

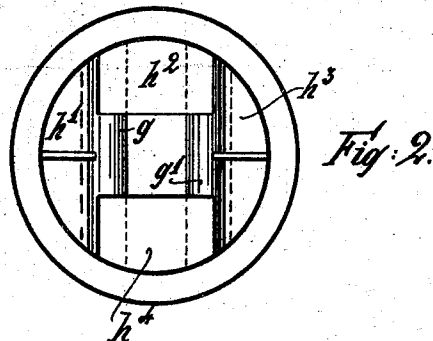
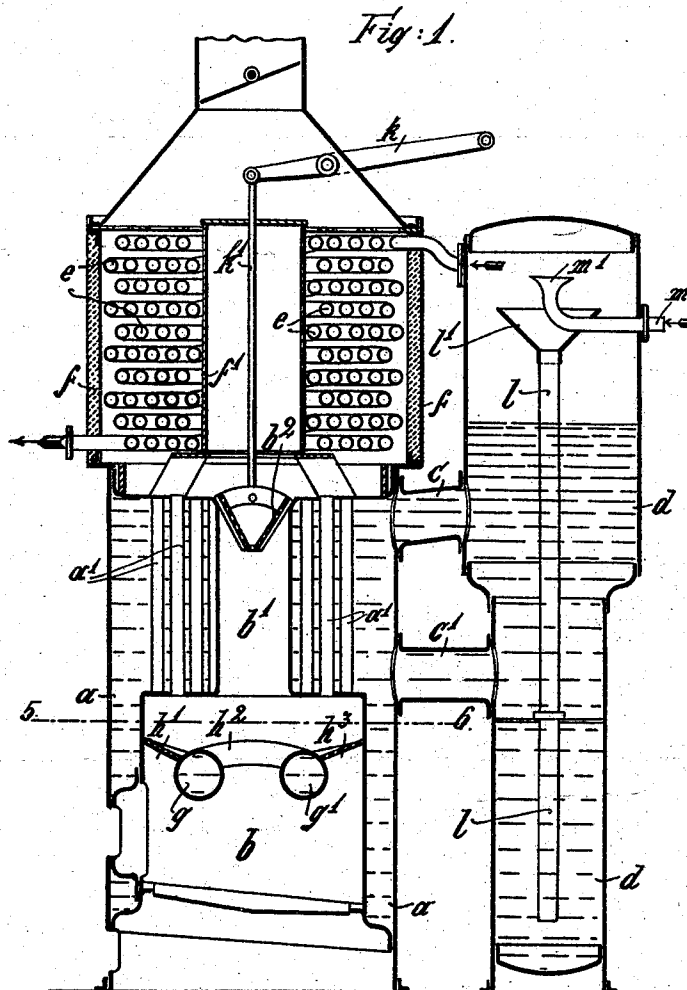
(No Model.)

2 Sheets—Sheet 1.

W. SCHMIDT & G. HENKEL.
STEAM BOILER WITH SUPERHEATER.

No. 558,210.

Patented Apr. 14, 1896.



Witnesses:
Carl Popsbach.
Emil Kayser.

Inventors:
Wilhelm Schmidt
Gustav Henkel
Robert Seifler
Attorney.

W. SCHMIDT & G. HENKEL.
STEAM BOILER WITH SUPERHEATER.

No. 558,210.

Patented Apr. 14, 1896.

Fig. 3.

