

March 9, 1965

A. L. JONES ETAL

3,172,302

SAFETY CONTROL MECHANISM FOR CYCLICALLY-OPERABLE APPARATUS

Filed Feb. 9, 1962

2 Sheets-Sheet 1

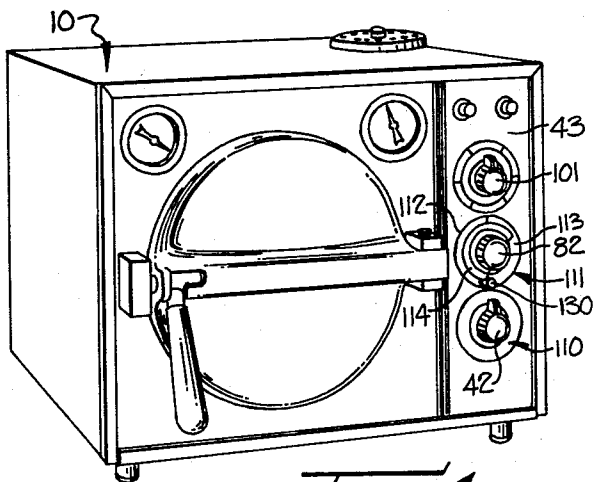


Fig-1

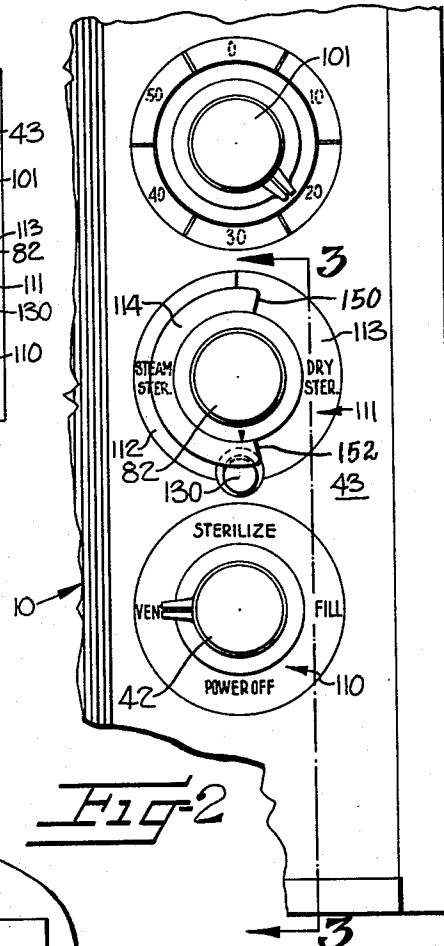


Fig-2

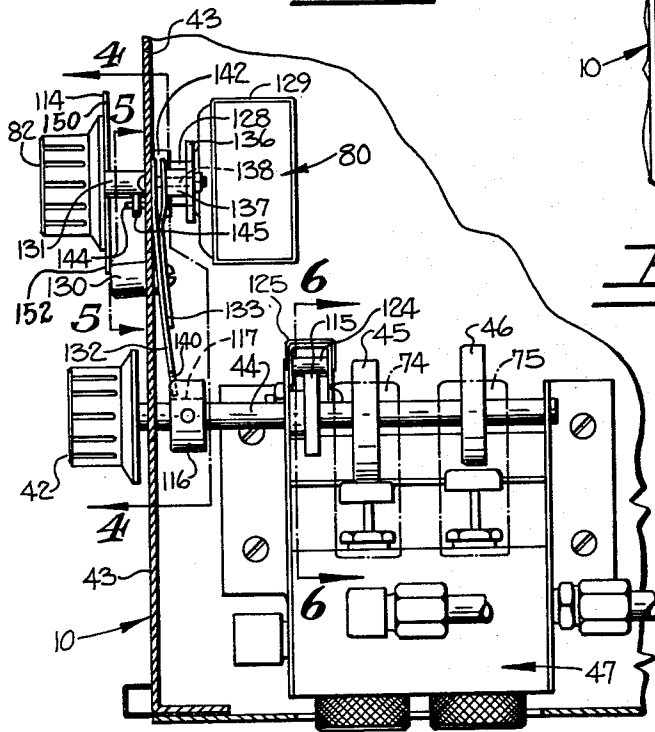


Fig-3

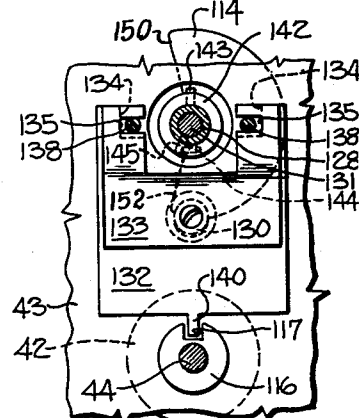


Fig-4

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2 Sheets-Sheet 2

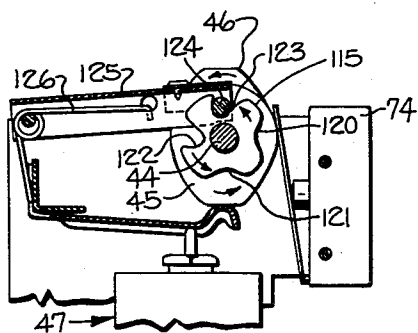


Fig-6

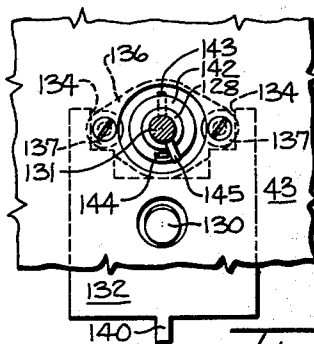


Fig-5

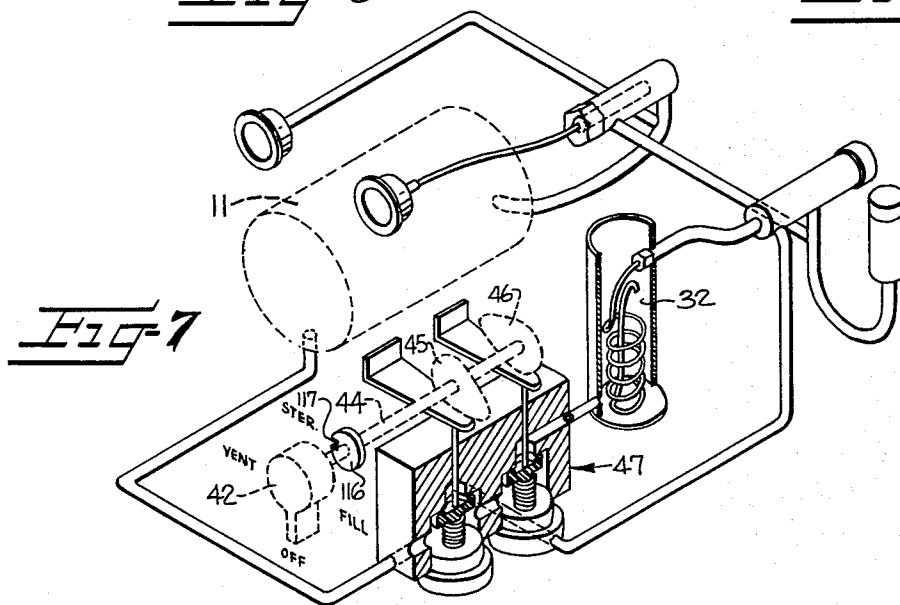


Fig-7

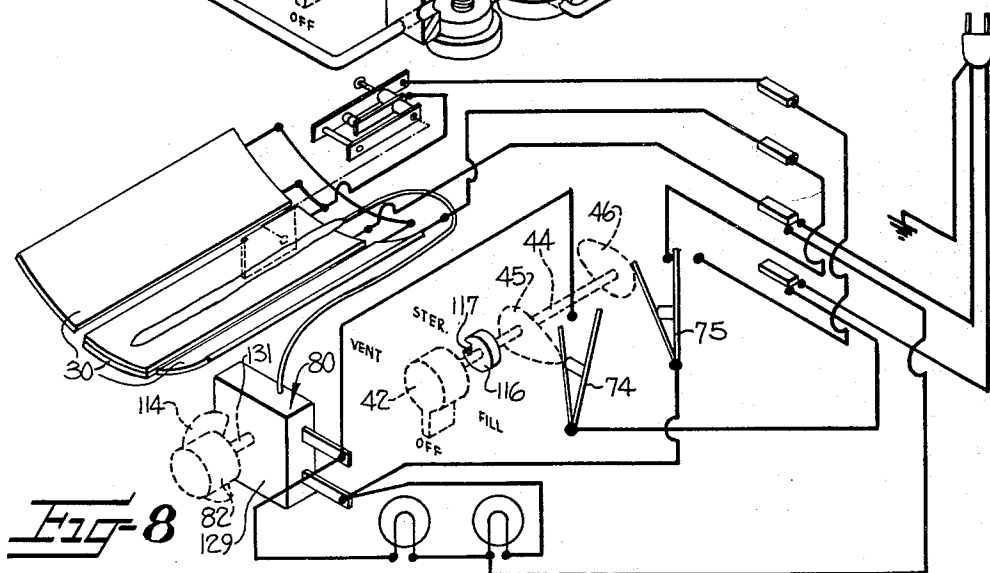


Fig-8

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3,172,302

SAFETY CONTROL MECHANISM FOR CYCLICALLY-OPERABLE APPARATUS

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Filed Feb. 9, 1962, Ser. No. 172,287

6 Claims. (Cl. 74-483)

