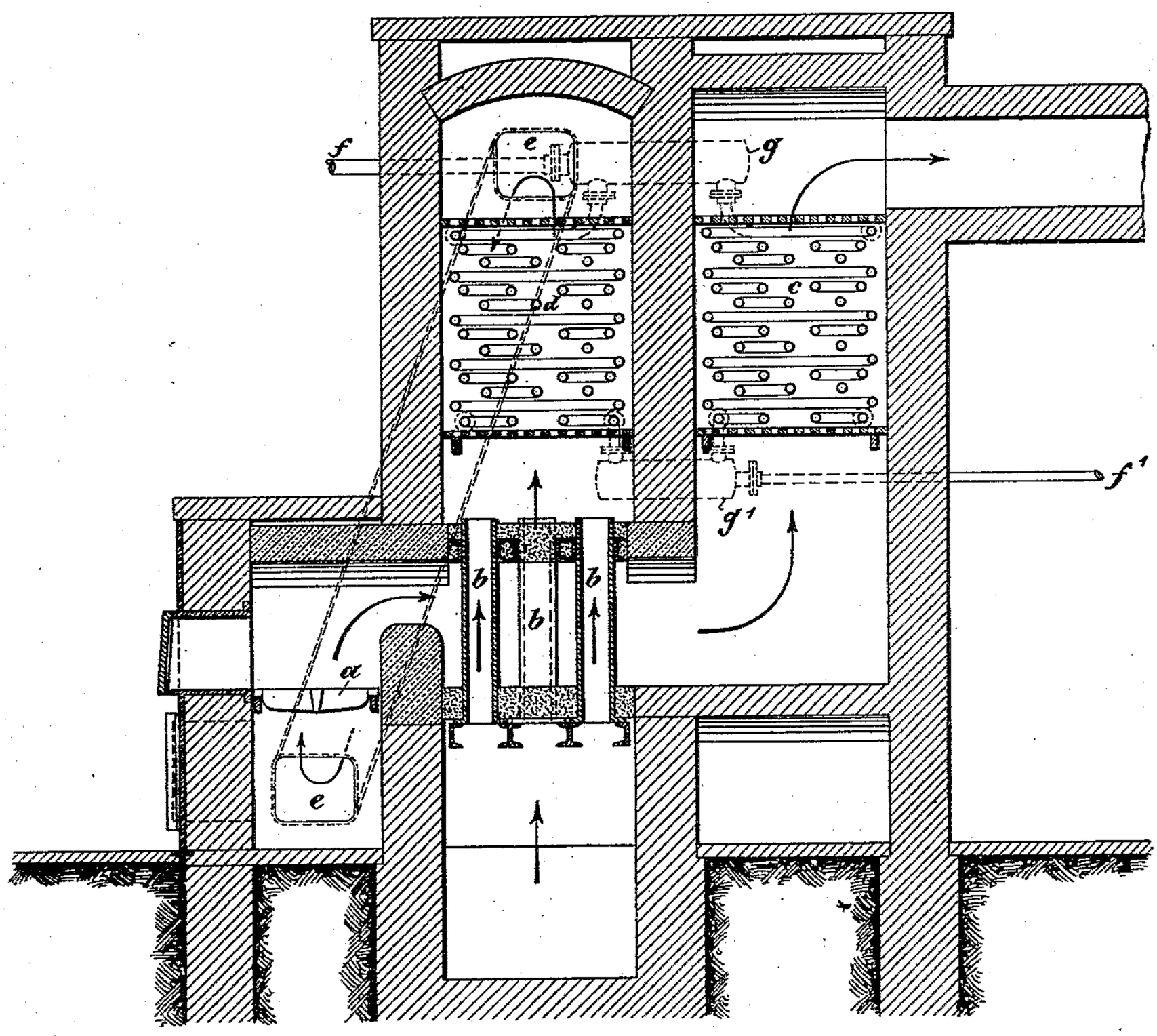
(No Model.)

