





# UNITED STATES PATENT OFFICE.

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## SUPERHEATER FOR TUBULAR BOILERS.

SPECIFICATION forming part of Letters Patent No. 721,242, dated February 24, 1903.

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*To all whom it may concern:*

Be it known that I, WILHELM SCHMIDT, a subject of the King of Prussia, German Emperor, and a resident of Wilhelmsöhe, near Cassel, in the Province of Hesse-Nassau, German Empire, have invented certain new and useful Improvements in Superheaters for Tubular Boilers, of which the following is an exact specification.

10 The present invention relates to superheaters for tubular boilers, and has for its object various improvements in the construction of same.

15 With regard to the arrangement of a superheating device upon tubular boilers, more especially for marine boilers, locomotive-boilers, portable-engine boilers, and the like, I beg to direct attention to the fact that the arrangement of a superheater upon such boilers has been hitherto connected with great difficulty, especially when high temperatures of steam were to be attained. The solution of this problem has been regarded as virtually impossible with regard to existing boilers to subsequently mount upon the same a superheater for the attainment of high temperatures, for the reason that generally the fire-gases in these kinds of boilers are already very considerably utilized. The problem would not be solved when the dimensions of the boiler were changed. If, for instance, the boiler were somewhat shortened, so that the waste or spent gases become discharged in such a manner that the same give off the entire amount of their heat to the superheater, the same would have to be so large that the space in or above the smoke-chamber would scarcely be sufficient to take up a superheater of such large dimensions.

40 The object of the present invention is to solve this problem and to enable an arrangement of superheaters of small dimensions upon tubular boilers. To attain this purpose, I proceed in such a manner that I utilize a part of the heating or fire gases in the usual manner and then conduct it into the chimney, while I cause the other portion of the remaining gases to pass out of the boiler with a temperature considerably high. This second portion of the fire-gases is conducted to the superheater. I attain this purpose by arranging one or several flame-tubes within the

boiler, through which that part of the heating-gases serving for superheating purposes is led into the superheater. The larger the diameter of these flame-tubes in proportion to their length the greater will be the temperature of the fire-gases entering the superheater, and inversely.

In order to make my invention more clear, I refer to the accompanying drawings, in which my invention is shown as applied to a locomotive or portable engine boiler provided with one flame-tube for leading that part of the heating-gases serving for superheating purposes into the superheater, and in which—

Figure 1 is a vertical section of the superheating arrangement. Fig. 2 is a transverse section of the same.

*a* represents the ordinary boiler-tubes, through which pass the gases which are utilized in the boiler itself. These gases after passing the tubes *a* are ejected through the chimney.

*i* is a flame-tube of larger diameter than the ordinary boiler-tubes. The superheater-tubes are curved tubes *f*, abutting into accumulator-boxes *g* and *h*. The superheating-tubes *f* are arranged on the inside wall of the smoke-chamber. The hot gases coming from the fire-box through the flame-tube *i* are conducted through the cap *k* into a ring-channel, which is formed by the side wall of the smoke-chamber and a mantle *m* reaching somewhat over the center of the smoke-chamber. The gases leaving the cap *k* are separated in two different currents, which adapt the way indicated by the arrows. The gases leave the annular channel on the upper end of the same and are ejected through the chimney. The steam enters the accumulator-box *g* through the pipe *b*. This accumulator-box *g* is divided in two parts by means of the cross-wall *g'*, as may be seen from Fig. 4, each of which parts is connected to a series of the superheating-pipes *f*. The steam streams through that part of the accumulator-box *g* which is connected to the pipe *b* and through the pipes *f*, connected to this part, into the accumulator-box *h*, and from this accumulator-box through those pipes *f* connected to the other part of the accumulator-box *g* into this accumulator-box *g*, from where it is led through the pipe *m* to the cylinder of the en-

gine. This construction has the great advantage that the center of the smoke-chamber is not filled with superheating-tubes or superheating-casings, so that the boiler-tubes  
5 may be easily cleaned and steam-pipes or exhausting mechanisms can be arranged within the smoke-chamber.

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

1. In tubular boilers, the combination of ordinary boiler-tubes, with a fire-tube of larger diameter than the ordinary boiler-tubes, and a superheater situated in the smoke-  
15 chamber and connected to the said larger fire-tube, substantially as and for the purpose set forth.

2. In tubular boilers, the combination of ordinary boiler-tubes, with a fire-tube of larger diameter than the ordinary boiler-tubes, and a superheater situated in the smoke-chamber and connected to the said larger fire-tube, said superheater consisting of curved tubes *f* abutting in two accumulator-boxes and situated between the side wall of the  
20 smoke-chamber and a mantle arranged within the smoke-chamber, substantially as and for the purpose set forth.

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

WILHELM SCHMIDT. [L. S.]

Witnesses:

MARTHA SCHMIDT,  
HERMANN OPITZ.