

(No Model.)

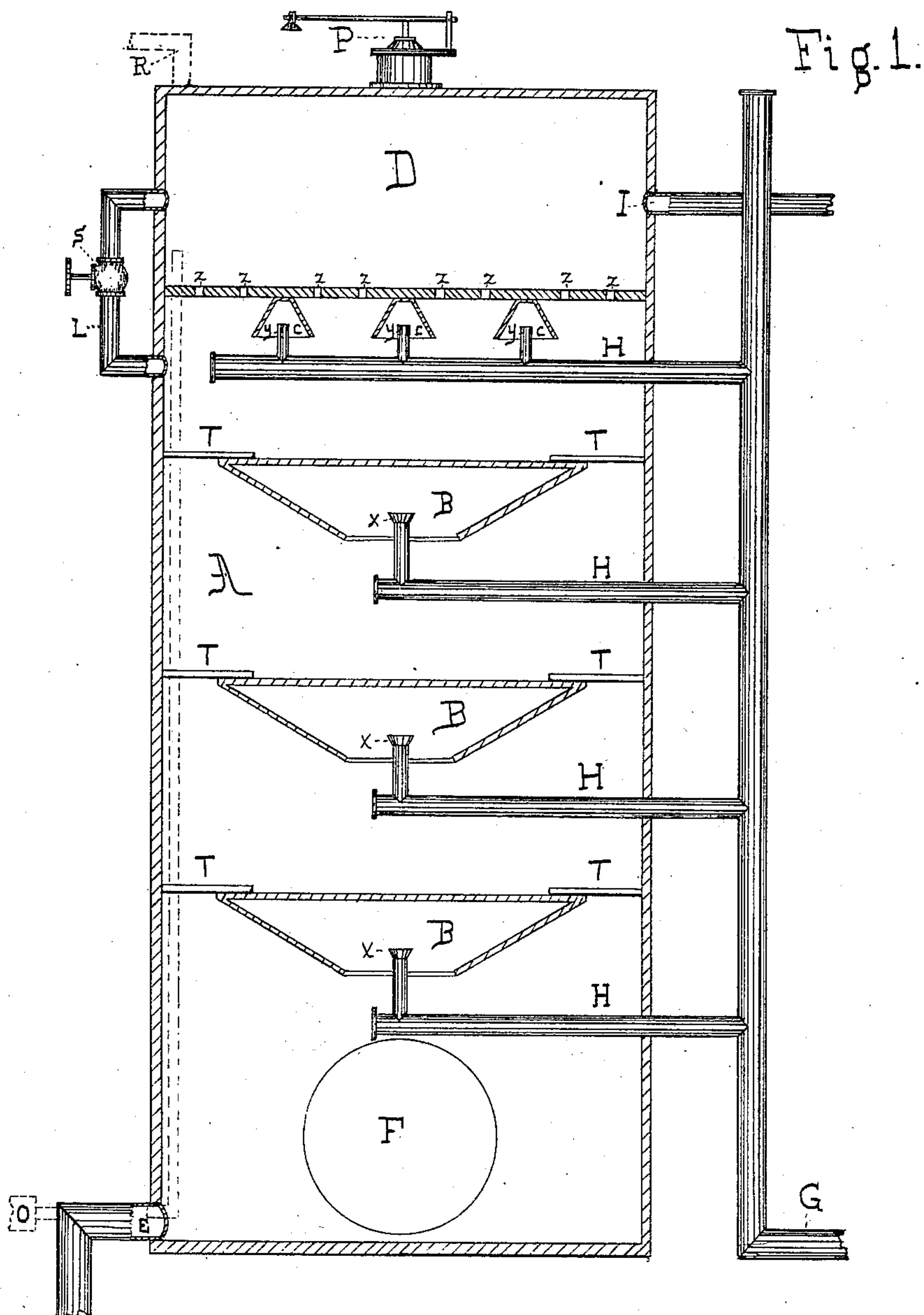
2 Sheets—Sheet 1.

C. J. LE ROY.

DEVICE FOR THE ABSORPTION OF THE GASEOUS PRODUCTS OF COMBUSTION.

No. 299,813.

Patented June 3, 1884.



WITNESSES:

E. J. Burton
H. K. Ketchum

INVENTOR

C. J. Le Roy

BY

Burton & Parker
ATTORNEYS.

(No Model.)

