

E. AFRICA

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REC'D  
11 NOV 1919

64133

Order for Fire  
Insurance Co

# Sulphurous Gas System of Fumigation

1919

New

70

See previous Paper

Enclosed particulars re

See 37243

~~Mr. Fiddler~~  
~~Mr. B. G. Bennett~~

For minute on M/63669 General  
to W. Flood.

Recd  
20/11/19

AF 25 - Oct 25.11.19.

to ~~Mr. Fiddler~~ Mr. B. G. Bennett

x 5 casing floor in the open

63669\* has no connection whatever with any

proper process of gas disinfection, and should not  
be in the same bundle.

The Clayton machine is well known but is  
expensive. Col. Glen Lester hopes to get his personal  
and plant out for about £100 or £150 a set.

I can bring this up at the 7.30 committee  
but everyone knows all about it.

Partly

8208

Exchange Paper

Yes - full work white

26/11/19

Partly

THE CLAYTON FIRE EXTINGUISHING  
AND DISINFECTING COMPANY,  
LIMITED.

64133

70 A

OUR REFERENCE IS

R/A  
7/11

22, CRAVEN STREET, LONDON, W.C.2.

NORTHUMBERLAND AVENUE.

LONDON, W.C.2.

7th Novr. 1919

Local Advisor,  
Colonial Office,  
Downing Street, S.W.1.

We have pleasure in enclosing some particulars of the Clayton Sulphurous Gas System of Fumigation & Disinfection, which we trust you will find of interest.

Clayton Machines offer the best method of thorough disinfection at present known to Hygienists; they are recommended & used by Medical Authorities throughout the world, and have proved of the greatest value in the destruction of disease germs and the prevention of disease.

There is no danger to human life when Clayton Gas is used, as the requisite percentage of gas can be reached and the length of exposure maintained with certainty & accuracy throughout the operation. The gas penetrates to every crack & crevice. It is not a "rule of thumb" method, nor is it a "hit or miss" idea such as spraying or burning sulphur in pots. The Clayton Process is not based on scientific facts but is extremely practical & simple.


Offering any further particulars you may desire,

We are, Sir,

Your obedient Servants,

THE CLAYTON FIRE EXTINGUISHING  
AND DISINFECTING COMPANY, LIMITED.

*W. J. Gurney*  
MANAGING DIRECTOR

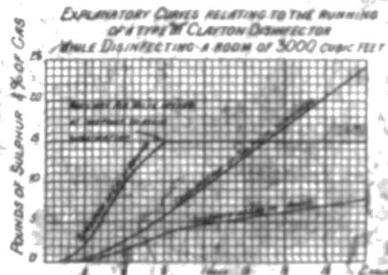
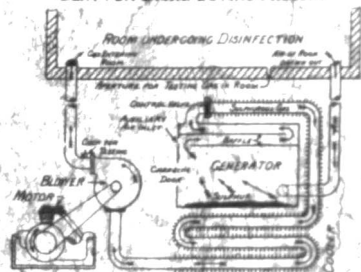


CLAYTON  
DISINFECTING  
AND  
FUMIGATING  
MACHINES

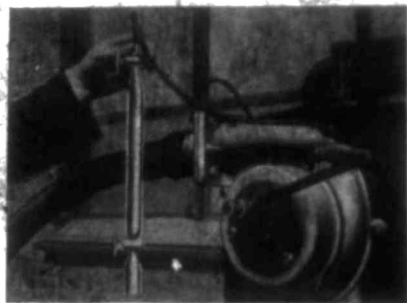
# Clayton Disinfectors.

The Clayton System of Disinfection by means of sulphurous vapours is the only one capable of being applied in a true scientific manner, embracing as it does (a) the use of a definite strength of gas for a definite time in the space undergoing disinfection, and (b) control throughout the period by the operator. By means of a specially graduated burette, the percentage of gas being generated and also that actually in the room undergoing disinfection can be determined at any moment.

## DIAGRAMMATIC SKETCH ILLUSTRATING CLAYTON DISINFECTING PROCESS



The sulphur is burnt in an iron generator through which air is drawn by means of a fan, the products of combustion being air-cooled by passing them through a form of radiator before they reach the fan. They are then driven through flexible hoses into the room being disinfected; a return pipe brings air back from the room to the generator.



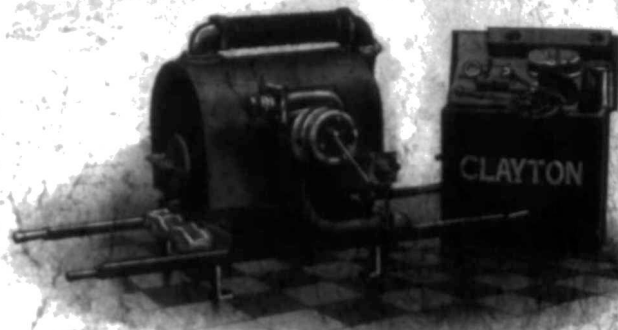
OPERATOR ASCERTAINING PERCENTAGE OF GAS GENERATED BY MEANS OF A BURETTE.

