

(No Model.)

5 Sheets—Sheet 1.

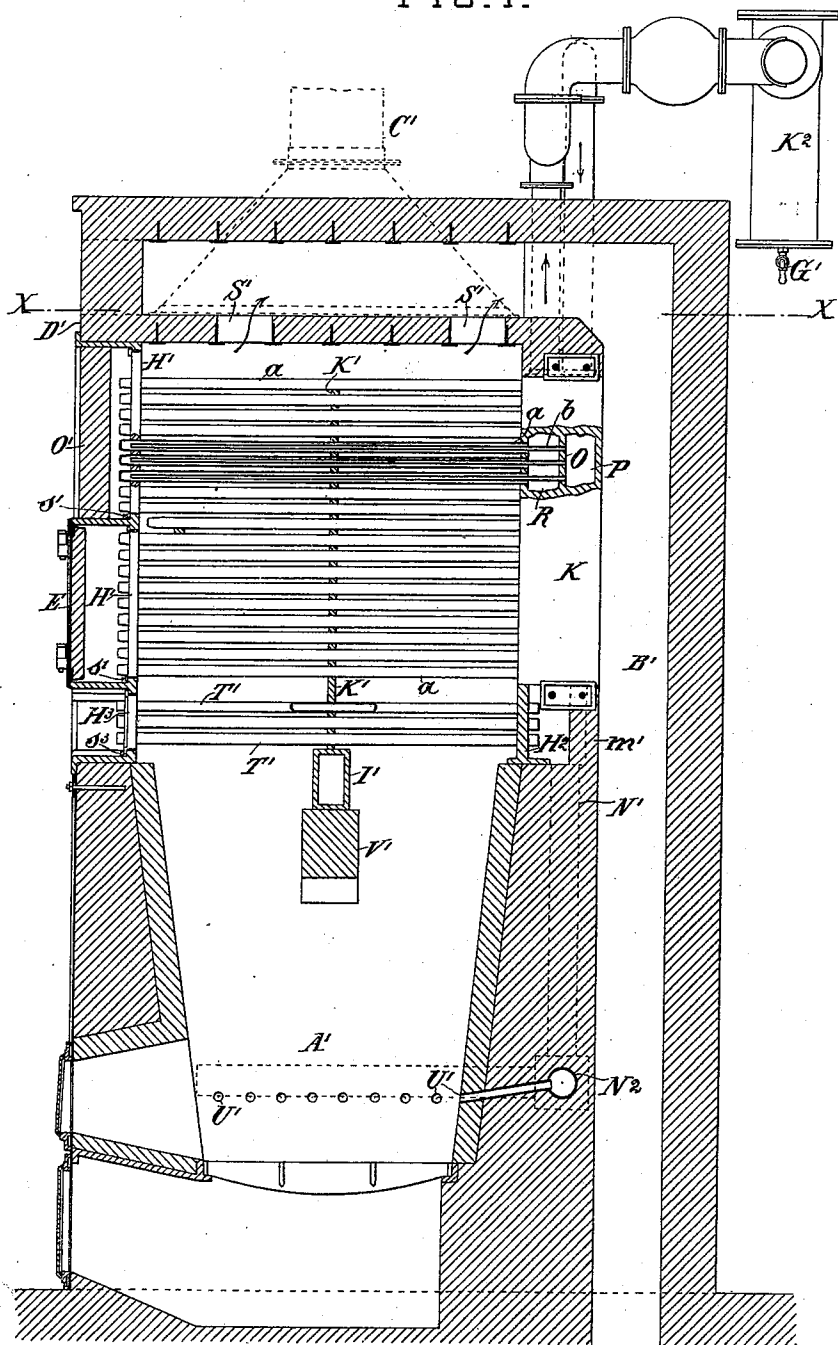
L. UHLER.

STEAM SUPERHEATER WITH INDEPENDENT FURNACE.

No. 510,658.

Patented Dec. 12, 1893.

FIG. 1.



