

No. 729,112.

PATENTED MAY 26, 1903.

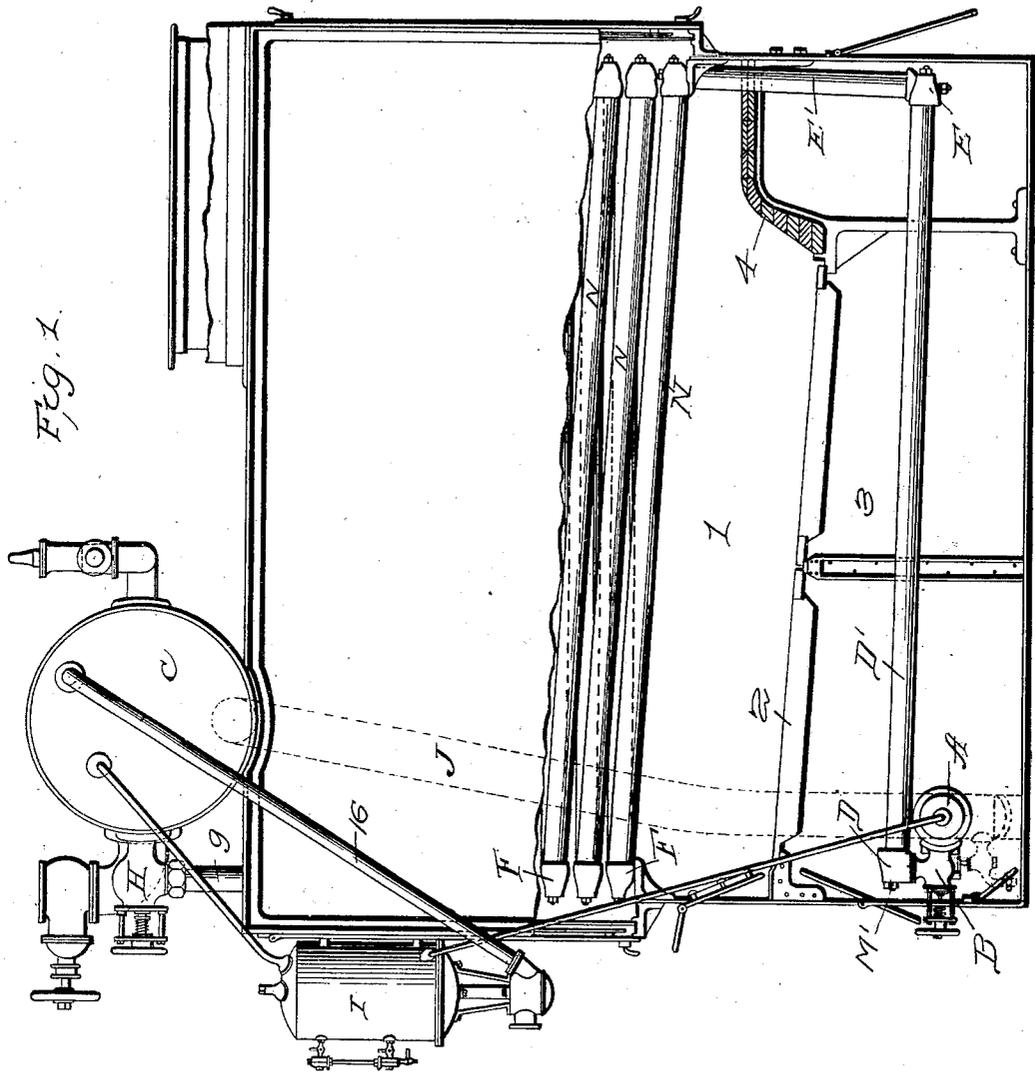
G. J. D'ALMEIDA & H. D'O. GUIMARAES.

WATER TUBE BOILER.

APPLICATION FILED MAR. 26, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses  
D. L. Hockman  
Comallton

Inventors  
Guilherme J. d'Almeida  
Henrique d'O. Guimaraes.  
By Richards & Co.  
Attorneys

No. 729,112.

