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DEVICE FOR STERILIZING INOCULATION NEEDLES AND LOOPS

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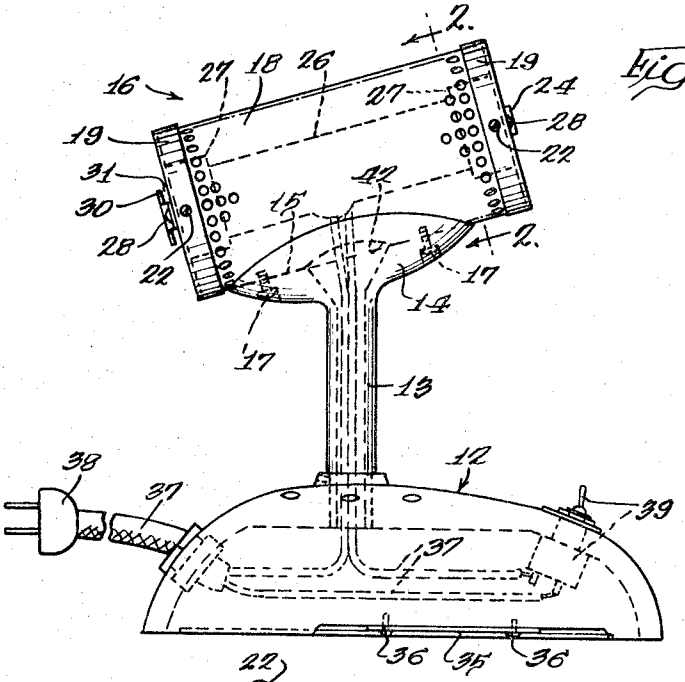


Fig. 1.

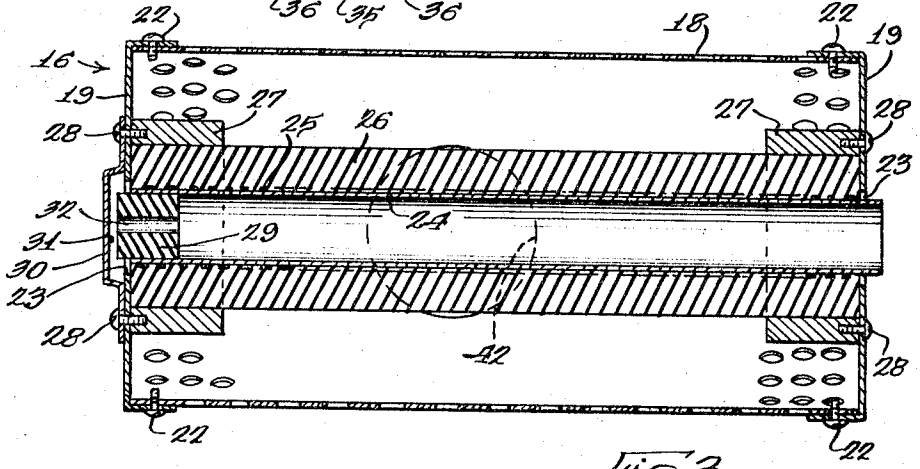
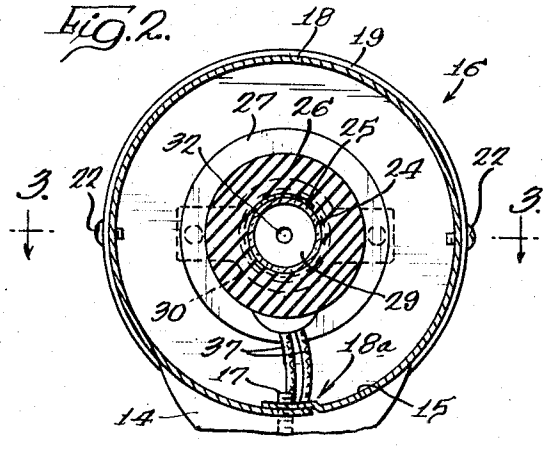


Fig. 3.

Fig. 2.



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DEVICE FOR STERILIZING INOCULATION NEEDLES AND LOOPS

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4 Claims

ABSTRACT OF THE DISCLOSURE

A device for sterilizing inoculating needles and loops which is capable of igniting microorganisms on the needles and loops while preventing spattering of the microorganisms to the surrounding atmosphere. The device comprises an electrically heated combustion chamber open at one end for receiving the inoculating needles and loops. The other end of the chamber is inclined downwardly and is provided with retaining means for preventing the needles and loops from sliding out. The retaining means is provided with a combustion air inlet which is covered with a spatter shield preventing spattering of microorganisms through the inlet but having air passages allowing air flow to the inlet.

This invention relates to a device for sterilizing inoculation needles and loops and more particularly relates to a device for igniting microorganisms on such needles or loops before and/or after use of the needles or loops in microorganism transfer procedures.

