

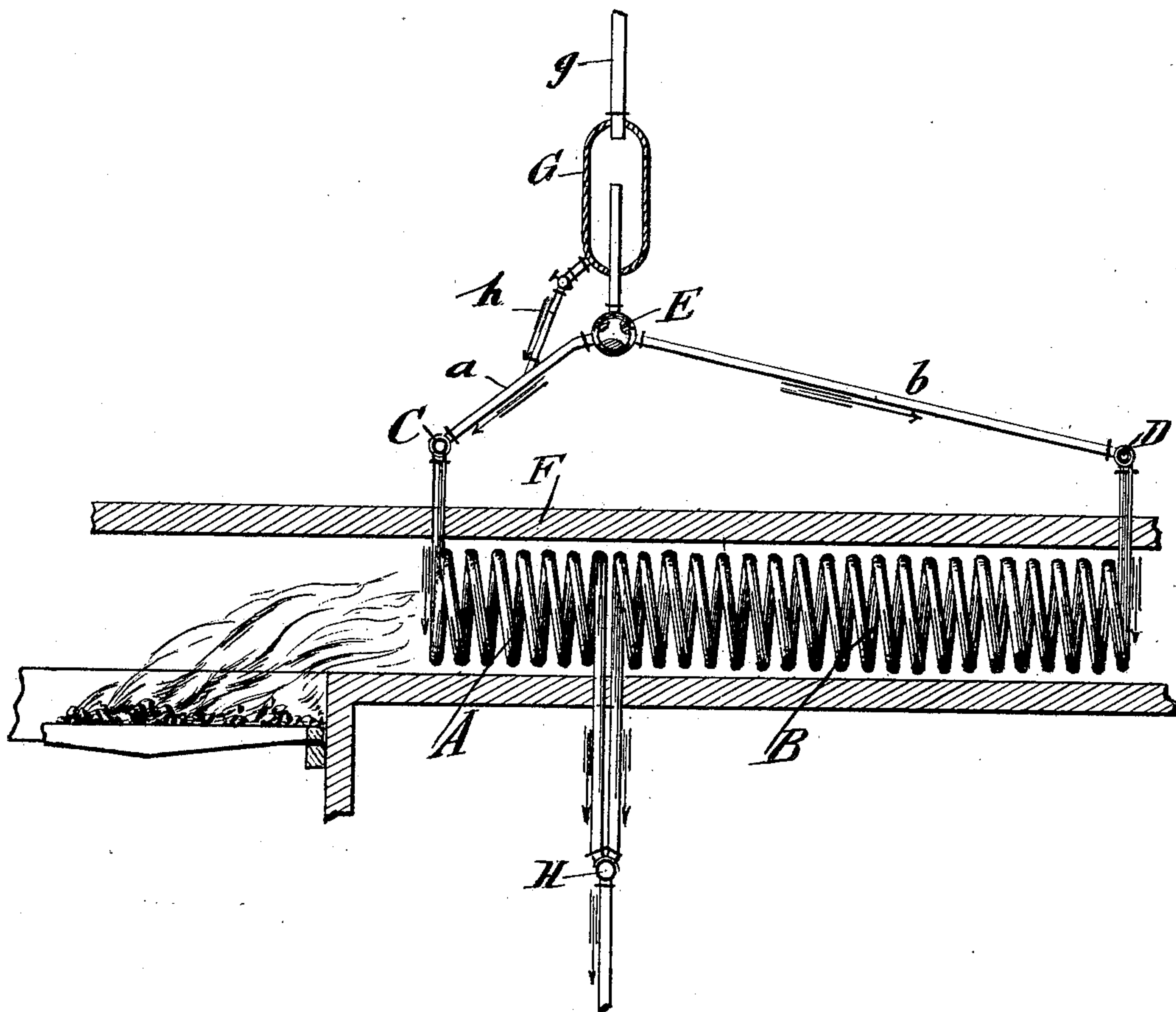
No. 639,981.

**Patented Dec. 26, 1899.**

**R. HILDEBRAND. -  
SUPERHEATER.**

(Application filed Aug. 24, 1899.)

(No Model.)



**WITNESSES:**

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# UNITED STATES PATENT OFFICE.

REINHARD HILDEBRAND, OF PHILADELPHIA, PENNSYLVANIA.

## SUPERHEATER.

SPECIFICATION forming part of Letters Patent No. 639,981, dated December 26, 1899.

Application filed August 24, 1899. Serial No. 728,348. (No model.)

*To all whom it may concern:*

Be it known that I, REINHARD HILDEBRAND, a citizen of Germany, residing in Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Superheaters, of which the following is a specification.

This invention relates to an improved superheater for steam or other gaseous fluids in which the hot products of combustion of a direct or indirect fire are utilized in an effective manner for the superheating of the steam or other fluid; and the invention consists of a superheater which comprises two independent coils arranged in line with each other, each coil being provided with an independent inlet and outlet pipe, the inlet-pipes of both superheating-coils being connected with suitable headers, which are again connected with a distributing valve or valves and the latter with a separator for the water of condensation, said separator being connected by a bypass pipe around the distributing-valve with the pipe leading to the superheating-coil located nearest to the source of heat.