Witnesses:

Herbert Blossom.
Peter A. Ross

Inventor
Louis Uhler.

by Henry Connors
Attorney

(No Model.)

5 Sheets—Sheet 2.

L. UHLER.
STEAM SUPERHEATER WITH INDEPENDENT FURNACE.
No. 510,658. Patented Dec. 12, 1893.

FIG. 2.

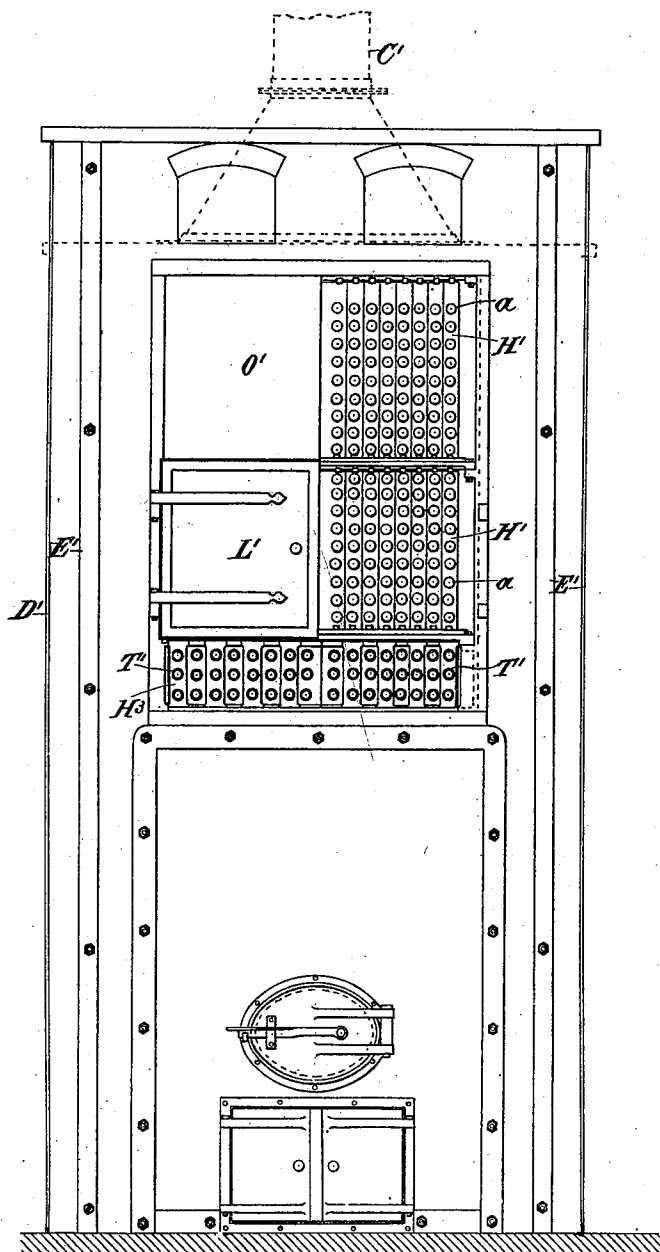


FIG. 10.



Witnesses:
Herbert Blossom.
Peter A. Ross

Inventor:
Louis Uhler.
by Henry Connell
Attorney

L. UHLER.

STEAM SUPERHEATER WITH INDEPENDENT FURNACE.

No. 510,658.

Patented Dec. 12, 1893.

FIG. 3.

