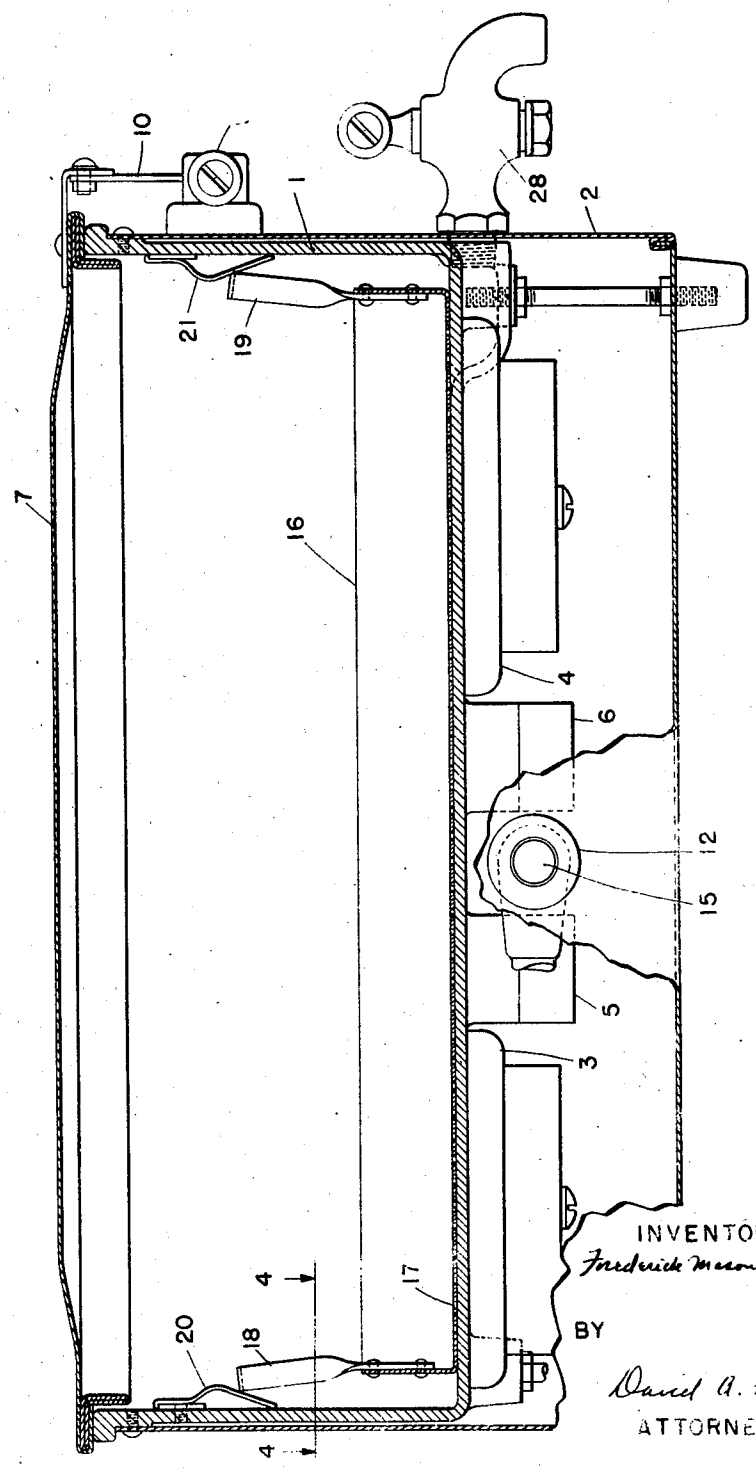
May 22, 1945. F. M. MINER, JR 2,376,611

WET-PACK STERILIZER

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FIG. 1.



May 22, 1945. F. M. MINER, JR 2,376,611

WET-PACK STERILIZER

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FIG. 2.