The present invention relates generally to a control mechanism for regulating an apparatus during the various cycles of its operation, the control mechanism being one in which certain safeguards are provided to assure that the various operating cycles of the apparatus occur in proper sequence. More particularly, the present invention concerns a control mechanism for use in a dual-purpose sterilizer capable of performing sterilization treatments for dental and medical articles and supplies by employing either steam under pressure or sustained dry heat as a sterilizing agent, such as disclosed in our copending U.S. patent application, Serial No. 172,208, filed February 9, 1962.

Accordingly, it is a primary object of this invention to provide a control mechanism for regulating an apparatus during the various cycles of its operation, the control mechanism being of the type associated with a panel forming part of the housing for the apparatus on which cycle-identifying indicia appear, and including manually rotatable control knobs disposed on the side of the panel having the cycle-identifying indicia thereon, the control knobs being located adjacent cycle-identifying indicia corresponding thereto and being respectively secured to spindles extending through the panel for imparting rotation to the spindles as the control knobs are manually rotated between a plurality of selective positions to regulate the operation of the apparatus, and the present invention contemplating the provision of mechanical elements cooperating with the control knobs and with each other to insure that the various operating cycles of the apparatus cannot occur in an improper sequence likely to be damaging to the apparatus or hazardous in nature. Thus, the control mechanism according to the present invention includes built-in safeguards which prevent indiscriminate manipulation of the control knobs and require the control knobs to be rotated in their proper sequence to start and end the various cycles of operation of the apparatus in which the control mechanism is provided.