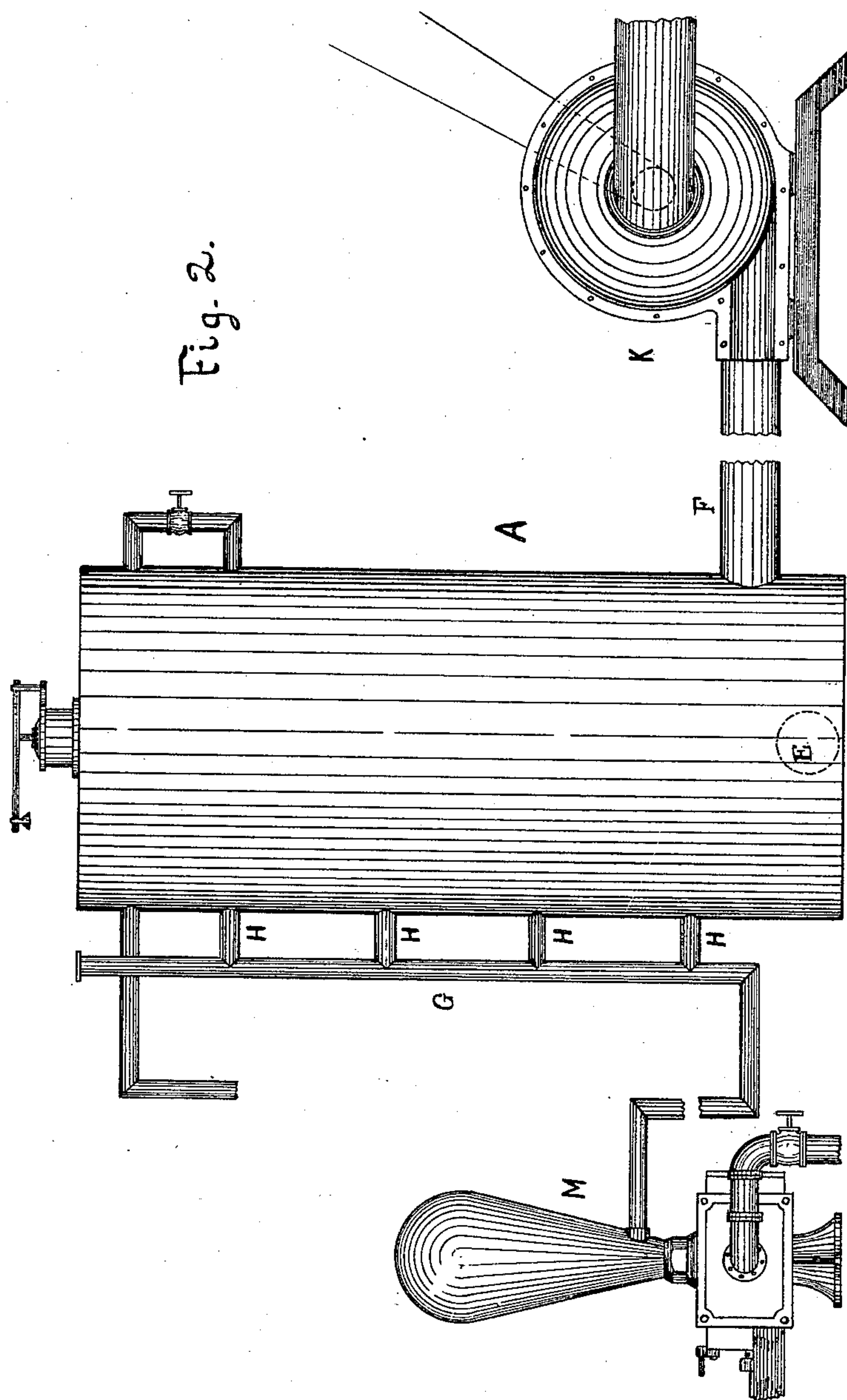
2 Sheets—Sheet 2.

C. J. LE ROY.

DEVICE FOR THE ABSORPTION OF THE GASEOUS PRODUCTS OF COMBUSTION.

No. 299,813.

Patented June 3, 1884.



WITNESSES:

Francis W. Parker
E. F. Burton.

INVENTOR

Charles J. Le Roy
BY *Burton & Park.*

ATTORNEY

UNITED STATES PATENT OFFICE.

CHARLES J. LE ROY, OF CHICAGO, ILLINOIS, ASSIGNOR TO LE GRAND S. BURTON AND BURTON & PARKER, ALL OF SAME PLACE.

DEVICE FOR THE ABSORPTION OF THE GASEOUS PRODUCTS OF COMBUSTION.

SPECIFICATION forming part of Letters Patent No. 299,813, dated June 3, 1884.

Application filed October 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, CHARLES J. LE ROY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Method of and Device for Absorbing or Condensing Smoke, of which the following is a specification.