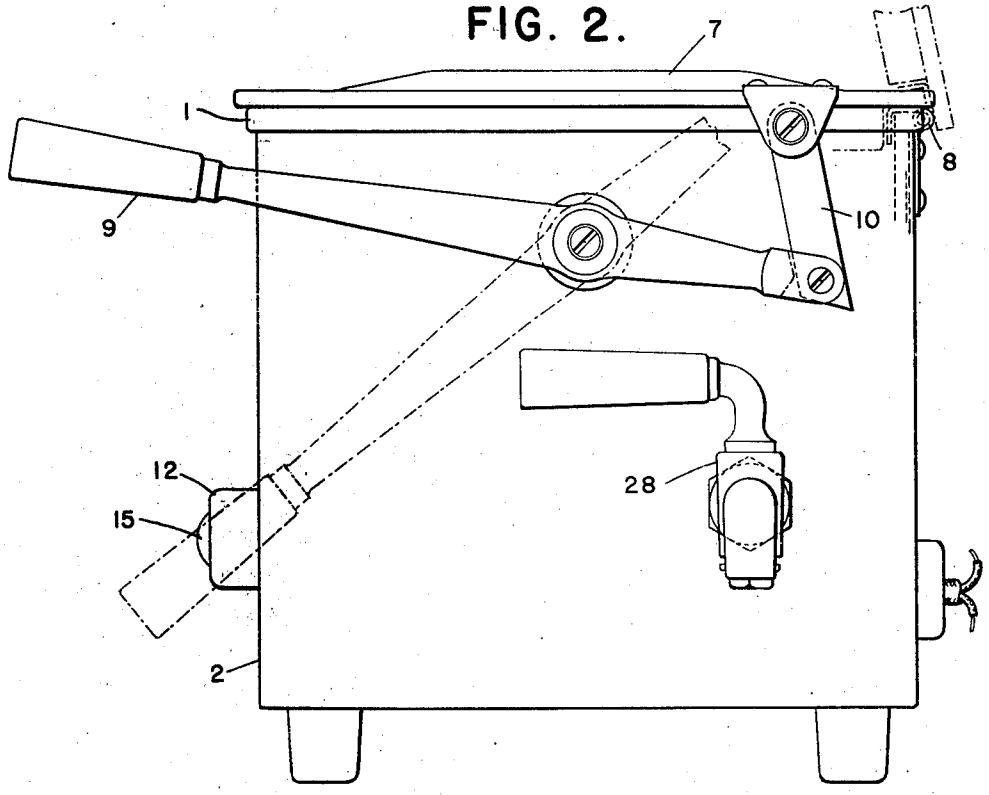


FIG. 3.

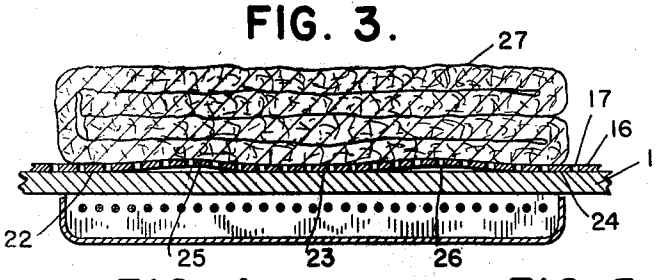


FIG. 6.

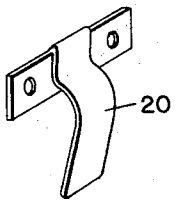


FIG. 4.

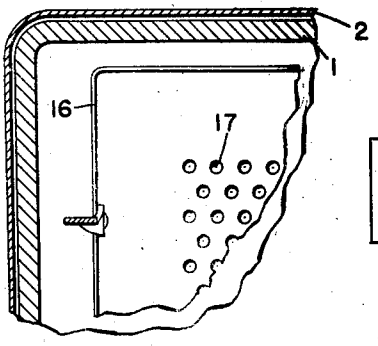
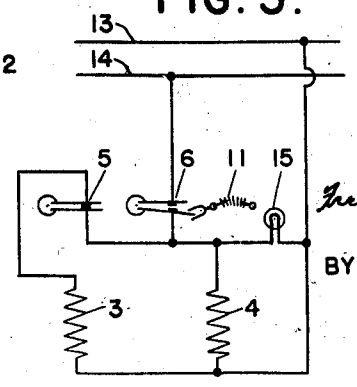


FIG. 5.



