

No. 698,109.

Patented Apr. 22, 1902.

E. FOURNIER.
DISINFECTING APPARATUS.
(Application filed Feb. 3, 1898.)

(No Model.)

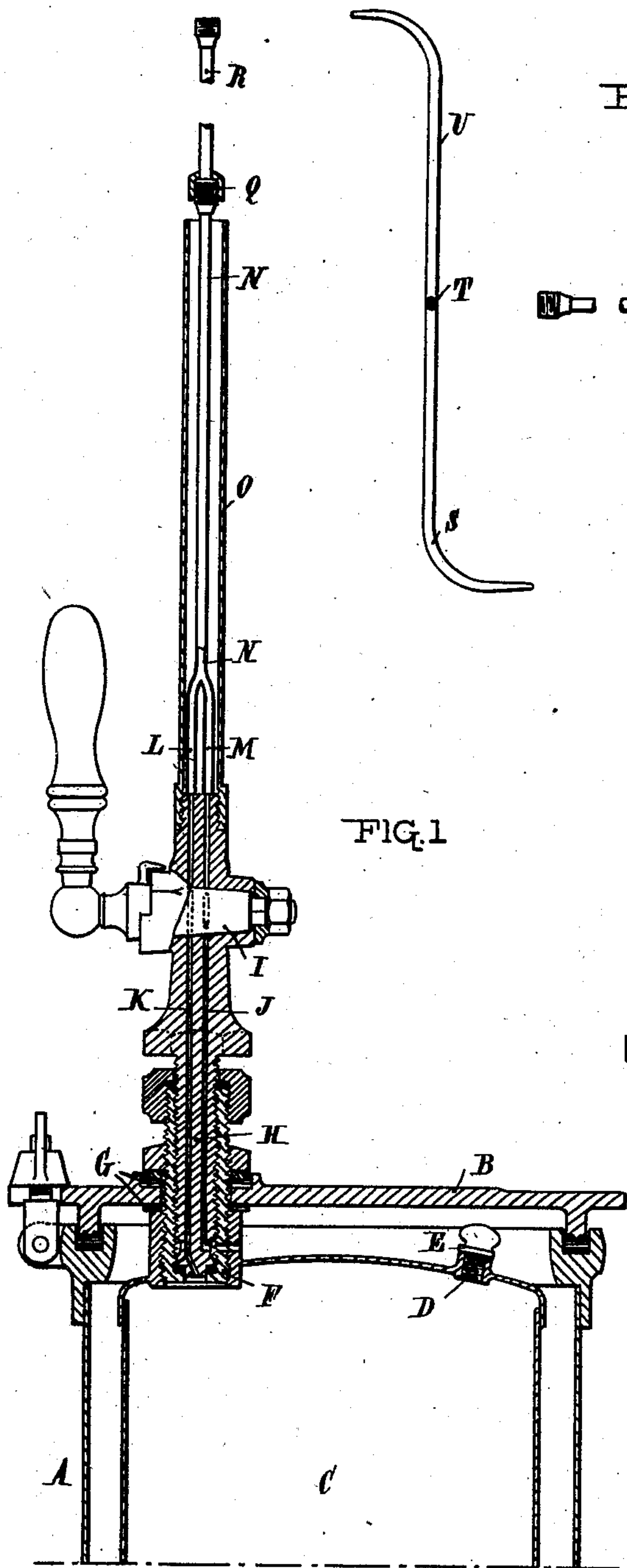


FIG. 1

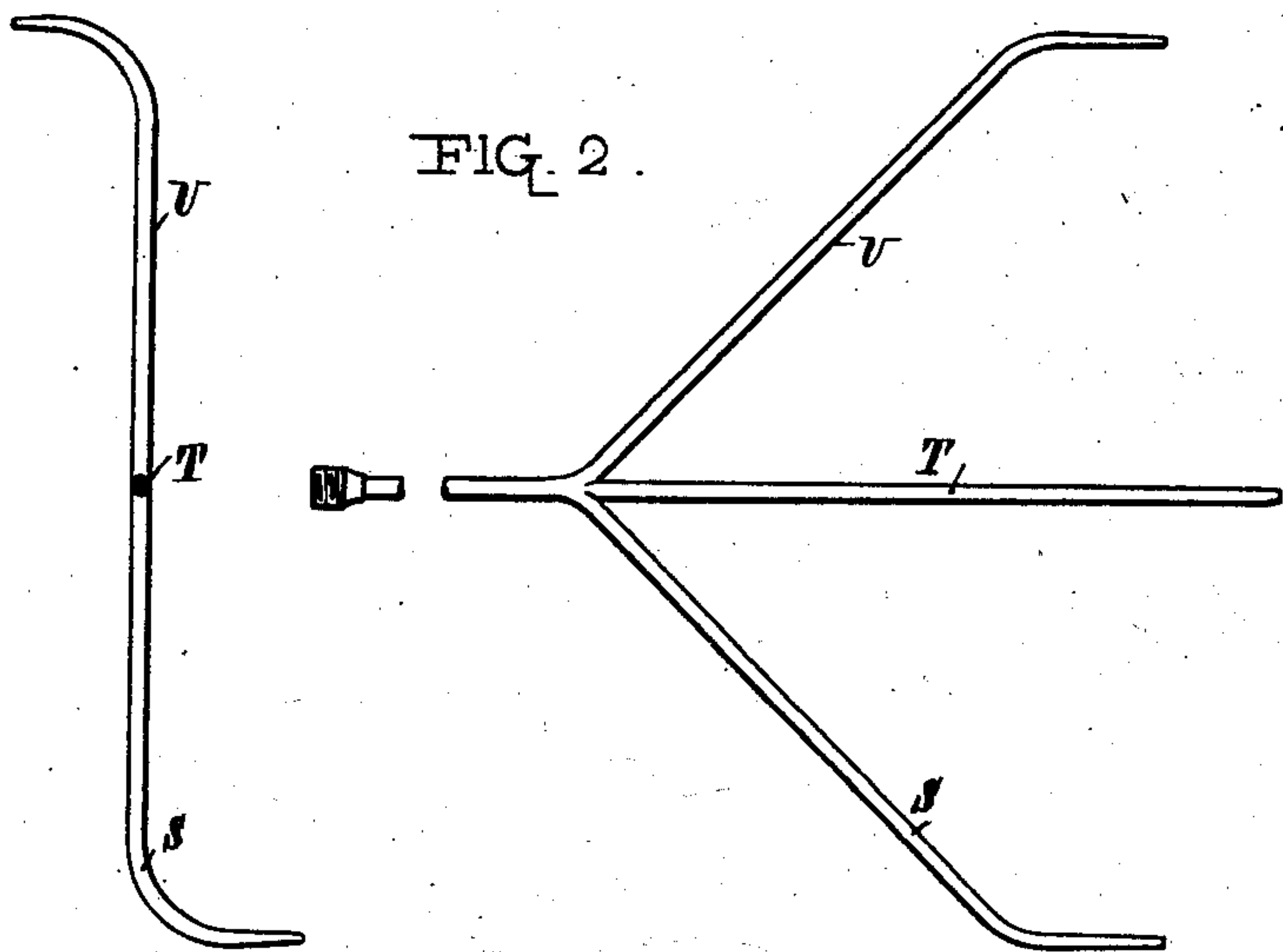


FIG. 2

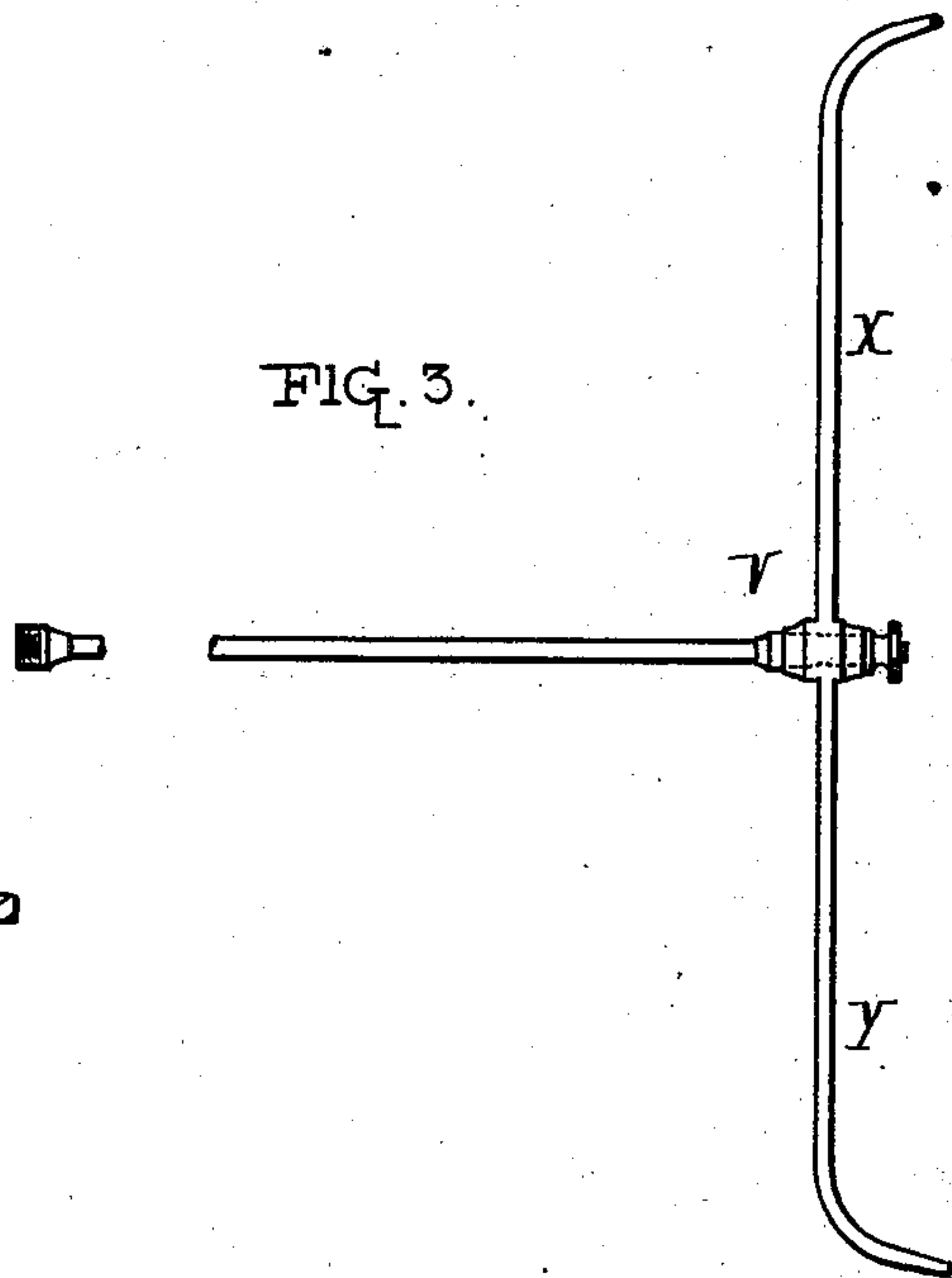


FIG. 3

Witnesses:

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EUGÈNE FOURNIER, OF PARIS, FRANCE.

DISINFECTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 698,109, dated April 22, 1902.

Application filed February 3, 1898. Serial No. 668,982. (No model.)

To all whom it may concern:

Be it known that I, EUGÈNE FOURNIER, a citizen of the Republic of France, residing at Paris, France, have invented a certain new and useful Disinfecting Apparatus, of which the following is a specification.

This invention has relation to an apparatus for disinfecting; and it consists in the novel construction, arrangement, and combination of parts, as hereinafter fully described, illustrated in the drawings, and pointed out in the appended claims.