My invention relates to the method of and machine for the consumption, absorption, or condensation of smoke or the products of combustion issuing from ordinary furnaces, and for the burning of such parts thereof as may be combustible. It has for its immediate objects the disposition of the entire product of combustion, so as to leave no residuum of the same to escape into the atmosphere, and the returning of certain gases to the furnace to be burned.

I have exhibited in the accompanying drawings, which are made a part of this application, and wherein like letters represent like parts in all the figures, a form of device which attains the result referred to, and which in its operation illustrates generally the method which I wish to employ.

Figure 1 is a sectional view through the condenser. Fig. 2 is a perspective view of the condenser and fan connected and in position for operation.

A represents the condenser in the form of a cylinder. B B B are horizontally-arranged boxes located therein, and consisting each of a disk and a flat open-mouthed funnel secured to the bottom thereof.

C C C are inverted funnels secured to the bottom of the chamber D.

E is a free discharge-pipe connected with the sewer.

F is the supply-pipe, connected to the fan K.

G is the water-pipe, having the branches H H H H extending into the condenser, the three lower ones terminating in the lateral discharging-nozzles X X X within the boxes B, and the upper in the vertically-discharging nozzles Y Y Y, terminating within the inverted funnels C.

I is the steam-supply pipe, discharging into the chamber D.

J is a pipe connecting the chimney or furnace discharge pipe with the exhaust-fan K.

M is a pump furnishing water to the condenser.

L is a pipe connecting the chamber D with the body of the condenser, and through which the uncondensed gases pass to the chamber D.

N (shown in dotted lines in Fig. 1) is a pipe extending from the top of the condenser, the chamber D being dispensed with in such case, and terminating in the upper part of the free discharge-pipe E.

O (shown in dotted lines in Fig. 1) is a pipe passing from the upper part of the discharge-pipe E at the elbow to the furnace, to conduct the uncondensed gases thence to be burned.

P is a safety-valve on the top of the condenser, to relieve the pressure.

R (shown in dotted lines in Fig. 1) is a pipe passing directly from the top of the condenser to the furnace.

Z Z Z are small holes connecting the chamber D with the body of the condenser.

T are straps attached to the edges of the boxes and secured to the sides of the condenser to support the boxes therein.

S is a valve to control the passage from the chamber D to the condenser proper.

The parts shown in dotted lines may or may not be used. When they are used, certain other features of the device shown are omitted, as is explained hereinafter.

The method of operation is as follows: The entire products of combustion are exhausted from the furnace, proper connection being made therewith, by the fan, and forced into the condenser at the bottom through the pipe W. The smoke rising in the condenser meets with various obstructions, beginning with the lower box B and ending with the inverted funnels C C C. The shapes and positions of these obstructions are such that the products of combustion are arrested and held subject to the discharge of water, which issues in spray from the nozzles X X X Y Y Y. It will be seen that a certain degree of pressure will be had in the condenser by reason of the action of the fan. The spray of water falling upon or being discharged into the products of combustion as they are arrested or held under pressure absorbs a large quantity thereof, and discharges the same with the waste water

through the pipe E into the sewer. Certain gases or parts of the products of combustion are not thus absorbed by the water, but rise to the top of the condenser, there accumulating and forming an elastic cushion which might ultimately cause the explosion of the condenser, if not otherwise relieved. These gases having passed to the top of the condenser are conducted through the pipe L to the chamber D. Here they are subjected to the action of steam from the pipe I, and thereby condensed or absorbed, so that they pass with the water of condensation through the apertures Z Z Z, and thence to the general discharge-pipe.

It will be seen, of course, that this device can be greatly changed in detail without departing from the spirit of my invention. The plates and jets and pipes can be altered as to size, shape, number, and position.

The chamber D might be dispensed with, and the steam introduced with the water, so as to accomplish the desired result.

It will be seen that the heat is much greater in the upper than in the lower part of the condenser, certain gases or parts of the products of combustion being absorbed or condensed in the lower part and the remainder in the upper part thereof.

Cold water is preferred when steam is applied to chamber D.

In some cases it may be desirable to heat the upper part of the condenser in some other manner than by steam, and in such case cold water may be discharged from the pipe into the chamber D or top of the condenser when the chamber D is dispensed with.

