

1,096,128.

# UNITED STATES PATENT OFFICE.

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## SUPERHEAT-REGULATOR FOR STEAM-GENERATORS.

1,096,128.

Specification of Letters Patent.

Patented May 12, 1914.

Application filed September 17, 1913. Serial No. 790,210.

*To all whom it may concern:*

Be it known that I, JAMES H. ROSENTHAL, a subject of the King of Great Britain, residing at Kemnal Manor, Kemnal Road, Chiselhurst, Kent, England, have invented certain new and useful Improvements in Superheat-Regulators for Steam-Generators, of which the following is a specification.

10 This invention has for its object to effect the regulation of the superheat of steam at the boiler stop valve or main supply pipe, by provision of means for directing the superheated steam in its passage to the stop valve or main, either direct, or wholly or in part through an attemperator fitted in the boiler drum, whereby its temperature may be reduced by transmission of heat to the saturated steam or water in said drum.

20 The invention is illustrated in the accompanying drawings in which—

Figure 1 is a side elevation partly in section of a part of a water tube steam generator of the Babcock & Wilcox type showing the improved superheat regulating means applied thereto; Fig. 2 is an elevation, and Fig. 3 a cross section, both to a larger scale, of the attemperator which is placed in the boiler drum; and Fig. 4 is a vertical section, also to an enlarged scale, of the valve and connections for directing the flow of superheated steam to the stop valve or main supply pipe.

The boiler drum A connected to the water circulating tubes B, and the superheater C are of ordinary construction. The intake for the steam to the superheater is through pipe D connected to the upper cross box, and the outlet for the superheated steam is through the tubes  $d$  connected to the lower cross box of the superheater. The outlet pipes, instead of passing direct to the stop valve E or the supply main, as usual, or of being led through the boiler drum, are connected to a branch  $f$  of a valve casing F fitted with a multiple-way directing valve formed with a movable diaphragm G, which, in the present instance, is adapted to be oscillated on its axis within the casing by means of an external handle  $g$  but which may be otherwise fitted and operated. The said diaphragm G serves, according to its position to direct the flow of superheated steam from the branch  $f$  to the stop valve E on the supply main, or to a branch  $f^2$

connected to an attemperator H through which it flows to pass through a third branch  $f'$ , and through the valve casing F to the stop valve; in an intermediate position of the diaphragm G part of the superheated steam is allowed to flow directly to the stop valve or main, and the remainder allowed to pass by way of the attemperator H.

The attemperator H fitted within the boiler drum A comprises a vessel composed of a long box or series of suitably coupled boxes connected, preferably at opposite ends, to steam pipes  $h'$ ,  $h^2$  which are in turn connected to the branches  $f'$ ,  $f^2$  of the valve casing F. Expanded into the side walls of said box or boxes are a large number of cross tubes  $h$  through which the saturated steam or the water in the drum will pass, which saturated steam or water being at a much lower temperature than the superheated steam will abstract heat from the latter.

As indicated in Fig. 4 the diaphragm G may be moved to the position shown in full lines or that shown by dotted lines or to any intermediate position; the degree of superheat being regulated by adjustment of the diaphragm.

For convenience of coupling the pipes  $d$ ,  $h'$  and  $h^2$  with the branches  $f$ ,  $f'$  and  $f^2$ , boxes  $f^3$ ,  $f^4$  and  $f^5$  may be provided.

What I claim and desire to secure by Letters Patent of the United States is:—

1. The combination with a steam boiler and a superheater, of an attemperator within the boiler drum, a connection between the attemperator and the superheater, and a directing valve adapted, according to its position to cause the superheated steam to flow through said connection or partly or wholly to by-pass said connection, whereby the saturated steam or the water in the drum may serve to regulate the temperature of the superheated steam.

2. The combination with a steam boiler and a superheater, of an attemperator within the boiler drum, a main outlet for the steam, connections between the superheater and attemperator and said outlet, and a valve governing said connections to cause the superheated steam to flow direct to the main outlet or wholly or in part through the attemperator before reaching the outlet.

3. The combination with a steam boiler and a superheater, of an attemperator within the boiler drum, said attemperator con-

sisting of a box, means to permit the circulation of the water or saturated steam in the drum through said box, and a connection to admit superheated steam to said box but out  
5 of contact with the cooling medium.

4. The combination with a steam boiler and a superheater, of an attemperator within the boiler drum, said attemperator consisting of a box having cross tubes expanded  
10 in the side walls thereof to permit of the circulation therethrough of the water or

saturated steam in the drum, and a connection to admit superheated steam to said box but out of contact with the cooling medium.

In testimony whereof I have hereunto  
signed my name in the presence of two sub-  
scribing witnesses. 15

JAMES H. ROSENTHAL.

Witnesses:

H. N. SMITH,  
H. WILLING.