PATENTED MAY. 26, 1903.

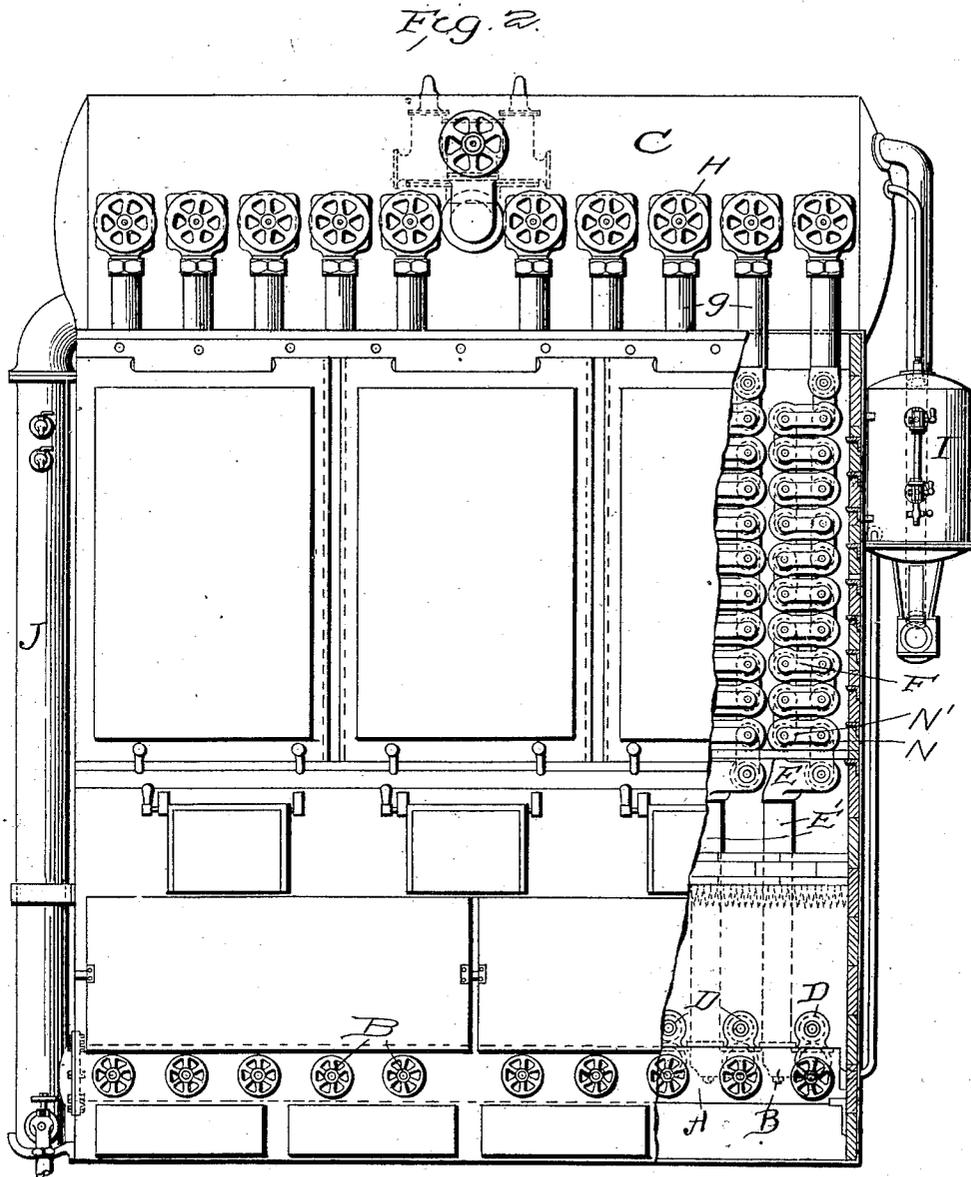
G. J. D'ALMEIDA & H. D'O. GUIMARAES.

WATER TUBE BOILER.

APPLICATION FILED MAR. 25, 1902.

NO MODEL.