The invention consists, further, of certain details of construction, which will be fully set forth and finally be more particularly defined in the claims.

The accompanying drawing represents a vertical longitudinal section of my improved superheater for steam and other fluids.

Referring to the drawing, F represents a flue through which the hot products of combustion are conducted, said products of combustion being obtained either directly from a furnace adjacent to the flue or from a generator or other indirect source of heat-supply. In the flue F are arranged two independent superheating-coils A and B, which are arranged in line with each other, the coil closer to the source of heat being shorter than the coil B, which is farther from the supply of heat. The coil A is supplied with steam at the end nearest to the source of heat, so that the steam passes through the coil in the same direction as the products of combustion. The steam is supplied to the farther end of the coil B, so that the steam passes through the coil in a direction opposite to the products of combustion. The ingoing ends of the superheating-coils A and B are connected with suit-

able headers C and D, which are arranged outside of the flue F. These headers may be made of suitable size so as to supply several sets of superheating-coils arranged sidewise of each other in the flue F or one within the other. The headers C and D are connected by inclined pipes *a* and *b* with a distributing-valve E, which is arranged at the end of a separator G for the water of condensation, said separator being connected by a short bypass pipe *h* with the pipe *a*, leading to the header C so as to conduct the water of condensation collected in the separator to the header C, and from the same to the superheating-coil A. The separator G is supplied with steam or other gaseous fluid by a supply-pipe *g*. The outgoing ends of the coils A and B are both passed through the wall of the flue A to the outside and connected with a collecting-header H. The hot gases of combustion pass in the direction of the arrows between the superheating-coils and around the same, the steam in the shorter coil having the same direction as the products of combustion, while the steam passes through the longer coil B in a direction opposite to that of the products of combustion. As the steam supplied to the shorter coil A carries along the water of condensation collected in the separator G the shorter coil A is protected against being burned by the products of combustion, while the coil B is protected against injury by the products of combustion for the reason that a large number of heat units have already been abstracted from them by the superheating-coil A.

The valve E is a distributing-valve and serves for regulating the supply of steam to the superheating-coils A and B—that is to say, it permits the sending of a greater or smaller quantity of steam to one or the other coil and the regulating of the velocity of the steam in the coils in proportion to the heat of the products of combustion. The velocity of the steam that is superheated in the coils influences the temperature at which it is conducted into the collecting-header H. By the distributing-valve E it is possible to regulate the temperature of the steam at the outgoing ends of the superheating-coils A and B, so that the steam is issued from both coils at approximately the same temperature. The dis-



tributing-valve E may be either a three-way valve or composed of two ordinary valves, by which the quantity and velocity of the steam in the superheating-coil A are regulated in such a degree that the superheating-coils are protected against destruction by the action of the fire-gases and that the temperature of the outgoing superheated steam can be fully regulated.

10 In place of coils any other body for effectively heating the steam supplied thereto may be used.

The improved superheater for steam and other gaseous fluids utilizes the heat of the 15 gases of combustion in a very effective manner by a very simple construction. It prevents the destruction of the superheating-coils by regulating the quantity, quality, and velocity of the steam passing through the coils 20 and permits the location of the superheating-coils in any suitable position relatively to the source of heat.

Having thus described my invention, I claim as new and desire to secure by Letters 25 Patent—

1. A superheater for steam or other fluids, comprising a flue or passage for hot products of combustion containing two independent superheating-coils in suitable position, and so 30 arranged that the coil closer to the source of heat has its inlet end nearer the source of heat than the outlet end, so that it leads the steam or other fluid in the same direction as the said products of combustion, while the other coil 35 has its outlet end nearer the source of heat than its inlet end, so that it leads the steam or other fluid in the opposite direction, headers located at the outer ends of said coils, and means for conducting steam or other fluid simultaneously to both headers and coils, substantially as set forth.

2. A superheater for steam or other fluids, comprising a flue or passage for hot products

of combustion containing two independent superheating-coils in suitable position, and so 45 arranged that the coil closer to the source of heat has its inlet end nearer the source of heat than the outlet end, so that it leads the steam or other fluid in the same direction as the said products of combustion, while the other coil 50 has its outlet end nearer the source of heat than its inlet end, so that it leads the steam or other fluid in the opposite direction, headers located at the outer ends of said coils, a steam-distributing valve connected with said headers, and a collecting-header connected with the inner adjacent ends of the coils, substantially as set forth.

3. A superheater for steam or other fluids, comprising a flue or passage for the products 60 of combustion, two superheating-coils arranged therein, and through which the steam or other fluid passes, the steam or other fluid having the same direction as the products of combustion in the coil closer to the source of 65 heat and in the other of said coils having the opposite direction, steam-inlet pipes connecting said coils at their inlet ends, steam-outlet pipes at the outlet ends of the same, a distributing-valve for regulating the supply and 70 velocity of the steam to the superheating-coils, a separator for separating the water of condensation, a steam-supply pipe for said separator, a by-pass pipe connecting the separator with the pipe leading to the coil nearest to the 75 source of heat, and a collecting-header for the steam superheated in both coils, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

REINHARD HILDEBRAND.

Witnesses:

GEO. L. WHEELOCK,  
KARL KAEUBLE.