In experimenting I have found that in order to completely disinfect dust or contaminated dry substances which are difficult to penetrate—such, for instance, as those containing anthrax spores—it is necessary to first saturate the atmosphere of the building, &c., with slightly alcoholized and alkalinized (say to the extent of 0.5 per cent.,) steam. The alcoholized and alkalinized vapors are obtained by adding to the water from one to five per cent. of alcohol and one-half per cent. of volatile alkali. These proportions are very small—in fact, for a building of one hundred cubic meters the quantity of water is two liters, so that only one hundred cubic centimeters of ethyl alcohol and five cubic centimeters of ammonia are necessary. It is, moreover, absolutely necessary for obtaining completely satisfactory results that this steam, as well as the disinfecting or sterilizing vapors subsequently injected, should penetrate or be diffused throughout the atmosphere. This is especially necessary when the dimensions of the place to be disinfected exceed sixty cubic meters and the height exceeds the usual height of a room—such, for instance, as is the case in official laboratories, where the minimum height is very often five meters. In order more particularly to sterilize contaminated dust and dry substances, I have found it best to generate disinfecting or sterilizing vapors by vaporizing a mixture of formaldehyde with alcohol and acetone. Having first moistened the atmosphere of the room by the first operation and before proceeding with the second operation, the floor of the room is sprinkled with the solution of the disinfectant used for said second operation.

One of the experiments made with the hereinbefore-described process related to fifteen cultures, with which fabrics and wood were impregnated and which comprised anthrax spores, the microbe of typhoid fever, the pyogenic microbe, &c., (*pus bleu*.) After twenty-four hours of contact the most perfect and absolute results were obtained, no germination taking place.

An apparatus enabling the easy and quick practical application of the hereinbefore described process to be made will now be described. For this purpose a hermetically-closable apparatus is employed, the construction of which will be easily understood from the description, with reference to the accompanying drawings, Figure 1 showing the essential parts of the apparatus in vertical section, Figs. 2 and 3 being detail views.

The apparatus comprises, Fig. 1, a hermetically-closing boiler or generator A with cover B, in which generator is arranged a cylindrical receptacle C, having a fixed bottom and cover, the latter of which is provided with an aperture D for filling, closed by an air-tight screw-plug E, and with a tubular projection or branch F, passing through the cover B of the boiler at G, the joint being rendered air-tight in any suitable manner. To this branch F is attached a short tube H, having a cock I, having a plug with two ways, one of which can come in line with the passage J, communicating at the bottom with the interior of the boiler A, and the other with the passage K, communicating with the interior of the receptacle C. The upper ends of these passages J and K are continued by two tubes L M, which come together at a certain height, merging into one tube N, which is made as long as desired. A protecting-casing O, attached to the end of the upper tube of the cock I, surrounds the tubes L, M, and N for a certain length. The tube N is preferably made of rigid metal. To its upper end is connected, by means of a screw union-piece Q, a continuation made of some flexible metal or material, so as to enable it to be bent in any direction. To the end of this extension may be joined other similar extensions made of flexible or rigid metal or material in any

desired number and of any length, or instead of these last extensions to the second extension may be, if required, directly connected a spraying or diffusing device. This device
 5 serves for projecting into and diffusing in the room, &c., firstly, the alcoholized and alkalized steam, which prepares the contaminated dust or material for the subsequent thorough impregnation with disinfecting vapors, and, secondly, the disinfecting vapors,
 10 after a sufficient interval has elapsed to enable the steam to condense and the pressure in the apparatus to be raised to four atmospheres, said projections taking place, preferably, at a pressure of about four atmospheres
 15 and for any desired length of time. Previously to these operations the room to be disinfected is closed in a more or less air-tight manner, the apparatus being placed outside
 20 and one of the tubes R being passed through a keyhole or any other suitable opening into the room.

