

No. 620,437.

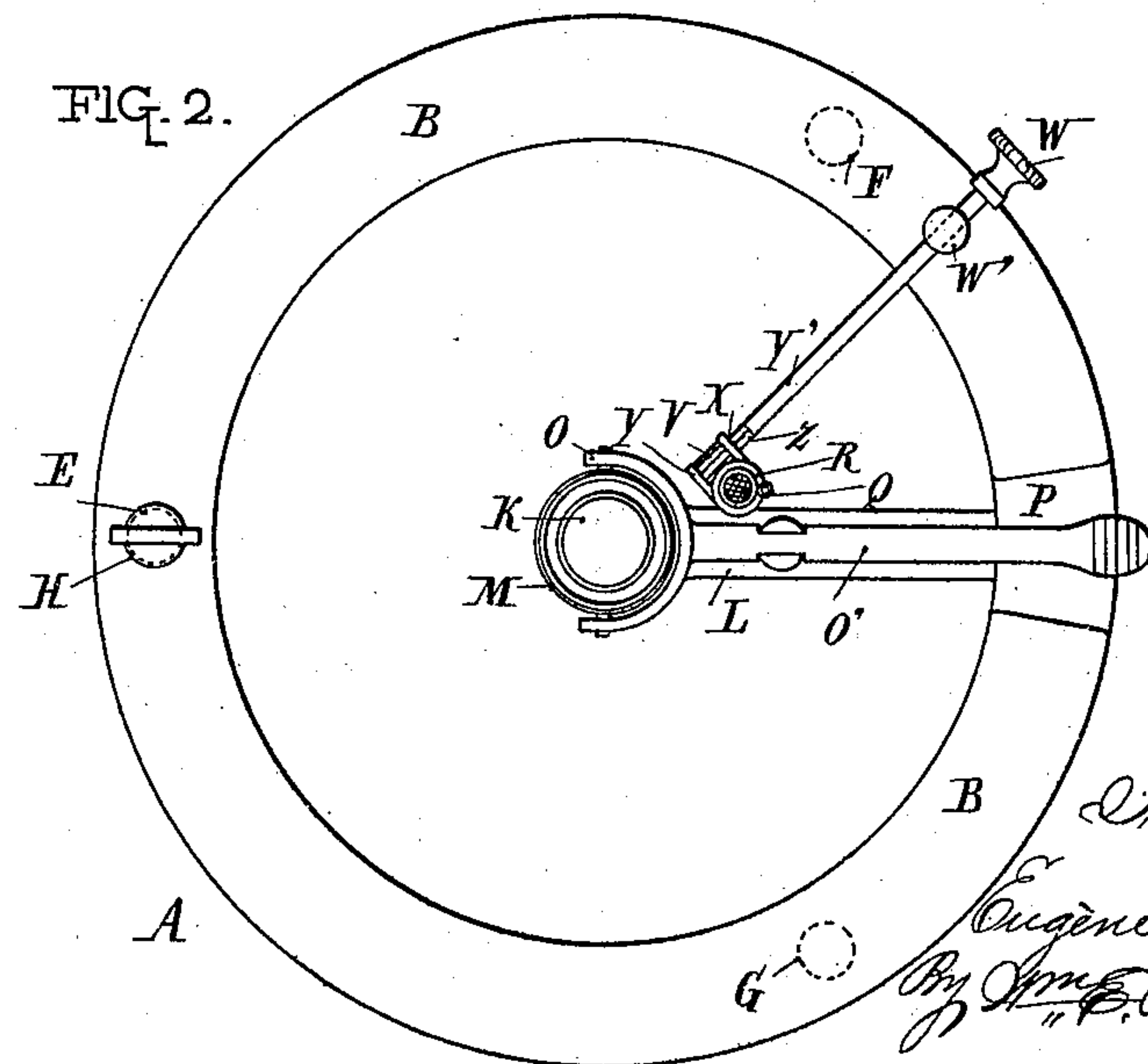
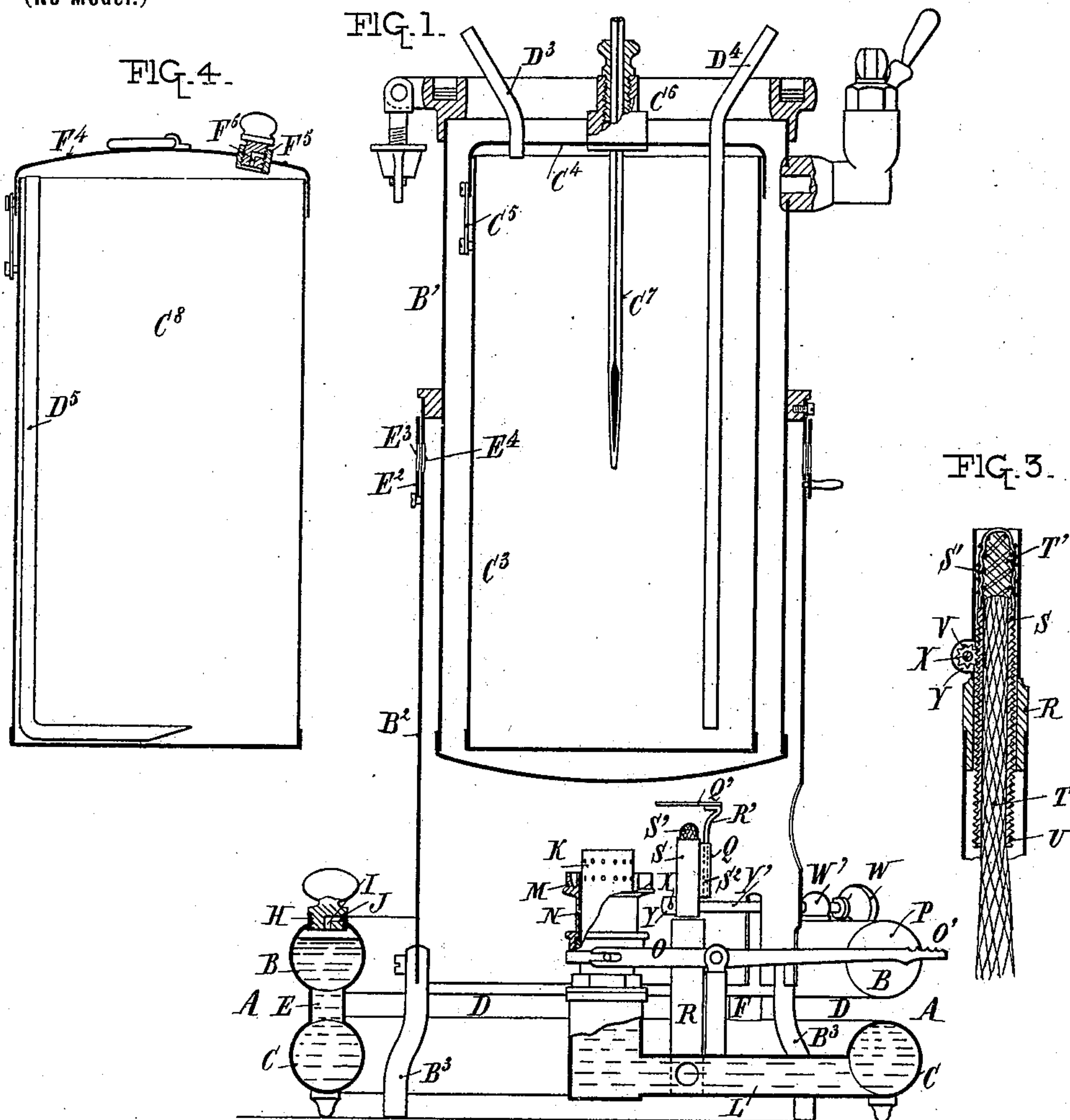
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E. FOURNIER.

