No. 607,284. Patented July 12, 1898.

J. G. SCHMIDT.

WATER TUBE BOILER.

(Application filed Nov. 10, 1897.)

(No Model.) 2 Sheets—Sheet 1.

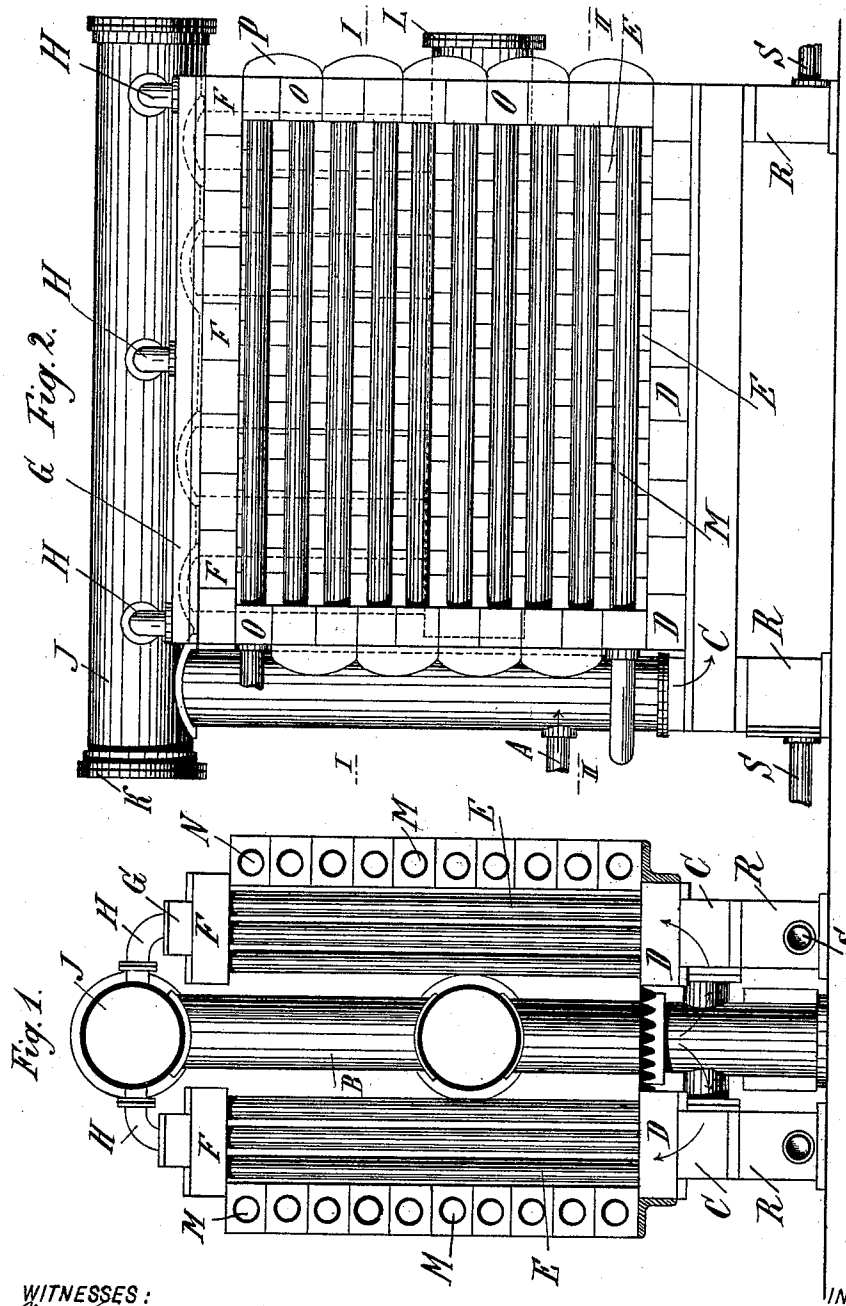


Fig. 2.

Fig. 1.

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Fig. 4.

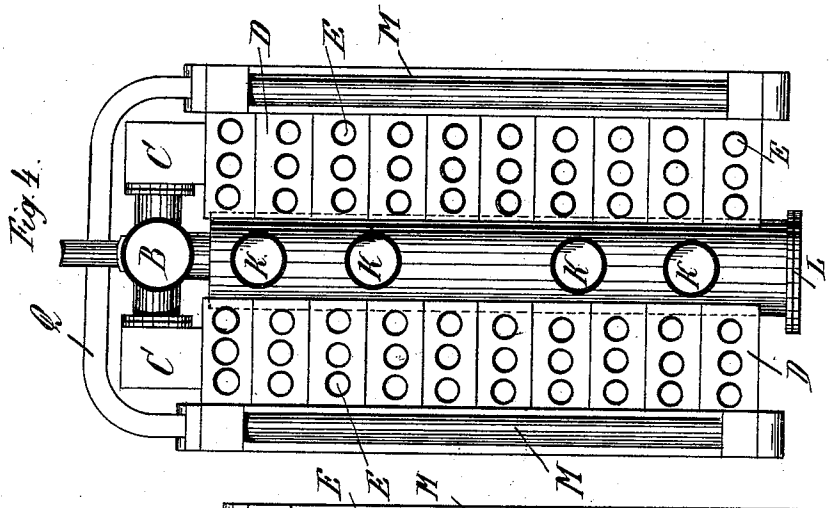


Fig. 5.

