No. 666,015. Patented Jan. 15, 1901.

E. KÖNIG & I. MAGER.

SUPERHEATER.

(Application filed Apr. 25, 1900.)

(No Model.)

Fig. 1.

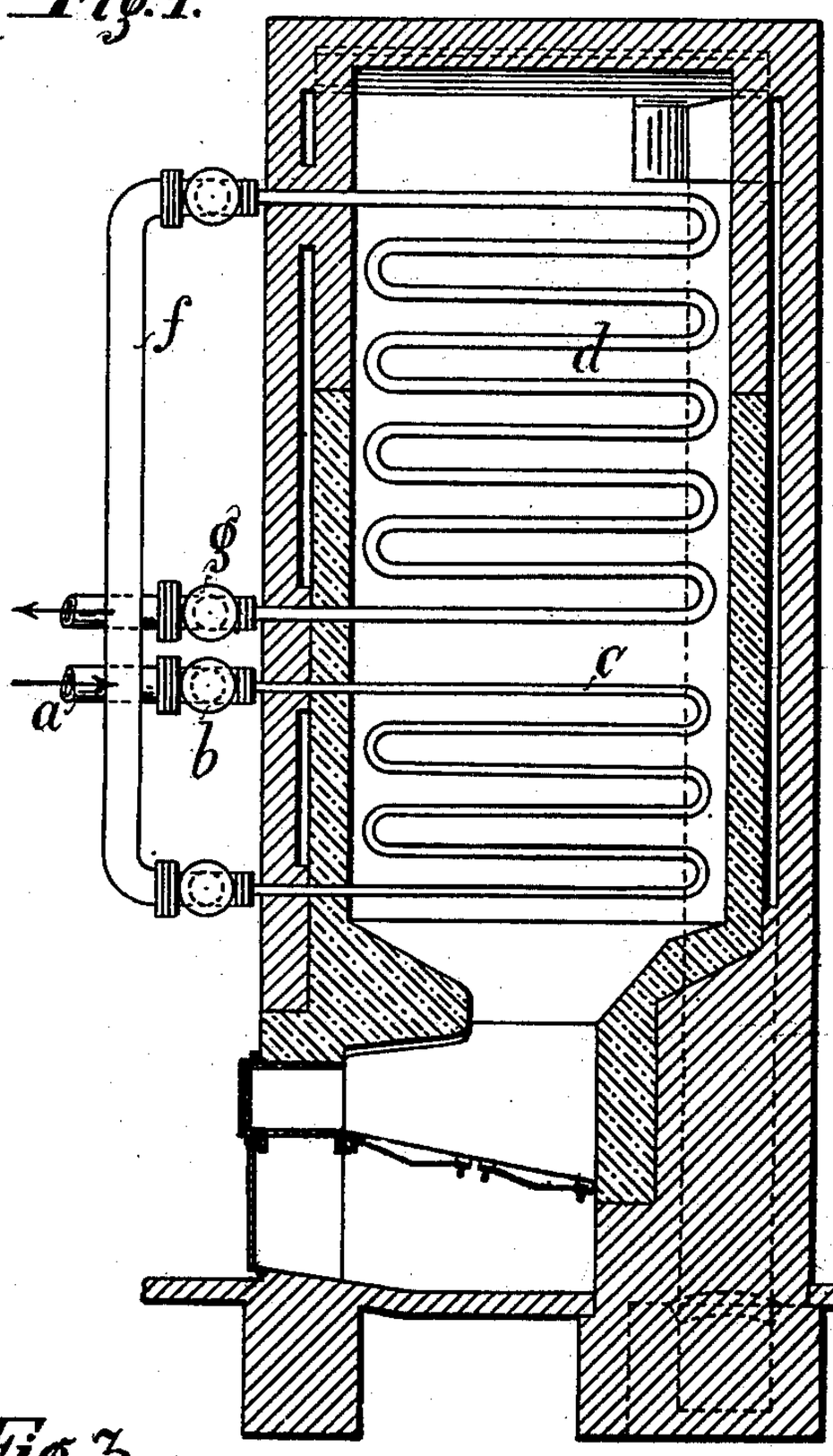


Fig. 2.