APPARATUS FOR USE IN STERILIZING, DISINFECTING, &c.

(Application filed Feb. 4, 1898.)

(No Model.)



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APPARATUS FOR USE IN STERILIZING, DISINFECTING, &c.

SPECIFICATION forming part of Letters Patent No. 620,437, dated February 28, 1899.

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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 certain new and
5 useful Improvements in Apparatus for Use in Sterilizing, Disinfecting, &c., of which the following is a specification.

Numerous experiments which I have made (some at the Bacteriological Laboratory of the
10 University of Paris) with the apparatus for sterilizing and bacteriological culture forming the subject of my prior application, Serial No. 631,562, and which was heated by alcohol and did not possess any regulator, having
15 proved to me that said apparatus did not altogether resolve the problem in a practical and complete manner I have succeeded in designing a new and a more perfect apparatus, forming the subject of the present invention.
20 tion.

The principal drawbacks of my former apparatus were as follows: First, when sterilizing by the wet process, in which steam enters into the vessel through the air screw-plug unscrewed two turns and spreads from top to
25 bottom through bandages, dressings, or articles to be sterilized, it frequently happens when linen or strongly-compressed dressings are used that their central or lower portion is not sufficiently impregnated with steam and that consequently their sterilization is far from being effective and absolute; secondly, and this is of much greater importance, the lamp in the former apparatus being mounted directly on the bracket supporting the generator it often happened, (especially in the sterilizing operation for which a pressure of four atmospheres was required,) that the reservoir of the lamp directly exposed to the radiating heat reflected from the
30 bottom of the generator became quickly dangerously hot, so that its use was combined with serious drawbacks, especially for inexperienced operators. I sought to obviate this drawback by increasing the distance between
40 the generator and the lamp; but then the heating of the generator took place very slowly, so that the apparatus could not be started quickly. Moreover, the employment
50 of a safety-tube to neutralize the inner pressure in the body of the lamp, by enabling the alcohol to escape when nearly boiling, and

which became ignited at the orifice of said tube, caused the latter to act as a kind of reaction-wheel.

In the third place, in the operations for the purpose of bacteriological culture by means of the apparatus used as a receptacle with constant temperature the essential part for this purpose—the burner—could not maintain the
60 temperature constant and uniform, as absolutely necessary in such operations, owing to faults in its construction, which has been also shown by experiments.

The different experiments which I made
65 with different burners of well-known construction, whether with open wick or with a wick closed in a tube perforated at the top with small holes, have convinced me that these constructions must be abandoned for the following reasons: In case of burners with open or projecting wicks the latter become carbonized after a few hours, and as the vapors of the fuel used do not rise beyond the non-carbonized part the result is a considerable reduction of the height of the flame, and consequently of the heat supplied. This reduction can reach 4°, so that the apparatus works in an irregular manner and the results are unsatisfactory. In case of burners having
80 inclosed wicks and a blue flame the tube surrounding the wick, which can be moved by means of a tooth-rack in the fixed outer tube, whereby the height of the flame can be regulated without directly moving the wick, it is possible to heat the apparatus only to a very high temperature, owing to the wick-supporting tube not being capable of being sufficiently lowered relatively to its protective tube or casing without the flame becoming
90 extinguished, as the combustible vapors cannot be suitably supplied through the holes of the wick-supporting tube, which are then completely closed by the protecting-tube within which they are situated. Finally, in
95 the fourth place, to this drawback in the regulation of the heating of the vessel or receptacle is to be added another, which is the result of natural causes, the cooling at night, especially noticeable in cold weather.

In endeavoring to obviate the above drawbacks, which are sufficiently serious to render the former apparatus comparatively useless, I have succeeded in designing a new ap-
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paratus which will be now described with reference to the accompanying drawings, in which—

Figure 1 shows the apparatus according to the present invention in vertical section, and Fig. 2 is a plan according to Fig. 1 of the heating device. These figures are completed by the detail views, Figs. 3 and 4.

