

M. FISCHER.
SMOKE BOX SUPERHEATER.
APPLICATION FILED JAN. 12, 1909.

934,151.

Patented Sept. 14, 1909.

Fig. 1.

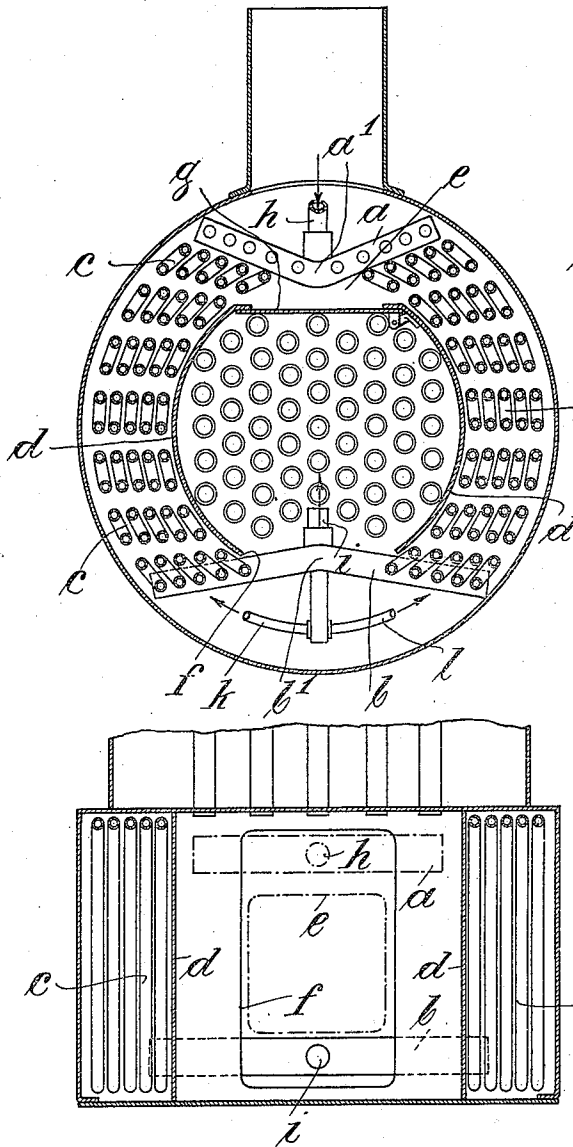


Fig. 3.

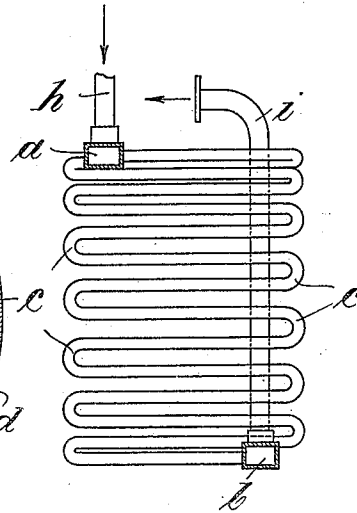
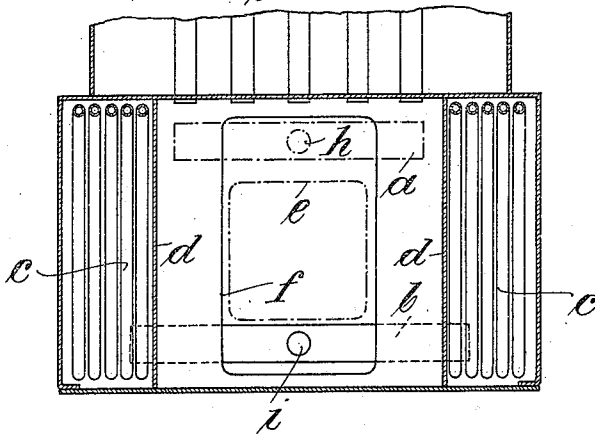


Fig. 2.



Witnesses:
Flora Greenwald.
James T. Goggin.

Inventor:
Martin Fischer.
by *L. K. Böhm,*
Attorney.

UNITED STATES PATENT OFFICE.

MARTIN FISCHER, OF MANNHEIM, GERMANY, ASSIGNOR TO THE FIRM OF HEINRICH LANZ, OF MANNHEIM, GERMANY.

SMOKE-BOX SUPERHEATER.

934,151.

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To all whom it may concern:

Be it known that I, MARTIN FISCHER, a subject of the Grand Duke of Hessen, and resident of Mannheim, in the Grand Duchy of Baden, German Empire, have invented a new and useful Smoke-Box Superheater, of which the following is a specification.

This invention relates to locomotive superheaters. Hitherto such superheaters have been formed of thin zigzag tubes arranged in the smoke box and connecting two headers. These zigzag tubes were arranged with the longest part of the zigzag parallel to the longitudinal axis of the boiler. In order to facilitate cleaning of the boiler smoke tubes, the superheater tubes were arranged so as not to cover the ends of the boiler smoke tubes which opened into the smoke box.