The introducing or diffusing device according to the present invention consists, in one
 25 form, of a trident-shaped device, Fig. 2, the tubular prong or branch S of which is directed downward normally to the prong U, directed upward, while the branch T is arranged along the bisector of the angle formed
 30 by the branches S and U and is horizontal. The cross-sectional area of the tubular branches is preferably such that the pressure of steam in the generator A and of the vapors in the receptacle C is only slightly diminished.

35 It will now be easy to understand the new disinfecting and sterilizing process. The receptacle C, containing the required quantity of the disinfectant solution, is introduced into the generator A, which is closed by its cover
 40 B and contains a quantity of alcoholized and alkalized water required for heating the receptacle C and producing the steam required for the first operation according to the present process. The attachment containing the
 45 cock I is screwed into the socket F. The protecting-casing is then attached. The tube N is connected by its first extension of flexible tubing to a second extension, which is rigid
 50 and which has been put in place before closing up the room or place to be disinfected. This extension passes through the wall of the room through a keyhole or any other suitable opening and is connected inside the room
 55 with the projecting and diffusing device or trident S T U, either directly or by means of one or several other extensions, protected, if required, by a woollen or fabric covering, according to the length of the room. Then
 60 the generator A is heated by any suitable means, the cock I being successively opened at both its passages to a sufficient extent to enable air to escape both from the generator and from the receptacle C. The apparatus
 65 may be provided with a safety-valve and alarm-whistle set to the desired pressure, which should be about four atmospheres.

The signal given by said safety devices indicates that the apparatus has acquired sufficient pressure and is ready to work. The
 70 cock I is then turned so as to open the passage J, communicating with the generator. When it is considered that a sufficient quantity of steam has been projected, the cock I is closed in order that the pressure may again
 75 reach four atmospheres and also to enable the steam projected to condense. Then the cock I is turned so as to open the passage K from the receptacle C, by which disinfecting vapors are projected into the room. As already mentioned, it is necessary between
 80 these two operations to sprinkle the floor with a suitable quantity of the disinfecting solution. The alcoholized and alkalized steam in the first operation, as well as the disinfecting vapors in the second, are thus
 85 projected into the room or place to be disinfected in all directions. After the necessary amount of disinfectant has been applied the room must remain closed in an air-tight manner for a certain time in order to enable the
 90 disinfecting and sterilizing action to take place, which time in the experiment above related was twenty-four hours.

In certain cases and according to the arrangement of rooms instead of the trident
 95 S T U the projecting and diffusing apparatus may be constituted by a pivoted rotating tube or sprayer V, Fig. 3, rotated by the fluid escaping under pressure and the tubular branches of which, under the influence of this rotation,
 100 which can be regulated as desired in any manner, spray and diffuse said vapors, but in a less perfect manner than is done by the trident, Fig. 2. These two apparatus naturally
 105 may vary in shape and dimensions, according to the rooms or places treated.

When disinfecting bedding, clothing, and other articles in air-tight receptacles of any shape, size, and description, whether fixed or
 110 mounted on a vehicle, the branches of the trident may vary in shape and size. In some cases they may be entirely dispensed with, a simple nozzle or tube being employed.

I claim—

1. In an apparatus for use as described, the
 115 combination with a closed receptacle adapted to contain alcoholized and alkalized water, and an inner closed vessel adapted to contain disinfecting solution, of an extension containing two passages one communicating with the
 120 inner and the other with the outer receptacle, a rotatable plug having two bores adapted to cooperate with said passages as described, a tubular extension having two branches which communicate at one end with the said pas-
 125 sages and which merge at the opposite end into a single branch of the said tubular extension, and a diffusing or spraying device in communication with the said single branch of the tubular extension.

2. In an apparatus for use as described, the
 130 combination with an outer hermetically-clos-

able receptacle and an inner closed receptacle, of an extension F having passages J, K, the cock I, the tubular extension comprising the branches L, M, N, the casing O, flexible
5 extension R, and a spraying device connected with the latter extension, all as and for the purpose specified.

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

EUGÈNE FOURNIER.

Witnesses:

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