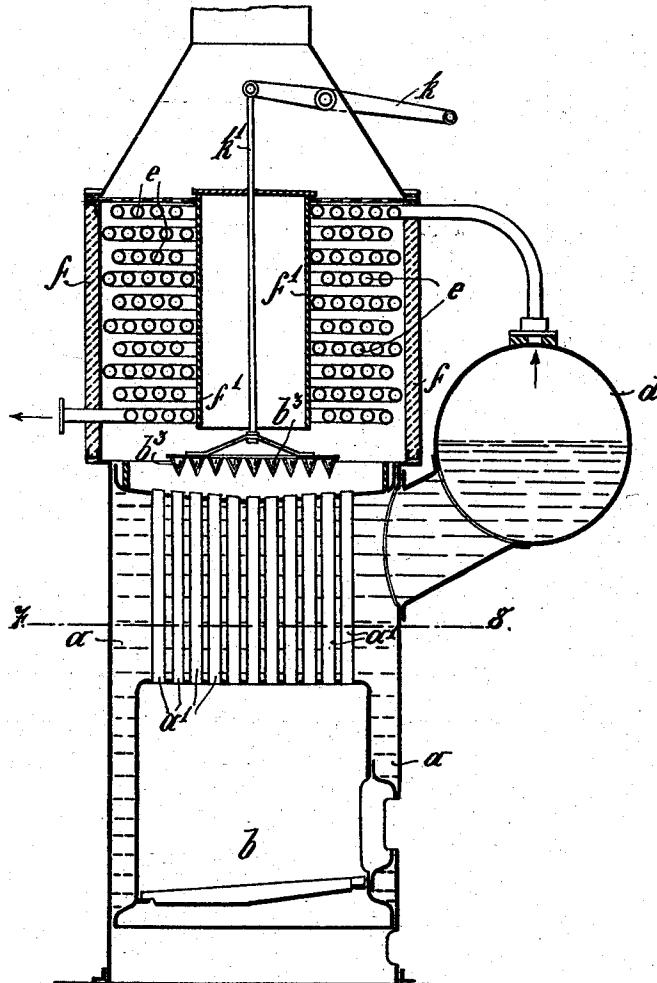
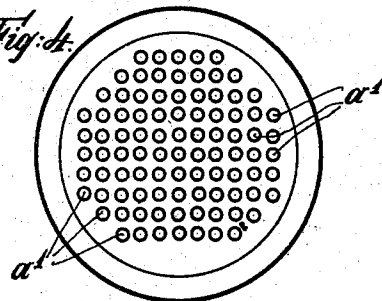


Fig. 4.



Witnesses:

Carl Popsbach
Emil Kaiser.

Inventors:

Wilhelm Schmidt
Gustav Henkel
by
Hermann Diefen
Attorney.

UNITED STATES PATENT OFFICE.

WILHELM SCHMIDT, OF BALLENSTEDT, AND GUSTAV HENKEL, OF
WILHELMSHÖHE, GERMANY.

STEAM-BOILER WITH SUPERHEATER.

SPECIFICATION forming part of Letters Patent No. 558,210, dated April 14, 1896.

Application filed June 10, 1895. Serial No. 552,287. (No model.)

To all whom it may concern:

Be it known that we, WILHELM SCHMIDT, a resident of Ballenstedt, near the Harz, Duchy of Anhalt, and GUSTAV HENKEL, a resident of Wilhelms Höhe, near Cassel, Province of Hesse-Nassau, Germany, subjects of the King of Prussia, German Emperor, have invented certain new and useful Improvements in Steam-Boilers with Superheaters, of which the following is an exact specification.

This invention refers to steam-boilers that are combined with a superheater heated by the waste gases of the furnace of the respective boiler.

Our improvements in boilers of said kind relate to the combination of the superheater with a boiler having vertical heating-tubes and connected with a reservoir adapted to keep said boiler constantly perfectly filled with water.

The purpose of our improvements is to make boilers of said kind suited for said combination by preventing the vertical heating-tubes of the boiler from being destroyed by the strong heat requisite for effecting a high superheating of the steam, and we attain that purpose by combining the said boiler with a reservoir constantly keeping said tubes in the whole of their length surrounded by water, instead of by water and steam as in the heating-tube boilers known up to now.