4 SHEETS—SHEET 2.



Witnesses

*J. L. Moulton*  
*Comptroller*

Inventors  
*Guilherme J. d'Almeida*  
*Henrique d'O. Guimaraes*  
by *Richardson & Co.*  
Attorneys

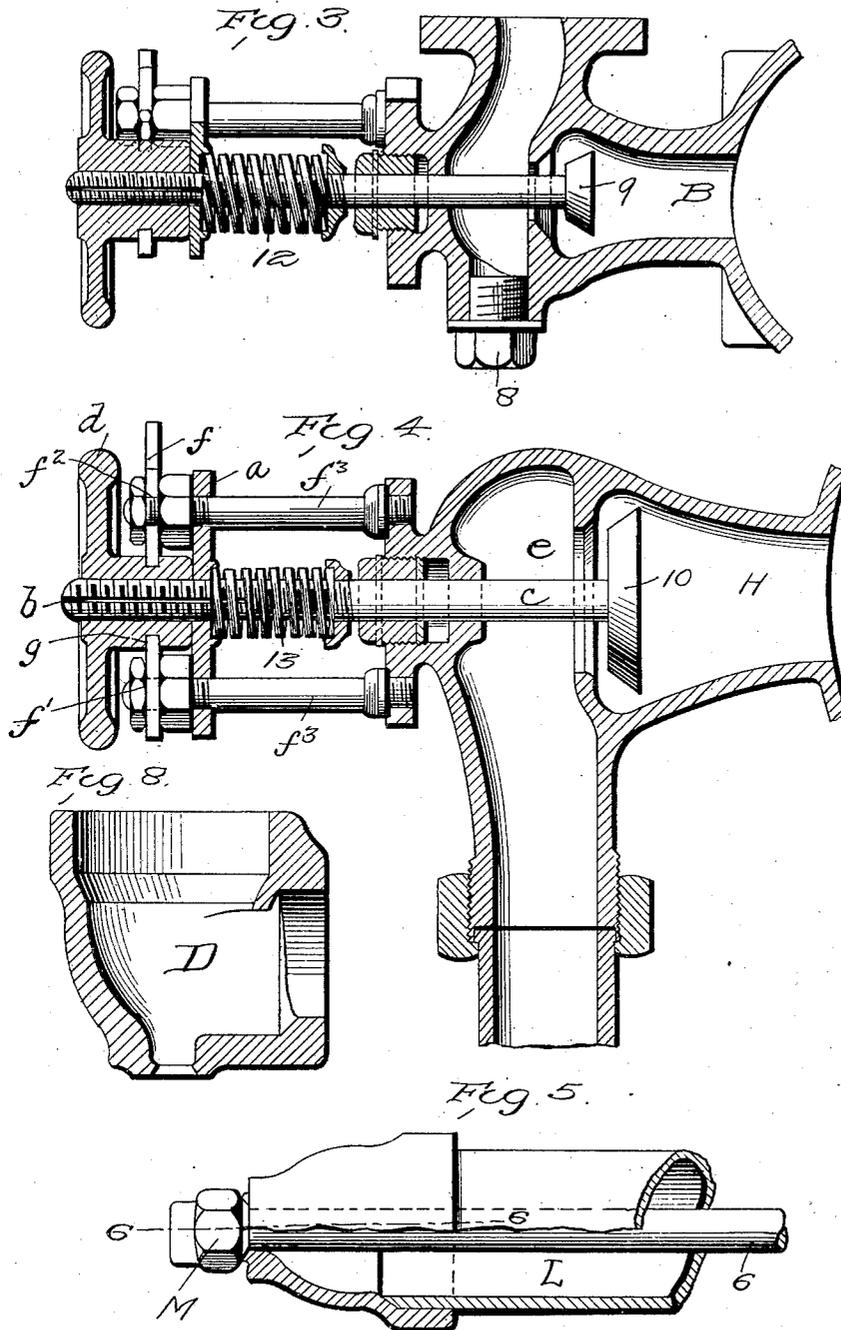
G. J. D'ALMEIDA & H. D'O. GUIMARAES.