Professor Haldane and Dr. John Wade carried out for the Local Government Board prolonged experiments to regard to the power of Clayton Gas, and in the report furnished by Dr. Wade state:

- "Rats and insects would be destroyed in less than two hours by the uniform diffusion of at most 0.5% of this gas.
- "Pathogenic bacteria in exposed places would also be destroyed by the above treatment and . . . if closed for a like period sufficient penetration will have taken place to ensure the disinfection of all those parts of the interior . . . in which these bacteria are likely to be present.
- "The bactericidal, insecticidal and the destroying power of this gas may be now said to be definitely established."

# Type "M"

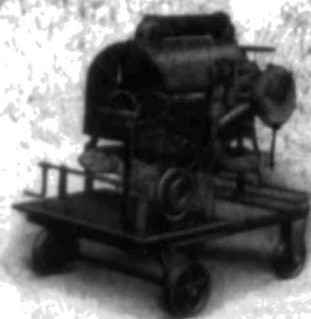
As used by the British and Allied Governments.



HAND-DRIVEN MACHINE.

Overall dimensions: 2 ft. 9 in. x 2 ft. 9 in. x 3 ft. 9 in. Weight: 20 cwt.

With a handle speed of 40 R.P.M. and 15% of gas delivered from the power, this machine is capable of saturating about 6,000 cu. ft. of space per hour with a Germicidal or Vermin-destroying Gas. This machine is of specially light construction, and can be carried by two men. It is small enough to be worked on a landing or passage-way, and being air-cooled, no water supply is necessary.



PETROL-DRIVEN MACHINE.

Overall dimensions: 3 ft. 10 in. x 3 ft. x 4 ft. Weight: 4 cwt.



ELECTRICALLY-DRIVEN MACHINE.

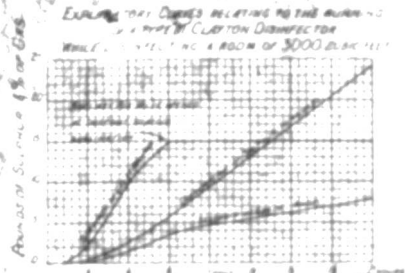
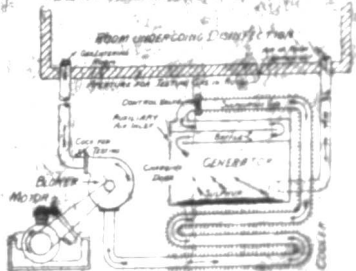
Overall dimensions: 4 ft. x 2 ft. 9 in. x 3 ft. 6 in. Weight: 4 cwt.

These machines are designed for carrying out more prolonged disinfections than those for which the hand-driven is suitable, and is specially recommended for municipalities, railway companies, etc. The petrol engine is air-cooled, therefore no water supply is necessary.

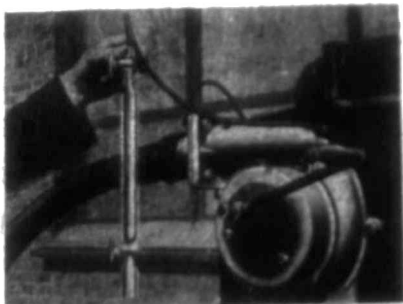
# Clayton Disinfectors.

The Clayton System of Disinfection by means of sulphurous vapours is the only one capable of being applied in a true scientific manner, embracing as it does (a) the use of a definite strength of gas for a definite time in the space undergoing disinfection, and (b) control throughout the period by the operator. By means of a specially graduated burette, the percentage of gas being generated and also that actually in the room undergoing disinfection can be determined at any moment.

## DYNAMOMIC SKETCH ILLUSTRATING CLAYTON DISINFECTING PROCESS



The sulphur is burnt in an iron generator through which air is drawn by means of a fan; the products of combustion being absorbed by passing through a form of radiator before they reach the fan. They are then driven through flexible hose in the room being disinfected; a return pipe brings air back from the room to the generator.



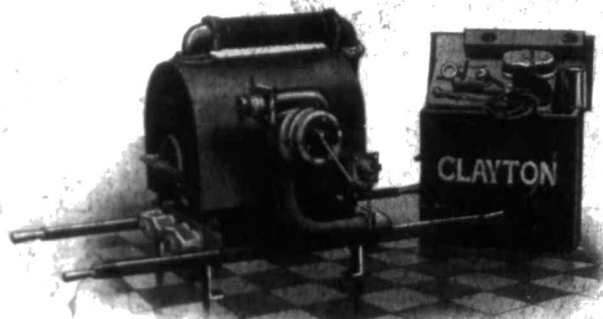
OPERATOR ASCERTAINING PERCENTAGE OF GAS GENERATED BY MEANS OF A BURETTE

Professor Haldane and Dr. John Wade carried out for the Home Government Board prolonged experiments to regard the power of Clayton Gas, and in a report furnished by Dr. Wade he states:

- "Rate and intensity would be destroyed in less than two hours by the uniform diffusion of at most 5% of this gas.
- "Pathogenic bacteria in exposed places would also be destroyed by the above treatment and if closed for a like period sufficient penetration will have taken place to insure the disinfection of all those parts of the interior in which these bacteria are likely to be present.
- "The bactericidal, insecticidal and germ-destroying power of this gas may be now said to be definitely established."

## Type "M"

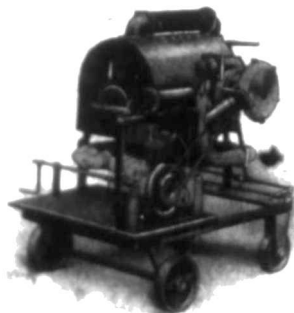
As used by the British and Allied Governments.



