

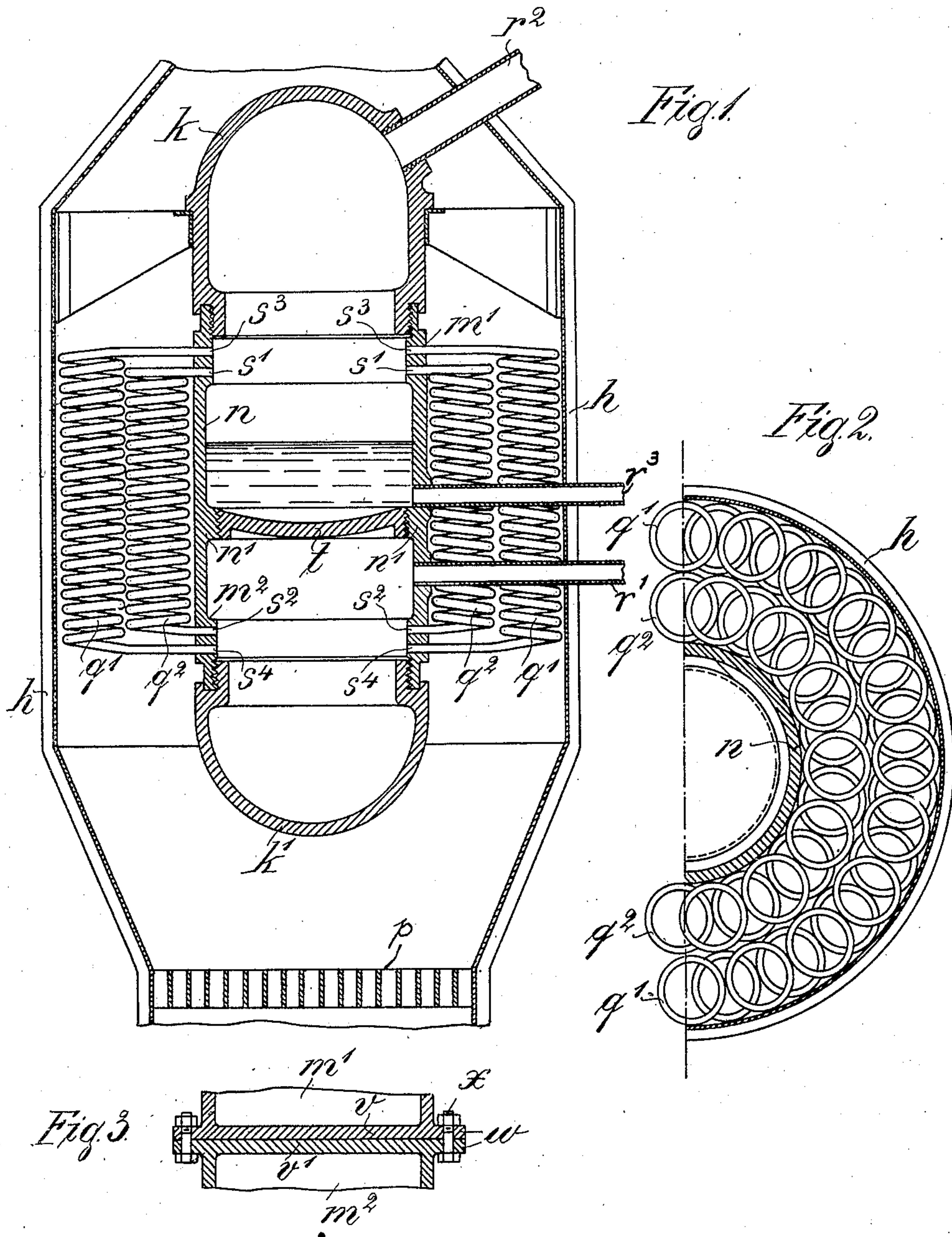
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O. FLAMM & F. ROMBERG.

WATER TUBE BOILER.

APPLICATION FILED APR. 27, 1906.



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UNITED STATES PATENT OFFICE.

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WATER-TUBE BOILER.

No. 832,572.

Specification of Letters Patent.

Patented Oct. 2, 1906.

