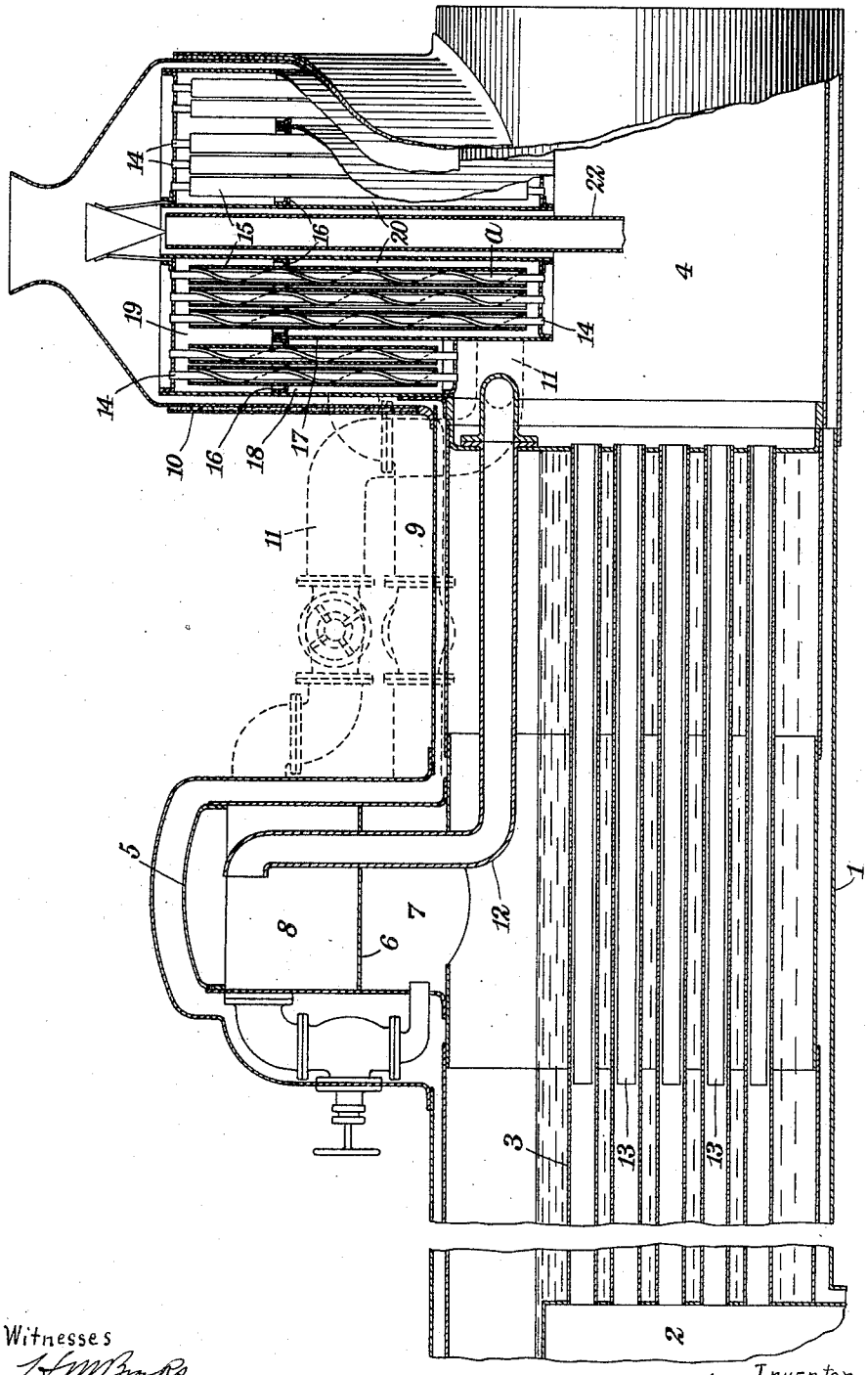
J. VON GRUBINSKI.

SUPERHEATER FOR LOCOMOTIVE BOILERS.

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1,067,107. Patented July 8, 1913.



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SUPERHEATER FOR LOCOMOTIVE-BOILERS.

1,067,107. Specification of Letters Patent. Patented July 8, 1913.

Application filed February 9, 1912. Serial No. 676,562.

To all whom it may concern:

Be it known that I, JAN von GRUBINSKI, a subject of the Czar of Russia, and residing at Warsaw, Russian Poland, Russia, have invented certain new and useful Improvements in Superheaters for Locomotive-Boilers, of which the following is a specification.

My invention relates to superheaters arranged above the smoke-boxes of locomotive boilers.

It has heretofore frequently been attempted to superheat the steam by means of the burnt gases issuing from the flues of the locomotive boiler by arranging a superheater in or above the smoke-box. These endeavors have not, however, met with success because the space at disposal at the said place did not admit of the superheater having a sufficiently large superficial area and the burnt gases which passed to the smoke-box were already cooled to such an extent that appreciable superheating could be obtained only with difficulty when the boilers or the flues were very long as in modern express train locomotives.