The new apparatus, Figs. 1 and 2, comprises an annular lamp-body A, constituted by two hollow tubes B C, arranged one above the other and leaving between them an open space D for the free circulation of air, said tubes being connected by tubular stays EF G, through which the two tubes B and C communicate with each other. The tube B is provided at the top with a filling-opening H, closed by a plug I, provided with an air-passage J for preventing a vacuum being produced in the body of the lamp as the combustible liquid contained in it is consumed.

In the center of the annular body A is arranged the main heating-burner K, connected to the lower tube C by means of a tubular passage L, through which the combustible liquid is supplied to said burner K. The latter comprises, in the usual manner, the lighting-cup M, supported by the sleeve N, for regulating and extinguishing the flame, which sleeve is operated by means of a pivoted fork O, the end O' of which, at the opposite end of the burner K, projects beyond the annular body A, the tube B being divided at this point P for the passage of said pivoted arm O' in order to allow it to oscillate freely.

The small burner Q, Figs. 1, 2, and 3, arranged near the burner K, is connected at the bottom by means of its protective tube R to the tube L, with which it communicates in such manner that the liquid fuel is also supplied through said conduit L to the burner Q.

The tube S, in which is placed the wick T, can be raised or lowered in the fixed outer tube R in the usual manner to enable the height of the wick T to be regulated, this raising and lowering being effected by means of a circular rack U, with which it is provided and which coöperates with a pinion V, the spindle X of which, supported in a fixed bracket Y, is operated from the exterior of the annular body A by means of a rod Y', connected to said spindle by means of a socket Z, with which the rod Y' is provided at the corresponding end, the opposite end projecting beyond the body A and being provided with a milled knob W. The rod Y' can freely slide in its fixed support W', carried by the tube B, so that said rod can be easily detached from the spindle X and moved away in case it is desired to detach the small burner when it is not required—as, for instance, during the sterilizing operations or for any other reasons.

The essential feature of the small burner Q consists in the wick-supporting tube S, terminating at the top in a hood S', of metallic

netting or gauze and closed at the top. In this hood is either placed the upper end of the wick T or an asbestos or other suitable wad, forming a continuation of said wick T and connected to or in close contact with it. It follows from this arrangement (clearly shown in the detail vertical section view Fig. 3) that the burner Q being lighted the metallic netting of which the hood S' is made will become heated and insure perfect conductivity and passage over its whole length for the combustible vapors, so that the flame may be made as weak as desired by lowering the wick-supporting tube S even below the orifice of the outer tube R without risk of extinguishing the flame and with perfect certainty of its regularity and intensity being maintained.

With the small burner Q of the described construction may be combined, when desired, a metal disk Q', which being horizontally supported at an adjustable height above the burner Q by means of its rod R', held in a socket S², connected externally to the tube R, diffuses the heat produced and prevents the flame from acting directly on the generator of the apparatus, thus forming a substitute for a water-bath or similar device.

For sterilizing operations, for surgical dressings, and for other articles, and also for the culture of microbes the lamp A is combined with a boiler or generating apparatus B', the sheet-metal casing B² of which is provided at the bottom with legs or brackets B³, resting on the same foundation-plate as the lamp, but perfectly independent of and inside the ring of said lamp, so that the apparatus and the lamp are not connected together, the body A of the lamp surrounding the base of the casing of the boiler and being outside and at a certain distance from the latter and not in contact, so that the radiating heat does not have any appreciable effect on the body of the lamp, and it is possible to considerably increase the heat without any danger by making the diameter of the head of the burner twice as large as hitherto, which would be impossible with the old burners.

This device insures, therefore, complete safety, as the body of the lamp A cannot become heated. Consequently the liquid fuel also contained in the tubes B and C in sufficient quantity to enable the heating to be continued for a time as long as required for the sterilizing operations or for the culture of microbes cannot become heated.