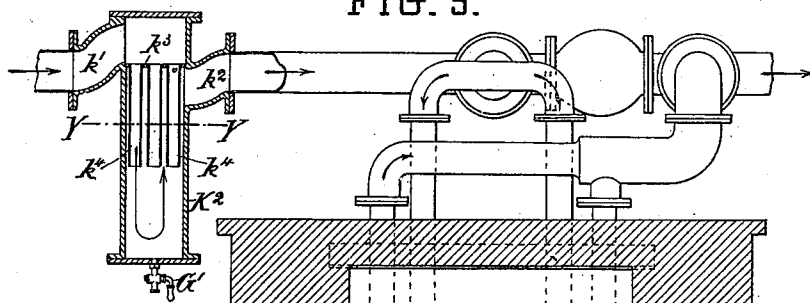
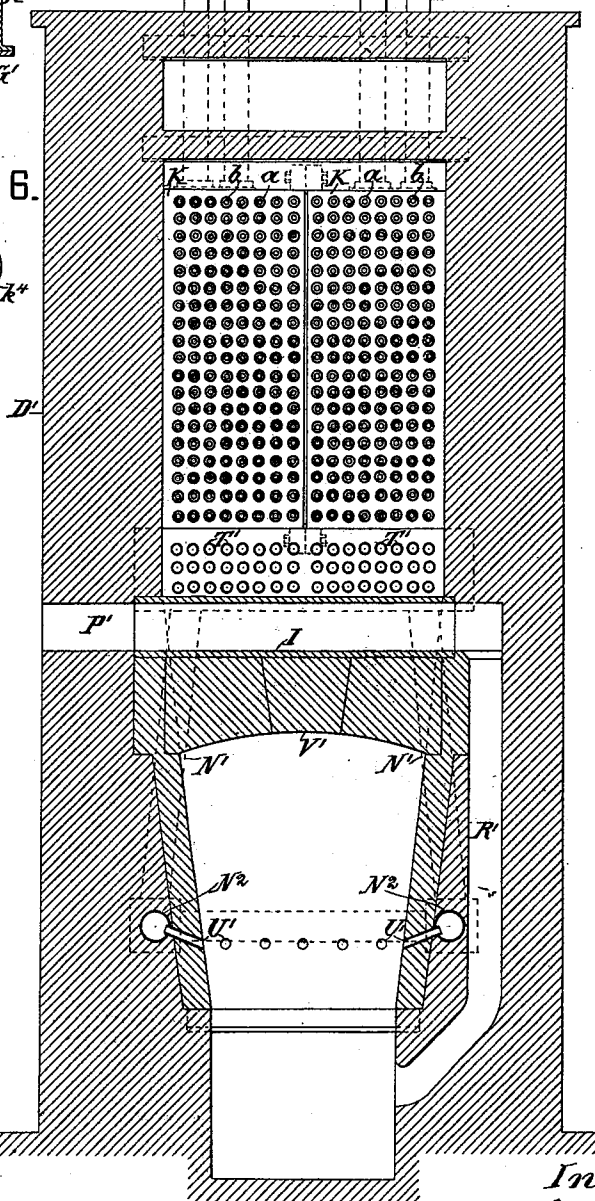


FIG. 6.



Witnesses:

Herbert Blossom.

Peter H. Ross

Inventor:

Louis Uhler.

by Henry Combs
Attorney

L. UHLER.

STEAM SUPERHEATER WITH INDEPENDENT FURNACE.

No. 510,658.

Patented Dec. 12, 1893.

FIG. 4.

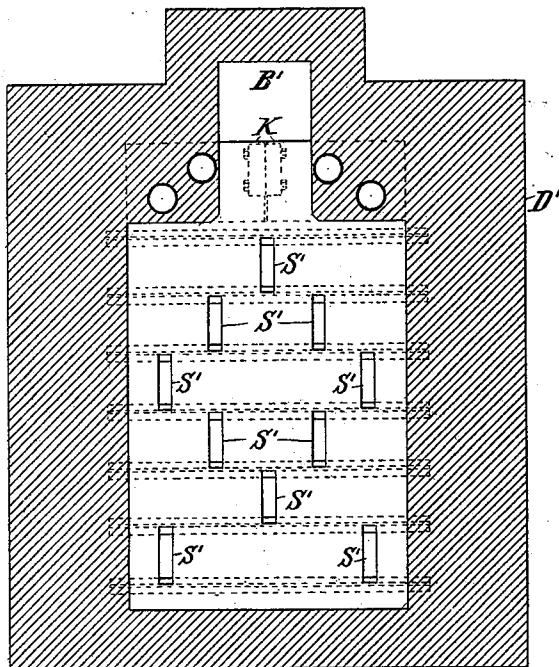


FIG. 9.