INVENTOR
Fredrick Mason Miner Jr
BY
David G. Fox
ATTORNEY

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WET-PACK STERILIZER

Frederick Mason Miner, Jr., Madison, Wis., assignor to Renim, Inc., Madison, Wis., a corporation of Wisconsin

Application September 27, 1941, Serial No. 412,542

8 Claims. (Cl. 21—2)

This invention relates to a method and apparatus for sterilizing wet-pack surgical dressings, such as are formed from a pad of gauze, or the like, and resides specifically in an apparatus and method by which such fomentations are converted from a cold, wet, thoroughly saturated, unsterilized condition to a hot, sterilized condition in which the pad is free from excessive moisture.

One object of this invention is to accomplish the above result without resort to any wringing, pressing, or squeezing to remove moisture.

Another object of this invention is to accomplish the desired result with a minimum of effort on the part of the operator and without resorting to superatmospheric pressures.

Another object of this invention is to provide a simple and effective apparatus which when operated in accordance with the method of this invention will produce an acceptable degree of sterilization.

This invention is herein described by reference to the drawings which form a part hereof and in which there is set forth, by way of illustration and not of limitation, one form of the apparatus of this invention.

In the drawings:

Fig. 1 is a side elevation, in section, showing the apparatus of this invention;

Fig. 2 is an end elevation of the apparatus shown in Fig. 1;

Fig. 3 is a detailed sectional view of a gauze pad undergoing treatment in accordance with this invention, the irregularity of the engagement between the barrier element and the heat source being shown exaggerated for the purpose of clarity;

Fig. 4 is a fragmentary plan view showing part of the barrier element;

Fig. 5 is a wiring diagram showing the connections employed in the apparatus illustrated in Fig. 1; and

Fig. 6 is a perspective, detail view of one of the barrier-holding clips.

Referring now to the drawings and particularly to Figs. 1 and 2 thereof, a sterilizer basin 1, formed of suitable material, such as cast bronze, is shown mounted within a supporting housing 2. The housing 2 extends downwardly beneath the bottom of basin 1 and forms an enclosure for heating elements 3 and 4 and thermostats 5 and 6, which are secured directly to the bottom of basin 1. The heating elements 3 and 4 are of the electrical resistance type of well-known form and the details of construction thereof are therefore not shown. The thermostatic switches 5 and 6 likewise are switches responsive to temperature, of well-known type, and are therefore also shown only in outline. The basin 1 is furnished with a lid 7 mounted upon hinges 8. For convenience in raising the lid, a handle 9 and pivotal link 10 are provided.

As shown in Fig. 5, the heating elements 3 and 4 are subject to the control of thermostatic switches 5 and 6 in the following manner: Thermostatic switch 6 is of the reset type, controlled by resetting means 11 actuated by a knob 12 located on the front of the housing 2. When the resetting device 11 is manually actuated by the knob 12 to bring the thermostat 6 into engagement, current from line leads 13 and 14 is supplied through switches 5 and 6 to the heating elements 3 and 4, which are then in parallel connection. At the same time a pilot lamp 15 housed within the knob 12 is lighted, showing the heating element to be in operation. Thermostatic switch 5 is so adjusted as to open and close automatically as the temperature of the heating element 3 rises above or falls below the approximate temperature of boiling water. Thermostatic switch 6, however, is arranged to open only when the temperature of the heating element 4 rises substantially above the boiling point of water, say in the neighborhood of 220 degrees F. Having opened, the thermostatic switch 6 will not close except by manual actuation of the knob 12 and the reset mechanism 11.

The apparatus thus far described is in all respects old and well known, being embodied in a large number of sterilizers in present day use. In order to adapt such a sterilizer to the purposes and uses of this invention there is provided within the basin 1 and resting closely against the bottom thereof a barrier member 16 in the form of a rectangular tray having a perforated bottom. The barrier 16 is formed of sheet metal of relatively thin section, the thickness thereof in the drawings being slightly exaggerated for the purpose of clarity. As shown more clearly in Fig. 4, the barrier 16 is provided with closely spaced perforations 17 which extend substantially throughout the extent of the bottom thereof.

Extending upwardly from the ends of the barrier 16 are handles 18 and 19 which engage respectively the clips 20 and 21. The clips 20 and 21 are formed of resilient sheet metal, such as spring brass, and are of the form shown more clearly in Fig. 6. The clips are securely fastened, as shown, to the inner end walls of the basin 1.