HAND-DRIVEN MACHINE

Overall dimensions: 24 ft. 0 in. x 21 ft. 0 in. x 21 ft. 0 in. Weight: 2 cwt.

With a handle speed of 4 R.P.M. and 15% of gas delivered from the blower, this machine is capable of saturating about 6,000 cu. ft. of space per hour with a **Germicidal or Vermin-destroying Gas**. This machine is of specially light construction, and can be carried by two men. It is small enough to be worked on a landing or passage way, and being air cooled, no water supply is necessary.



PETROL-DRIVEN MACHINE

Overall dimensions: 3 ft. 10 in. x 3 ft. x 4 ft. Weight: 4 cwt.



ELECTRICALLY-DRIVEN MACHINE

Overall dimensions: 4 ft. x 2 ft. 9 in. x 3 ft. 6 in. Weight: 4 cwt.

These machines are designed for carrying out more prolonged disinfections than those for which the hand-driven is suitable, and is specially recommended for municipalities, railway companies, etc. The petrol engine is air-cooled, therefore no water supply is necessary.

The advantages obtained by the use of the Clayton process are:

1. **Safety from Fire.** The gas being made in a special generator outside the room undergoing disinfection.
2. Does not damage leather nor silk or fabrics.
3. So arranged as to allow the use of a high strength gas.
4. No hot penetration caused by the suction created in the room.
5. Simple to control in place of the thumb methods. The percentage of gas is ascertained and controlled by the operator.
6. The minimum amount of sulphur necessary for true disinfection is used, consequently low running costs.
7. Last, but not least, it also of all other so-called gaseous disinfectants, **produces a disinfectant which disinfects.**

Larger types than the "M" are made. They are in use in all parts of the world for the disinfection of ships, plague prevention work, etc., but the "M" specially meets the needs of those concerned with the disinfection of houses, hospital wards, barns, stables, railway carriages, goods stores, business premises, etc.

No better testimonials are required to emphasize the efficiency of the Clayton Machine than the following extract from the lecture on "The Obstacles to Ship-borne Infections" given by Dr. W. M. Whitby, M.D., D.P.H., M.O.H., Port of London Sanitary Authority, at the Royal Institute of Public Health, published in "The Journal of State Medicine" for April, 1919.

Speaking of the fumigation of ships, Dr. Whitby said:

"The gaseous sulphur by its physical properties as well as its chemical through diffusion is rapid and complete in its action, acting en masse on all contents of the chamber, and a ship is fitted up in a few hours. This effect can be produced with great certainty by the instrument of precision used in the "Port of London."

The Port of London has a Clayton Fumigating and Disinfecting Plant in constant use. Clayton's experts are at the disposal of all interested parties.

Write for literature or a large illustrated catalogue.

**The Clayton Fire Extinguishing and Disinfecting Company, Limited,**

100, NEWCASTLE STREET, NORTHUMBERLAND AVENUE,

LONDON W.C. 2

Telephone: GERRARD 1111  
Telegrams: UNCLEBURNELL; WATFORD, LONDON

CLAYTON

75

DISINFECTING

& FUMIGATING

MACHINES.

For Ships . . . . .  
Port Sanitary Services  
Hospitals, Workhouses  
Prisons, &c. . . . .

The Clayton Fire Extinguishing & <sup>DISINFECTING</sup> Ventilating Company, Limited,

22, Craven Street, LONDON, W.1

SOLE AGENTS: MESSRS. J. & J. W. B. & CO., LTD.,  
10, Abchurch Lane, LONDON, E.C. 4

Telephone: UPWARD 3232

## CLAYTON DISINFECTING SYSTEM.



CLAYTON MACHINES and the CLAYTON PROCESS of Disinfection and Destruction of Vermin are so well known and in such general use all over the world to-day, that it would be superfluous to point out their value, which is self-evident to all hygienists and persons directly interested; but in view of the ever-increasing danger from exotic diseases, resulting from the enormous development of the means of communication by land and sea, it is well that the public also should be acquainted with the weapons at our disposal to-day, and help to generalize their use.

Everyone knows the part played by Rodents and certain other animals, as well as insects—Fleas, Bugs, Lice, Cockroaches and others—in the spreading of disease, the animals as transporters, the insects as inoculators, and before proceeding to give a description of the Clayton System, it is most important to point out that a disinfecting process which destroys Microbes while it spares Animals and Insects—as is the case with Formal vapours—is imperfect. Again, a process which spares the Microbes and Insects while it destroys Rodents—as is the case with Carbon Monoxide ( $\text{CO}$ ), Carbon Dioxide ( $\text{CO}_2$ ), and with waste gases from the boiler, furnaces, commonly called Flue Gases—is absolutely dangerous, as it gives a false sense of security, for the microbes remain virulent, and the insects hasten to leave the bodies of the dead rodents and take refuge on other living animals which they at once inoculate. On the other hand, the Clayton System is insecticidal, while everything is disinfected *in situ*, thus obviating the handling or removing of goods to steam or other disinfecting stoves. It is the only system officially approved for disinfection as well as for the destruction of rats, insects (with their larvæ and their eggs) and all other vermin.