WATER TUBE BOILER.

APPLICATION FILED MAR. 25, 1902.

NO MODEL.

4 SHEETS—SHEET 3.



Witnesses  
*D. L. Mochelau*  
*Comadron*

Inventors  
*Guilherme J. d'Almeida*  
*Henrique d'O. Guimaraes*  
 by *Richardson*  
 Attorneys

No. 729,112.

PATENTED MAY 26, 1903.

G. J. D'ALMEIDA & H. D'O. GUIMARAES.

WATER TUBE BOILER.

APPLICATION FILED MAR. 25, 1902.

NO MODEL.

4 SHEETS—SHEET 4.

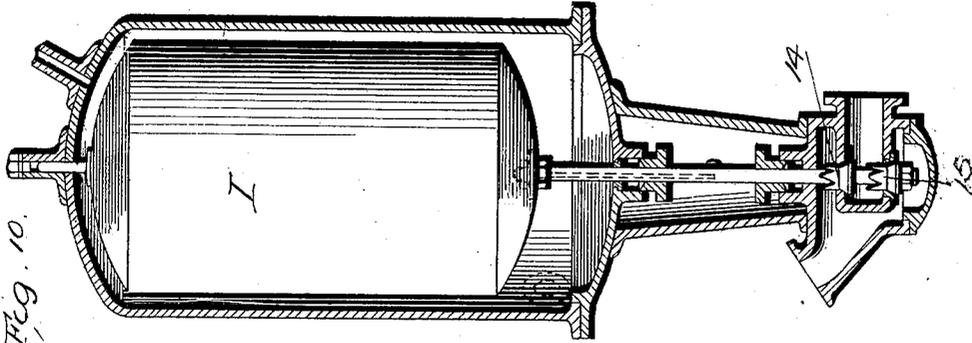


Fig. 10.

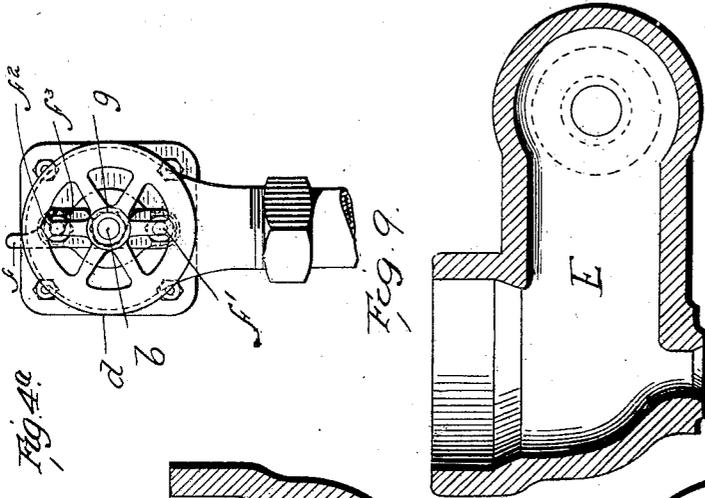


Fig. 9.

Fig. 10.

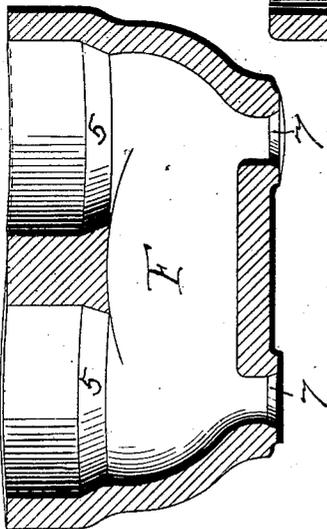
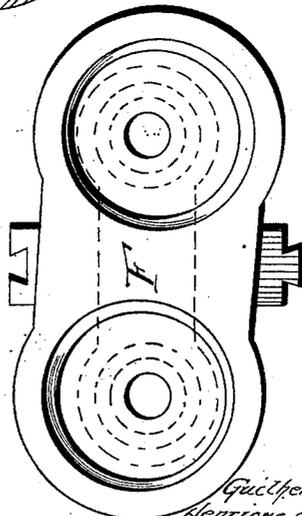


Fig. 6.