By reason of this construction the barrier 16 can be quickly removed from the basin 1 by simply grasping the handles 18 and 19 and raising it, and may be returned to the basin 1 as easily by the opposite movement. However, when the barrier 16 is in place, as shown in Fig. 1, the clips 20 and 21 exert a positive downward force upon the handles 18 and 19, thus pressing the barrier 16 into close contact with the bottom of the basin 1.

Because of the construction of barrier 16 from thin sheet metal, as described, engagement of the same with the bottom of basin 1, even under the resilient thrust applied by the clips 20 and 21, is such that a limited number of actual contacts between the barrier 16 and the bottom of basin 1 exists. The nature of these engagements is shown in somewhat exaggerated form in Fig. 3, where points of contact 22, 23 and 24 are indicated. Between these points of contact capillary free spaces 25 and 26 are shown.

The apparatus of this invention is thus constructed to permit the carrying out of the method of this invention, which consists in saturating a gauze pad 27 with water or medicated water solution. The pad is then placed within the barrier 16 and the barrier forced against the bottom of the basin 1. Current is then admitted to the heating elements 3 and 4 by turning the knob 12, as described. As the temperature of the bottom of basin 1 rises, excess liquid water contained within the pad 27 passes downwardly through the openings 17 and is carried by capillary action into the free spaces 25 and 26 in intimate contact with the bottom of the basin 1. By reason of this action, conduction of heat into the body of liquid water contained in the pad 27 proceeds at a relatively rapid rate until the temperature of boiling is reached. Thereafter conduction of heat continues at a relatively rapid rate and liquid water within the pad 27 boils.

In accordance with the method of this invention, it is necessary that boiling of liquid water within the pad take place in order to effect sterilization of the pad. The mere steaming at atmospheric pressure of surgical dressing material does not produce an effective sterilization, due probably to the lowered partial pressure of the steam occasioned by diluting air which is inevitably present when steaming at atmospheric pressure is attempted. This difficulty of obtaining effective sterilization by means of open steam is overcome by the method of this invention by producing actual boiling of liquid water within the dressing, thus insuring the raising of all parts of the dressing material to the temperature of boiling water. It is thus possible, by the method of this invention, to obtain effective sterilization without resort to superatmospheric pressure, thus dispensing with the inconvenience and expense of constructing and operating pressure-tight equipment.

As boiling of the liquid water within the pad 27 proceeds the water content thereof is continuously reduced until the pad 27 reaches a semi-moist condition. When this condition is attained liquid water is no longer drawn down through the openings 17 and the free spaces, such as 25 and 26, become emptied of liquid water. Thereafter conduction of heat from the basin 1 into the pad 27 proceeds at a greatly reduced rate and the bottom of basin 1 immediately rises in temperature. When this occurs the thermostat 5 interrupts the supply of current to the heater 3 and shortly thereafter the thermostat 6 also opens, terminating the supply of current to heater 4. When this stage is reached the pad 27 will be ready for use in thoroughly sterilized condition and in a semi-moist state suitable for the purposes for which such dressings are applied. Throughout the latter stages of the operation the barrier 16 serves the additional purpose of protecting the pad 27 from destructive temperature so that there is no danger of charring the dressing.

During the treatment some of the moisture driven from the pad condenses and drops to the bottom of the basin 1 beyond the margins of the barrier 16 and is drawn by capillarity beneath the barrier 16 to aid in maintaining the high heat conductivity required during the boiling step. The remainder of vapor driven from the pad 27 escapes beneath the lid 7. It is such escaping vapor which regulates and determines the length of treatment and therefore the lid 7 should rest loosely upon the top of basin 1. Because of the return of condensate, as above described, the openings 17 through the barrier 16 may be dispensed with as long as access to free spaces, such as spaces 25 and 26, is sufficiently free. Because of the difficulty of insuring such free access, it is preferred that the openings 17 be employed.

If it is desired to withdraw excess condensate from the basin 1, this may be done and a draw-off valve 28 is provided for this purpose.

At the completion of the treatment of a surgical dressing in accordance with this invention, as stated above, the moisture content is reduced to a state of semi-moistness and this is of particular advantage since it is not necessary thereafter to press, squeeze, or wring the pad before it is placed in use. When pads have been immersed in boiling water for the purpose of heating or sterilization, it is difficult to wring them out to the desired semi-moist condition without contaminating the dressing. The method and apparatus of this invention are therefore of particular advantage in that no subsequent step need be performed in order to render the dressing suitable for use.

