

(No Model.)

O. HUNGER.
SUPERHEATER.

No. 568,763.

Patented Oct. 6, 1896.

Fig. 1.

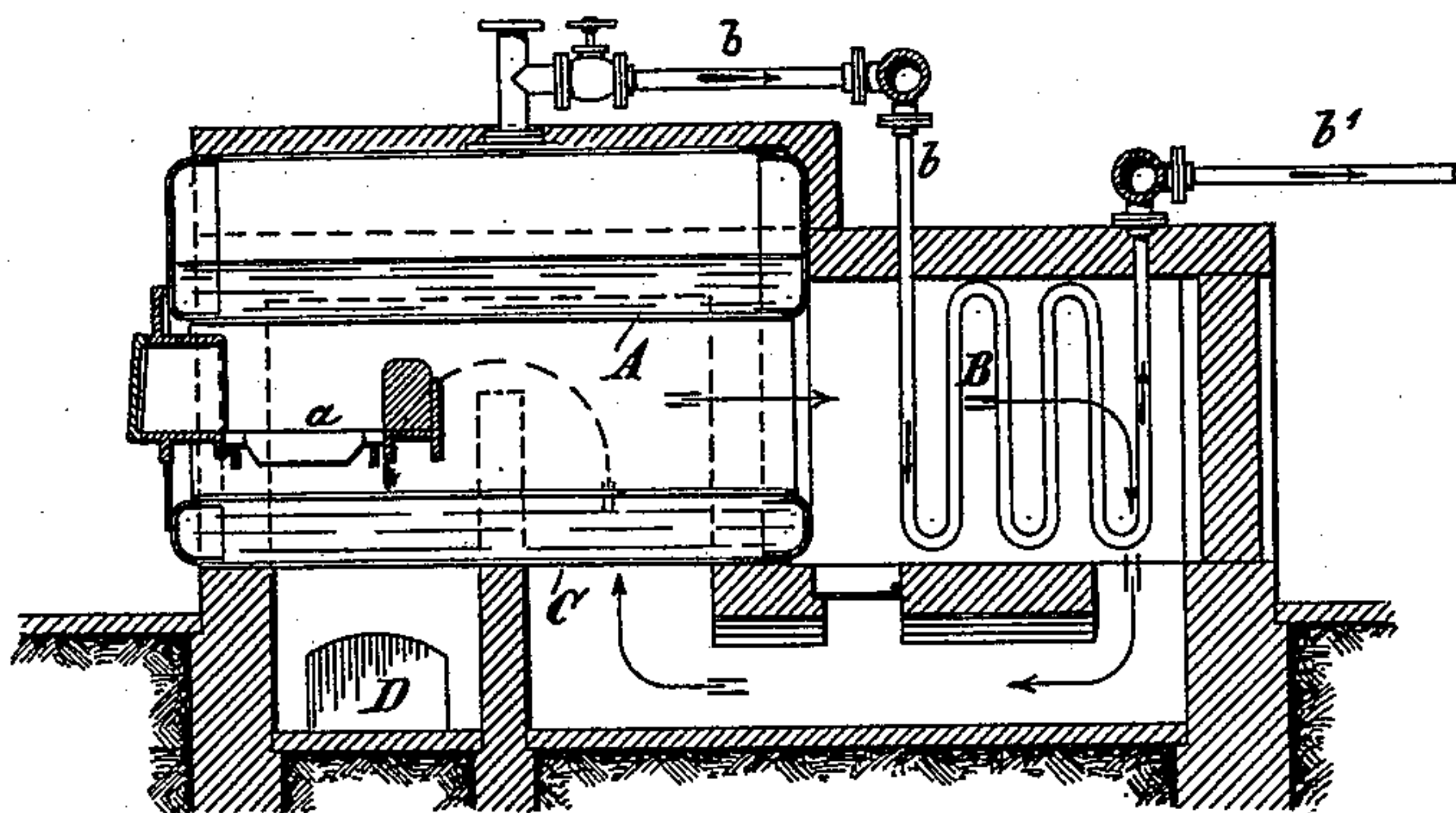
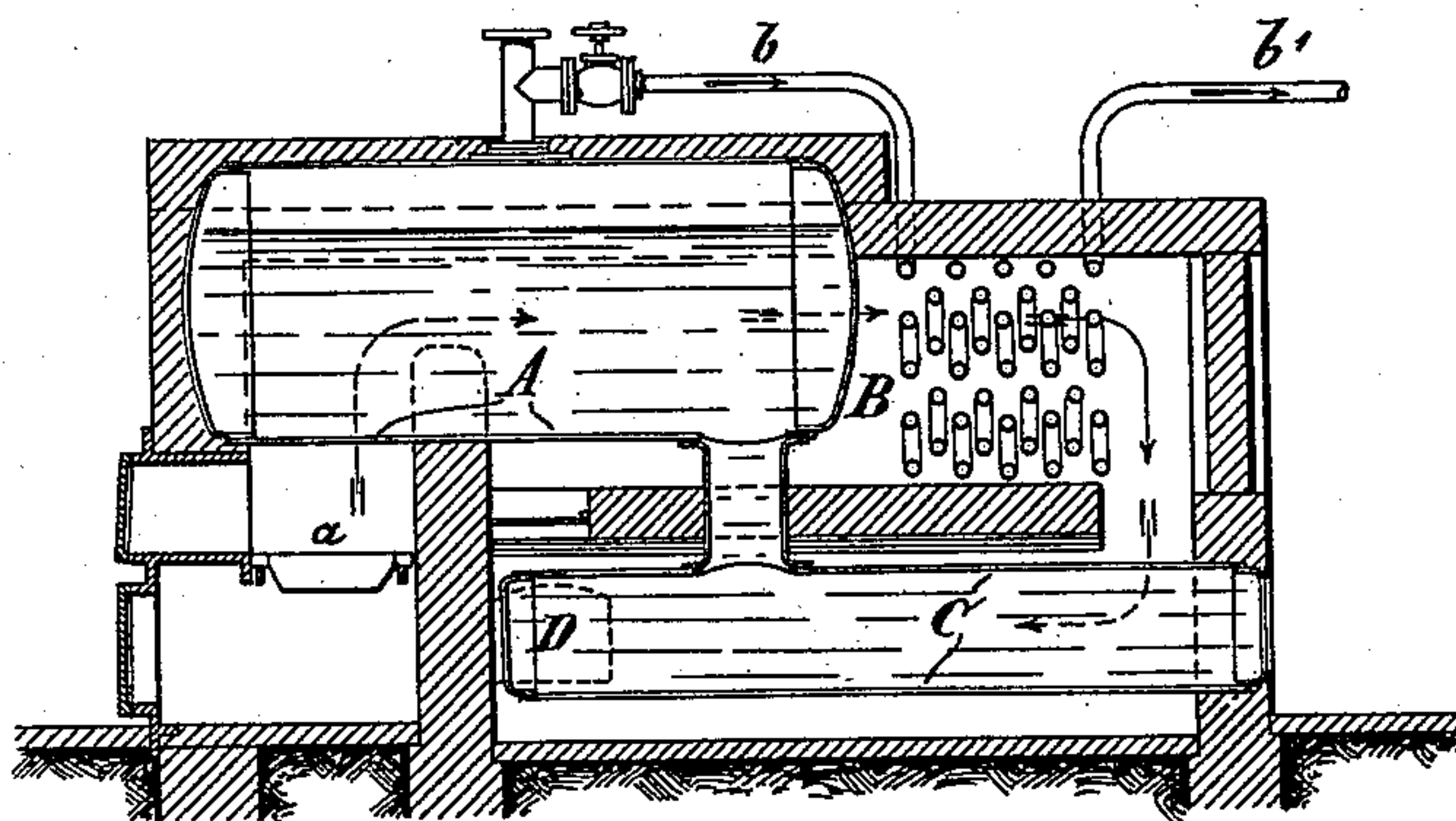


