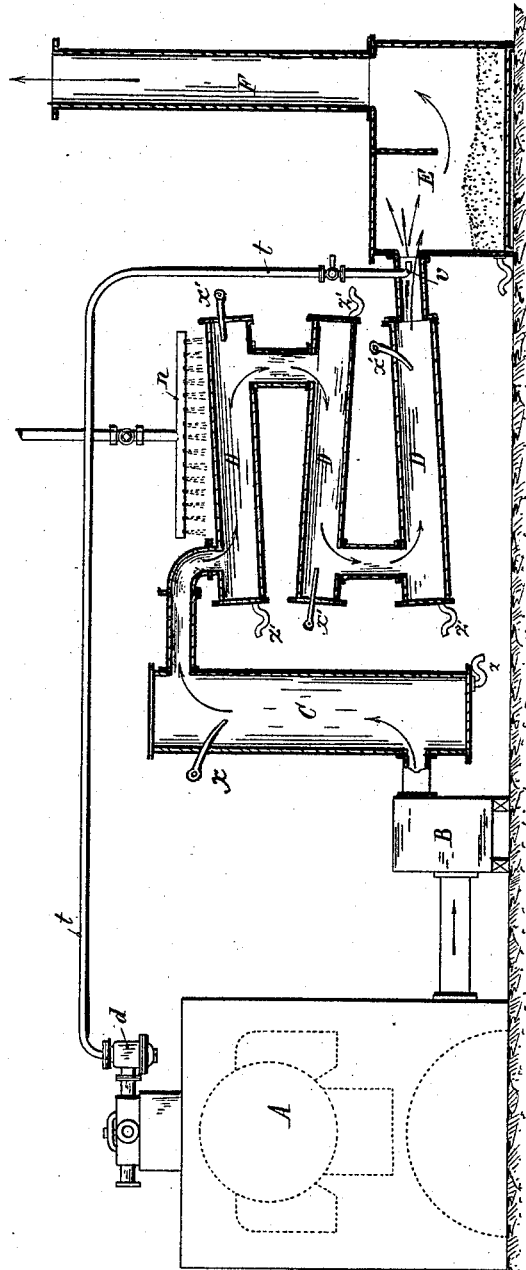


(No Model.)

A. GÉRARDIN & M. RINGELMANN.  
SMOKE PREVENTING APPARATUS.

No. 584,344.

Patented June 15, 1897.



Witnesses:

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# UNITED STATES PATENT OFFICE.

AUGUSTE GÉRARDIN AND MAXIMILIEN RINGELMANN, OF PARIS, FRANCE.

## SMOKE-PREVENTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 584,344, dated June 15, 1897.

Application filed April 16, 1895. Serial No. 545,966. (No model.) Patented in France October 29, 1894, No. 242,461; in England February 5, 1895, No. 2,487; in Belgium April 3, 1895, No. 114,897; in Switzerland April 4, 1895, No. 10,156, and in Germany September 28, 1895, No. 86,743.

*To all whom it may concern:*

Be it known that we, AUGUSTE GÉRARDIN and MAXIMILIEN RINGELMANN, citizens of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in Smoke-Preventing Apparatus, (for which Letters Patent have been obtained in France, No. 242,461, dated October 29, 1894; in England, No. 2,487, dated February 5, 1895; in Belgium, No. 114,897, dated April 3, 1895; in Switzerland, No. 10,156, dated April 4, 1895, and in Germany, No. 86,743, dated September 28, 1895,) of which the following is a specification.

15 This invention relates to apparatus for preventing the emission of smoke from furnaces.

The apparatus to attain this result effects two distinct operations: first, the cooling below 100° centigrade of the smoke as it issues from the furnace—that is to say, of all the particles in suspension, and consequently of the gases which contain them; second, the moistening of the said particles by means of a small quantity of steam admitted without pressure with a view to augment the weight of those particles of soot in suspension, so that they may be precipitated.

In order that the nature of our invention may be properly understood, we have caused it to be represented in the accompanying drawing, which shows in longitudinal vertical section one of our apparatus adapted to a steam-generator furnace.