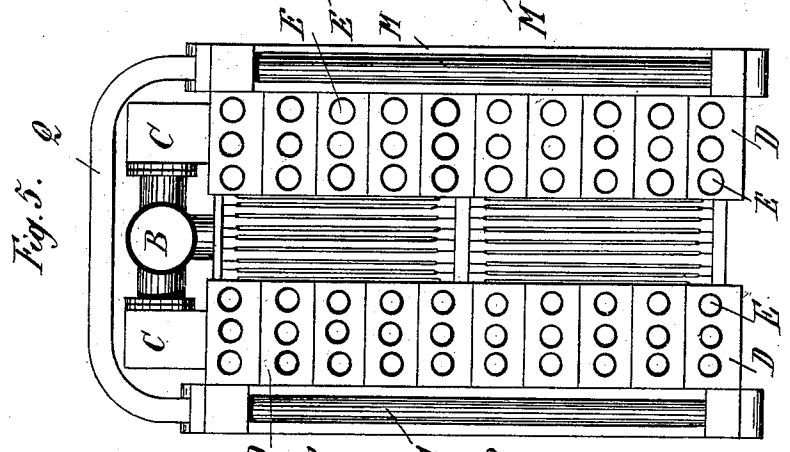
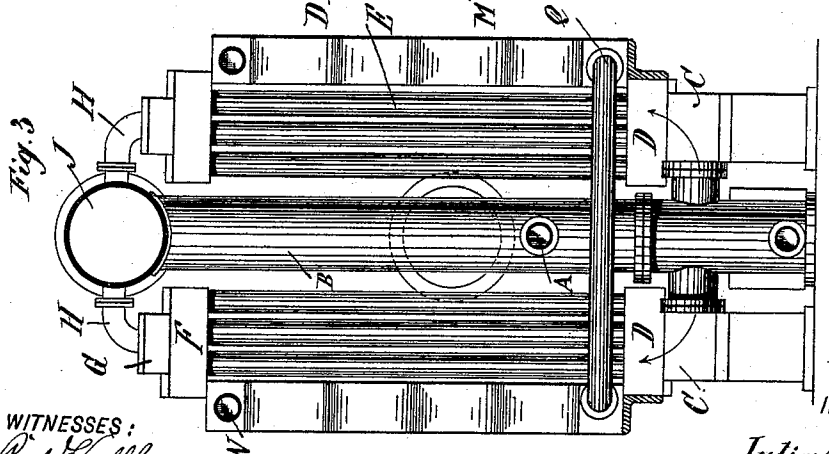


Fig. 3.



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UNITED STATES PATENT OFFICE.

JULIUS GUSTAV SCHMIDT, OF ERKNER, GERMANY.

WATER-TUBE BOILER.

SPECIFICATION forming part of Letters Patent No. 607,284, dated July 12, 1898.

Application filed November 10, 1897. Serial No. 658,025. (No model.)

To all whom it may concern:

Be it known that I, JULIUS GUSTAV SCHMIDT, manufacturer, of Erkner, in the Empire of Germany, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is a true specification.

The present invention relates to a water-tube boiler the tube system of which consists of two groups of tubes, of which the one is composed of single tubes standing vertically close to one another and which can be connected in various ways with the second group of tubes, which consists of single tubes placed horizontally, so that quite different methods of working the boiler can be thereby attained, according to the special purposes in view.

Referring to the accompanying drawings, which illustrate one modification of this boiler, Figure 1 is a front view of the boiler. Fig. 2 is a side view. Fig. 3 is a view from behind. Fig. 4 is a section on the line I I of Fig. 2. Fig. 5 is a section on the line II II of Fig. 2.

The entrance of the water into the boiler is effected through the projection A, Figs. 2 and 3, on the tube B. From this point the water falls downward and fills the tubes C, arranged symmetrically on both sides of the boiler and connected to the tube B. To each of the said tubes C there connects along the whole length directly a series of tube-heads D. Into each of these tube-heads are inserted several water-tubes E, (in the drawings three tubes are shown,) which tubes are brazed or in any other suitable manner firmly connected therewith. The water will consequently distribute itself symmetrically throughout the two vertical-tube groups E and must rise up in these tubes under the influence of the heating by the combustion-gases. At the upper tube ends are placed similar tube-heads F and firmly connected thereto and arranged in a series close to one another in the like manner as in the case of the tube-heads D. Moreover, the tube-heads F connect immediately to a common collecting-pipe G, so that the mixture of water and steam discharges into this pipe G in order to pass from it through the connection H into the common steam-collector J. Moreover, the feed-water passes at the same time into the collecting-tube L, which is also attached to B, and is here in consequence of the heating driven upward and must therefore pass through the four connecting-tubes K into the steam-collector J. While the evolved steam here becomes free from the water and collects above, the water sinks through the tube B downward, mixes there with the freshly-supplied feed-water, passes, through the connections already described, again into the heated tubes E, and proceeds on its circuit over again.