The Clayton System is applicable in all cases for the sterilization of disease germs and the killing of vermin in buildings, ships, railway carriages, clothing, bedding, etc., etc. It is a method of generating special combinations of



oxygen and sulphur, the machine by which this is done extracts the air from the compartment undergoing fumigation, passes it over sulphur burning at a very high temperature in a specially constructed generator, cools it and drives it back into the compartment.

Delivery and suction, which are produced by a powerful blower, proceed simultaneously, and as the volume of air withdrawn is equal to the volume of disinfecting gas introduced, the leakage which occurs is practically *nil*; this not only adds to the comfort of people in the vicinity during the operation, but secures good penetration of the gas and effects economy in the amount of sulphur used.

The advantages over the old method of burning sulphur in a room or ship's hold are (1) the heat from combustion of the sulphur is not set free in the compartment, and consequently damage due to condensation of water vapour (commonly termed "sweating") is eliminated; it is this condensation which sulphur is burnt in a room which causes discolouration and damage, and can be thoroughly understood when one realizes that for every pound of sulphur burnt, about 4,000 units of heat are liberated. (2) By the fixation system, the charging of a compartment is controlled from outside, and can be continued as long as desired, so that the strength of gas and length of exposure can be reached and maintained with certainty. Strength of gas and length of exposure are the two most important factors for either the sterilization of disease germs or the killing of vermin, and should therefore always be under control. (3) Risk of fire is completely eliminated, as the gas will not support combustion, and several of the machines here illustrated are employed not only for disinfecting purposes, but also for preventing and extinguishing fires in compartments such as ships' holds and the like. (4) The toxic properties of the special combinations of oxygen and sulphur are immeasurably greater.

By disinfecting an infected room without removing bedding or furniture much labour is saved, and the risk of infection in other parts of the house is removed. The room should, of course, be made as air-tight as possible by pasting up doors, windows, etc., with paper or any material handy.

Of the various methods of disinfecting there is no doubt that a gas process is the only really effective one; a liquid will not penetrate into cracks and crevices where insects and germs are likely to accumulate, and vaporised

disinfectants requiring to be mixed with steam fail to penetrate into bedding, carpets, under floor-boards, etc., while a gas will always diffuse and spread even into the remotest corner of a ship's hold, into a closed chest of drawers, or under the floor-boards of a room.

Much experimental work has been done in connection with the Clayton System, the most important being the Local Government Board experiments of 1905-6, the results of which will be found in the Official Report, No. 232.

Rats very quickly succumb to the gas, and their parasites (viz., fleas) survive only a little longer when exposed to the same gas. Bugs, lice, and other insects and their eggs, if on exposed articles, are easily destroyed, but if in protected places, a longer exposure and rather stronger gas in the surrounding space become necessary. Sporing organisms are most difficult to destroy, and while the Clayton process retards their development and reduces their virulence, it is not claimed that it is perfectly efficient against them.

Rats, insects, and the less resistant pathogenic bacteria will be destroyed if actually exposed to 5% of sulphur dioxide for not less than two hours, but there are always factors, such as absorption of gas, which in practice make it necessary to increase the strength of gas and time of treatment of a compartment, and an exposure of 3/4 hours to a 3% gas will usually be found necessary; this varies with local conditions.

Polished metals will not be tarnished if covered with a coating of vaseline or whiting. Ordinary textile fabrics and fibrous, when dry, will not be affected. If covered by a dustcloth or newspaper, the most delicately coloured silks, etc., can be disinfected without any injury to them. Moist food-stuffs, such as fresh fruit, vegetables, and fresh meat are uneatable after exposure to the gas, although processes have been employed for preserving such articles by the gas which is afterwards extracted. Dried foods, tea, and frozen meat are not damaged.

Disinfection by machines types "A," "B," "E," "H," and "M" is carried out by converting a part of the atmosphere from a compartment into a mixture of gases containing from 12-18%  $\text{SO}_2$ , delivering the gas back into the compartment, where it mixes with the rest of the air, and converts it into a lower strength disinfecting gas. This is quite suitable for hospital wards, rooms, or empty holds of ships; but for laden ships or warehouses, closely packed with merchandise, it is preferable to convert the whole of the atmosphere into disinfecting gas of about 3% in the machine, and deliver it at this

strength into the compartment, as recommended in the Local Government Board Report already referred to; for this purpose the type "C" machine has been designed with a large delivery capacity.

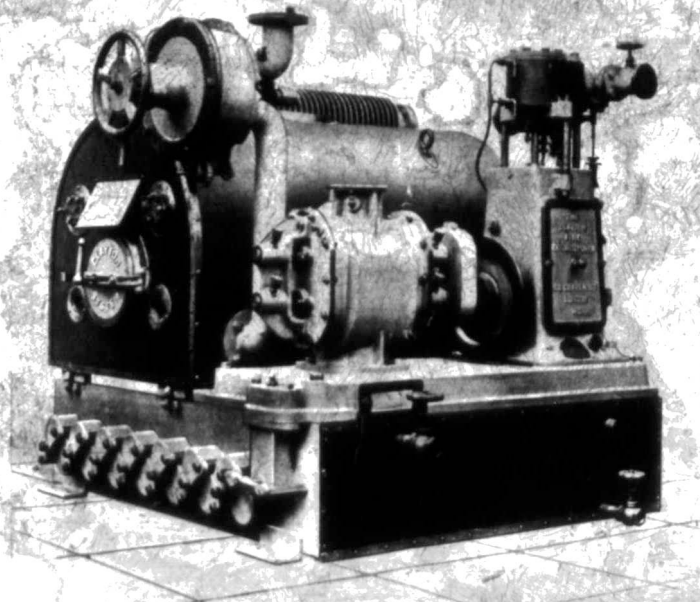
Types "A," "B," and "E" can also be used for extinguishing fires in closed spaces, such as ships' holds, and full particulars of their employment for this purpose can be had on application. Permanent installations have been fitted on some 320 vessels, whilst floating plants have been supplied to most of the principal ports of the world.

