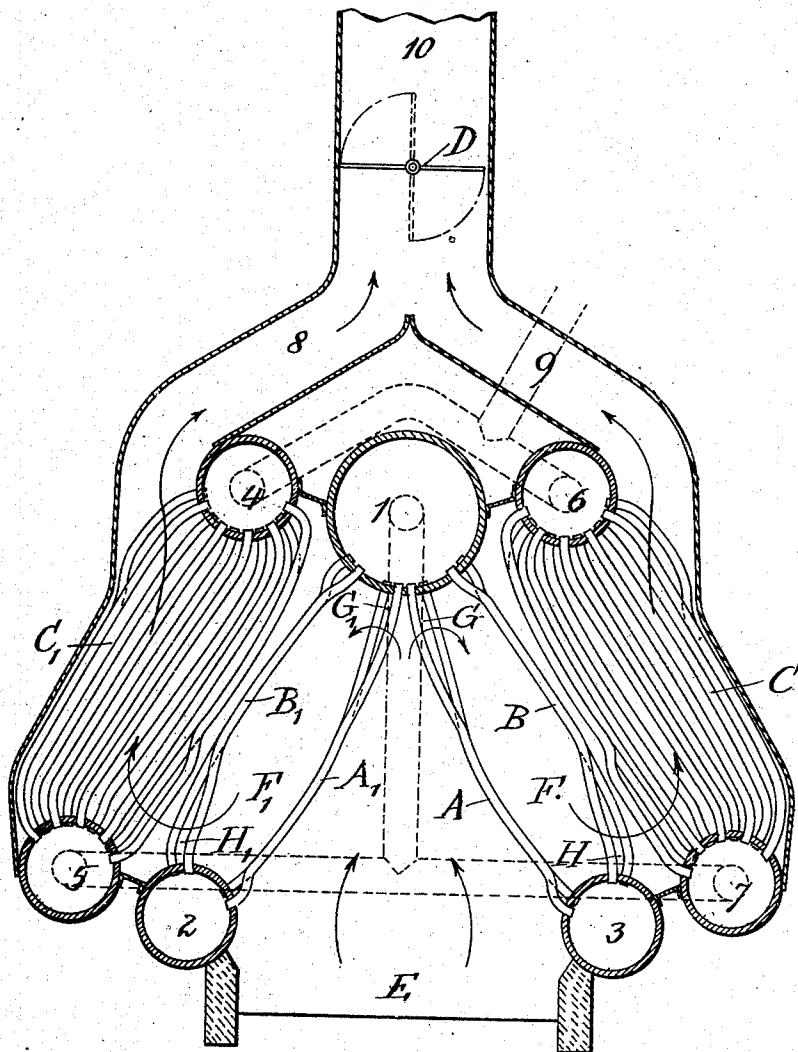


W. SCHMIDT.
 SUPERHEATER FOR STEAM BOILERS.
 APPLICATION FILED DEC. 10, 1908.

946,466.

Patented Jan. 11, 1910.



WITNESSES

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WILHELM SCHMIDT, OF WILHELMSHOEHE, NEAR CASSEL, GERMANY.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILHELM SCHMIDT, a subject of the King of Prussia, Emperor of Germany, and residing at Wilhelmshoehe, near Cassel, Germany, have invented a new and useful Improvement in Superheaters for Steam-Boilers, of which the following is a full, true, and exact specification.

More especially my invention has reference to superheaters as applied to water tube boilers, and particularly to that type of superheater which is detached from but joined to the boiler as distinguished from the well-known type in which the superheater is built into and surrounded by portions of the boiler structure proper.

My invention has for its object to provide a means by which the superheater may be protected from direct radiation from the fire box, and from the direct action of convection currents issuing therefrom as well as from any substantial action of the fire gases except as desired. Such protection is particularly necessary when the boiler is first started up from its cold condition, and also if for any reason or at any time the flow of steam through the superheater pipes should be interrupted, as at such times, there being no steam or vapor in the superheater structure to keep down its temperature, there will be great risk of the superheater structure being burned out and destroyed.