Fig. 2.



Attest:

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UNITED STATES PATENT OFFICE.

OSKAR HUNGER, OF DURLACH, GERMANY, ASSIGNOR TO RUDOLF GRITZNER, OF SAME PLACE.

SUPERHEATER.

SPECIFICATION forming part of Letters Patent No. 568,763, dated October 6, 1896.

Application filed October 16, 1895. Serial No. 565,900. (No model.) Patented in Switzerland December 31, 1894, No. 9,532, and in Hungary July 6, 1895, No. 3,174.

To all whom it may concern:

Be it known that I, OSKAR HUNGER, chief engineer, a subject of the King of Saxony, residing at Durlach, in the Grand Duchy of Baden, German Empire, have invented new and useful Improvements in Connection with Boilers for the Production of Superheated Steam, (for which I have obtained a patent in Switzerland, No. 9,532, bearing date December 31, 1894, and in Hungary, No. 3,174, bearing date July 6, 1895,) of which the following is a specification.

This invention relates to improvements in connection with steam-boilers in which water is converted into steam by the direct action of the fire, the steam thus generated being then superheated; and the said invention consists in the adoption of a new and improved method for the guidance or circulation of the combustion-gases through or in connection with such steam-boilers, whereby the useful effect obtained from the heat of such gases becomes very considerable in comparison with the small extent of the heating-surfaces, in the construction of which a material saving of cost may be accordingly realized. This reduction or contraction of the area of the heating-surfaces, especially in the portion of the boiler where the superheating of the steam is intended to take place, is facilitated by conducting the combustion-gases, not, as is usual, on the counter-current principle, but in a current following the same direction as the steam to be superheated, so that the whole of the existing difference of temperature between the products of combustion and the saturated steam flowing toward the superheater is utilized in the process of transmission of the surplus heat of the combustion-gases to the steam. This arrangement of the superheater guiding the current of gases in the same direction as the steam is not only rational regarded from the point of view of the reduction of the superheating-surfaces, but may also be so from that of the economical use of heat if the products of combustion to be sent to the superheater have acted only on the most effective part of the boiler where the steam is generated, so that the heat which the combustion-gases still retain as they leave

the superheater may then be extracted from them and turned to account by causing them in the subsequent stage of operation to meet a part of the heating-surface in contact with water which they had not touched before and which is generally set apart for raising the temperature of the water, so that eventually their temperature is reduced to a low degree, at which they are fit to be discharged through the chimney.

The described course of the furnace-gases may be performed in a Cornish boiler by first using the said gases in the flue for generating steam, then guiding them through the superheating-chamber from the front to the rear, that is to say, in the same direction in which the steam traverses the superheating-coil, and finally bringing them into contact with the lower and coldest part of the boiler, after which they pass through the flue and thence escape through the chimney.

In a combination of a cylindrical boiler wherein the steam is generated, having its fire arranged below, with another similar though smaller boiler, which serves for the preliminary heating of the water, the furnace-gases or products of combustion may heat both these boilers in succession and on their way from the greater to the smaller one pass through the superheating-chamber; and in order that the said invention may be fully understood I shall now proceed more particularly to describe the same, and for that purpose shall refer to the figures on the annexed sheet of drawings, of which—

Figure 1 is a longitudinal section of a Cornish boiler embodying the subject of my invention, whereas Fig. 2 illustrates, by way of another example, in longitudinal section the invention applied to a boiler composed of a larger cylindrical part and a smaller part arranged underneath the same.

In the arrangement of parts shown in Fig. 1 the gases of combustion generated on the grate *a*, after having been used in the flue *A* for producing steam and after having passed through the superheating-chamber *B* from the front to the rear in the direction indicated by arrows, that is to say, in the same direction in which the steam traverses the super-

heating-coil, come into contact with the lower and relatively coldest part C of the boiler. From here they pass through the flue D and thence escape through the chimney. *b b* is the pipe-and-valve connection by means of which the superheating-coil in the chamber B is fed with the steam to be heated, and a pipe *b'* conducts the superheated steam to the place of consumption.

10 In cases where a cylindrical boiler A is used for the generation of steam, and, in combination therewith, another similar but smaller boiler C is employed for the preliminary heating of the feed-water, as indicated in Fig. 2, 15 the gases developed on the grate *a* may heat both boilers in succession, and on their way from the flues of the greater to those or that of the smaller one they pass through the superheating-chamber B in the direction shown 20 by the arrows, and finally escape through flue D in the chimney. The lower part C of the boiler being the coldest part of the whole heating-surface, a very considerable useful effect of the heat produced by the combustible 25 burned on the grate is so secured.

I am aware that prior to my invention boilers have been made in combination with superheaters and feed-water heaters, the combustion-gases of such boilers directly, before

their escaping into the chimney, heating the 30 superheater-pipes, and on their direct passage thence to the chimney heating the feed-water heater. I therefore do not claim such a combination broadly, but

What I claim as my invention, and desire 35 to secure by Letters Patent, is—

In a boiler for the production of superheated steam, the combination of a boiler A for generating steam, presenting the hottest heating-surface to the combustion-gases developed on the grate, a superheating-chamber B through which the combustion-gases pass, said boiler having a part C presenting the coolest portion of the heating-surface to the gases before their escape in the chimney, 45 pipe *b*, and a superheating-coil for conducting the steam to be superheated from the boiler A through the superheating-chamber B in the same direction as the current of the combustion-gases, substantially as and for 50 the purpose specified.

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

OSKAR HUNGER.

Witnesses:

PAUL BAUS,
ALBERT SCHOLL.