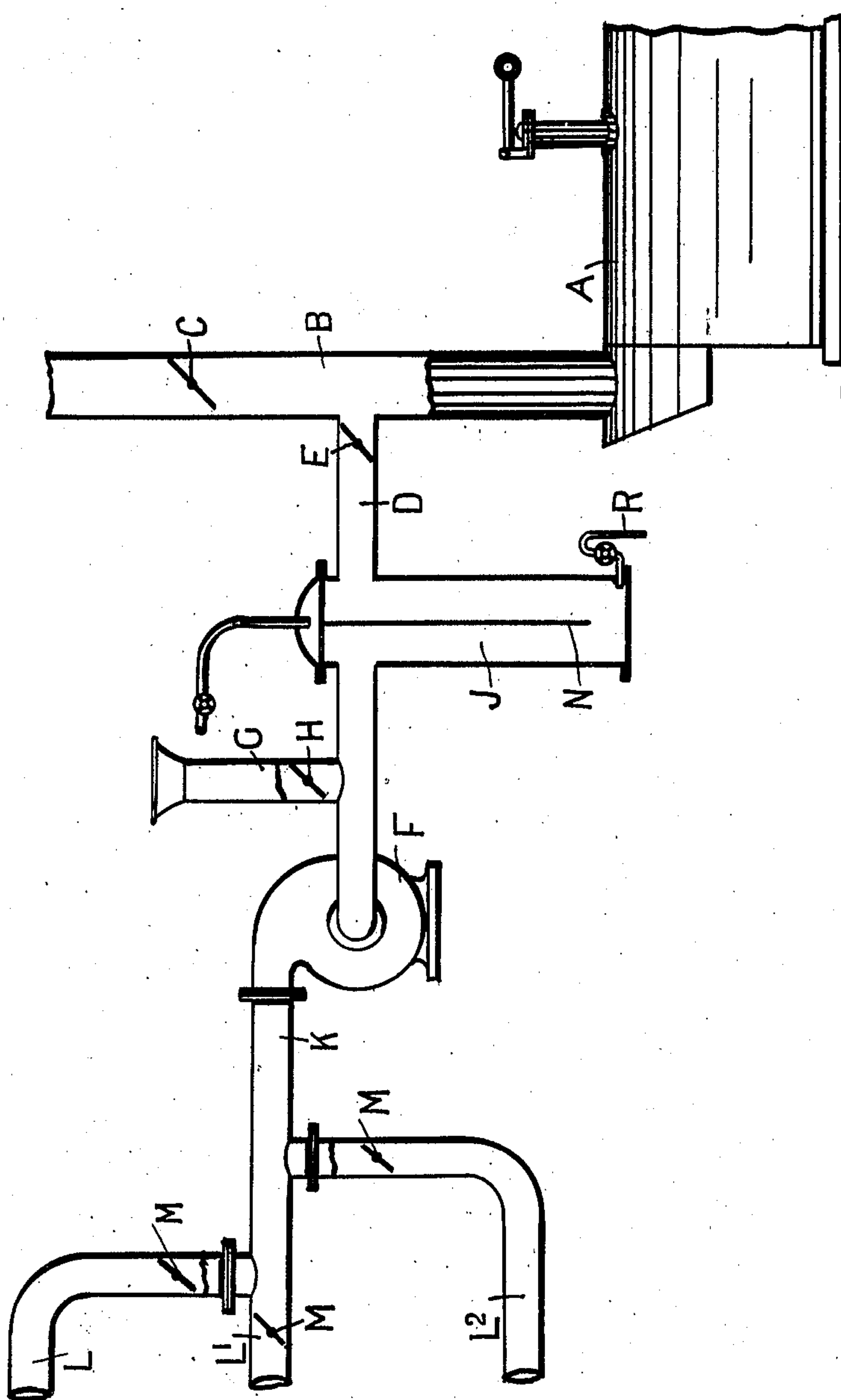


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 APPARATUS FOR EXTINGUISHING FIRE AND FOR DESTROYING VERMIN.
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UNITED STATES PATENT OFFICE.