A primary object of my invention is to obviate these defects. To this end, on the one hand, I insert in the ordinary smoke-tubes of the locomotive boiler auxiliary tubes coaxial therewith and arranged with a space between the walls of the tubes, the arrangement being such that, particularly in long locomotives, almost unburnt gases arrive at the smoke-box and consequently the temperature existing here for the purposes of superheating is increased, and, on the other hand, in superheaters of known construction, particularly those comprising tubes coaxially inserted one in another, through whose annular chambers the steam to be superheated flows, I obtain a greater superficial area by lengthening groups of these superheater tubes, preferably all the superheater tubes of an entire box, stepwise various amounts toward the smoke-box, so that the superficial heating area is increased without its being made more difficult for the heating gases to pass out of the smoke-tubes of the locomotive boiler.

One illustrative embodiment of my invention is represented by way of example in longitudinal section in the accompanying drawing.

Referring to the drawing, the locomotive boiler 1 is provided as usual with the fire-box 2, the smoke-tubes 3 and the smoke-box 4. The steam dome 5 is divided by a partition 6 into the lower chamber 7 and the upper chamber 8. Steam is conducted from the lower chamber 7 through a pipe 9 into a superheater arranged above the smoke-box 4, and the superheated steam is conducted through a pipe 11 to the upper chamber 8 of the dome whence it passes through the pipe 12 to the cylinders. Now according to my invention, in order that the superheater 10 may be heated more than heretofore I provide that a higher temperature exists in the smoke-box 4 than was the case heretofore, particularly in very long locomotive boilers. To this end, I arrange in the smoke-tubes 3 auxiliary tubes 13 disposed coaxially with the smoke-tubes 3 in such manner that the combustible gases coming from the fire-box 2 can heat the smoke-tubes 3 and the water 5 in the usual manner. A portion of these combustible gases passes, however, through the auxiliary tubes 13, and as these are not directly contacted by water and also do not contact with the tubes 3 closely surrounded and cooled by the water the heating gases passing through the auxiliary tubes 13 must pass almost without loss of heat to the smoke-box 4, and consequently the temperature here is materially increased. These auxiliary tubes 13 open into the smoke-box 4. At the front end it is preferable for these tubes not to open directly at the fire-box 2, but at a pre-determined distance therefrom, because otherwise there would be danger of the front ends of these tubes 13 being burnt. Further, according to my invention I increase the superficial area of the superheater arranged above the smoke-box 4. The superheater I use for this purpose is of a construction known in itself and comprises coaxial tubes, of which the inner tubes 14 conduct the combustible gases coming from the smoke-box 4 further, while the outer tubes 15 surround the tubes 14 with play so that narrow jacketing spaces are formed between these tubes, through which spaces the steam must pass. It is also known to provide such superheaters with a plurality of chambers. In the illustrative embodiment three chambers are shown separated by the walls 16 and 17. The wet steam enters into the chamber 18 and passes thence through one group of the tubes 15 to the upper chamber 19. It then passes through another group of tubes 15

to the inner chamber 20, whence it now passes highly superheated through the tube 11 to the upper chamber 8 of the dome. As mentioned above, such superheaters and such subdivision thereof are already well-known and it is also well-known to arrange such superheaters above the smoke-box 4. According to my invention, however, the inner group *a* of tubes is lengthened downward relatively to the outer group of tubes, so that the tubes in the inner group project a greater or less distance into the smoke-box 4. In the illustrative embodiment only one lengthened group *a* of tubes is represented, but additional groups of tubes located more toward the center might be provided extending still lower into the smoke-box 4. In this manner the effective heating area of the superheater is materially increased and yet, owing to this construction of the superheater, the heating gases are in no way impeded when issuing from the smoke-tubes 3 and the auxiliary tubes 13, because in consequence of the superheater tubes being lengthened stepwise there is still sufficient room left up to the end of the boiler to enable the burnt or combustible gases to issue freely. The very limited space in the smoke-box is, however, used materially better in this construction of superheater.

It is to be understood that my invention is not limited to the groups selected in the illustrative embodiment nor to the three chambers which are shown. Any desired number of the chambers may be provided, and particularly, the number may be increased when the stepwise lengthening of the superheater tubes is carried out further than represented in the drawing. It is only essential that in superheaters of the described type known in itself, the tubes are lengthened stepwise in such manner toward the smoke-box that the heating gases are not impeded when issuing from the smoke-tubes. The tube 22 in the middle of the superheater is for the exhaust steam coming from the cylinders.

With the aid of the above-described means it is possible certainly to superheat the steam intensively even in very long locomotive boilers.

I claim:—

1. The combination with a locomotive boiler comprising a smoke box with which boiler heating pipes communicate, of a superheater arranged above said smoke box and comprising three coaxial ring-shaped chambers, two of said chambers being disposed side by side and the third arranged above the two before mentioned, and each of said chambers containing a plurality of coaxial tubes, the inner ones of which communicate with the smoke box and the outer of said tubes connecting the two lower chambers with the third upper chamber, whereby the steam is caused to pass twice through the space between the outer and inner tubes.

2. The combination with a locomotive boiler comprising a smoke box and boiler heating pipes communicating therewith, of a superheater arranged above the smoke box and consisting of three chambers arranged coaxially, two of said chambers being disposed side by side and the third arranged above the two aforesaid, and each of said chambers containing a plurality of coaxial tubes, the inner ones of which connect with the smoke box and the outer tubes of both the lower chambers communicating with the third upper chamber, and coaxial auxiliary pipes disposed in the heating pipes aforesaid, through which auxiliary pipes a portion of the combustible gases pass into the smoke box for superheating purposes without contact with the walls of the heating pipes.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

JAN VON GRUBINSKI.

Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."