For disinfecting ships, machines types "A," "E," and "H" are usually fitted permanently on board, with fixed connections to all holds, and hose connections for passenger accommodation; for vessels not so fitted, a floating plant, such as a type "B" or "C" machine on a barge or launch, is used, and the gas conveyed through flexible hose of large size, which, if desired, may branch into two or more smaller lines of hose on the ships. Such floating plants can be used for fumigating any buildings on the wharves, but for houses, hospitals, etc., the type "A" machine on some form of vehicle, the type "H" machine on the standard underframe, or the hand-driven portable machine type "M" will generally be found suitable.

Railway carriages may be fumigated either by running them into a specially constructed shed built to contain the gas, or the windows and doors can be pasted up and only the interior of the car exposed to the gas, which would then be introduced through hose pipes from a portable machine or from a fixed machine with a suitable run of iron pipes laid alongside the carriage sidings. Both systems are in use.

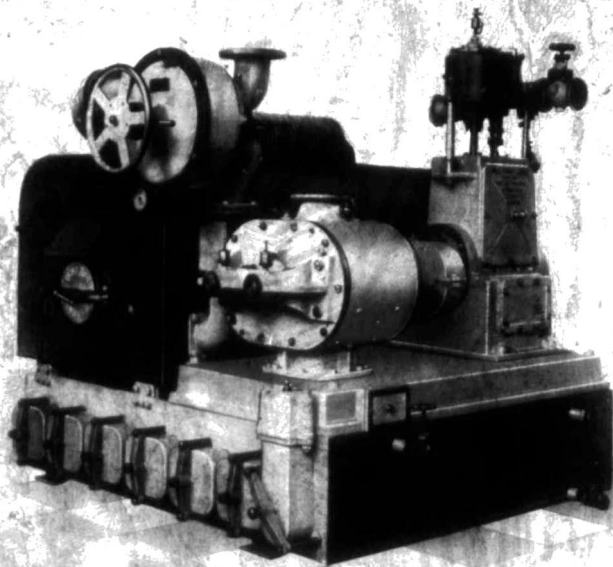
A standard method of driving has been adopted for each type of machine to suit the usual class of work for which it is employed, but modifications can be made or special machines built to suit exceptional circumstances. Any form of power can be utilized, and for cooling purposes fresh or salt water may be used. The small "M" machine is air cooled. The sulphur required should be best refined roll or rock.

Working conditions vary greatly in different Countries, and to enable us to give the full benefit of our experience, we would ask clients to state as fully as possible to what particular use they propose to put the machine; what power they prefer; if steam, whether a boiler is required; if electric, state current and voltage; what supply of cooling water is available, and also quantity of tubing required.



MACHINE TYPE "A."

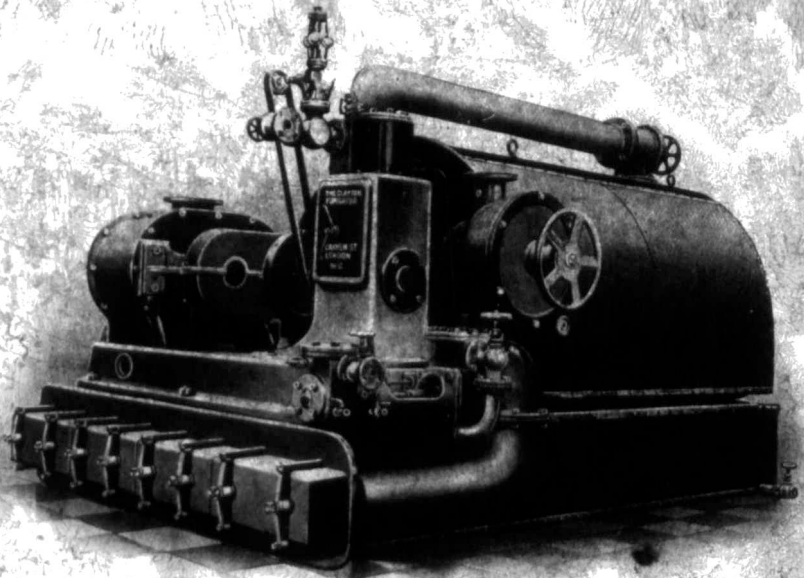
Base Dimensions: 5 feet 8 inches x 4 feet 10 inches; Height, 5 feet; Weight, 36 cwts.  
With an engine speed of 450 R.P.M. and 15 per cent. strength of gas discharged from the blower, this machine is capable of saturating about 41,500 cubic feet of space per hour with a germicidal or vermin-destroying gas.