GEORGE HARKER, OF PETERSHAM, NEAR SYDNEY, NEW SOUTH WALES, AUSTRALIA.

APPARATUS FOR EXTINGUISHING FIRE AND FOR DESTROYING VERMIN.

No. 915,431.

Specification of Letters Patent.

Patented March 16, 1909.

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To all whom it may concern:

Be it known that I, GEORGE HARKER, a subject of the King of Great Britain and Ireland, and residing at Petersham, near Sydney, in the State of New South Wales, Commonwealth of Australia, have invented new and useful Apparatus for Extinguishing Fire and for Destroying Vermin, of which the following is a specification.

My invention aims to flood ships' holds, store rooms, and other inclosed spaces generally with certain gases, so as to displace air therefrom and in place thereof fill such spaces with an atmosphere containing less oxygen than is required to sustain ordinary combustion and respiration. In this specification I call gases forming such an atmosphere "inert gases."

I am aware that sulfurous acid gas and carbon dioxide have been used heretofore for the purpose of extinguishing fire; and I do not claim broadly the discovery of a process of preventing combustion or respiration by the employment of a wholly or partially inert atmosphere of gas or gases.

My object is rather to obtain a rapid supply at nominal cost of inert gases which will have no harmful effects upon the structure in which same are used or on the contents thereof. Sulfur fumes are more or less effective for the purposes I have in view, but they are injurious to certain goods, more particularly in the presence of water or aqueous vapor, and are especially destructive to the metal work in the bilges of ships owing to the presence of water therein by which they are absorbed and ultimately converted under atmospheric influence more or less into sulfuric acid.

I utilize the waste gaseous products of combustion from an ordinary furnace in which fuel is burned, preferably under conditions which will give a gaseous product containing a minimum proportion of free oxygen, but first cool and clean said gases by passing them through a scrubber or through a water jet condenser, thereafter forcing them by means of a pump or blower into the holds or other chambers upon which it is required to operate. Such gases contain too little free oxygen to support ordinary combustion or respiration, particularly if the furnace is operated without an overplus air supply. In order to effect combustion with a view to obtain a suitable gaseous product, I may operate the furnace under normal or

extra draft—preferably the latter because then the proportion of free oxygen may be kept lowest. The other portions of the gaseous product are incapable of supporting ordinary combustion or respiration. I also fit to said pump or blower a double intake, one for the inert gas feed and one for atmospheric air feed, fitting both with stop valves, whereof the gas intake valve is opened to supply inert gas for the purpose of filling the chamber, and the air intake valve is opened when the chamber is to be cleared of gas by displacing the same with air, and thus restoring it to normal habitable condition.

In practice I fit a gas take off pipe from the funnel or smokestack of the generating furnace, which in the case of a steamer or a factory may be an ordinary boiler furnace; this take off pipe should be fitted below the funnel damper, and itself must be provided with a damper to cut off communication between the funnel and the blower, cooler and other parts unless when the apparatus is in use. Through this intake the furnace gases are conveyed to the hold, storeroom, or other chamber to be operated on, passing on their way thereto through the cooler and cleaner and the forcing pump or blower, and being distributed through the necessary number of ducts, one or more as circumstances may require, each fitted with a damper or valve of butterfly or other convenient pattern. A ship, building or other inclosed place in which the invention is to be used may be fitted with a permanent pipe system for purposes of effective distribution of the gases.

The annexed sheet of drawings represents in diagrammatic form the apparatus requisite for working my said invention in practice.