It is common practice in microbiology laboratories to use inoculating needles and loops for transferring microorganisms from a culture to a nutrient medium or the like, e.g. for eventual isolation of the organism. An inoculating needle or loop is an elongate member having a handle at one end and a microorganism-carrying portion at the other end. The microorganism-carrying portion is usually a blunt ended platinum wire needle or a length of platinum wire having a loop formed at the end. In use, the microorganism-carrying end is contacted with the microorganism desired to be transferred and is then contacted with the nutrient medium to which the transfer is desired.

After use, the inoculating needles or loops are cleaned or sterilized for reuse. This is usually accomplished by igniting the microorganism-carrying end in the open flame of a Bunsen burner. However, such ignition with direct flame causes immediate boiling, spattering and volatilization of the microorganism material which is usually a suspension of organic material in water. Such spattering and volatilization spreads the microorganism to areas about the flame or even throughout an entire laboratory or building and may cause contact with laboratory or other personnel. This can be very dangerous, especially where pathogenic fungi and pathogenic bacteria are involved.

It is a general object of this invention to provide a new and useful device for sterilizing inoculating needles and loops.

It is a more particular object of this invention to provide a new and useful device for igniting, and thereby destroying, microorganisms on inoculating loops and needles without spreading the microorganisms by spattering or the like.

Another object of this invention is to provide a device for receiving and holding inoculating loops and needles and which is capable of igniting the loops and needles while containing microorganisms against escape until the microorganisms are fully destroyed.

It is a further object to provide a device according to any of the foregoing objects, in which device the inoculating needles and loops can be readily inserted and are supported during ignition, and from which device the loops and needles can be easily recovered after ignition.

In a preferred form of this invention, it is an object to provide a highly efficient device according to any of the foregoing objects, which device has a low current requirement for use in microbiology laboratory to perform the sterilization within a reasonable length of time without requiring special high current wiring.

Other objects and improved features of this invention will be apparent from the following description and the drawings, in which:

FIGURE 1 is a side elevational view of a form of inoculating loop and needle sterilizing device, according to this invention;

FIGURE 2 is an enlarged section along line 2—2 of FIGURE 1; and

FIGURE 3 is a section along line 3—3 of FIGURE 2.

While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail a specific embodiment of the invention with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated.

Turning first to the specific exemplary embodiment of the device of this invention as illustrated in the drawings, with reference to FIGURE 1, the device includes a weighted cast aluminum base **12** having an upstanding hollow cast support post **13** received and secured in a bore in the top of base **12**. The upper end of post **13** is flared or expanded as at **14** and has a concave receptacle **15** (FIGURES 1 and 2) on the upper end for receiving and supporting an incinerator assembly **16** on an incline. Self-threading screws **17** secure the incinerator assembly **16** to flared end **14**.

As seen in better detail in FIGURES 2 and 3, the incinerator assembly **16** includes a foraminous or perforated tubular cooling shield or guard **18** which comprises a foraminous stainless steel sheet formed into a tube and having an overlap at **18***a* (FIGURE 2). Screws **17** are secured through the overlap **18***a*. A circular end cap **19**, formed from aluminum sheet material, is provided on each end of the shield **18** and is secured to the shield **18** by self-threading screws **22** to hold shield **18** in its tubular configuration. Each end cap **19** has a central opening **23**.

Heat-transmitting wall means define a heater tube **24** disposed centrally within shield **18**. A heating coil **25** is wound around tube **24**, and a tubular layer of insulation **26** is provided over the heating coil **25**. Support rings **27** receive the ends of the tubular layer of insulation **26** and are secured to the end caps **19** by suitable screws **28** to support the combination of tube **24**, coil **25** and insulation **26** generally centrally within shield **18**.

In the form illustrated, the heating coil **25** is wound generally evenly over the exterior of tube **24** to provide even heat on the interior surface of tube **24** along the length of the tube wall. The tube **24** is of an infra-red heat-transmitting material such as Vycor glass, a high silica

glass, providing an inner tube surface which is a very smooth and even heating surface. A ceramic plug **29** is provided in one end of tube **24**, i.e., the lower end of tube **24** with tube **24** disposed on the incline shown in FIGURE 1, so that inoculating needles or loops inserted from the other end of tube **24** will rest in tube **24** with their microorganism-carrying ends resting against plug **29** and their handled ends extending from the upper unplugged or open end of tube **24** so that the needles can be readily recovered.

It will be noted that plug **29** has a central combustion air inlet port **32** which is preferably sized for permitting entry of a minimum amount of combustion air needed for burning the microorganisms with the device loaded to capacity with microorganism bearing loops or needles. The air entering port **32** flows through tube **24** by convection during operation of the device. An end cap **30** is secured by screws **28** to enclose the outer end of port **32** and completely blocks escape of spattering microorganism from port **32** but has air flow passages **31** for permitting entry of air into port **32**. The inner surface of tube **24** is the Vycor glass surface.

Base plate **35** is secured by screws **36** to the bottom of the base **12** forming a generally enclosed cavity in base **12**. Electrically conductive wires **37** lead from a wall plug **38** or other suitable source of electricity through an on-off toggle switch **39**, thence through hollow column **13**, a port **42** in shield **18**, and through the insulation **26**, as lead wires to coil **25** for supplying electricity to coil **25**.