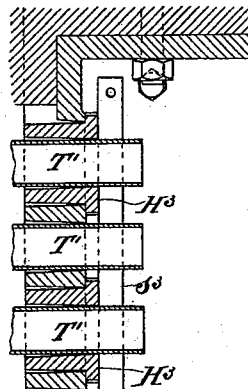


FIG. 7.

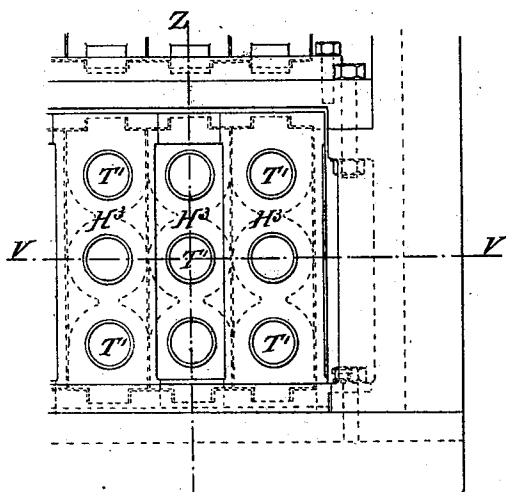
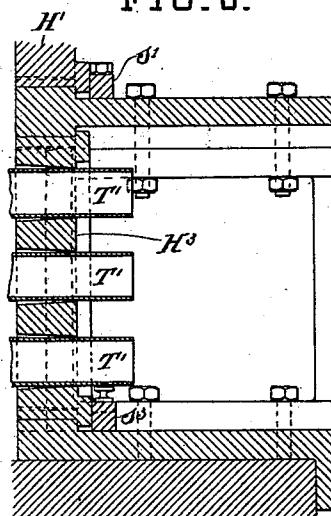


FIG. 8.



Witnesses
Harber Blossom.
Peter A. Ross.

Inventor
Louis Uhler.
by Henry Connell
Attorney.

(No Model.)

5 Sheets—Sheet 5.

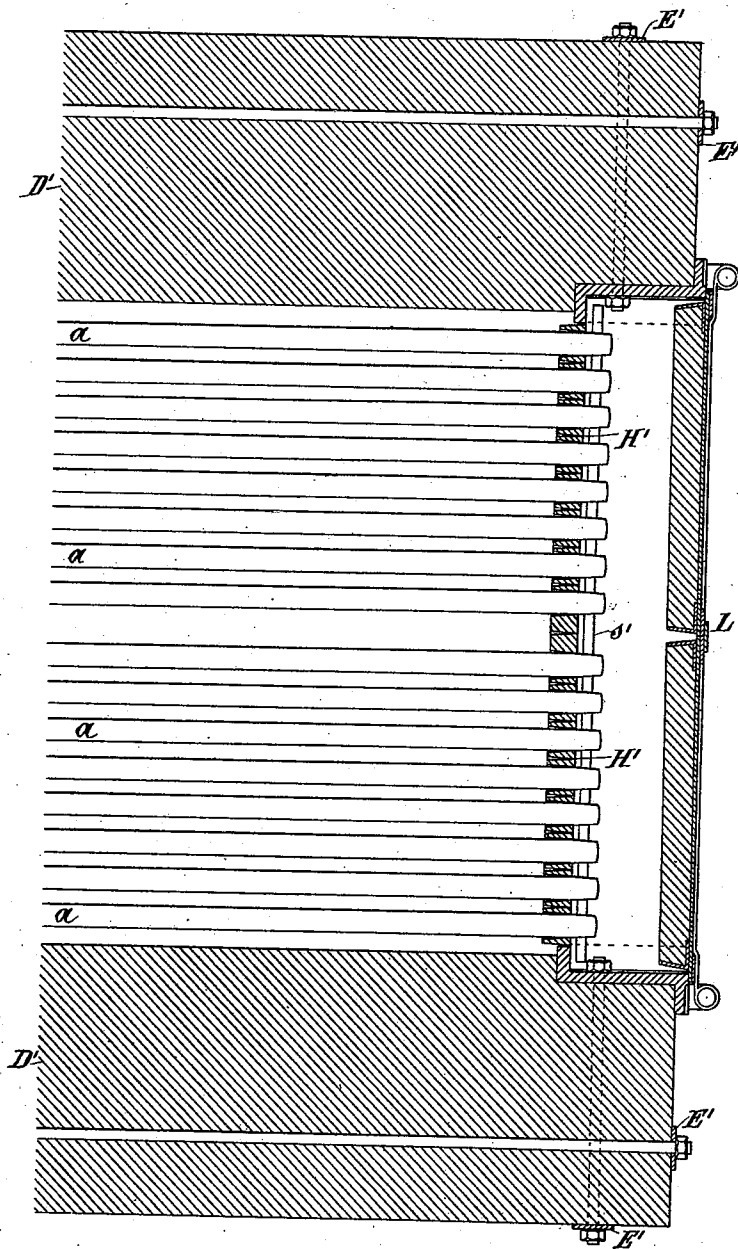
L. UHLER.