Original application filed September 15, 1905, Serial No. 278,688. Divided and this application filed April 27, 1906. Serial No. 313,985.

To all whom it may concern:

Be it known that we, OSWALD FLAMM and FRIEDRICH ROMBERG, subjects of the King of Prussia, German Emperor, and residents of Charlottenburg, near Berlin, Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Water-Tube Boilers, of which the following is an exact specification and which forms an eliminated part from our pending application, Serial No. 278,688, filed September 15, 1905.

Our invention relates to water-tube boilers consisting of one or more lower chambers, one or more upper chambers, and a number of tubes around these chambers connecting them, in combination with a circulating pump or pumps, by means of which an artificial accelerating water circulation is maintained in the long and narrow water-tubes, the diameter of which can be very low without fear of limiting or preventing the necessary speed of circulation of the water.

It has been heretofore proposed to use long narrow water-tubes in combination with steam-boilers. However, in these tubes an artificial water circulation has not been maintained or the boilers have not been divided into special lower and upper chambers, being connected by the long narrow water-tubes.

The present invention provides a tubular boiler of special construction, in connection with which a circulation pump or pumps are intended to be used. The lower and upper chambers of the boiler are arranged and connected with each other in a special manner, and long water-tubes of small diameter are placed around the chambers to save space without the necessity of decreasing the evaporative capacity.

In order to make our invention clear, reference is made to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of our improved boiler. Fig. 2 is a fragmentary horizontal section, and Fig. 3 is a fragmentary sectional view in detail of a special connection between the lower and upper chamber.

The small boiler illustrated consists of an upper chamber m' , a lower chamber m^2 , helical water-tubes of great length and small diameter arranged in two concentric series q'

q^2 around the lower and upper chamber. Each tube of the series q^2 is connected at s' with the upper chamber and at s^2 with the lower chamber and each tube of the series q' at s^3 and s^4 with the upper and lower chambers, respectively. A shell h incloses the whole boiler, being provided at its lower part with the fire-grate p . The upper chamber m' is in communication, by means of the tube r^3 , with the circulating-pump, (not shown in the drawings,) while from the circulating-pump the tube r' passes to the lower chamber. The lower and upper chambers are formed, according to our invention, by a single tubular-shaped receptacle n , divided into two parts, according to one construction, by a diaphragm t , screwed into an annular projection n' . Semiglobular caps $k k'$ are screwed to the receptacle m at its top and bottom for the purpose of enlarging the capacity of the boiler.

The boiler as above described operates in the following manner: The water to be evaporated is forced by a circulating-pump through the tube r' into the lower chamber m^2 , flows then through the series $q' q^2$ of water-tubes, and passes into the upper chamber as steam, which is taken off by means of the outlet-tube r^2 . The superfluous water not evaporated is drawn off through the tube r^3 by the circulating-pump and again passed, for a second time, through the boiler.

In Fig. 3 is illustrated a modified mode of connecting the upper and lower chambers $m' m^2$, which in this case are separate receptacles. m' is placed with its bottom v directly upon the top plate v' of the lower chamber m^2 . The two plates $v v'$, being provided with flanges w , are united by means of bolts x .

Having thus fully described the nature of our invention, what we desire to secure by Letters Patent of the United States is—

1. A water-tube boiler having an artificially-accelerated circulation, comprising in combination, a tubular receptacle divided by diaphragm into two parts and constituting the upper and lower chamber of the boiler, concentric rows of helical long and narrow water-tubes situated around said chambers and connecting the lower and upper chamber of the boiler.

2. A water-tube boiler having an artifi-

cially-accelerated circulation, comprising in combination, a tubular receptacle divided by diaphragm into two parts and constituting the upper and lower chamber of the boiler, the
5 upper chamber and the lower chamber being provided with a flanged bottom and top plate respectively, to enable them to be connected, and concentric rows of helical water-tubes situated around said chambers and connect-
10 ing the lower and upper chamber of the boiler.

In witness whereof we have hereunto set our hands in the presence of two witnesses.

OSWALD FLAMM.

FRIEDRICH ROMBERG.

Witnesses to signature of Oswald Flamm:

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Witnesses to signature of Friedrich Romberg:

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