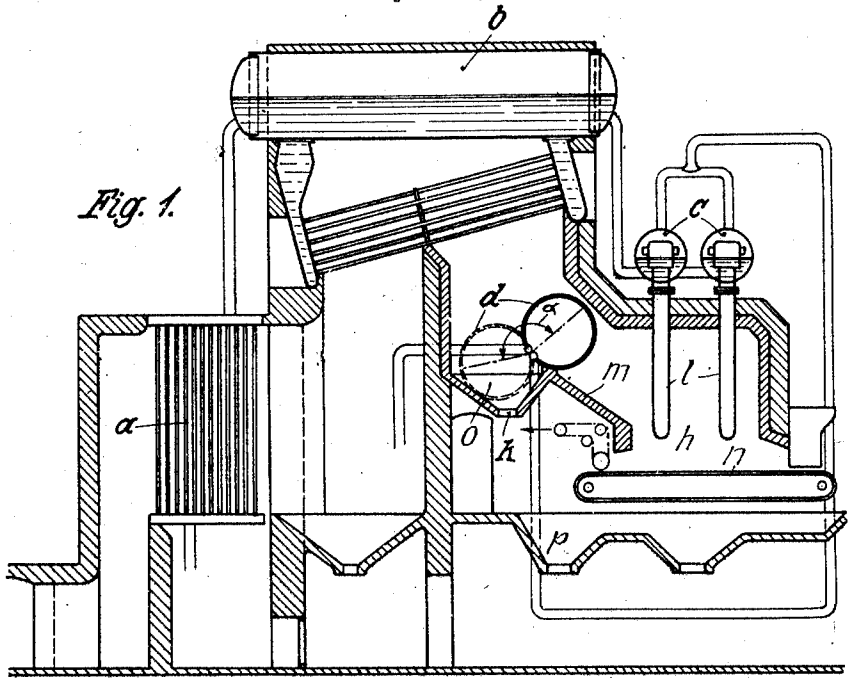
March 26, 1929. A. SCHNEIDER 1,707,143

SUPERHEATER

Filed April 22, 1926

Fig. 1.



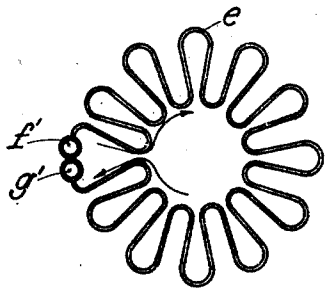
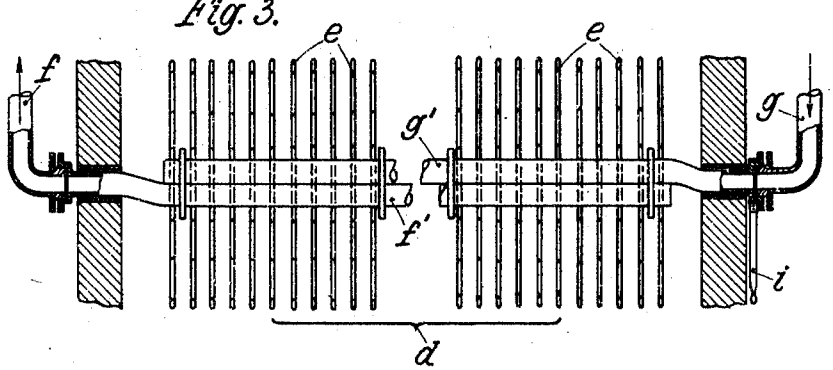


Fig. 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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SUPERHEATER.

Application filed April 22, 1926, Serial No. 103,939, and in Germany August 19, 1925.

This invention relates to movable superheaters of the type which are heated by radiation, in contradistinction to superheaters in which the superheater tubes are heated solely by contact with the gases of combustion.

It has already been proposed to superheat steam by means of movable superheaters, the latter being movable into or out of the stream of heating gases, to a greater or lesser extent. Superheaters of this type receive their heat only from the hot gases, and do not therefore use up the radiant heat of the burning fuel. The heating surfaces must on that account be of unnecessarily large dimensions, which entails the further disadvantage that the uniform heating of the superheater tubes by the hot gases is difficult to ensure, so that individual tubes may easily be burnt through. Further when the temperature of the hot gases varies the difficulty of regulating the superheater to a constant temperature is greater the greater the heating surface of the superheater and the lower the temperature of the heat transmitting medium.