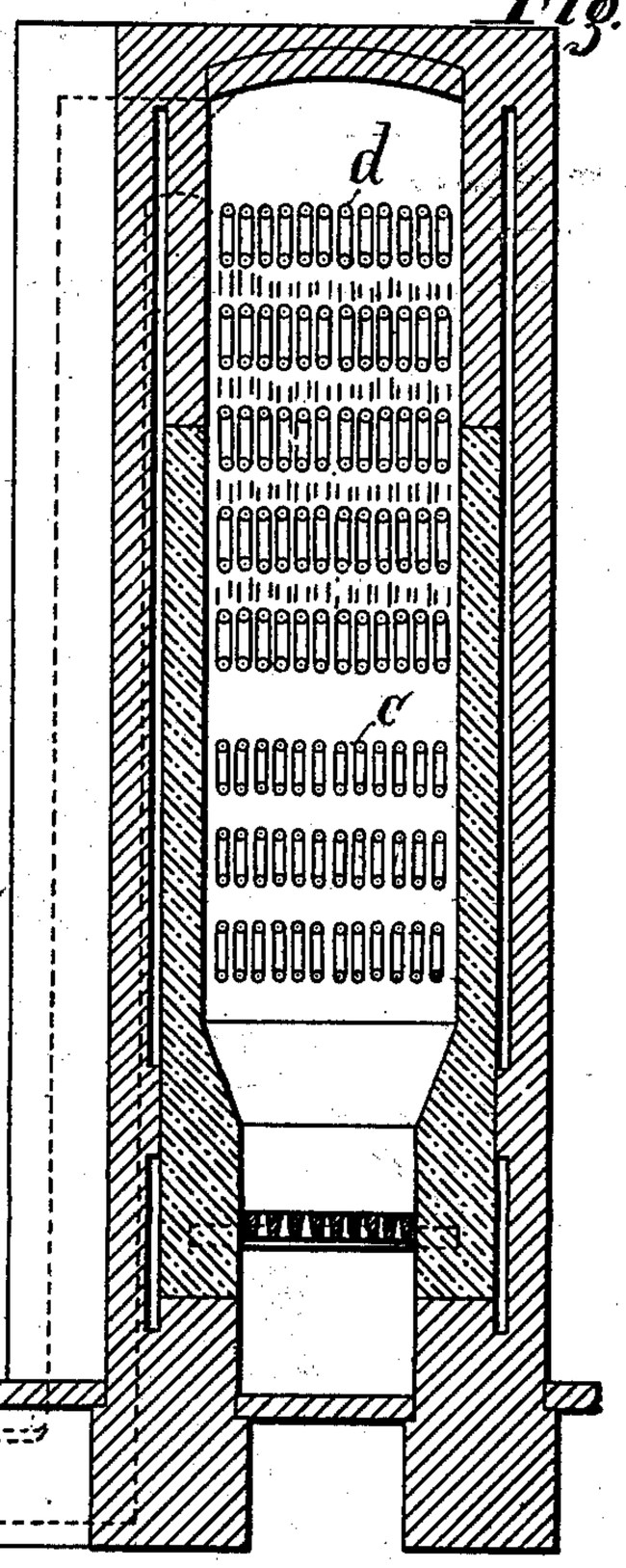
