G. HARKER.

APPARATUS FOR SCRUBBING AND COOLING GASES FOR USE IN FUMIGATING AND FIRE EXTINGUISHING AND LIKE PURPOSES.

APPLICATION FILED MAR. 28, 1913.

1,103,509. Patented July 14, 1914.

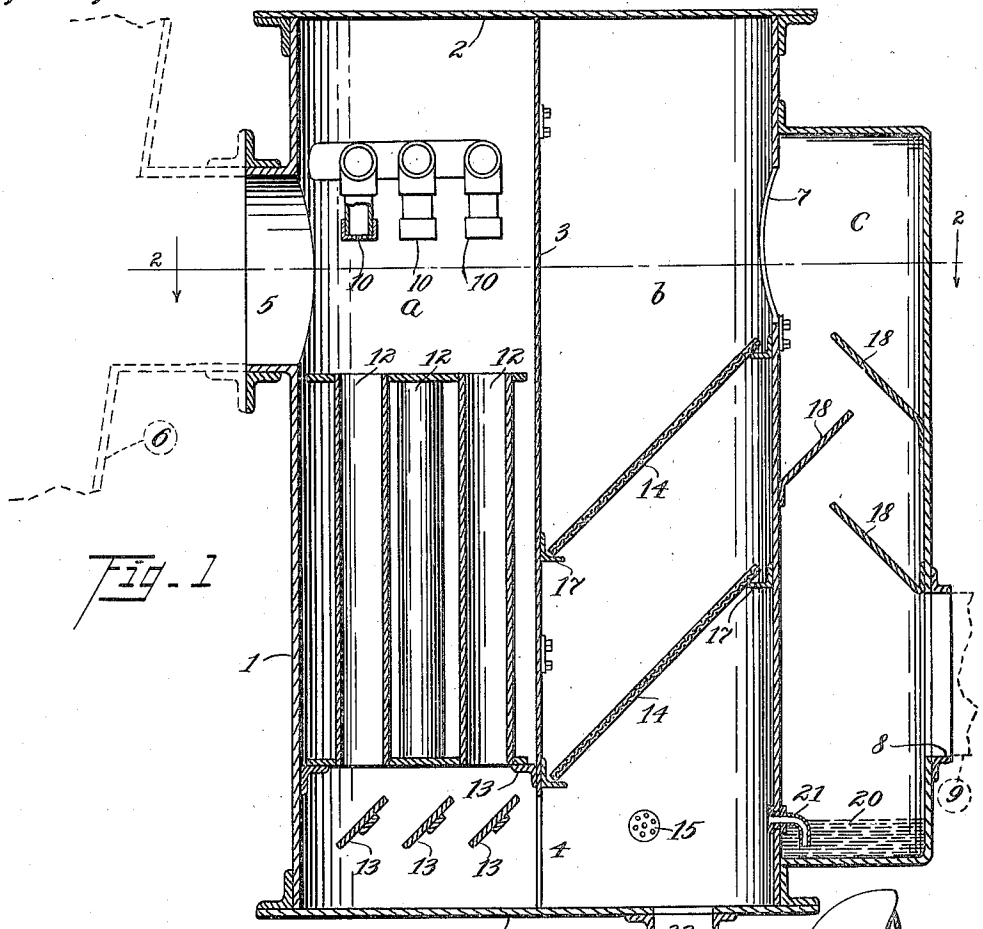


Fig. 1

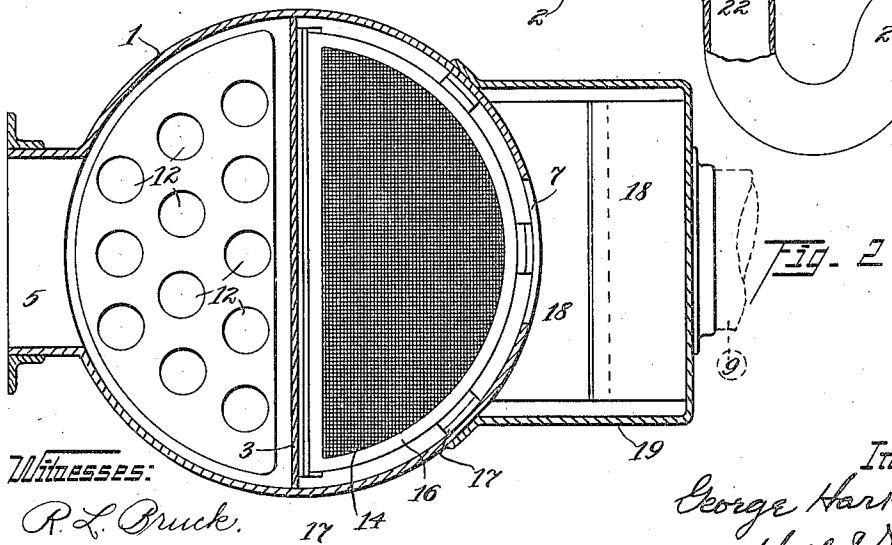


Fig. 2

Witnesses:
R. L. Bruck.
Brennan B. West

Inventor
George Harker
by Hull & Smith
Attorneys

UNITED STATES PATENT OFFICE.

GEORGE HARKER, OF PETERSHAM, NEAR SYDNEY, NEW SOUTH WALES, AUSTRALIA, ASSIGNOR TO THE HARKER FIRE EXTINGUISHER & FUMIGATOR COMPANY LIMITED, OF SYDNEY, AUSTRALIA.

APPARATUS FOR SCRUBBING AND COOLING GASES FOR USE IN FUMIGATING AND FIRE-EXTINGUISHING AND LIKE PURPOSES.

1,103,509. Specification of Letters Patent. Patented July 14, 1914.

Application filed March 28, 1913. Serial No. 757,288.

To all whom it may concern:

Be it known that I, GEORGE HARKER, a subject of the King of Great Britain, residing at Petersham, near Sydney, New South Wales, Australia, have invented a certain new and useful Improvement in Apparatus for Scrubbing and Cooling Gases for Use in Fumigating and Fire-Extinguishing and like Purposes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to fumigating and fire-extinguishing apparatus, and particularly to apparatus for cooling, washing, and drying gaseous products of combustion for use in such fumigation or in such fire-extinguishing.

In my prior United States Letters Patent No. 915,431, granted March 16, 1909, and 1,016,145 granted Jan. 30, 1912, as well as in my copending application filed Feb. 14, 1911, Ser. No. 608,513, I have illustrated and described certain systems and apparatus for extinguishing fires, for destroying vermin, and for disinfecting and fumigating inclosed places, all of which are based upon the