STEAM SUPERHEATER WITH INDEPENDENT FURNACE.

No. 510,658.

Patented Dec. 12, 1893.

FIG. 5.



Witnesses:

Herbert Blossom.

Peter H. Ross.

Inventor

Louis Uhler.

by Henry Connelley
Attorney.

UNITED STATES PATENT OFFICE

LOUIS UHLER, OF GENEVA, SWITZERLAND, ASSIGNOR TO LOUIS UHLER & CADISCH, OF SAME PLACE.

STEAM-SUPERHEATER WITH INDEPENDENT FURNACE.

SPECIFICATION forming part of Letters Patent No. 510,658, dated December 12, 1893.

Application filed October 22, 1892. Serial No. 449,636. (No model.) Patented in France February 11, 1892, No. 219,306; in Switzerland March 19, 1892, No. 4,851, and in Italy April 23, 1892, XXVI, 31,616, LXII, 138.

To all whom it may concern:

Be it known that I, LOUIS UHLER, a citizen of Switzerland, residing at Geneva, Switzerland, have invented certain new and useful
5 Improvements in Steam-Superheaters with Independent Furnaces, of which the following is a specification.

The present invention has been patented in foreign countries, as follows: in France No.
10 219,306, dated February 11, 1892; in Switzerland No. 4,851, dated March 19, 1892, and in Italy XXVI, 31,616, LXII, 138, dated April 23, 1892.

In constructing vertical steam superheaters with independent furnaces various inconveniences have shown themselves, and the present invention has for its object an improved construction of such superheaters whereby the said inconveniences are obviated.
20 Experience has shown that the vertical superheater requires the tubes to be placed at least 2.40 meters away from the fire, in order to prevent their too rapid deterioration. As the tubes themselves are 2.40 meters high, it follows that the upper part of the tubes is 4.80
25 meters from the fire; at this distance the temperature of the combustion gases is hardly as high as that of the superheated steam, and in addition, the transmission of heat takes place very imperfectly between gases when they
30 ascend vertically in contact with vertical tube surfaces. In consequence hereof it has been necessary to construct such superheaters with a relatively very great extent of heating surface, thereby greatly increasing the cost thereof. In addition the great total height of such
35 superheaters (being about six meters) frequently causes great inconvenience and difficulty in properly locating them, and furthermore, the lower ends of the vertical tubes where they are formed with joints are the parts subject to the greatest heat and are consequently most liable to deterioration, as the joints being brazed, are liable to give way under excessive heating.
45

