

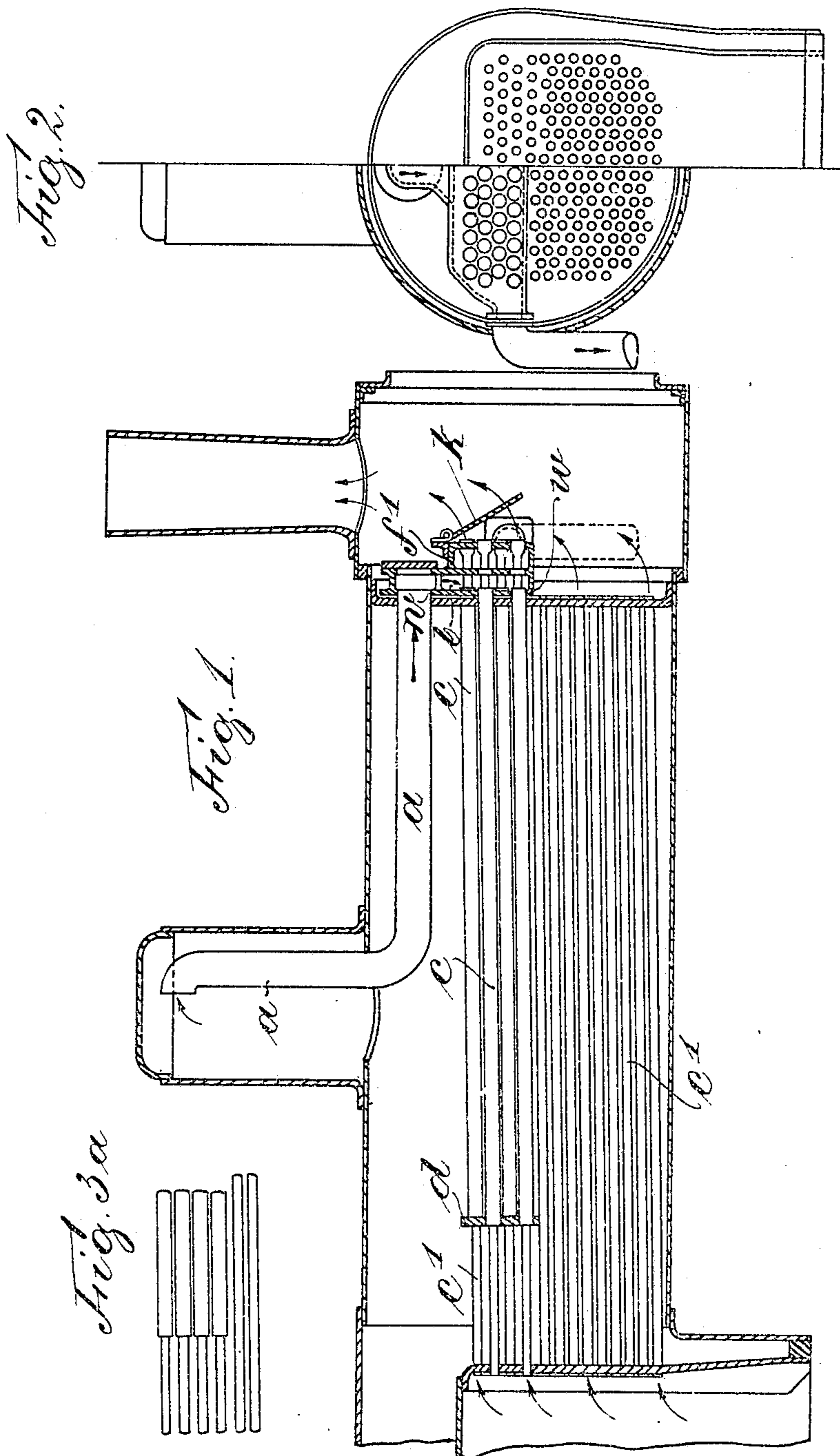
No. 788,169.

PATENTED APR. 25, 1905.

W. SCHMIDT.
SUPERHEATER FOR TUBE BOILERS.

APPLICATION FILED NOV. 21, 1904.