The above-described tubular system consequently constitutes a circulating water-tube boiler. In order to render this arrangement specially applicable for different methods of working, the two horizontally-placed groups of tubes M M are added, which are connected with it according as the work may require. By way of explanation in what manner the circulating water-tube system may be caused, through altered connections with the tube groups M M, to produce other methods of operating the boiler, suited for various requirements, the following description will show:

Example 1: The boiler is intended for motor purposes to work at a very high pressure and with multiple expansion. In this case the steam liberated at J passes to the first tube-head of the group M and through all the tubes of the group M M, which are connected by means of the connecting-pieces P and the circulation-tube Q in serpentine fashion and must in this manner become, through the action of the fire, superheated to dryness and finally escape at N in order to serve for the driving of the motor. This method of operating the boiler is especially designed to obtain a very high percentage of efficiency upon the heat-units contained in the fuel consumed, and this even with the simplest expansion mechanism.

Example 2: The boiler is intended to supply saturated steam corresponding to a given pressure without superheating. In this case and in opposition to the process employed in the first example the feed-water is first passed through the tubes M M in such manner, for instance, that the said water enters at the same time in both lowest sets of tubes and there it rises equally on both sides in the tubes connected in serpentine manner together by means of the connecting-pieces P, and thus arrives in the tube Q, which in this case is

placed above and passes on through a connecting-piece attached to Q into the discharge-pipe B, where it takes part in the circulation already described and is completely evaporated. The steam which may have developed already in the group of tubes M M can pass directly into the collector J through the other connecting-pieces attached to Q. In this method of constructing the boiler the collecting-tube J can be constructed as much larger as may be requisite to fulfil the special requirements.

Example 3: The boiler is intended to be applied to both the methods of working set forth in examples 1 and 2. In this case the steam liberated in J is treated in the manner described under example 1 and conducted to the motor through one of the groups of tubes M, while the feed-water is passed through the other group of tubes M in the manner described in example 2. The connecting-tube Q is not required, because the connections are made direct to each group of tubes. The above-described boiler is therefore reversible according to the special destination of the steam to be raised in it, inasmuch as the one group of tubes may serve either as a superheater or as a preliminary heater. By correspondingly-arranged connections the same boiler can therefore be applied to the different purposes with especial advantages.

With regard to the illustrations of the horizontally-placed boiler system M M it should be stated that in Fig. 1 the same tube-heads are illustrated, whereas in Fig. 3 the connecting-pieces P are represented as placed upon the several tube-heads. The feet R of the boiler are hollow and are in immediate connection with the circulation-space of the water, so that the said feet serve as mud-collectors, and the contents of the boiler can be blown out through them by means of the connecting-pieces S. The fire-space is so arranged in the middle of the boiler system (shown in the drawings) that the water-tubes in respect to the same lie symmetrically at both sides thereof, and that in consequence of the special arrangement of the tubes the fire-gases can rise equally on both sides, and thus heat all the tubes almost equally, thereby securing a very high efficiency. The fire-gases may be taken away in this boiler system either from above or sidewise, or even sidewise and downward, according as the cover is arranged; also, several boilers may be combined together with a single cover, especially when economy of space is of consideration—as, for instance, in ships.

I claim—

1. A water-tube boiler, consisting of an upright tube B, provided with an inlet, transverse tubes C connected with tube B below the inlet, two groups of upright tubes E E arranged one at each side of a central space and connected with the tubes C, horizontal collecting-tubes G above and connected with the respective groups E, E, a common steam-collector J arranged horizontally and centrally above and connected with said collecting-tubes G, said collector J being at one end connected with the upright tube B, and a collecting-tube L between the two groups of tubes E, E, arranged below the steam-collector J and connected at one end with the upright tube B, substantially as set forth.

2. A water-tube boiler, consisting of an upright tube B provided with an inlet, transverse tubes C connected with tube B below the inlet, two groups of upright tubes E, E, arranged one at each side of a central space and connected with the tubes C, horizontal collecting-tubes G arranged above and connected with the respective groups E, E, a common steam-collector J arranged horizontally and centrally above and connected with said collecting-tubes G, said collector J being at one end connected with the upright tube B, and a series of horizontal tubes M connected in serpentine form and arranged at each side of said groups of tubes E, E, and being connected with the common steam-collector J, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JULIUS GUSTAV SCHMIDT.

Witnesses:
HENRY HASPER,
W. HAUPT.