According to the present invention, these disadvantages are obviated by arranging the tubes of the superheater horizontally; also, by the introduction of tubes not connected with
50 the superheater between the superheater tubes

and the fire, we are enabled to bring the said tubes nearer to the furnace, so that as the bottom tubes are considerably lower than in the case of vertical tubes, they are subjected to a much higher temperature, thus effecting a better utilization of the furnace heat, and consequently enabling the heating surface to be considerably reduced. By this means the height of the superheater, its cost of installation, and the quantity of fuel required for heating it, are all reduced to a corresponding extent.

On the accompanying drawings is shown a superheater constructed according to my said invention.

Figure 1 shows a longitudinal section. Fig. 2 is a front view and Fig. 3 is a cross section. Fig. 4 is a horizontal section on line X X Fig. 1. Fig. 5 is a horizontal section through the front part of the superheater. Fig. 6 is a horizontal section on line Y Y Fig. 3. Fig. 7 is an enlarged detail view. Figs. 8 and 9 are sections on lines Z Z and W W of Fig. 7, and Fig. 10 is another enlarged detail view.

In the arrangement here shown, the tubes of the superheater are constructed in a similar manner to "Field" boiler tubes placed horizontally the concentric tubes *a b*, being adapted to one or more boxes *K* (two in the present case) each being divided by a partition *O* into two compartments, of which one, *P* communicates with the internal tubes *b*, while the other *R* communicates with the outer tubes *a*, the steam to be superheated being introduced into the compartment *P* and consequently forced to pass first through the inner tubes *b*, and then back again through the annular space between *a* and *b*, becoming superheated on its way, and then passing away through the chamber *R*.

The furnace *A'* is of ordinary construction, either with intermittent or continuous firing, and the boxes or chambers *K* with their tubes *a, b*, are suitably supported above it. The waste combustion gases escape through a descending pipe *B'* Fig. 1, communicating with the flue of the steam boilers, or they may be led into a sheet iron chimney *C'* indicated in dotted lines in Figs. 1 and 2. The furnace *D'* and casing of the superheater are built of or
100

dinary brickwork strengthened by iron stays E', Figs. 2 and 5. The furnace chamber is lined with fire bricks, which can be readily renewed.

5 The superheating tubes are supported at their closed ends, which are not fixed to boxes K, by means of two tiers of movable cast iron supports H' H' placed closely side by side, which supports are of a width equal to the
10 distance from center to center of the tubes, and can be removed at will for the passage of instruments for the withdrawal and replacing of tubes when required. The tubes are supported at the middle of their length by
15 means of a tubular metal bearer I' Figs. 1 and 3, and by movable struts K' K' Figs. 1 and 10, which are pushed into their place from the front, before placing the supports H' in position. It will be seen that the arrangement is such that one or more defective
20 tubes can be removed without requiring the operator to enter the furnace, as was requisite with the vertical arrangement of the tubes, necessitating the stoppage for a long time of
25 the superheater's action, in order to allow the furnace to cool down. The front side of the furnace is partly closed by a sheet iron door L' and partly by brickwork O'. The tubular bearer I' has air admitted to it at P Fig. 3
30 and it communicates at the other end with a passage R' formed in the brickwork, opening underneath the furnace grate. This arrangement has for its object both to keep the bearer cool and to supply hot air to the furnace. In the roof of the tube chamber are
35 formed openings S' S' Figs. 1 and 4, the number and area of which are calculated to give a suitable direction of the hot combustion gases, in order that the tubes may be more
40 or less uniformly heated thereby.

An important feature of the improved superheater consists in the employment of tubes T' T' that are not connected to the superheater, and the object of which is to preserve
45 the lower rows of superheating tubes from excessive heating.