2 SHEETS—SHEET 1.



Witnesses:
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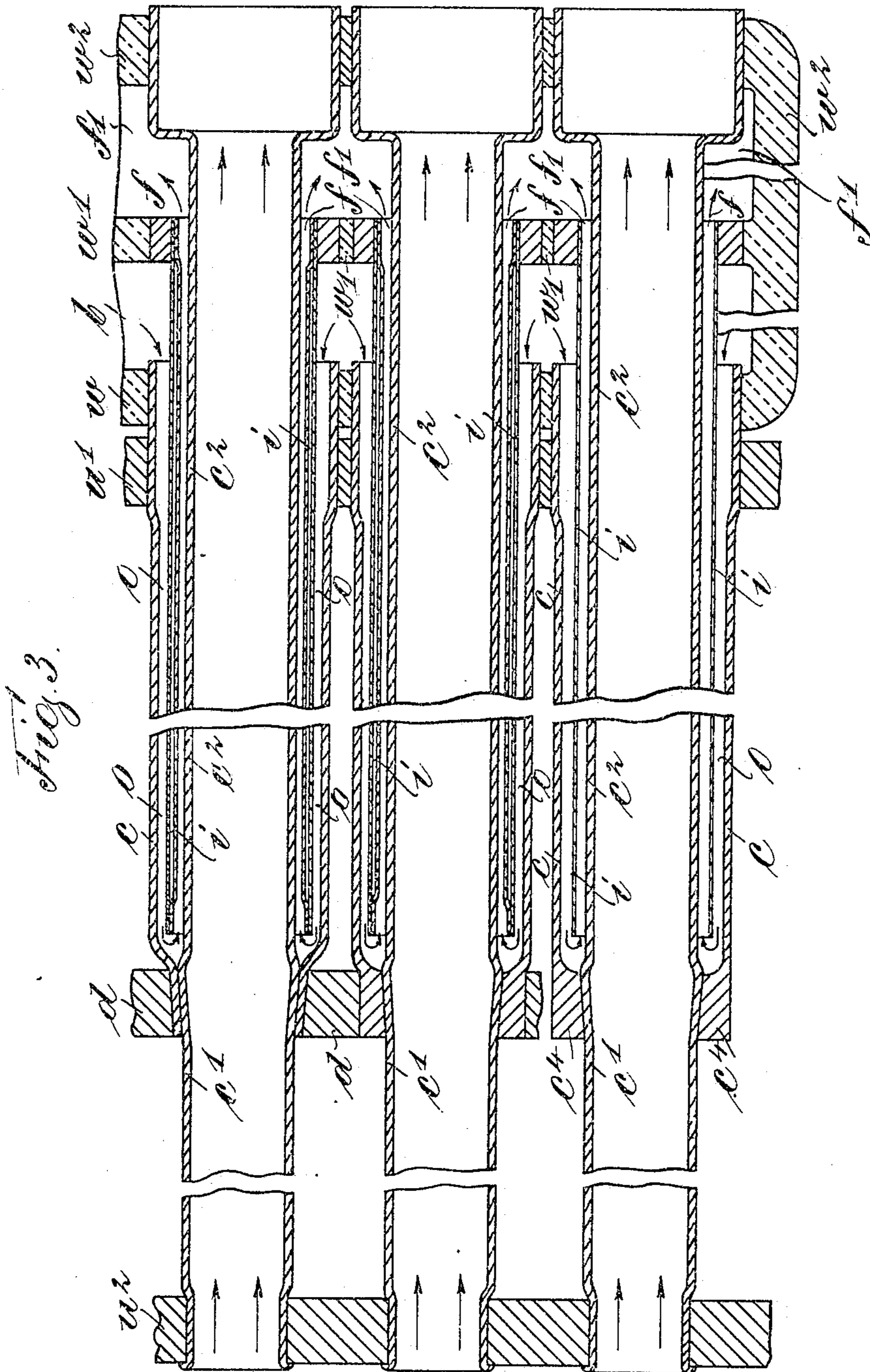
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2 SHEETS—SHEET 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILHELM SCHMIDT, OF WILHELMSHÖHE, NEAR CASSEL, GERMANY.

SUPERHEATER FOR TUBE-BOILERS.

SPECIFICATION forming part of Letters Patent No. 788,169, dated April 25, 1905.

Application filed November 21, 1904. Serial No. 233,645.

To all whom it may concern:

Be it known that I, WILHELM SCHMIDT, a subject of the King of Prussia, German Emperor, and a resident of Wilhelmshöhe, near Cassel, in the Province of Hesse-Nassau, German Empire, have invented certain new and useful Improvements in Superheaters for Tube-Boilers, of which the following is an exact specification.

My invention relates to improvements in superheaters for tube-boilers, and more especially to such boilers in which the tubes or flues serve at the same time for anchoring the tube-boiler-body proper. In such boilers the anchoring was diminished if the flues are surrounded by steam—that is to say, if a superheater is put into the boiler proper the flues are then not as usually surrounded by the water of the boiler, but they are surrounded by steam, which does not lead the heat as well as water. Therefore when putting into the boiler a superheater surrounding the flues these latter cannot act and serve as anchoring as usually.

The subject of my present invention consists in avoiding the disadvantages aforesaid, and the arrangement is such that the walls of the superheater serve as anchors instead of the flue-tubes. For this purpose tubes are placed over some of the flues and form the superheater and are so secured into the flues as to help anchoring, thereby discharging the flues as anchors. Through the annular space formed between the flues and their surrounding mantle-tubes steam is led, which is thereby superheated and at the same time cools the flues. The mantle-tubes may surround their respective flues nearly on their whole length up to the fire-box, so that only some of the flues need be provided with surrounding mantle-tubes for obtaining a considerable superheating of the steam. The latter can be led in a thin stream in equal or counter current through the annular space between the mantle-tubes and flues, thereby effecting a quick energetic superheating regulable at will.