MACHINE TYPE "E"

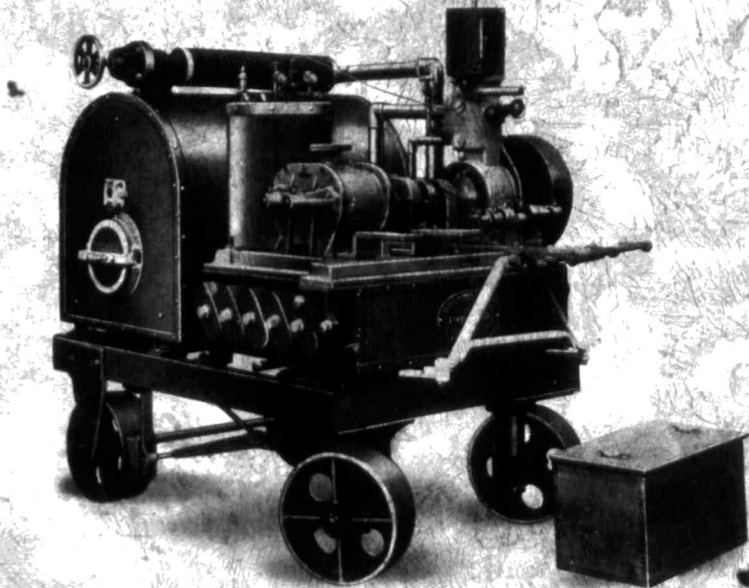
Base Dimensions: 7 feet x 6 feet 2 inches; Height, 5 feet 11 inches; Weight, 3 tons 8 cwt.  
With an engine speed of 400 R.P.M. and 15 per cent. strength of gas discharged from the blower, this machine is capable of saturating about 83,000 cubic feet of space per hour with a germicidal or vermic-deströying gas.





MACHINE TYPE "B."

Base Dimensions: 12 feet x 7 feet 3 inches; Height, 6 feet 3 inches; Weight, 5 tons.  
With an engine speed of 350 R.P.M. and 15 per cent. strength of gas discharged from the blower, this machine is capable of saturating about 250,000 cubic feet of space per hour with a germicidal or vermin-destroying gas.



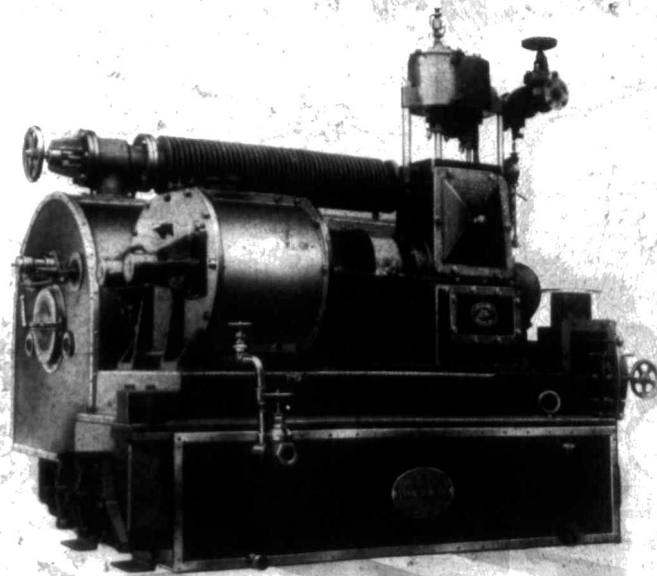
MACHINE TYPE "H"

Base Dimensions: 6 feet 7 inches x 8 feet 6 1/2 inches; Height, 5 feet 4 inches; Weight, 21 cwts.  
With an engine speed of 500 R.P.M. and 15 per cent strength of gas discharged from the blower, this machine is capable of saturating about 20,000 cubic feet of space per hour with a germicidal or vermin-destroying gas.



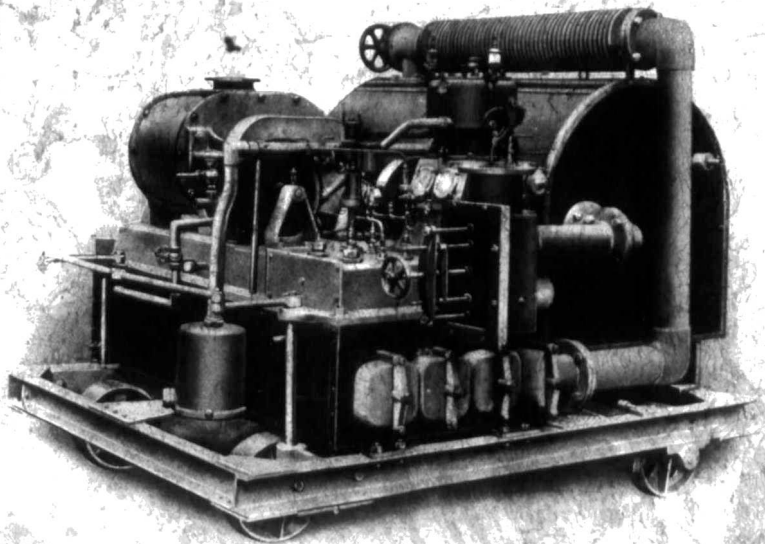
INFECTED PREMISES UNDERGOING FUMIGATION BY PORTABLE MACHINE, TYPE "H."





DILUTE GAS MACHINE, TYPE "C."

Base Dimensions: 7 feet  $\times$  6 feet 8 inches; Height, 6 feet 4 inches; Weight, 2 tons 18 cwts.  
With an engine speed of 500 R.P.M. this machine is capable of supplying 60,000 cubic feet of  
germicial or vermin-destroying gas per hour.