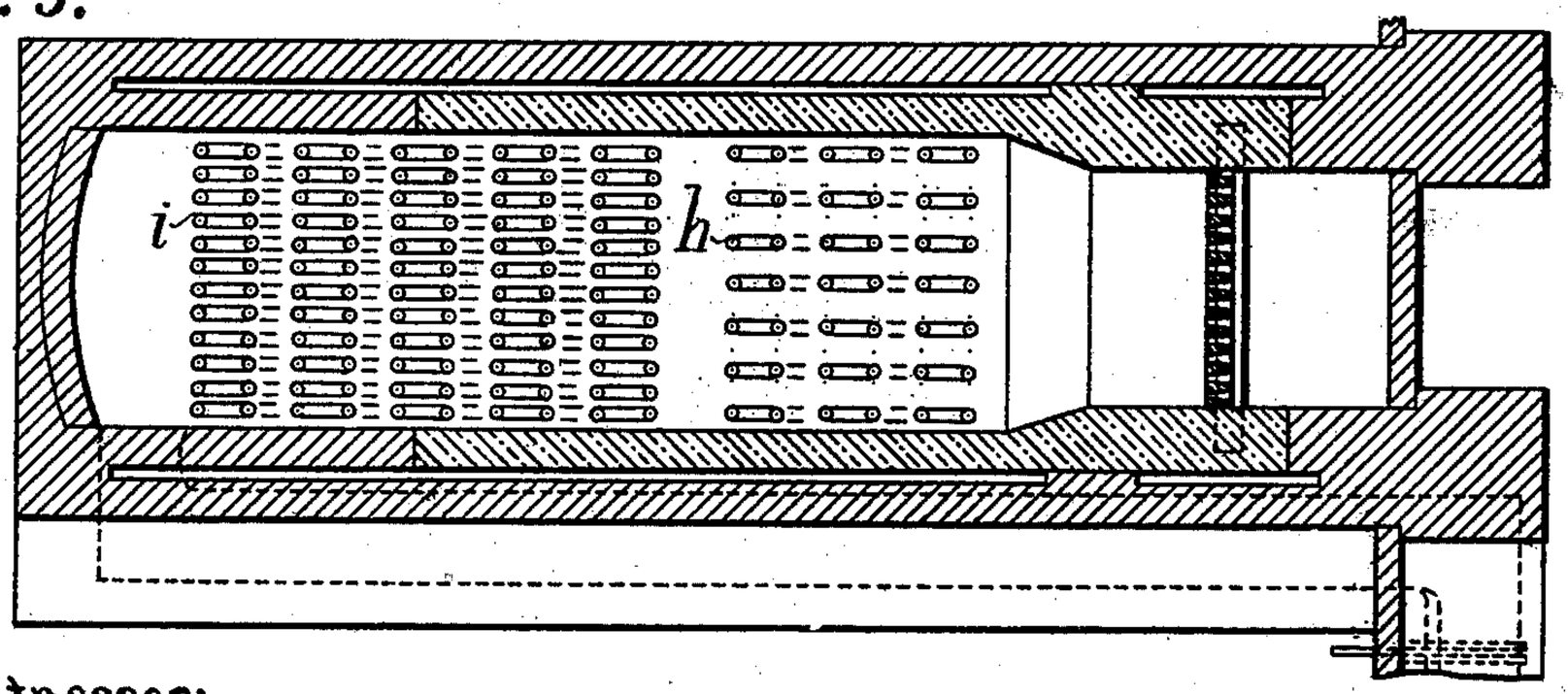