In order to make my invention more clear,

I refer to the accompanying drawings, in which—

Figure 1 is a longitudinal section through a tube-boiler provided with a superheater according to my invention. Fig. 2 is a front view of the boiler according to Fig. 1. Fig. 3 shows a section through a set of flues with surrounding mantle-tubes, illustrating three different kinds of securing the mantle-tubes to the flues. Fig. 3^a shows a side view of a set of flues.

In the drawings, Fig. 1, *a* is a tube leading the steam to be superheated from the steam-dome to the chamber *b*, arranged at the back wall *u'* of the boiler, *u''* being the front wall, at which the gases enter the flues.

c' represents the boiler-flues.

c represents mantle-tubes surrounding the four upper rows of flues *c'*.

f'' is a second chamber, into which the superheated steam enters and can be led therefrom to the steam-cylinders.

d is a partition serving as reacting-plate if the end of the mantle-tubes *c* is secured to the flues *c''* by rolling.

In the uppermost device shown in Fig. 3 only the part *c''* of the flue *c'* is surrounded by a mantle-tube *c*. The flue *c'* is so rolled as to form a somewhat conical part, upon which the left-hand end of the mantle-tube *c* is rolled, so as to form rigid connection. The right-hand end of the mantle-tube is secured to the back wall *u'* and the wall *w* of chamber *b*, whereas the right-hand end of the flue is fastened to the wall *w''*. Into the annular space between *c* and *c''* an intermediate tube *i* is inserted, which is fastened with its right-hand end to the wall *w'* of chamber *b*. The tube *i* creates return-channels within said annular space.

In the device shown in the middle of Fig. 3 the connection between *c* and *c'* is accomplished in somewhat different manner from that shown in the arrangement just described. The left-hand end of the tube *c* is thickened, so as to facilitate the connection of the tubes *c* and *c'*. Also the lowest device in Fig. 3 shows a similar kind of connection, in which

c is provided at the left-hand end with a thickening *c*¹, but indicates at the same time that in this case the partition *d* can be spared, as to be seen from Fig. 3^a.

5 The two upper arrangements of Fig. 3 show an intermediate double partition *i*, whereas in the lowest device the partition *i* consists of a simple tube. This partition *i* is formed in the two upper devices of a double tube, there-
10 by preventing that the space between *c* and *i* cools the space between *i* and *c*².

The operation is as follows: The steam enters through *a* the chamber *b*, flows through space *o* between *c* and *i* to the left, and then
15 between *i* and *c*² to the right into chamber *f*, from where the steam, now superheated, can be led to its place of destination. The steam is by this way highly superheated and at the same time prevents the flue part *c*² to be dam-
20 aged by the heat, whereas at the same time the mantle-tube *c* helps anchoring.

In Fig. 3 the right-hand ends of the flues are somewhat enlarged, thereby equalizing a dangerous stretching and extending of the
25 flues. Instead of simply enlarging the flue ends they may be further formed of undulated sheet-iron.

The rolling on of the mantle-tube upon its flue may be effected in a conical form, there-
30 by guaranteeing a sure anchoring and a quick means for disconnecting. In Fig. 1 a cover *k* is shown, by means of which the flues, which are surrounded by mantle-tubes for superheating purposes, can be cut off from the
35 smoke-box. This cover *k* may preferably be connected to the blast-pipe, so that by opening this pipe the cover *k* is closed, whereas *k* is opened by cutting off the blast-pipe—that is to say, at the beginning of a drive. By
40 this means the action of the superheater is during the stopping cut out or as much as possible reduced.

Having thus fully described the nature of my invention, what I desire to secure by Letters Patent of the United States is—

1. In a tube-boiler, the combination of the boiler-body proper, of a plurality of flues, mantle-tubes surrounding some of the flues on part of their length and so fastened to their respective flues as to help anchoring, means for leading steam to be superheated and serving for cooling the said flues, through the annular space between the flues and the surrounding mantle-tubes, substantially as and for the purpose set forth.

2. In a tube-boiler, the combination of the boiler-body proper, of a plurality of flues, mantle-tubes surrounding some of the flues on part of their length and each so fastened with one end to its respective flue as to help anchoring, means for leading steam to be superheated and serving for cooling the said flues, through the annular space between the flues and the surrounding mantle-tubes, substantially as and for the purpose set forth.

3. In a tube-boiler, the combination of the boiler-body proper, of a plurality of flues, mantle-tubes surrounding some of the flues on part of their length and so fastened to their respective flues as to help anchoring, an intermediate tube placed into the annular space between said flues and the surrounding mantle-tubes, so as to form return-channels, means for leading steam to be superheated and serving for cooling the said flues, through the annular space between the flues and the surrounding mantle-tubes, substantially as and for the purpose set forth.

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

WILHELM SCHMIDT.

Witnesses:

GUSTAV HENKEL,
JULIUS FRANKE.