O. HUNGER.

SUPERHEATER.

No. 552,906. Patented Jan. 14, 1896.



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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. 552,906, dated January 14, 1896.

Application filed October 16, 1895. Serial No. 565,901. (No model.) Patented in Germany December 8, 1894, No. 81,924; in Switzerland January 3, 1895, No. 9,820; in England June 10, 1895, No. 11,351; in Hungary June 29, 1895, No. 3,125, and in Austria July 2, 1895, No. 2,411/45.

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 Superheaters, (for which I have obtained patents in Germany, No. 81,924, bearing date December 8, 1894; in Switzerland, No. 9,820, bearing date January 3, 1895; in Great Britain, No. 11,351, bearing date June 10, 1895; in Hungary, No. 3,125, bearing date June 29, 1895, and in Austria, No. 2,411/45, bearing date July 2, 1895,) whereof the following is a specification.

This invention relates to that class of superheaters for steam or gases which are heated by the direct action of the fire-gases; and the object of the invention is to overcome some serious inconveniences hitherto experienced in such superheaters.

It has been found that most disturbing injuries arise from the fact that the gaseous products of combustion evolved above the grate are too hot to be capable of being conducted along the heating-surfaces of the superheater without injury to the material thereof. In consequence of this the said gaseous products have hitherto been cooled by cold air mixed with the said products behind the fire-bridge, but this method of cooling makes it very difficult to take full advantage of the heat generated, the whole furnace arrangement being caused to operate under unfavorable conditions as the quantity of air which escapes into the chimney at the high temperature required for sustaining the chimney-draft is far greater than is necessary for total combustion.

The object of this invention is especially to avoid such loss of heat, the products of combustion being cooled in the rear of the fire-bridge by cold air, not, however, by mixing such air with the said products, but by surface transmission, so that the air remains fit for subsequent utilization of the heat absorbed by it.

An improved superheater according to this invention is represented in the annexed drawing, illustrating the same in a vertical section.

In the accompanying drawing, the grate whereon the fuel is burned is shown at *a*. The volatile products of combustion on their way to the chimney envelop the tubes or flues *b* situated behind the fire-bridge. Air is passed through the said tubes *b* and the said air takes up from the products of combustion an amount of heat which may be determined at will by correspondingly proportioning the extent of the heating-surface. The products of combustion, on being thus slightly cooled, thence pass on to one portion *c* of the superheater, and thence escape into the chimney. The air heated within the tubes *b* is conducted to another portion *d* of the superheater, being at the same time cooled down again as far as practicable. The heat which may not be utilized here may be made serviceable by conducting the hot air after it has left the portion *d* of the superheater either through the air-conduit *e* to beneath the grate or into the chamber beneath the tubes or flues *b* to pass again therethrough. The steam to be superheated (for the conduction of which pipes *f f'* and reservoirs *g g'*, suitably connected to the superheater-coils, are arranged) may pass through the superheater-coils *c* and *d* either simultaneously or successively—that is to say, first through the coil *d* and then through the coil *c*—and it may pass through the coils either in reverse direction to that of the heating-gases or in the same direction as that of the heating-gases, which gases preferably enter the superheating-chambers at the bottom and escape at the top, as shown.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In superheaters having two superheating chambers, the combination of the flue, leading from the fire-place to a superheating chamber (*c*), with air-passages (*b*) crossing the former and opening into the other super-

heater chamber (*d*), and means provided for reutilizing the heat of the air escaping from the chamber *d*, substantially as described.

2. In superheaters having two superheater chambers, the combination of one (*d*) of these chambers with air passages (*b*) crossing the flue which conducts the fire-gases to the other chamber (*c*), and a conduit (*e*) leading from the end of the first chamber (*d*) to beneath the grate whereon the fuel is burned, essentially as and for the purpose set forth.

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

OSKAR HUNGER.

Witnesses:
PAUL BAUR,
ALBERT SCHOLL.