Fig. 7.



Inventors

Guilherme J. d'Almeida  
Henrique d'O. Guimaraes

By

Richardson  
Attorneys

Witnesses

T. L. Mookerjee  
C. M. M. M.

# UNITED STATES PATENT OFFICE.

GUILHERME JOAQUIM D'ALMEIDA AND HENRIQUE D'OLIVEIRA GUIMARAES,  
OF LISBON, PORTUGAL.

## WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 729,112, dated May 26, 1903.

Application filed March 25, 1902. Serial No. 99,974. (No model.)

*To all whom it may concern:*

Be it known that we, GUILHERME JOAQUIM D'ALMEIDA and HENRIQUE D'OLIVEIRA GUIMARAES, mechanical engineers, subjects of the King of Portugal, residing at Lisbon, Portugal, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a specification.

The object of the invention is to provide a boiler in which a high degree of safety is afforded in case of any damage to any one or more of its tubes. The tube-nest of said boiler is made up of elements which to a certain extent are independent of each other, and in case of damage to any one of the elements it is automatically cut out, while the remaining elements perform their functions without change.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a central longitudinal section taken through the boiler and furnace with parts in side elevation and parts broken away. Fig. 2 is a front view of the boiler and furnace with parts broken away. Fig. 3 is a detail sectional view of one of the valved couplings. Fig. 4 is a similar view of another valved coupling. Fig. 4<sup>a</sup> is a detail view of a locking-arm used in manipulating the valve. Fig. 5 is a detail view, partly broken away, showing means for coupling the tubes together. Fig. 6 is a view on line 6 6 of the coupling shown in Fig. 5. Fig. 7 is a front view of the said coupling. Figs. 8 and 9 are sectional views of other couplings. Fig. 10 is a view of the feed-water regulator.

In the drawings the furnace is shown at 1, the grate-bars at 2, the ash-pit at 3, and the fire-bridge wall at 4. These may be of ordinary construction. A steam-drum C surmounts the furnace, extending transversely thereof, and from it a pipe J extends downwardly and connects with a distributor-pipe extending transversely of the furnace at the front portion of the ash-pit. The tube-nest is made up of independent sections or elements, one of which and a portion of another are shown on the right of Fig. 2, each section being connected with the steam-drum through a pipe g and a valved coupling H and each section or element, at its lower end, being connected,

through a coupling E and a vertical pipe E', with a substantially horizontal or slightly-inclined pipe D', extending from the rear to the front of the ash-pit, where it is connected, through a coupling D, with a valved coupling B, which latter in turn is connected with the transverse distributor-pipe A. The vertical connecting-pipe E' extends up in rear of the fire-bridge wall, and the water-tubes N, extending longitudinally of the furnace, overlie the fire-box.

Each element or section of the water-tubes is made up of two series of pipes arranged adjacent in vertical rows, as at N', Fig. 2, and the connections between the tubes of these two series consist of the couplings F, disposed substantially horizontally and each having two seats for the ends of the two adjacent water-tubes. These seats are tapered, as shown in Fig. 6, to receive the tapered ends of the water-tubes, which are drawn into place on said seats by rods 6, Fig. 5, extending through the tubes and which are adjusted by nuts M. The rods 6 pass through the openings 7 in the coupling, Fig. 6. The nuts M are slightly conical to fit the conical seats of these openings, thus keeping the parts properly alined. By this construction the proper tightness of joint between the tubes and couplings is attained.