employment of the de-oxygenized products of combustion in steam boiler or other furnaces, wherein coal, hydro-carbon, or other combustible material is consumed, the products of combustion being either employed without addition or as a vehicle for the propagation and distribution of some active disinfectant and vermicide such as formaldehyde or carbon-bisulfid.

While a furnace or gas engine forms a very prolific source of carbon dioxid and other inert gases, which are highly efficacious for the purpose in view, its use is attended with certain practical difficulties particularly concerned with the cooling and cleaning of the gases, these difficulties being enhanced by the necessity for employing a compact and simple apparatus which can be easily transported and economically used, and is a feature of particular importance in installations such as are used on shipboard. It is necessary before the gases can be admitted to living chambers, merchandise, storerooms, the holds of ships, and the like inclosed spaces that all smoke and dust be removed from the gases, that the gases have their temperature reduced to a reasonable degree, and that creosote, tar, and other easily condensing and noxious hydrocarbons ordinarily present be condensed and deposited prior to the use of the gases. Finally, the gases must be delivered to the place of use in a substantially dry condition.

All of the above requirements and others to be hereinafter described are attained by the use of the apparatus illustrated in the accompanying drawings in which,

Figure 1 is a vertical cross sectional view illustrating the general construction and arrangement of my improved apparatus; and Fig. 2 is a horizontal cross sectional view taken upon the line 2—2 of Fig. 1 and looking downwardly.