The object of the present invention is to provide an improved construction of superheater of this type. According to the present invention the superheater is composed of a saturated steam header and a superheated steam header arranged within the smoke box and connected by two groups of tubes arranged on opposite sides of the axis of the boiler. Each group is composed of several zigzag tube coils which lie concentrically in an annular space within the smoke box. The boiler smoke tubes open into the center of this annular space.

The invention is illustrated in one convenient form on the accompanying drawing, in which:

Figure 1 is a cross section through the smoke box of a locomotive boiler having a superheater constructed according to the present invention arranged therein, Fig. 2 is a plan also in section of the smoke box and the superheater, Fig. 3 is a side elevation of the superheater alone.

In the form shown two headers *a* and *b* are arranged in the smoke box of the boiler. These headers are connected by tubes *c* which are zigzagged from the saturated steam header *a* to the superheated steam header *b* and are arranged concentrically within the smoke box. The header *a* receives steam from the boiler through a pipe *h* entering said header at the center thereof, while the superheated steam passes from the header *b* by the pipe *i* which also leads from the center of the header. The tubes

passing from the header *a* to the header *b* are arranged in two groups lying on opposite sides of the central axis of the boiler. To facilitate this grouping, the headers *a* and *b* are preferably bent at *a'* and *b'* inwardly toward the axis of the boiler. The annular space occupied by the zigzag tubes *c* is on its inner part closed off by a wall *d* with openings *e* and *f* at the top and bottom. In the form of the invention shown the opening *e* is provided with a plate *g* adapted to close said opening. A tube having branches *k* and *l* is preferably provided for the purpose of cleaning the tubes of the superheater.

In the above construction it will be seen that the superheater tubes are zigzagged to progress gradually in a circular direction so that the steam is gradually conducted into zones of higher temperature and condensation water completely drains out of the tubes thereby avoiding the danger of water hammering on restarting the superheater after a period of idleness.

This superheater acts as follows:—The heated gases issuing from the smoke tubes of the boiler pass through the opening *f* at the lower end of the wall *d* and then are divided into two streams passing to the left and right through the annular chamber occupied by the zigzag tubes. From this chamber the gases pass out to the chimney. If it is desired to put the superheater out of action the plate *g* is moved so that the gases pass directly from the smoke tubes to the chimney. With this arrangement it will be seen that the smoke tubes open into the central space inclosed by the substantially annular chamber which contains the superheater tubes. If the gases are required to pass through a chamber arranged below the boiler, as for instance in the case of steam locomobiles, the plate *g* should be arranged over the opening *f*. The zigzag coils are not necessarily arranged parallel to the longitudinal axis of the boiler, but may be arranged at right angles to the position illustrated. It is only necessary that the zigzag coils should be arranged concentrically within an annular space within the smoke box. The invention may be applied to locomobiles and other boilers of the locomotive type.

It is preferable to arrange the flow of fur-

nace gases in the opposite direction to the flow of the steam as illustrated in the drawings.

I claim:—

- 5 1. In combination with a locomotive boiler, a smoke box into which the smoke tubes open, a casing within the outer wall of the smoke box, there being an annular space between said casing and the outer wall
10 of said smoke box, said boiler smoke tubes being arranged to open into the interior of said casing and said casing being provided with an opening to permit the furnace gases to pass to said annular space, saturated and
15 superheated steam headers arranged one above and the other below the boiler axis and in said annular space, the superheated steam header being arranged opposite the opening in said casing, and two groups of
20 zigzagged tubes in said annular space and connecting said headers, said groups being arranged on opposite sides of the boiler axis and the tubes of said groups progressing gradually in a circular path, substantially
25 as described.
2. In combination in the smoke box of a locomotive boiler, two headers arranged one above and one below the axis of the boiler, said headers being bent inwardly at their
30 centers toward said axis, two groups of tubes connecting said headers and arranged in an annular space within said smoke box and on opposite sides of the axis of the boiler, the tubes in said groups being ar-
35 ranged concentrically and each tube being zigzagged from the saturated to the superheated steam header.

3. In combination in the smoke box of a locomotive boiler, two headers arranged one above and one below the axis of the boiler, said headers being bent inwardly at their centers toward said axis, two groups of tubes connecting said headers and arranged in an annular space within said smoke box and on opposite sides of the axis of the boiler, the tubes in said groups being arranged concentrically and each tube being zigzagged from the saturated to the superheated steam header, and a cylindrical casing forming the inner wall of said annular space containing the groups of tubes and having controllable openings therein.

4. In combination in the smoke box of a locomotive boiler, two headers arranged one above and one below the axis of the boiler, said headers being bent inwardly at their centers toward said axis, a steam supply pipe leading to the center of one of said headers, and a superheated steam pipe leading from the center of the other header, two groups of tubes connecting said headers and arranged in an annular space within said smoke box and on opposite sides of the axis of the boiler, the tubes in said groups being arranged concentrically and each tube being zigzagged from the saturated to the superheated steam header.

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

MARTIN FISCHER.

Witnesses:

RAY A. SIGSBEE,
TERESA CATTURANI.