In such a furnace the soot particles are in suspension in a highly-heated gas, (from 250° to 350° centigrade,) which, after leaving the furnace, must first be reduced to below 100°, as already stated. This lowering of temperature of the combustion products having the effect of checking the draft the latter must be maintained by means of a fan, blower, or equivalent applied either at B, in front of the cooling apparatus D, or immediately after the said cooler.

45 A represents a steam-generator furnace, which may be of any desired construction. The combustion products drawn off by the fan or blower B, above mentioned, pass into the expansion-chamber C, made of masonry, brickwork, galvanized iron, or other material.

This chamber is preferably vertical, so as to facilitate the extraction of the first settlement of soot, which is deposited here at the very outset. The removal of the same is effected by a jet of water from a pipe or nozzle *x* and through a suitably-arranged siphon or trapped pipe *z*. 55

On leaving the chamber C the smoke and combustion products pass into a cooler D, preferably in the open air, and formed, for example, of several slightly-inclined tubes, the interior of which may from time to time be cleaned by the aid of jets of water from pipes or nozzles *x'*.

Siphons or trapped outlets *z'*, placed at the lowest parts of these pipes, act as hydraulic seals to the same, the same provision as previously stated being applied to the chamber C. This cooler may, however, be of any type, form, and dimension suitable to its employment and use. It may be located in the open air and protected by a roof, and it produces a rapid decrease of temperature in the gases passing through it, and this effect may be accelerated by a shower of water falling from a perforated sprinkling or spraying pipe *n*, either directly on the pipes D or upon cloths or equivalents encircling them. In the latter case the cooling results from the evaporation of the water thereon. Lastly, the pipes D may have water circulated through or around them supplied from a pipe *n*. 75

The combustion products issuing from the cooling apparatus D reach the precipitation-chamber E after being brought into contact with the steam-jet *v*, delivered by the steam-pipe *t* from the steam-generator A or other source, or, in the case of a steam-engine, from the exhaust-steam pipe. 85

The chamber E, like the chambers C and D, may, as shown, be provided at its lower part with a trapped outlet-pipe. 90

The pipe *t* may be fitted with an expansion-chamber or a reducing-valve *d*, so that the steam when it issues from *v* is only at minimum pressure or without any pressure. 95

The soot absorbs humidity from the jet of steam *v* by the condensation thereof, thereby becoming of augmented density, and falling by its own weight at S to the lower part of 100

the precipitation-chamber E, while the combustion-gases, cooled and completely devoid of soot, escape finally into the open air by the chimney F.

5 We claim—

1. In apparatus for preventing the emission of smoke into the atmosphere, the combination with a smoke-outlet, of a fan or blower for drawing the smoke through the outlet, a  
10 chamber into which the smoke is next forced by the blower and wherein the smoke is free to expand, another chamber into which the smoke is next passed, and wherein the temperature of the smoke is lowered, a spray-  
15 pipe for showering cooling liquid onto the last chamber, a further chamber wherein the soot or solid particles of the smoke are deposited, and a steam-jet for moistening the soot so as  
20 forth.

2. In apparatus for preventing the emission of smoke into the atmosphere, the combination with a smoke-outlet, of a fan or blower for drawing the smoke through the outlet, a  
25 chamber into which the smoke is next forced by the blower and wherein the smoke is free to expand, another chamber into which the smoke is next passed and wherein the temperature of the smoke is lowered, a further

chamber wherein the soot or solid particles 30 of the smoke are deposited, and a steam-jet for moistening the soot so as to cause this deposition, substantially as set forth.

3. In a smoke-preventing apparatus, the combination of a fan or blower B drawing the 35 smoke and combustion products from a furnace, an expansion-chamber into which the blower delivers them, a cooling-chamber D formed of inclined tubes into which they are delivered from the expansion-chamber and 40 which lowers the temperature thereof to below 100° centigrade, and a precipitation-chamber E into which the combustion products pass from the cooling-chamber and wherein they are operated upon by a jet of steam at mini- 45 mum pressure which charges the soot particles with moisture so that the saturated soot falls by its own weight into the said chamber E while the cooled and purified gases escape  
50 into the atmosphere.

In testimony whereof we have hereto set our hands in the presence of the two subscribing witnesses.

AUGUSTE GÉRARDIN.

MAXIMILIEN RINGELMANN.

Witnesses:

ACHILLE MARILLIER,

HENRY D'ANCHALD.