I provide this protection by utilizing the water tubes of the boiler itself, arranging them in wall formations between the superheater and the fire box in such a way that when a suitably placed damper is closed the fire gases, then subject to the law of their specific gravity only, will rise but cannot contact with the superheater pipes; when the damper is open, however, these hot gases are drawn over the top of one of the aforesaid wall formations and downwardly between said wall and a neighboring similar wall, under which they pass to flow upon and among the superheater tubes.

My invention will be made clear by reference to the drawing which represents an elevation, part section, of a water tube boiler of conventional type. Here 1, 2 and 3 are main boiler shells containing a suitable amount of water and joined, 2 to 1, and 3 to 1, by water tubes; 4, 5 and 6, 7 are large steam pipes or chambers joined in pairs by a plurality of superheater pipes C and C₁.

Steam, after being generated in the water tubes, is carried by suitable connecting pipes (shown dotted) to the chambers 5 and 7, passing through the superheater tubes where its temperature is raised, and finally going from chambers 4 and 6 to the engine, where it is to be used.

The water tubes in the structure represented are arranged in four wall-like groups, A, B and A₁, B₁. A and B lie on one side of the boiler, separating the superheater pipes C from the fire box E, while A₁ and B₁ lie on the other side of the boiler and separate the superheater tubes C₁ from the fire box E. Each water tube wall A, B, A₁, B₁, is made up of water tubes placed fairly close together, and arranged in planes roughly parallel to the axis of the boiler. The inner walls, A and A₁, have the tubes laterally separated at the top, while the outer walls, B and B₁, have the tubes laterally separated at the bottom, thus constituting a series of openings G, G₁, H, H₁.

8 and 9 are exits symmetrically placed on each side of the boiler for the escape of fire gases; they join to constitute the main exit, 10, which leads to or may be the stack itself.

D is a suitable damper which may be placed so as to stop off or permit the issue of the fire gases at will.

In operation, suppose that the boiler is suitably filled with water, and that steam is to be started up. The damper D will be placed across the exit 10 and fire started in the fire-box E. The gases generated will rise, heating the facing sides of the water tubes A and A₁ but can not take the downward path through F and F₁ necessary to reach the superheater tubes C and C₁ by reason of the lack of draft. Steam, as soon as generated, passes into and through these superheater tubes. The damper D may then be opened; a draft will now be established through the upper openings G and G₁, down through the spaces F and F₁, and then through the lower openings H and H₁, following the direction of the several arrows, into and through the superheater tubes and thence through stack 10, by way of the exits 8 and 9. The supply of steam being now continuously maintained in the superheater pipes, it will be impossible for said pipes to become overheated, and damper D may be left open as long as steam is maintained unless for some reason, accidental or otherwise,

steam should be shut off from the superheater. This damper D may be actuated by hand, or automatically by steam pressure, as is already known in the art.

5 The preferred embodiment of my invention shown in the drawings is that of a superheater divided into two halves and symmetrically placed on each side of the boiler. I may, of course, eliminate one of
10 these superheaters altogether, or if preferred, replace the half superheater on one side by ordinary water tubes, without departing from my invention. In arranging the wall formation of water tubes, also, as
15 A for example, I preferably place the tubes quite close together in one row, but not necessarily in contact; instead of one row, however, I may arrange the tubes in two rows preferably staggered with reference to
20 one another; or more than two rows may be used in special cases, if found desirable but in such cases care must be taken that the total number of water tubes used in the wall be not so great as to abstract an excessive
25 amount of heat from the passing fire gases, thus leaving insufficient heat to properly superheat the steam; or I may place the tubes some distance apart individually, filling the spaces between adjacent tubes with fire
30 brick or iron tongues, or in any other suitable way, the essential consideration being only that any openings between the body of the superheater pipes should be relatively quite small as compared with the arranged
35 draft openings G, G₁, H, H₁.