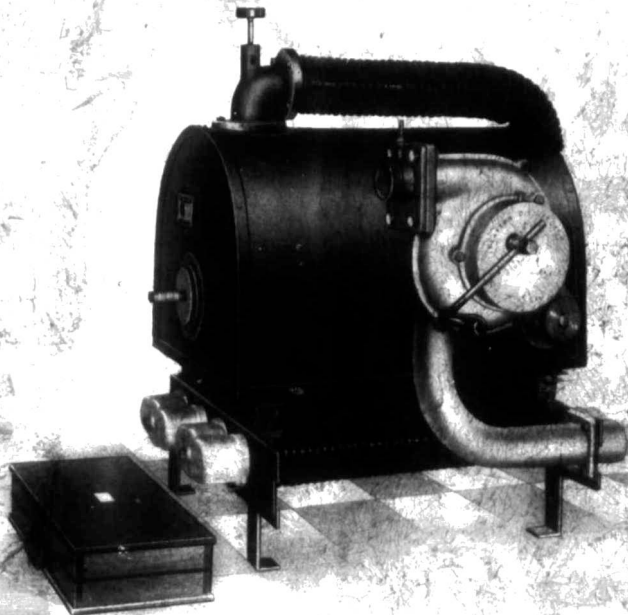


PORTABLE DILUTE GAS MACHINE, TYPE "C."

Weight, 3 tons 15 cwts.

Fitted with petrol engine and mounted on low trolley, together with gear-driven pump for circulating water through the cooler.

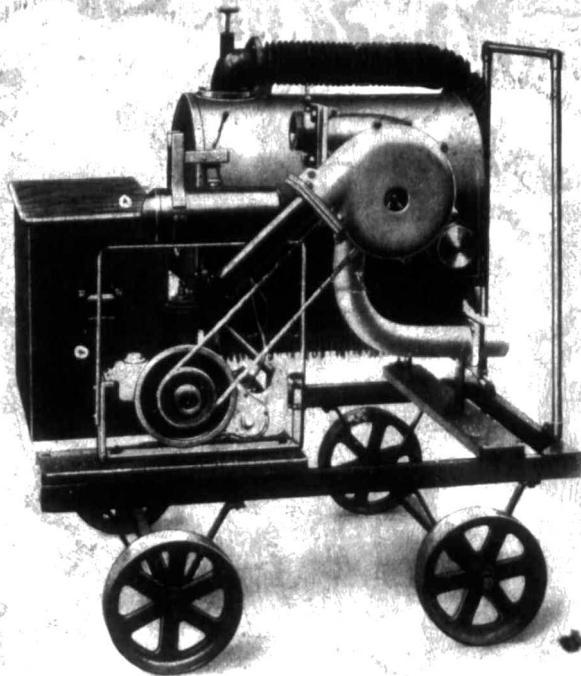
This apparatus is designed for fumigating ships from a quay, and can be transported easily on paved roads. Shafts are provided for horse traction if required.



HAND-DRIVEN MACHINE, TYPE "M."

Base Dimensions: 2 feet 9 inches - 2 feet; Weight 17 cwts.

With a handle speed of 40 R.P.M. and 15 per cent. strength of gas delivered from the blower, this machine is capable of saturating about 6,000 cubic feet of space per hour with a germicidal or vermin-destroying gas. This machine is of specially light construction and can be carried by two men; it is small enough to be worked on a landing or in a passageway and being air-cooled, no water supply is needed.

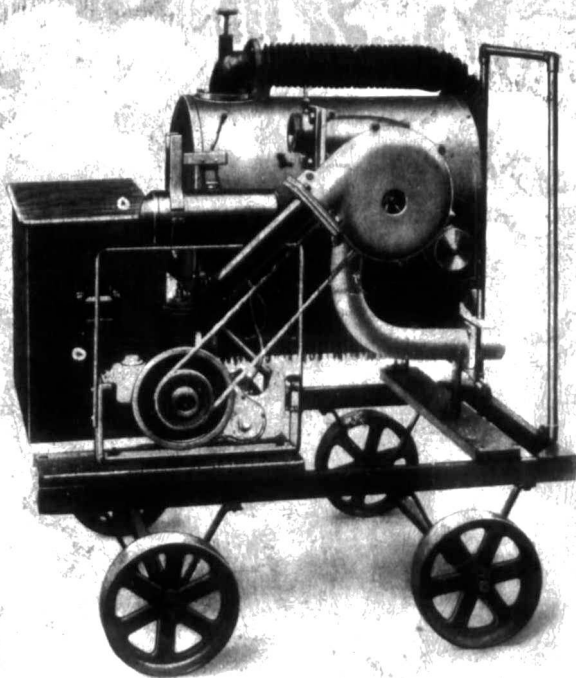


PETROL-DRIVEN MACHINE, TYPE "M."

Weight, 4 cwts.

This machine has been designed for carrying out disinfections rather more prolonged than those for which the hand-driven machine is suitable. The engine as well as the machine being air-cooled no water supply is needed and the apparatus is very compact.

This machine can be fitted with electric motor if desired.