The device, it will be observed, comprises, a plurality of vertically elongated laterally narrowed chambers connected alternately at the bottom and top so that the entering gases are forced to take a tortuous passage therethrough, being cooled and washed by downwardly projected water sprays during their downward passage through one chamber being passed upwardly through suitable screens during their upward passage through a succeeding chamber, and being passed downwardly around suitable water deposition plates in the final chamber whereby entrained water may be removed prior to their discharge to the point of use.

In the embodiment here disclosed, an upright cylindrical casing 1 is provided having suitable bottom and top closures 2—2 and having an internal septum plate 3 whereby the cylinder is divided into two chambers *a* and *b*, the septum plate terminating a short distance from the bottom as shown at 4 so as to afford communication between the two chambers. Near the upper end of the chamber *a* the wall of the casing is formed with an inlet branch suitably connected to the funnel 6 or other source of products of combustion, while a similar part of the chamber *b* is formed with an outlet 7 communicating with the chamber *c* wherein are placed the deflecting plates. Adjacent to the lower part of the chamber *c* an outlet passageway 8 is formed to which is attached the inlet duct 9 of a suitable fan or blower (not shown).

For the purpose of cooling and washing

the gases, I provide the upper part of the chamber *a* with a plurality of downwardly directed spray-nozzles 10—10 connected to a suitable manifold 11, said spray-nozzles being preferably arranged in line with a battery of vertical pipes 12—12 suitably connected together as by being attached to common head plates and supported in alinement with said nozzles in any suitable manner as by being rested upon brackets 13 carried by the chamber walls. The effect of this arrangement is not only to mix the burned gases thoroughly with the water during the passage of the two through the pipes 12—12, but also to assist to some degree the action of the exhaust fan in withdrawing such gases from the stack 6. Beneath the ends of the pipes 12—12 a plurality of inclined baffle plates 13—13 are preferably mounted for the purpose of removing from the gases the excess of water and also for mixing the partially cooled gases with the water vapor. The gases now pass upwardly through the chamber *b* in which are mounted one or more gauze screens 14 which screens serve to separate out the tarry and other solid impurities remaining in suspension, and also to separate out the lampblack, dust, carbon particles, and other solid impurities remaining in suspension, and in addition to condense any vaporized combustion products not already condensed by the water and deposited upon the bottom of the chamber. The lower portion of the screening chamber may, if desired, be furnished with a cold water spray jet 15 for the purpose of further reducing the temperature of the gases. The screens in the present embodiment consist of semi-elliptical frames 16 filled with fine meshed metallic screen cloth and supported on suitable ledges 17—17 attached to the chamber walls. While the shape of the screens is entirely unimportant, except as to causing the screens to fill completely the compartment in which they are placed, their inclined position and the fact that the gases pass through them from below upwardly is of great importance, as will hereafter be pointed out.

From the chamber *b* the gases pass by way of the aperture 7 to the chamber *c*, the walls whereof are provided with inclined metallic deflecting plates 18—18 so arranged as to cause the gases to take a tortuous course therebetween which shall cause the greater inertia of any water particles entrained in the gases to carry them out of the gas stream and so become deposited, and also to bring the gases into close proximity with cold metallic surfaces so that vaporized water may be condensed and deposited directly thereon. These plates are preferably terminated a short distance from the end walls of the chamber, as indicated at 19, in Fig. 2, so as to enable the water deposited therein to trickle down the walls of the chamber to the well 20 at the bottom thereof from whence it is discharged by the trapped overflow 21 to the bottom of the casing 1. This water, together with the water deposited directly within the first casing is discharged by means of the drainpipe 22, preferably trapped as at 23 to prevent the admission of air at this point.