In order to make our invention more clear, we refer to the accompanying drawings, in which similar letters refer to similar parts throughout the different views, and in which—

Figure 1 is a vertical section through our improved steam-generator. Fig. 2 is a similar section through a modified form of construction. Fig. 3 is a horizontal section taken on line 5 6 of Fig. 1, and Fig. 4 is a horizontal section taken on line 7 8 of Fig. 2.

Referring to Fig. 1, *a* is the boiler, and *a'* the heating-tubes of the same. Said tubes are arranged around a large central flue *b'* extending upward from the furnace *b*. Said flue may partly or wholly be closed by a lid or cover *b²*. The boiler *a* is connected by means of the pipes *c c'* with a reservoir *d*, which is kept filled with water up to such a height that the level of the water is constantly

higher than the upper ends of the heating-tubes *a'*. The latter are therefore constantly surrounded by water throughout their whole length.

The superheater *e* consists, in the mode of construction shown, of a column of horizontal coils arranged above the boiler *a* and between an outer casing *f* and an inner casing *f'*. One end of said superheater is connected with the dome of the reservoir *d*. The steam escaping from the latter and flowing through the coils of the superheater *e* is superheated by the furnace-gases passing either through the heating-tubes *a'* only or through the flue *b'*. If the latter is closed by the lid or cover *b²*, the fire-gases will be comparatively much exhausted by the large area of surface offered by the heating-tubes, and the degree of superheating will thus be less than if a smaller or greater portion of said gases is allowed to escape through the flue *b'*. There is thus afforded thereby a means of regulating the degree of superheating of the steam.

Instead of employing a vertical reservoir we may use a horizontal one, as shown, as an example, in Fig. 2. There is in this case but one connecting-pipe between said reservoir and the boiler, but, as a matter of course, two may be used. The large central flue is replaced by heating-tubes, and the lid or cover is enlarged and provided with projections *b³*, adapted to close the greatest part of said tubes. There is thus gained the same effect as described with regard to the mode of construction first described.

The conical cover *b²*, Fig. 1, or the flat cover *b³*, Fig. 2, may, as a matter of course, be replaced by any other equivalent device—for instance, by a flap, a rotatable disk provided with openings, or the like.

If a large central flue is employed, as in Fig. 1, we prefer to contract within the upper portion of the fire-box the way for the fire-gases by arranging within said portion two horizontal boiler-tubes *g g'*, Fig. 3, supporting four plates *h' h² h³ h⁴*. The latter cover the greatest part of the horizontal area of the fire-box, leaving only a channel *i*, situated directly below the flue *b'*. The fire-gases are thus brought into intimate contact with the flames and will rush wholly or partly directly

into the flue b' as soon as the lid b^2 is more or less raised. The lid b^2 or b^3 , respectively, may be operated by a hand-lever k , connected to said lid by a rod k' .

5 The form of construction of the reservoir shown in Fig. 1 may well be used for purifying the feed-water for the boiler proper. For this purpose we arrange within said reservoir a tube l , having at its top a funnel l' and terminating shortly above the bottom of the said reservoir. The impure feed-water enters the reservoir through pipe m , the inner end of which is bent upward and formed into a funnel m' . The water is heated, first, by coming
10 into intimate contact with the steam contained within the dome of the reservoir, and, second, by flowing slowly down through pipe l into the lower compartment of said reservoir. The impurities contained within the water separate and precipitate within said compartment,
15 and the water thus enters the boiler proper in a pure state.

20 Having thus fully described the nature of

our invention, what we desire to secure by Letters Patent of the United States is— 25

As a steam-generator for the production of highly-superheated steam, the combination with a boiler proper having vertical heating-tubes, of a reservoir forming the steam-space for said boiler, and of a tube or tubes connecting said reservoir with the said boiler; a
30 superheater connected at one end with said steam-space; means for regulating the flow of the fire-gases through said vertical heating-tubes, said means being arranged between the boiler and said superheater, for the purpose as described. 35

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

WILHELM SCHMIDT.
GUSTAV HENKEL.

Witnesses:

CHAS. W. DAY,
W. HAUPT.