Experiments have shown that, in a group of superheated horizontal tubes, only the three lower rows can become red hot by excessive heating. Consequently by the application of three rows of protective tubes T' all excessive heating and oxidation of the superheating tubes will be avoided, and these will therefore be much more durable. The tubes
50 T' can be of any description. They are supported on the one hand by the casting H², which, together with the brickwork m' also supports the boxes K of the superheater tubes, and on the other hand they are supported by
55 movable supports H³ of cast iron, the construction of which is shown at Figs. 7, 8 and 9. These movable supports are secured in such manner as not to allow the entrance of air between them. The movable supports
60 H³ are held at bottom by a bearer s³ secured so as to be removable. The two upper sets of movable supports H' H' are held in the

same manner by a bearer s'. The tubes T' can be rapidly removed and replaced from the outside without stopping the working of
70 the superheater. Cold air enters them from one end so as to cool them to a certain extent and also to provide a further supply of hot air which passes from the other end of the tubes into flues N' N² and enters the furnace
75 above the fire through nozzles U' U' for the purpose of consuming the smoke.

The fire-brick arch V' which is built below the tubular bearer I' can be readily reconstructed when worn out; it serves to protect
80 the bearer I' against excessive heat from the fire.

When a superheater with independent fire is used in combination with boilers worked at a high pressure, there will frequently be
85 carried, along with the steam, water charged with solid impurities, owing to priming. These solid impurities would be precipitated to the lower sides of the superheating tubes and would accumulate therein so as to eventually
90 prevent the circulation of the steam through the tubes, so that these, being no longer in contact with steam, would rapidly burn away. For the purpose of preventing such solid impurities from passing into these tubes, there
95 is placed at any convenient point between the steam boilers and the superheater a water and mud separator, or purifier, consisting of a recipient K² provided with two branch pipes k' k² separated by a partition k³ provided with
100 pendent tubes k⁴ k⁴, so that the steam entering through the branch k' will first pass downward with considerable velocity through the tubes k⁴ on its way to the branch k², and the solid impurities will consequently be precipitated
105 from the steam to the bottom of the receptacle K². This is provided with a mud cock G' at bottom, through which the accumulated impurities can be discharged from time to time. The tubes T' might of course
110 be replaced by solid iron bars, of about the same diameter as the tubes. These tubes T', or the bars replacing the same, may also be applied with advantage to steam superheaters placed in the furnaces or flues of steam
115 boilers.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—
120

1. A superheater for steam, having its superheating tubes arranged in a substantially horizontal position over the furnace and a series of hollow bars arranged between the lower tier of superheating tubes and the fire pot,
125 the said hollow bars communicating at one end with the outer air and at the other end with a flue or flues leading to the furnace, substantially as set forth.

2. In a superheater for steam, the combination with a set of superheating tubes arranged over a furnace, the said furnace, and an arch, V', spanning the furnace below the tubes, of a tubular, metal bearer, I', extending across
130

the furnace and resting on said arch, and movable supports for the middle portion of the series of superheating tubes, resting on said bearer I', as set forth.

5 3. In a superheater for steam, the combination with the series of superposed tiers of tubes, of movable supports H' for the closed ends of said tubes, said supports being upright and having a width equal to the space
10 between centers of two adjacent vertical rows of tubes, whereby said supports distance and space the tubes and form a close wall, as shown.

15 4. In a superheater for steam, the combination with a furnace and a series of superheating tubes arranged over the same, of a series of tubular bars T', arranged under the superheating tubes and over the furnace, and a tubular metal bearer I', arranged under the
20 tubes T' and across the furnace, said bars T',

and bearer I', communicating at one end with the outer air and at the other end with flues leading to the furnace, whereby a draft is created through the same, as set forth.

5. In a superheater for steam, the combination 25 with the series of superposed tiers of tubes supported at their ends, as shown, of the tubular metal bearer I', and the removable intermediate supports, K', arranged between the tubes, having their ends curved or
30 hollowed, as shown, to fit the rounded surfaces of the tubes, as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

LOUIS UHLER.

Witnesses:

LOUIS C. TÉTARD,
G. C. WELKER.