While simple horizontal plates might be used instead of the inverted conical boxes B, I consider the boxes much the better means for the purpose, for the reason that the smoke and gases, having once entered such a box, are by their own levity compelled to remain in it until condensed or absorbed, so as to pass out with the water, (except that a small portion might be carried out by the friction of the falling and outflowing water,) and as the products of combustion are condensed and absorbed in these traps—for such they are in effect—the vacuum thereby caused is filled by the outer pressure driving in a new supply to undergo the same treatment. Thus this form of smoke-arresting device still further exemplifies in one detail the method and principle which prevail throughout the whole device—viz., the detention of the gaseous products subject to the water or steam by which they are to be condensed or absorbed until such condensation is effected, no escape being provided except such and so located as will be available to liquid only, and not, under ordinary conditions, to gaseous matter, for from the structure described it will be seen that the gaseous products of combustion forced into the condenser have no avenue of escape from it, until the safety-valve's limit of pressure is passed, except the waste-pipe at the bottom, so that

they must, perforce, remain in the condenser until condensed or absorbed, so as to be carried out with the waste water. By thus confining the smoke I am able to effect with a very small condenser much more complete absorption and condensation than has heretofore been accomplished by means of more extended and expensive apparatus. If there should be gases incapable of being absorbed or condensed even by the aid of the top steam-chamber, such gases would accumulate at the top, and the safety-valve being set to such pressure as to detain the absorbable gases long enough to accomplish their absorption, the unabsorbable gases, if any, would then escape past the safety-valve. In the same manner such of the unburned gases as are not at once absorbed by the water-spray may be conducted back to the furnace, to be utilized by combustion, and in that case the chamber D and its steam-induct pipe may be omitted or retained, as found best, according to the character of the fuel and the gases it produces. This return of gas to the furnace may be effected through the free pipe R or the pipes N and O, for in practice I find that the burned gases from ordinary fuels are absorbed or condensed so readily with my device that sufficient pressure is maintainable in the condenser to detain these gases long enough for their absorption or condensation, even when there is a free discharge-pipe back to the furnace or elsewhere, provided such pipe is small relatively to the smoke-induct pipe F. When, therefore, it is desired simply to remove the coloring-matter from the smoke and permit the colorless gases which rise to the top of the condenser to escape, the chamber D may be dispensed with, and a properly-restricted discharge-pipe carried up to any desired point where the escape of the gas will not cause nuisance. The safety-valve may in that case be interposed in the discharge-pipe, in order to maintain a higher pressure and effect more complete absorption in the condenser.

What I claim, and desire to secure by Letters Patent, is—

1. The method of condensing the gaseous products of combustion, which consists in spraying them with water while detained under pressure, and subjecting them to increased heat during the latter part of the process, substantially as set forth.

2. The method of condensing the gaseous products of combustion, which consists in spraying them with water while detained under pressure, and discharging steam upon the unabsorbed portion, substantially as set forth.

3. The method of condensing the ascending gaseous products of combustion, which consists in trapping them, as shown, by virtue of their levity, and spraying them with water while so trapped.

4. The method of disposing of the gaseous products of combustion, which consists in spraying them with water while detained under pressure, and discharging steam upon the

portion uncondensed, and conducting the portion still remaining uncondensed back to the furnace, substantially as set forth.

5 5. In a device for condensing the gaseous products of combustion, the combination of a box or chamber open at the bottom with spray-pipes arranged to discharge within such box or chamber, substantially as and for the purpose set forth.

10 6. In a device for condensing the gaseous products of combustion, in combination, the downwardly-opening and upwardly-expanded smoke-traps B and the spray-pipes X, arranged to discharge within said smoke-traps, substantially as set forth.

15 7. In a device for condensing and absorbing the gaseous products of combustion, the combination of a smoke-receiving chamber, a box or boxes therein opening downwardly, and 20 spray-pipes arranged to discharge within said boxes, substantially as and for the purpose set forth.

8. In a device for condensing the gaseous products of combustion, the combination of a

condenser having a steam-chamber at the top, 25 means for driving the smoke into such condenser, water-supply pipes thereto, waste-pipe therefrom, and smoke-arresting plates therein, substantially as set forth.

9. In a device for condensing the gaseous 30 products of combustion, the combination of a condenser, means for driving the smoke thereinto, smoke-arresting plates therein, water-supply pipes thereto, and waste-pipe therefrom, an upper heating-chamber, and a safety- 35 valve, substantially as set forth.

10. In a device for condensing or absorbing the gaseous products of combustion, a condensing-chamber, in combination with means for driving the smoke thereinto, smoke arresting 40 and condensing boxes therein, water-spray pipes arranged to discharge within said boxes, and a waste-pipe leading from such condensing-chamber, substantially as set forth.

CHARLES J. LE ROY.

Witnesses:

FRANCIS W. PARKER,
CHAS. S. BURTON.