

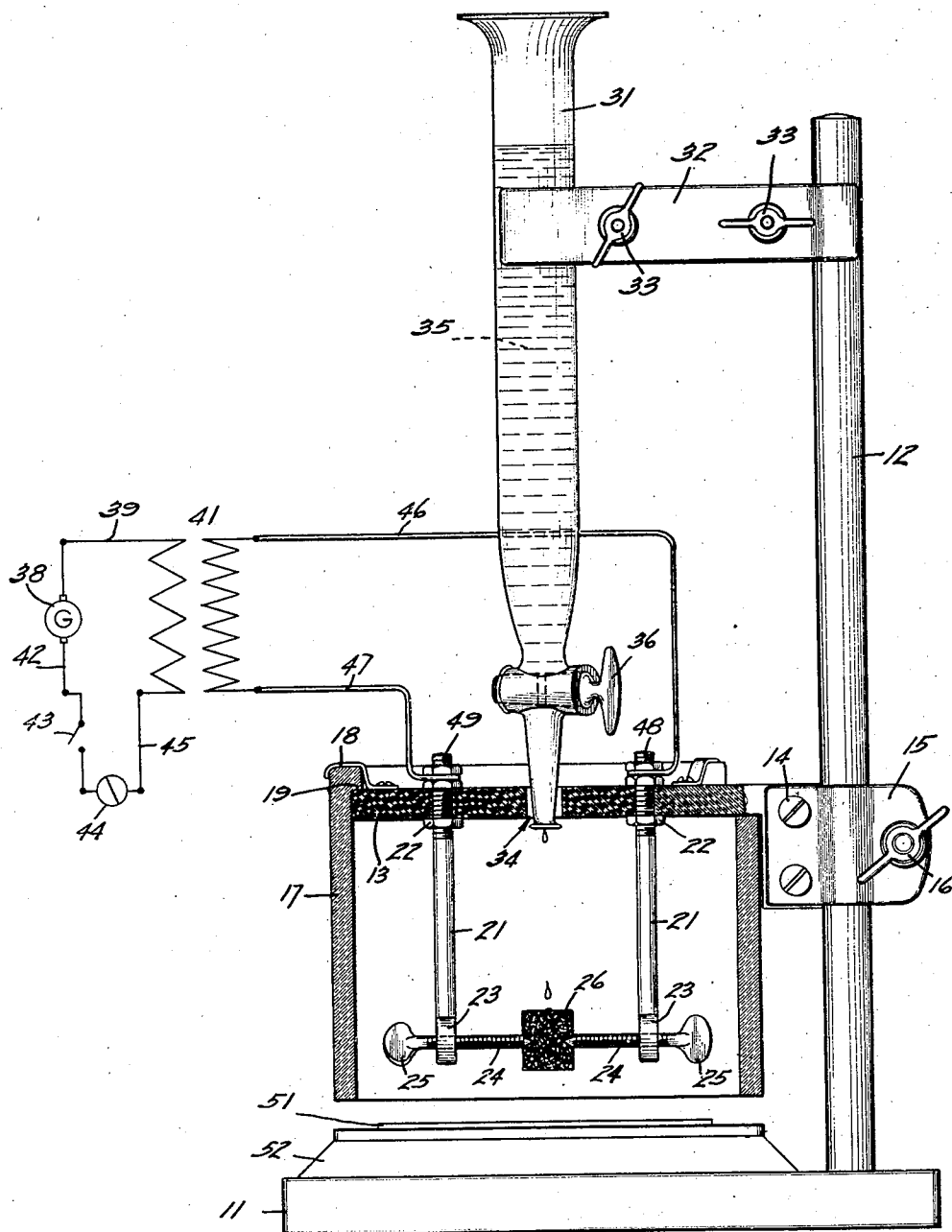
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ELECTRICAL STERILIZATION OF OBJECTS OR SUBSTANCES

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ELECTRICAL STERILIZATION OF OBJECTS
OR SUBSTANCES

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The present invention relates to a method of sterilizing substances or objects or surfaces electrically and has particular reference to sterilizing by the use of a naked arc having improved penetrating bactericidal characteristics. This improved form of electrical arc is described and set forth in my pending application on Method of producing electrical disruptive discharges, filed in the United States Patent Office October 11, 1930, as Serial No. 488,141.

The principal object of the present invention is the provision of a method of sterilization wherein the substance or object or surface being treated is subjected to the bombardment of an improved electrical arc or spark having highly penetrating rays of radiant energy of short wave lengths of the ultraviolet region and even shorter wave lengths approaching the X-ray region.

An important object of the invention is the provision of a method of electrical sterilization wherein the substance or object or surface being sterilized is subjected to an improved type of naked arc or spark having highly penetrating actinic light rays of the short wave length order.

The invention contemplates the maintenance of favorable arcing conditions for treatment of the articles being sterilized by utilizing arcs which have been formed by passage of high tension electrical current between spaced electrodes and along leakage paths of moisture vapor of certain characteristics.

Numerous other objects of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawing, discloses a preferred embodiment thereof.

By way of graphically illustrating the invention a simplified form of apparatus is schematically illustrated in the drawing and reference should now be had thereto.

A base 11 is used to support an upright standard 12 which in turn supports the apparatus for producing the electrical arc or spark. Such an apparatus comprises a plate 13 of insulating material, such as bakelite, which is held by screws 14 in a clamp 15 having a thumb nut 16 for locking the parts in position on the standard 12. A short section of glass tubing 17 is used to enclose the sparking apparatus and this is carried by the plate 13, clips 18 being used to secure the glass tubing 17 in proper position with an upper edge or shoulder 19, formed in the tubing, resting on the upper surface of the plate.