When the apparatus is to be used for bacteriological culture, the vessel C³, Fig. 1, will be used, having a cover C⁴, secured by hooks or catches C⁵, and comprising a socket C⁶, in which is placed and held frictionally a thermometer C⁷ and tubes D³ D⁴, providing for the aeration of the interior of said vessel during the operations. These tubes open at both ends. One, D³, projects wholly outside

the upper portion of the vessel, and the other, D⁴, extends downward to within about one centimeter of the bottom of the vessel.

For sterilizing operations in a dry or wet manner a vessel C⁸, of the construction shown in Fig. 4, will be used, comprising an inner tube D⁵, having the opening at the upper end of its vertical branch in the upper part of the vessel, the end of the horizontal branch, bent at a right angle to the first and preferably with a beveled end, being arranged at the bottom of the vessel, and a cover F⁴, secured by a hook attachment C⁵, and provided only with one opening F⁵, closed by a screw-plug F⁶, provided with an air-escape passage. When sterilizing in a dry way, the opening F⁵ is closed in an air-tight manner by its screw-plug being completely screwed down, and the bent tube D⁵ is not used. This opening F⁵ enables air to be introduced into the vessel after the latter has cooled at the end of the operation and a nearly complete vacuum has been produced therein by unscrewing the plug, say, a couple of turns, whereupon the removal of the cover becomes possible. When sterilizing by the wet process, the plug in the opening F⁵ is further unscrewed to enable steam to enter the vessel, said steam spreading or passing from top to bottom and also from bottom upward, owing to its passage from the top through the tube D⁵, and thence upward through the interior of the vessel, the articles to be sterilized being thus impregnated, practically simultaneously, from top to bottom and from bottom upward, no matter how said articles may be arranged in the vessel.

The above two operations, the wet and dry sterilization, always take place in the closed generator, the pressure varying from one and one-half or two atmospheres to four atmospheres.

Bacteriological culture is effected with the generator open, the cover being removed, so that the generator serves as a water-bath for the inner vessel C³, Fig. 1.

The vessel is maintained at a constant temperature, owing to the special construction of the apparatus according to the present invention, comprising a comparatively large metallic mass forming, as it were, a heat-accumulator. The small burner serves, after the vessel has been once heated to a suitable temperature, to prevent the metal, and consequently the whole apparatus, from cooling down, and

maintains it at the same constant temperature. The new burner fulfils its task in an absolutely satisfactory manner.

To obviate the drawbacks of the cooling of the apparatus during the night, the upper portion of the jacket B² of the boiler or generator is provided with holes or perforations E⁴, and on it is placed an adjustable ring or damper E², provided with corresponding holes E³. By turning this ring in one or in the other direction the holes E⁴ may be more or less opened or closed, and thus the heat from the lamp either all kept concentrated on the boiler or a greater or smaller part of it enabled to escape. In this way it is possible to exactly regulate the amount of heat acting on the apparatus for the purpose of preventing it from cooling, owing to the differences of the temperature of the surrounding atmosphere during the day and the night.

I claim—

1. Apparatus for use in sterilizing, disinfecting, or bacteriological culture comprising a vessel as B', a casing B² supporting said vessel, said casing being provided with perforations E⁴, a regulating-ring E², and an inner receptacle for the material to be heated, in combination with a heating device comprising two communicating tubes B, C, extending outside the generator-support and out of contact therewith, a central burner K, the adjustable sleeve N and forked lever O, and a secondary burner Q, comprising an outer tube R and inner adjustable wick-tube S carrying a metallic gauze cap S' closed at the top, substantially as described.

2. In heating apparatus for use in sterilizing or disinfecting or for bacteriological culture, a heating device comprising combustible liquid-containers B, C, arranged one above the other, and connected by vertical tubes, a central burner K, with an adjustable outer sleeve N, and a smaller burner Q, comprising an outer tube R, an adjustable wick-tube S, provided with a metallic gauze cap S', closed at the top, and means for adjusting said wick-holder as set forth.

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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