It is of course not necessary that the gas producing furnace should be associated with a steam boiler. A special furnace may be provided for the purpose; this would be necessary particularly in the case of a sailing ship as a donkey boiler furnace might not be large enough to produce a sufficient volume of inert gases to effectively fill the holds rapidly in the event of an outbreak of fire. For the purpose of obtaining gaseous products containing a minimum of free oxygen it is found preferable to operate the furnace under forced or induced draft. The presence of carbonic oxide gas is immaterial where the gases are used to extinguish fire and may even be advantageous when they are being used to destroy vermin. It is not practicable

to use raw furnace gases without risk of injury to the chamber or its contents owing to their temperature and foulness; in order to make said gases available for practical use I cool and wash them before passing them into the ship's hold and other places in which the process is to be operated. It is of course necessary to provide suitable vents to permit exit of the air or gases which it is necessary to displace in operating the process. In the case of ship cargoes of coal, wool, or other goods liable to spontaneous combustion, security against outbreak of fire is obtained by periodically flooding the holds with inert gases or keeping the same flooded therewith so that the atmosphere therein will be made too poor in oxygen to support combustion or to promote free oxidation and produce consequent heating. It has been proven experimentally that flame is extinguished in an atmosphere whose oxygen content has been substantially reduced by the addition of inert gas or gases; where therefore an outbreak of fire has occurred, flooding of the hold or other chamber with furnace gases in the manner described will at once prevent extension of the conflagration by stifling the flame.

It is obviously necessary particularly in the case of a ship that due precaution be observed that living spaces in actual use while the process is in operation should be amply ventilated to insure removal of inert gas which may leak into such spaces.

In the case of steamships at sea the fuel used would be coal, and coal may be used in land installations in harbor fire boats and elsewhere generally with complete effectiveness. In the case of special plant for utilizing the invention I prefer however to use coke as fuel owing to the relative cleanness of the gases produced and the consequent saving of injury to vessels, rooms and the contents thereof.

A is a steam boiler with furnace, and B funnel or smokestack with damper valve C. D is gas offtake with damper valve E, leading to the suction of centrifugal blower F, to which suction also an air intake pipe G is branched.

H is a damper valve in the air pipe G.

J is the gas cleaner and cooler which is interposed between the pump or blower F and the funnel B.

The main gas duct K leads from the blower delivery to the holds or chambers, being broken into as many branches, as L L' L² etc. each provided with a damper valve M, as the local circumstances of each particular case may call for. The spindles of these

valves should be carried outside the hold or building in order that the valves may be operated externally thereto.

The cooler and cleaner J is shown as a vertical chamber with middle septum N, water spraying head O, water feed pipe P, and drain R.

In operation, the furnace being in action, the funnel damper C and the air damper H are wholly or partially closed and the dampers E opened, the water service P turned on, the blower F started, and the drain R opened. Such of the dampers M as control the gas service ducts L L' &c. are also opened to direct the gas where required. A current of furnace gas will now pass from the funnel B through the pipe D, the cooler J, the blower F and the ducts L L' &c. to the holds or chambers being operated on, flooding the same and displacing the atmosphere partially or wholly therefrom and rendering ordinary combustion and respiration impossible. When it is required to clear the chamber so operated upon to allow men to enter the same, the damper valves C and H are opened and the valve E closed, whereupon atmospheric air is drawn by the blower F through the air intake G and forced through the ducts L L' &c. into the chambers to which same lead, gradually displacing the inert gases therefrom and restoring a normal atmospheric condition within them.

What I claim as my invention, and desire to secure by Letters Patent, is:—

Apparatus for extinguishing fire and destroying vermin, comprising in combination with a furnace producing inert gases, a flue, a damper therein, a valved duct from said flue below said damper leading to a scrubber, a duct from said scrubber to a centrifugal blower, a gas trunk from said blower, and valved branches therefrom, for conducting the inert gases to the desired places, a valved atmosphere inlet pipe connected with said duct between the said scrubber and the said centrifugal blower, the scrubber consisting of a vertical closed cylinder provided with a central partition extending nearly to the bottom thereof and with a water head having a perforated spraying plate therein and a water-pipe leading thereto, and a valved waste-trap arranged at the bottom of said cylinder.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEORGE HARKER.

Witnesses:

N. RILEY,

W. J. DAVIS.