The electrical energy is conveyed to the sparking zone within the tubing by a pair of vertical

rods 21 threaded at their upper ends for engagement with the plate 13, nuts 22 being used for this purpose. The lower end of each rod is enlarged at 23 and is threaded to provide a seat for an adjustable screw electrode 24 having a head 25. The two screws 24 of the two electrodes are in alignment one with the other and are adjusted by turning within their seats to produce the desired sparking distance between their ends and, at the same time to clamp and hold an absorbent non-inflammable wick 26.

To provide the desired improved spark with its increased effective spacial limits, a high tension electrical current is passed between the spaced electrodes 24, the electrical energy in this passage following a conductive path (in effect a leakage path) provided by a moisture vapor resulting from moisture in the wick 26. This leakage path presents less resistance, electrically, than the resistance of the air and makes possible a spark or arc along that path which otherwise would not take place, owing to the great space between the electrodes. This will be further explained in connection with a description of the electrical circuits that follows.

The wick 26 is kept moist to the proper degree of liquid allowed to drip from a burette 31 retained in a vertical position by a clamping device 32 having thumb screw nuts 33, the clamping device engaging the standard 12 and holding the burette in fixed position. The lower spout end of the burette extends through an opening 34 and contains a suitable liquid, indicated by the numeral 35, which may be water. A valve 36 located adjacent the lower end of the burette, controls the amount of liquid passing through the spout. In operation this valve is set to permit the water to drip at intervals onto the upper surface of the wick 26 and this provides the proper moisture in the wick and supplies the moisture vapor for the arcing operation.

The rods 21 are connected in an electrical circuit which is preferably the secondary circuit of a transformer installation. The wiring diagram to illustrate the transformer circuits is illustrated in the drawing. A source of electrical energy is indicated as a generator 38 which is located in the primary circuit of the transformer system and this generator is connected by a wire 39 to one end of the primary winding of a transformer 41. A second wire 42 connects the opposite end of the generator, through a switch 43, with a circuit breaker or interrupter 44 which in turn is connected by a

wire 45 to the opposite end of the primary winding of the transformer.

The secondary winding of the transformer 41 is connected by wires 46 and 47 to the upper ends of the rods 21, the ends of rods forming binding posts 48 and 49 for electrically connecting the wires to the rods.

The object to be sterilized, which in the drawing is illustrated as a flat object, such as a sheet 51 which may be coated with a coating or other suitable substance, is placed on a table 52 formed in the base 11, and in this position is directly beneath the wick 26 and the ends of the screws 24. While in this position, the primary circuit 15 of the transformer 41 is closed by closing the switch 43 and the induced current formed in the secondary circuit of the transformer flows through a circuit which is completed by passage of electrical energy around the leakage path 20 formed by the moist wick 26 between the ends of the electrode screws 24.

This forms a spark or arc having increased spacial limits of great explosive effect and one which has high penetrating characteristics. Such a spark is rich in the highly actinic wave lengths of the ultraviolet range, and shorter lengths, and is spread out to such an extent as to produce a naked arc attendant with far less heat than is usually produced in an arc and one, therefore, having bactericidal characteristics. The blinding flash of this improved arc, produced as described, impinges on the surface of the article 51 penetrating within the body thereof and destroying the bacteria present.

The improved electrical spark or arc used in the present invention and produced by the mechanism just described has a swift moving or high velocity stream of electrons and a great quantity of effective energy and highly actinic light rays of different wave lengths. Such a spark or arc being spread out (increased spacially) by the moisture leakage path, is not attended with the intense heat ordinarily present in an electrical spark or arc and is, therefore, more effective as a sterilizing agent. In other words, it possesses increased effective spacial limits. This spark or arc, considered as a sterilizing agent, contains a great quantity of effective death dealing rays of various wave lengths of the short wave length order and waves having great penetration power.

The circuit breaker 44 interrupts the flow of the primary current and, therefore, maintains the explosive effect of the arcs which would otherwise entirely lose their dynamic character, as is well known in the electrical field.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description and it will be apparent that various changes may be made in the steps and their order of accomplishment of the process described without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the process hereinbefore described being merely a preferred embodiment thereof.

I claim:—

1. The method of electrically sterilizing objects which comprises, subjecting the object to an electrical arc having increased spacial limits formed by the passage of a high tension electrical current between spaced electrodes and along a leakage path.

2. The method of electrically sterilizing objects which comprises, subjecting the object to an electrical arc having increased spacial limits formed by the passage of a high tension electrical current between spaced electrodes and along a leakage path of moisture vapor.

3. The method of electrically sterilizing surfaces which comprises, placing the surface in close proximity to spaced electrodes, providing a leakage path between said electrodes, and passing a high tension electrical current between said electrodes and along said leakage path whereby an arc having increased spacial limits is formed and caused to impinge on said surface.

4. The method of electrically sterilizing surfaces which comprises, placing the surface in close proximity to spaced electrodes, providing a leakage path of moisture vapor between said electrodes, and passing a high tension electrical current between said electrodes and along said leakage path whereby an arc having increased spacial limits is formed and caused to impinge on said surface.

5. The method of electrically sterilizing surfaces which comprises, placing the surface in close proximity to spaced electrodes, providing a leakage path of moisture vapor between said electrodes, and intermittently passing a high tension electrical current between said electrodes and along said path of leakage while maintaining a constant moisture supply for said moisture vapor whereby successive arcs each having increased spacial limits are formed and are caused to impinge against said surface.

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