the smooth parts of the tubes; and one or more similar partitions *m* established in the length of the cluster by the means of rectangular pieces fixed upon the tubes.

2. In combination in a multitubular boiler, the collector *d*, the tube *a* inclining upwardly therefrom, the tube *a'* extending from the end of the tube *a*, in a different vertical plane and in incline position opposite to that of the tube *a*, and the coupling between the tubes *a*, and *a'* consisting of the horizontal connection *h*, having one of its open socketed ends inclining upwardly and the other downwardly, the said tubes having conical bosses on their ends fitting the openings in the coupling, the collars bearing against the said bosses and against each other and the screw bolts extending from the coupling to the collars for holding the same in place, substantially as described.

3. In combination in a multitubular boiler, the upper and lower collectors, the tubular columns *g, g'* extending between the same and serving to support the upper collector, and the cluster of tubes extending laterally of the collectors and made up of reversely inclined sections, said cluster of tubes being connected at its upper and lower ends with the upper and lower collectors respectively, substantially as described.

In witness whereof I have hereunto set my hand in presence of witnesses.

ALPHONSE COIGNET.

Witnesses:

YVIN RABILLARD,
GASTON JEANNIAUX.