With this apparatus the first mingling of the heated gases with the spray from the nozzles 10—10 causes a subsidence of a large part of the solid ashy and carbonaceous particles ordinarily present in the process of combustion, and a very sudden lowering of the temperature with an accompanying vaporization of water. A sufficient excess of water is introduced to prevent complete vaporization and to obtain a more extensive cooling effect, a large part of this excess water being separated out by the baffles 13—13 which also serve to complete the mixing of the gaseous and liquid particles and further to throw the gases against the sides and bottom of the chamber whereby cooling effect is still further enhanced. The gases by this time by reason of their cooling are saturated with water vapor and upon being carried upwardly against the cool screens 14—14 a large part of this water vapor is deposited carrying with it the tarry, greasy and other obnoxious constituents of the burned gases, which frequently condense more thoroughly in the presence of water than they will do alone. The inclination of these screens causes the condensed water to flow downwardly across the same thereby washing away the deposited hydro-carbon particles thereon and keeping the screens always clear, while the deposition of condensed matters upon the bottom of the screen instead of upon the tops thereof minimizes the clogging and adhering tendencies. The tortuous passage of the gas through the final chamber serves still further to cool the same and to remove water particles therefrom as already explained, and to prepare the same for injection into contact with furniture, dry goods, food stuffs and the like. Should it be desired to use the washed and cooled gases as the medium for the conveyance of a disinfecting agent, such agent is preferably added during the passage of the gases through the fan or blower, as described and claimed in my prior Patent No. 1,016,145, hereinbefore mentioned.

It will be understood that I may employ as a source for the gases any suitable or convenient place of combustion such as a steam boiler, internal combustion engine, or even a special furnace designed solely for the production of such gas. Also it will be understood that the number of chambers may be increased as much as desired, and that

the number of such chambers that shall be employed for washing or for screening or for drying the gases may be varied in accordance with the condition of the gases as regards temperature, amount of solid matter present and amount of vaporized hydrocarbon, or in view of the use to which the resulting product is to be put. Finally it will be understood that while I have illustrated casings, etc., of a peculiar shape I have adopted this shape merely because of the fact that it corresponds with the design of apparatus heretofore employed by me and that any suitable or desired design can be used. Accordingly it will be understood that while I have described my invention in detail, I do not propose to be limited to such details, except as the same may be positively included in the claims hereto annexed or may be rendered necessary by the prior state of the art.

Having thus described my invention, what I claim is:—

1. In an apparatus of the type described, the combination, with a source of waste combustion gases, of a group of tubes through which said gases pass, spray jet disposed opposite each of said tubes whereby an inspirating effect upon said gases is produced and said gases are thoroughly cooled and washed by water spray, a second chamber, gauze screening devices in said second chamber, and means for finally cooling the gases and extracting entrained water therefrom.

2. In apparatus of the type set forth, the combination, with a vertically elongated chamber, of a group of elongated vertical tubes supported in said chamber, and spaced from both ends thereof, a plurality of downwardly directed water spray nozzles mounted above said tubes and in substantial alinement therewith, a plurality of baffle plates supported opposite the ends of the tubes farthest from said nozzle, means for connecting the end of said chamber nearest to said spray nozzles to a source of waste combustion gases, and means for condensing and separating entrained water and other materials from the gases after their passage by said baffle plates.

3. In apparatus of the type set forth, the combination, with a chamber, of a group of elongated tubes supported in said chamber and spaced from both ends thereof, a plurality of water spray nozzles mounted in alinement with said tubes, a plurality of baffle plates supported opposite the ends of the tubes farthest from said nozzle, means for connecting the end of said chamber nearest to said spray nozzles to a source of waste combustion gases, a chamber communicating with said first chamber and adapted to receive the gases after their passage by said baffle plates, and inclined overlapping metallic baffle plates in said last mentioned chamber and defining a tortuous passageway whereby the gases will be brought closely in contact with cool metal surfaces, portions of said plates adjacent to their free edges being upwardly turned to form troughs and the ends of said plates being formed to discharge liquid collected thereby.

4. Mechanism for purifying waste combustion gases for use in disinfecting ships, buildings, or other inclosed spaces, or in extinguishing fires, comprising, in combination, a group of tubes communicating with a source of waste combustion gases, a plurality of spray nozzles adapted and arranged to discharge into said tubes whereby said gases may be cooled and washed, a chamber with which said tubes communicate, gauze screens within said chamber, a second chamber communicating with said first chamber, and inclined baffle plates in said last mentioned chamber whereby entrained water is removed.

In testimony whereof, I hereunto affix my signature in the presence of two witnesses.

GEORGE HARKER.

Witnesses:
O. J. Worth,
W. E. Rogers.