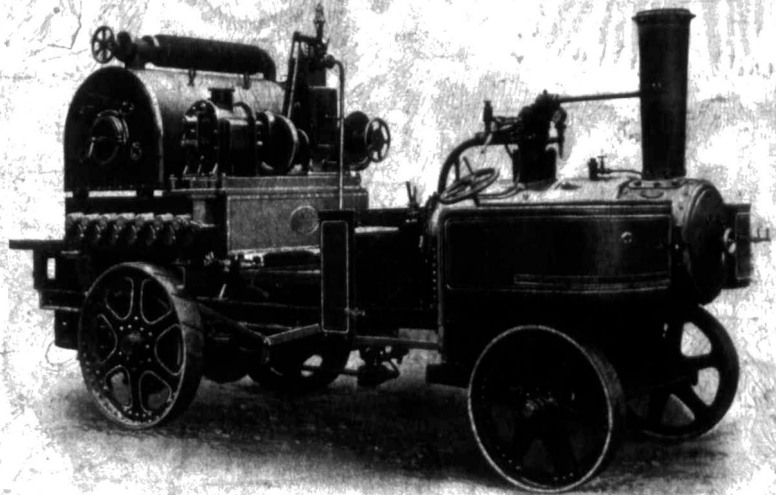


PETROL-DRIVEN MACHINE. TYPE "M."

Weight, 4 cwt.

This machine has been designed for carrying out disinfections rather more prolonged than those for which the hand-driven machine is suitable. The engine as well as the machine being air-cooled no water supply is needed and the apparatus is very compact.

This machine can be fitted with electric motor if desired.

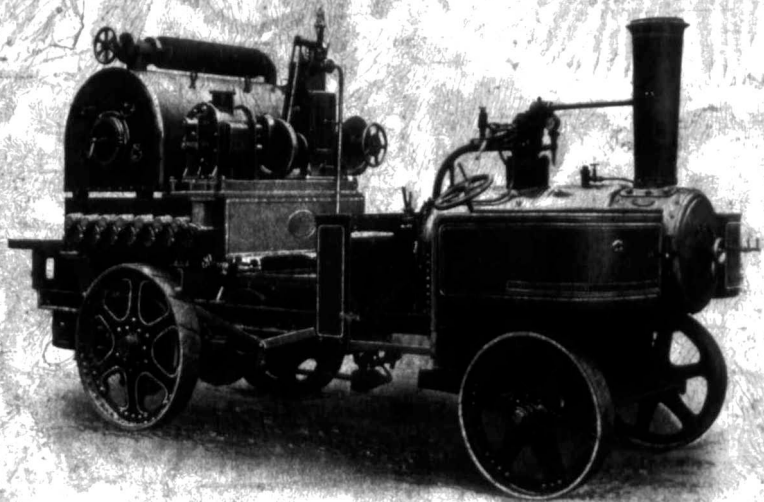


DISINFECTOR MACHINE, TYPE "A."

Fitted on steam wagon, which is capable of transporting it considerable distances, and of supplying steam for the engine. The machine can be easily removed from the wagon so that the latter may be used for general transport.

Weight of Machine and Wagon, 5 tons 4 cwts.

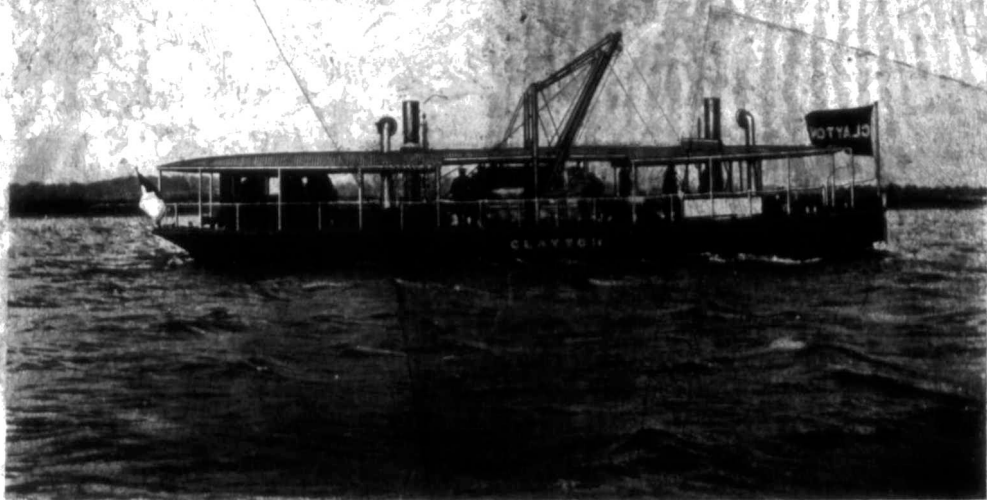




DISINFECTING MACHINE, TYPE "A."

Fitted on steam wagon, which is capable of transporting it considerable distances, and of supplying steam for the engine. The machine can be easily removed from the wagon so that the latter may be used for general transport.

Weight of Machine and Wagon, 5 tons 4 cwts.



TWIN SCREW SHALLOW-DRAUGHT STEAM LAUNCH FITTED WITH DISINFECTING MACHINE, TYPE "B."

(As supplied to the Mozambique Government for use at Delagoa Bay.)

Dimensions: 70 feet 6 inches  $\times$  13 feet 6 inches  $\times$  5 feet 6 inches. Speed, 6 1/2 knots.

This vessel is suitable for port or river work, and is fitted with two water-tube boilers, each capable of supplying sufficient steam to drive the launch or Clayton Machine, and of raising full steam pressure in 15 minutes.