Where the tubes are opened up as at G, G₁, H, H₁, this is preferably accomplished by simply separating the tubes laterally and alternately. Any other way of accomplishing
40 the same result, however, as by causing two adjacent tubes to merge into a single tube having a cross section equivalent to the two tubes, may be utilized without departing from my invention.

45 I may, if I choose, replace any wall formation of water tubes by a wall of fire brick or the equivalent, suitable openings, of course, being provided, for the flow of the hot gases. I may also, if I desire, in the configuration
50 shown in the drawing, so arrange that either superheater element may be operated as a steam generator at will so that all the tubes at one side of the fire box are water tubes, while the superheater is confined to the other
55 side thereof, the necessary adjuncts for effecting the change from superheater to boiler, and vice versa, being provided.

I prefer to leave very generous spaces F, F₁, between my water tube walls thereby securing secondary combustion chambers, instead of mere flues, with a material efficiency
60 increase; while preferred, however, such secondary chambers are not absolutely essential to the practice of my invention.

65 Many variations of mechanical detail will,

of course, readily occur to those skilled in the art, and may be utilized without departing from the spirit of my invention.

Having now described my invention, I claim:

70 1. In a water tube boiler having a steam superheater adjacent to and possessing steam connection therewith, a plurality of water tubes arranged in a plurality of spaced apart and upwardly inclined wall formations approximately parallel to the axis of the boiler
75 and separating the superheater from the fire box, said walls having openings at the top and bottom alternately, counting from the fire box, whereby fire gases may pass between said walls to the superheater. 80

2. In combination with a water tube boiler adjacent to and having steam connection with a superheater, a plurality of water tubes separating the fire box from the superheater
85 and disposed in wall formation so as to include between said wall secondary combustion chambers, and means for leading fire gases from the fire box into said chambers.

3. In a water tube boiler comprising an
90 upper shell joined by water tubes to lower lateral shells symmetrically placed on each side of the fire box and located between symmetrically placed pairs of superheater shells joined by superheater tubes, the arrangement of the water tubes in two groups
95 each group having its tubes disposed in spaced apart upwardly and centrally inclined wall formations, separating the superheater from the fire box, and means for leading the fire
100 gases downwardly between the walls, and upon the superheater pipes.

4. In a water tube boiler comprising an upper shell joined by water tubes to lower lateral shells on each side of the fire box and
105 located between pairs of superheater shells joined by superheater tubes, a plurality of water tubes arranged in two groups each group having its tubes disposed in spaced apart, upwardly and centrally inclined wall
110 formations between the superheater and the fire box, said walls having openings alternately at top and bottom whereby fire gases may pass between said walls to the superheater. 115

5. The combination, with a water tube boiler having a steam superheater adjacent to and possessing steam connection therewith, of two outwardly extended and spaced apart wall formations of water tubes between
120 superheater and fire box, the wall nearest said fire box being provided with openings in its upper portion and the remaining wall with openings in its lower portion, so that fire gases may be led downwardly between said walls from the fire box
125 upon the superheater, substantially as and for the purposes described.

6. The combination, with a water tube boiler having a steam superheater adjacent
130

to and possessing steam connections there-
with, of two upwardly extended and spaced
apart walls between superheater and fire
box, one of said walls, at least, containing
5 water tubes; and the wall nearest said fire
box being provided with openings in its
upper portion and the remaining wall with
openings in its lower portion, so that fire
gases may be led downwardly between said
10 walls from the fire box upon the superheater,

substantially as and for the purpose de-
scribed.

In testimony whereof I have hereunto set
my hand in the presence of two subscribing
witnesses.

WILHELM SCHMIDT.

Witnesses:

JULIUS FRANKE,
GUSTAV RETTIG.