Fig. 3.



Witnesses:
J. D. McMahon.
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UNITED STATES PATENT OFFICE.

EDUARD KÖNIG AND IMMANUEL MAGER, OF ASCHERSLEBEN, GERMANY.

SUPERHEATER.

SPECIFICATION forming part of Letters Patent No. 666,015, dated January 15, 1901.

Application filed April 25, 1900. Serial No. 14,234. (No model.)

To all whom it may concern:

Be it known that we, EDUARD KÖNIG, civil engineer and manager of the Aschersleben Maschinen-bau-Actien-Gesellschaft, and IMMANUEL MAGER, chief engineer of the Aschersleben Maschinen-bau-Actien-Gesellschaft, subjects of the King of Prussia, German Emperor, residing at Aschersleben, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Superheaters, of which the following is a specification.

This invention relates to superheaters of the kind in which the steam and the fire-gases move in opposite directions. It is known that the fire-gases are very fully exhausted in superheaters of this kind; but that advantage is wholly offset by the disadvantage that those pipes of the superheater which are located in the zone of the hottest gases cannot be cooled at all, and the result thereof is that the pipes commence to glow and combust in a considerably short time.

The object of our invention is to do away with the aforementioned drawback, and in order to make our invention more clear we refer to the accompanying drawings, in which similar letters denote similar parts throughout the different views, and in which—

Figure 1 is a vertical section through a superheater constructed according to our invention. Fig. 2 is another vertical section taken in line 4 5 of Fig. 1; and Fig. 3 is a view similar to Fig. 2, but showing a slightly-modified form of construction.

There are in our superheater two sets of coiled or convoluted pipes, one of which is located in the zone of the hottest gases and is of such a kind that the combined free sections of all the pipes forming this set are considerably smaller than the combined sections of the pipes of the other set, the latter being located in the succeeding zone, where the temperature of the fire-gases is a lower one. Owing to this contrivance the steam flows through the first set of pipes with a very great speed, in consequence of which the pipes are so powerfully cooled that they are prevented against commencing to glow and combusting, and the area of the surface of the pipes of this set is so determined that the greatest part of the heat of the fire-gases is taken up by the pipes in question.

Referring to Figs. 1 and 2, the wet steam issuing from the boiler enters the superheater at *a*, Fig. 1, and distributes along a pipe *b*, from which it passes into the convoluted superheating-pipes *c*, which are located side by side in the way distinctly to be seen from said figures. A similar set of pipes *d* is arranged above the pipes *c*, and the free section of the pipes of the upper set is considerably greater than the section of the pipes of the lower set, so that the steam in the upper pipes has a correspondingly lower velocity.

The lower ends of the pipes *c* are connected by a collecting-pipe similar to the pipe *b*, and also the upper ends of the upper pipes are connected by such a pipe, and this pipe is connected with the lowermost collecting-pipe by a vertical pipe *f*, which leads the steam from the superheating set *c* to the superheating set *d*, from which latter the superheated steam passes away at *g*.

In the form of construction shown in Fig. 3 the pipes of the lower set *h* have the same diameter as the pipes of the upper set *i;* but the spaces between the undulated pipes of the lower set are by far greater than the upper spaces, so that there is a correspondingly less number of pipes in the lower set, and the combined free sections of the pipes of this set are therefore also in this case considerably smaller than the combined free sections of the pipes of the upper set.

The steam to be superheated flows in both sets in opposite direction to the furnace-gases; but owing to the division of the superheating-pipes in two sets, as aforedescribed, the drawback mentioned is completely avoided.

Having now fully described the nature of our invention, what we desire to secure by Letters Patent of the United States is—

1. In a superheater in which the steam and the fire-gases flow in opposite directions, the combination with a set of superheating-pipes located nearest to the source of heat and receiving the steam at the ends farthest from said source, of another set of superheating-pipes located beyond said former set, connections between the farther ends of said second set and those ends of the first-mentioned set

nearest the source of heat, and a discharge for the second set at the ends adjacent to the first set.

2. In a superheater in which the steam and the fire-gases flow in opposite directions, the combination with a set of superheating-pipes located nearest to the source of heat and receiving the steam at their ends farthest removed from said source, of another set of superheating-pipes located behind said former set, the ends nearest to the source of heat of the superheating-pipes of the first-mentioned set being connected with the farther ends of the superheating-pipes of the other set to deliver steam from the first set to the second, and the combined free sections of the lower pipes being smaller than the combined free sections of the upper pipes, substantially as and for the purpose described.

In witness whereof we have hereunto set our hands in presence of two witnesses.

EDUARD KÖNIG.
IMMANUEL MAGER.

Witnesses:
RUDOLPH FRICKE,
B. H. WARNER, Jr.