In order to obviate these disadvantages, movable superheaters have been proposed, which can be moved to a greater or lesser extent behind heating tubes, in order to be able to expose them in this way to the radiant heat of the furnace to a greater or lesser extent. Superheaters of the above mentioned type possess the disadvantage, that they are too powerfully cooled by the water-conveying heating tubes serving as screens, and that the hot gases cannot flow round the superheater tubes adequately, being prevented from doing so by the heating tubes. The radiant heat of the gas stream itself, as well as the contact heat, can only be imperfectly transmitted when the above mentioned type of superheater tube is employed. In practice, the above mentioned type of superheater has the disadvantage that the position can only be changed by a longitudinal movement of the superheater, parallel, for example, to the water tubes so that the distance of the superheater from, or its position in, the stream of hot gases, and its position with respect to the fire cannot be altered. This drawback in its turn causes disadvantages from the point of view of both heat and temperature regulation. Further the movement of the superheater by displacement is also unsatisfactory from a constructive point of view as well as in operation.

Superheaters have also been proposed which are pivoted so as to enable them to be moved into and out of the combustion chamber of the boiler or into and out of a flue situated in the upper part of the boiler. Such constructions have the drawback that means have to be provided for packing the combustion chamber at the place where the superheater is moved into and out of it, the material of which the packing means is made being very liable to burn. There is the further drawback that the superheater tubes are in the form of U-shaped loops so that there is considerable risk of the tubes becoming jammed in the packing means.

The object of the present invention is to obviate all the abovementioned disadvantages, and produce a superheater having new advantages.

The invention is illustrated, by way of example, in the accompanying drawings, in which:

Fig. 1 is a cross section of a steam boiler provided with a radiation superheater which is also capable of removing the heat from the hot gases.

Fig. 2 is a side view of a superheater element and

Fig. 3 shows several superheater elements, together with their rotary device.

Referring to the drawings, *a* is a preheater for air or feed-water, which is heated by the flue-gases from the furnace *h* of the medium or low pressure boiler *b*. A Field tube boiler *c* is interposed in front of the boiler *b*, and serves as a high pressure boiler, receiving its feed water from the boiler *b* and being heated by the furnace *h* into which the Field tubes *l* depend. At the rear end of the furnace *h* is a wall *m* which is capable of obstructing the passage of radiant heat from the burning fuel, which is placed on the grate *n*, and mounted above the wall *m* inside the boiler is a superheater *d* comprising a plurality of tubes bent into the form of annular loops. The superheater *d* is pivoted eccentrically with respect to the centres of the loops so as to be capable of being turned from the position shown in full lines in Figure 1 where it rests on the wall *m* into the position shown in broken lines behind the wall *m*. Behind the wall *m* is a space

o forming a flue dust bunker, said space having an opening *k* at the bottom which communicates with the ashpit *p*. In the position indicated by broken lines the superheater is withdrawn from the radiant heat of the fire, as well as from the stream of hot gases. The greatest superheater temperature is attained when the superheater is in the position indicated in full lines. The temperature can be regulated in between the two positions, according to the angle α. It is to be understood that the invention is not limited to the kinds of boilers, nor to the particular boiler arrangement hereinbefore described.

The tube coils *e*, are so arranged in Figs. 2 and 3 that each coil *e* lies in a plane, the superheater tubes being wound in and out sinuously.

The individual elements may however be wound in any other manner, and if preferred they may be bent out of the plane, whereby the transfer of heat is improved. The windings *e* may be of any desired length, and may also be used in the form of large spirals or coils wound on the periphery of a cylinder, into which they may project. *g* is the inlet of the medium to be superheated, for instance the steam.

f is the outlet of the superheated steam, and *f' g'* are the headers of the superheater elements. In Fig. 3 these headers are rotatably mounted in the form of stuffing boxes. *i* is a device for turning the superheater. The two headers *f' g'* may be united into one single header.

What I claim is:—

1. In combination, a steam boiler having a furnace constituting a source of radiant heat within the boiler, said furnace having a wall capable of obstructing the passage of radiant heat, a flue dust bunker within the furnace behind said wall, and a superheater comprising a plurality of tubes bent into the form of annular loops and pivoted in the boiler in proximity to said furnace wall and eccentrically with respect to the centres of the loops so as to be capable of being turned into a position projecting beyond said wall for enabling it to be heated by radiant heat from the furnace and of being turned out of said position behind said wall into the flue dust bunker, as set forth.

2. In combination, a steam boiler having a furnace constituting a source of radiant heat within the boiler, said furnace having a wall capable of obstructing the passage of radiant heat, a flue dust bunker within the furnace behind said wall, and a superheater comprising a plurality of sinuously wound tubes bent into the form of annular loops and pivoted in the boiler in proximity to said furnace wall and eccentrically with respect to the centres of the loops so as to be capable of being turned into a position projecting beyond said wall for enabling it to be heated by radiant heat from the furnace and of being turned out of said position behind said wall into the flue dust bunker, as set forth.

In testimony whereof I have signed my name to this specification.

ADOLF SCHNEIDER.