For operation, switch **39** is turned to "on" position and coil **25** immediately produces infra-red heat which penetrates the wall of tube **24** to evenly heat the inner surface of tube **24** over the length of tube **24**. The needles or loops are then inserted, microorganism-carrying end first, into the unplugged upper end of tube **24** which protrudes through opening **23**. During sterilization the loops or needles are hand held by their handled ends which project from the open end of tube **24** while the microorganism-carrying ends are near ceramic plug **29**. The incline of tube **24** is at a proper angle for convenient insertion of the loops or needles and for maintaining flow of sufficient air into port **32** by convection to supply combustion air within tube **24** and remove combustion gases from the open end of the tube. The infra-red heat, radiating the loop and needle ends, is not materially affected by the flow or draft of air through the tube.

Also, the incline and length of the tube **24** are proper for inhibiting or blocking the spattering of the microorganisms through the open end, and port **32** is of sufficient small diameter and sufficient length to inhibit or block spattering through port **32**; the updraft through port **32** may also help some in preventing escape of spattering microorganisms through port **32**. The angle of incline is not critical, but the optimum angle in any device will depend to a large extent on the arrangement, shape and size of the various compenents of the device. The angle is preferably such as to make insertion and withdrawal of needles and loops easier with the device resting on a laboratory bench of conventional height.

The device described above has been successfully used in sterilizing inoculating needles and loops. The smooth inner surface of the tube **24** is advantageous in lessening abrasion of the needles and loops during their insertion and withdrawal. The wall of tube **24** is transparent to infra-red and permits instantaneous transfer of infra-red heat so that optimum sterilizing temperatures can be reached within a matter of a few minutes, after switch **39** is turned on.

In a model of the illustrated device, tube **24** was about 0.5 inch in inner diameter and 6 inches in length, mounted at a 17 degree incline. Insulation **26** was 5⅜ inches long, spaced ⅛ inch from the plugged end and ⅛ inch from the open end of tube **24**. Coil **25** extended between positions spaced inward ⅛ inch from the ends of insulation **26**. Port **32** was ½ inch in length and 3 mm. in diameter. The structure had a current consumption of less than 0.9 ampere and required less than 110 watts at a maximum voltage of 120 volts, yet the device attained sterilization temperatures of about 1600° F. The low current requirement is advantageous in that a number of the devices can be run from one ordinary house circuit in a microbiology laboratory.

In use of the device, a ring of Petri dishes containing a suitable nutrient was placed around the device during sterilization operations using loops having Staphylococcus albus on the microorganism-carrying ends, and it was determined that microorganisms did not escape from the device to the Petri dishes. In conducting a similar experiment while using the open-flame Bunsen burner method of igniting a loop, the burner was ringed with Petri dishes containing the nutrient, and it was found that the Staphylococcus albus was transferred to the nutrient material in the dishes.

We claim:

1. A device for sterilizing inoculating needles and loops which comprises heat-transmitting wall means defining a receptacle for receiving and containing inoculating loops and needles bearing microorganisms, means outside said receptacle for heating said wall means over generally the entire inner surface of said wall means to microorganism ignition temperature, means for mounting said receptacle at an incline, retaining means at the lower end of said receptacle for retaining inoculating loops and needles against sliding from said lower end, a combustion air inlet through said retaining means, and a spatter shield means covering said inlet for preventing dissemination of microorganisms spattering through said inlet but having air passage means for permitting free flow of air to said inlet from outside said spatter shield means, the incline of said receptacle and the size of said inlet being such as to permit an updraft through said receptacle, when heated, of a minimum amount of air sufficient for burning the microorganisms when said receptacle is loaded to capacity with microorganism bearing loops and needles.

2. A device for sterilizing inoculating needles and loops which comprises an incinerator assembly including: an elongate tubular receptacle having an infra-red heat-transmitting wall, said receptacle having an open end for receiving inoculating loops and needles bearing microorganisms and a combustion air inlet end, infra-red electric resistance heater coil means surrounding said receptacle for heating said receptacle to microorganism ignition temperature, insulation means surrounding said coil means for minimizing escape of heat, foraminous covering shield means spaced from and surrounding said insulating means, means supporting said insulating means, coil means and receptacle from said covering shield means, retaining means at said combustion air inlet end of said receptacle for retaining inoculating loops and needles within said receptacle, a combustion air inlet through said retaining means, and spatter shield means covering said inlet for preventing dissemination of microorganisms spattering through said inlet but having air passage means for permitting free flow of air to said inlet from outside said spatter shield means; means for supplying electric power to said coil; and means for supporting said incinerator assembly with said receptacle on an incline and with the combustion air inlet end of said receptacle as the lower end; the incline of said receptacle and the size of said inlet being such as to permit an updraft through said receptacle, when heated, of a minimum amount of air sufficient for burning the microorganisms when said receptacle is loaded to capacity with microorganism bearing loops and needles.

3. The device of claim **2** wherein said means for supporting said incinerator assembly comprises a weighted base member and a hollow support post secured to said base member and mounting said incinerator assembly by said covering shield means.

4. The device of claim 3 including switch means mounted on said base for controlling the supply of electric power by said supplying means to said coil.

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