Each element or section of the tube-nest is provided, as before stated, with a valve B, and this is arranged horizontally, so as not to obstruct the work in the ash-pit. The valve-box has a plug 8, Fig. 3, which when removed allows the element or section to be cleaned by blowing it out with the steam from the steam-drum. In order to do this, the valve 9 in the coupling B is closed, the plug 8 opened, and the valve 10 within the coupling H is opened, so that the steam may pass through the element and discharge any accumulation through the plug-hole at 8. The coupling D between the substantially horizontal pipes D' and the valve-coupling B is of a single character, as shown in Fig. 8, it connecting with but a single tube; but the coupling at E is of a double character, having a connection with two tubes—the horizontal and vertical ones. These couplings and tubes, like the ones F, already described, may

be held tightly together by draw-rods passing through openings in the coupling and held adjustably by nuts; (indicated at M', Fig. 1.) The valves in the couplings B and H are under the influence of springs 12 and 13, respectively. As soon as a tube bursts in any one of the elements or sections the water rushes out from the same, and the pressure from the steam-dome on the large side of the valve overcomes the resistance of the spring, and, moving away the valve 9, it presses the latter against its seat, so that the passage of water through it is intercepted. The valve 10 in the coupling H undergoes the same action, so that no steam passes out from the steam-dome. It is now only necessary to turn the hand-wheels of the valves to have them securely closed, so that the damaged tube or tubes can be repaired without affecting the operation of the rest of the elements composing the boiler.

The feed-water supply is regulated by a float I, which controls two valves 14 and 15, Fig. 10, which control the passage of the water to the collector or steam-dome through the pipe 16.

From the above it will be seen that the valves 9 and 10 of each element are arranged to close automatically against the passage of water and steam, respectively, at the moment that any of the tubes of the element to which said valves belong become damaged so as to leak or burst. By this immediate repairs may be made to the damaged element without emptying the boiler.

Referring to the construction and arrangement of the valves, bar *a* of the valve, Fig. 4, is provided with a small tooth acting like a key, which engages with the longitudinal groove *b* and prevents rod *c* from turning, admitting, however, the latter moving longitudinally. The threaded hand-wheel *d* is placed on the rod in the same manner like any nut upon its bolt. If steam presses upon the valve on the side opposite the rod and if there is a lower pressure in space *e*, locking-lever *f* being ordinarily not engaged in groove *g* of the hand-wheel, then the valve and the rod are moved longitudinally and the valve is closed. While this happens the hand-wheel, which has followed the movement of the rod, is moved away from bar *a*. Now we turn the said hand-wheel to bring it nearer the above-mentioned bar in order to avoid any opening of the valve of its own accord.

Moreover, this is almost impossible, since the difference of the pressures acts in such a manner as to keep it closed. After having finished the repairs in the bundle of tubes locking-arm *f* is made to engage in groove *g* of the hand-wheel, the latter being turned, (and unscrewed,) and as it cannot move away from bar *a* on account of said locking-arm *f* the rod is moved, and consequently the valve is opened. If locking-arm *f* were wanting, it would only be possible to open the valve by means of pushing the rod by pressing on its end, a manipulation which cannot be considered practical. After having opened the valve part *f* is left to fall, so as to admit an automatic closing of the valve, and the latter remains simply subjected to the pressure of the spring, as when the valve is open the pressure is on both sides of the same. The locking-arm *f* is pivoted at *f'* and is notched at *f''* to engage one of the frame-rods *f'''*, which support the frame-bar *a*.

We claim as our invention—

1. In combination with a boiler, an element connected therewith composed of water-tubes, an automatically-closing valve arranged to close under the pressure from the boiler in case of rupture of the tubes and means for resetting the said valve, said means consisting of the threaded stem on the valve, a threaded hand-wheel engaging the same, means for holding the stem against rotation and a locking-arm to prevent movement of the hand-wheel axially substantially as described.

2. In combination with a boiler, an element connected therewith composed of water-tubes, an automatically-closing valve arranged to close under the pressure from the boiler in case of rupture of the tubes and means for resetting the said valve, said means consisting of the threaded stem on the valve, a threaded hand-wheel engaging the same, means for holding the stem against rotation and a locking-arm to prevent movement of the hand-wheel axially and being pivoted to fall by gravity when released, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

GUILHERME JOAQUIM D'ALMEIDA.  
HENRIQUE D'OLIVEIRA GUIMARAES.

Witnesses:

J. P. PROSNENT,  
ANTONIO JOAQUIM D'LUNA-SANTOS.