What I claim as my invention is:

1. The method of sterilizing and removing water from a surgical dressing pad, which consists in saturating a pad with liquid water, placing said saturated pad in contact with a sheet metal barrier which is in contact with a heatable surface at spaced points surrounded by intervening free space areas, conducting part of the liquid water in said pad into said free space areas, heating said surface to cause heat to be transmitted through the liquid water contained in said free space areas and through said barrier into the liquid water contained within said pad to cause said water in said pad to boil, continuing said heating until liquid water is driven by boiling from said pad and free space areas, and then discontinuing the heating of said heatable surface in response to the resultant rise in temperature of said heatable surface.

2. The method of sterilizing and removing water from a surgical dressing pad, which consists in saturating a pad with liquid water, placing said saturated pad in contact with a perforated sheet metal barrier which is in contact with a heatable surface at spaced points surrounded by intervening free space areas, conducting part of the liquid water in said pad into said free space areas through the perforations in said barrier, heating said surface to cause heat to be transmitted through the liquid water contained in said free space areas and through said barrier

into the liquid water contained within said pad to cause said water in said pad to boil, continuing said heating until liquid water is driven by boiling from said pad and free space area, and then discontinuing the heating of said heatable surface in response to the resultant rise in temperature of said heatable surface.

3. The method of sterilizing and removing water from a surgical dressing pad, which consists in saturating a dressing pad with liquid water, placing said saturated pad in contact with a perforated sheet metal barrier which is in contact with a heatable surface at spaced points surrounded by intervening free space areas, loosely enclosing said pad and barrier, conducting part of the liquid water contained in said pad into said free space areas through said perforations, heating said surface to cause heat to be transmitted through the liquid water contained in said free space areas and through said barrier into the liquid water contained within said pad to cause said water in said pad to boil, and then continuing said heating until liquid water is driven from said pad and free space by boiling.

4. The method of sterilizing and removing liquid from a surgical dressing pad, which consists in saturating a dressing pad with a liquid aqueous medium, placing said saturated pad in contact with a sheet metal barrier which is in contact with a heatable surface at spaced points surrounded by intervening free space areas, conducting part of said liquid contained in said pad into said free space areas, heating said surface to cause heat to be transmitted through the liquid contained in said free space areas and through said barrier into the liquid contained in said pad to cause said liquid to boil, and then continuing said heating until liquid is driven from said pad by boiling.

5. In an apparatus for sterilizing surgical dressings, the combination comprising an enclosure formed of a basin having a bottom and a loosely fitting lid, a perforated barrier member in engagement with the bottom of said basin at spaced points, heating means for supplying heat to the outside of the bottom of said basin, and means dependent upon rise in temperature of the bottom of said basin in response to disappearance of liquid water in contact therewith for interrupting the supply of heat furnished by said heating means.

6. In an apparatus for sterilizing surgical dressings, the combination comprising an enclosure formed of a basin having a bottom and a loosely fitting lid, a perforated barrier member in engagement with the bottom of said basin at spaced points, means for resiliently maintaining the engagement between said barrier and said bottom, heating means for supplying heat to the outside of the bottom of said basin, and means dependent upon rise in temperature of the bottom of said basin in response to disappearance of liquid water in contact therewith for interrupting the supply of heat furnished by said heating means.

7. In an apparatus for sterilizing surgical dressings, the combination comprising an enclosure formed of a basin having a bottom and a loosely fitting lid, a perforated barrier member in close engagement with the bottom of said basin at spaced points, a pair of handles on said barrier member, resilient retaining means secured to the interior of said basin in position to engage said handles and to resiliently urge said barrier against said bottom, heating means for supplying heat to the outside of the bottom of said basin, and means dependent upon rise in temperature of the bottom of said basin in response to disappearance of liquid water in contact therewith for interrupting the supply of heat furnished by said heating means.

8. In an apparatus for sterilizing surgical dressings, the combination comprising a heatable surface, a perforated sheet metal barrier adapted to contact said surface at spaced points, means for resiliently urging said barrier into close engagement with said heatable surface, heating heans for supplying heat to said surface, and means dependent upon rise in temperature of said surface in response to disappearance of liquid water in contact therewith for interrupting the supply of heat furnished by said heating means.

FREDERICK MASON MINER, JR.