It is another more specific object of this invention to provide a control mechanism for a dual-purpose sterilizer capable of performing sterilization treatments for dental and medical articles and supplies by employing either steam under pressure or sustained dry heat as a sterilizing agent, such as disclosed in our copending patent application, Serial No. 172,208, filed February 9, 1962, wherein the control mechanism includes built-in safeguards (1) forestalling indiscriminate rotation of a thermostat-adjusting control knob for regulating the temperature at which a sterilizing procedure is carried on from the "steam sterilizing" sector of the cycle-identifying indicia corresponding to the thermostat-adjusting control knob, to the "dry sterilizing" sector until certain conditions are met; these conditions being the location of another cycle-determining control knob in "vent" position and the subsequent latching of the other control knob in the "vent" position with the latched condition of

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the other control knob in the "vent" position being assured during a dry heat sterilizing cycle by rotation of the thermostat-adjusting control knob from the "steam sterilizing" sector to the "dry sterilizing" sector in beginning the dry heat sterilizing cycle; and (2) restricting rotation of the cycle-determining control knob which may assume a plurality of selective positions including "power off," "fill," "sterilize" and "vent" positions to a predetermined sequence of rotation by preventing the rotation of the cycle-determining control knob from its "sterilize" position back to the "fill" position or from its "vent" position back to the "sterilize" position.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a perspective view of a dual-purpose sterilizer capable of performing sterilization treatments by utilizing either steam under pressure or sustained dry heat as a sterilizing agent, such as disclosed in our copending patent application, Serial No. 172,208, filed February 9, 1962, the dual-purpose sterilizer having a control panel with a plurality of rotatable control knobs associated therewith;

FIGURE 2 is an enlarged fragmentary front elevational view showing the control panel for the dual-purpose sterilizer of FIGURE 1 with the plurality of control knobs associated therewith and legends corresponding to each of the control knobs presenting cycle-identifying indicia;

FIGURE 3 is a fragmentary vertical sectional view taken along the line 3—3 in FIGURE 2 with the door closure on the front cabinet wall being omitted for purposes of clarity;

FIGURE 4 is a transverse vertical sectional view taken along the line 4—4 in FIGURE 3;

FIGURE 5 is a transverse vertical sectional view taken along the line 5—5 in FIGURE 3;

FIGURE 6 is a transverse vertical sectional view taken along the line 6—6 in FIGURE 3;

FIGURE 7 is a schematic view illustrating the piping system interconnecting various components of the dual-purpose sterilizer shown in FIGURE 1 for transmitting fluid to and from a sterilizing chamber as regulated by a cycle-determining control knob; and

FIGURE 8 is a schematic wiring diagram illustrating the electrical circuits for energizing heating elements employed in the dual-purpose sterilizer shown in FIGURE 1 as controlled by the cycle-determining control knob.

Referring more specifically to the drawings, while the safety control mechanism embodying the present invention is illustrated as being incorporated in the dual-purpose sterilizer disclosed in our aforesaid copending patent application Serial No. 172,208, filed February 9, 1962, it will be understood that the safety control mechanism is of a type suitable for general use in regulating an apparatus during the various cycles of its operation to prevent undesirable deviation from the normal sequence of the cycles involved in the operation of the apparatus. The dual-purpose sterilizer has an outer casing or housing forming a cabinet 10 in which a chamber 11 (FIGURE 7) is received. The chamber 11 is adapted to be used as a sterilizing chamber in which sterilization may be accomplished by either employing steam under pressure or sustained dry heat as a sterilizing agent. The piping system, as shown in FIGURE 7, and the elec-

trical system, as shown in FIGURE 8, for the dual-purpose sterilizer are the same as the piping system and the electrical system disclosed in our copending patent application Serial No. 172,208, filed February 9, 1962, to which reference may be made for a detailed description thereof.

The front wall of the cabinet 10 includes a control panel 43 on which a vertical row of three control knobs 42, 82, and 101 are disposed, proceeding from the lowermost control knob upwardly. The panel 43 is provided with suitable circular legends corresponding to each of the control knobs 42, 82, and 101—the circular legends being over-sized with respect to the control knobs so as to expose indicia thereon. The uppermost control knob 101 which is a timer control knob associated with a bell timer (not shown), and the circular legend which corresponds to the timer control knob 101 and bears numbers designating time intervals are not important components of the control mechanism for the purposes of this invention. It will be understood that when either the steam sterilizing cycle or the dry heat sterilizing cycle of the dual-purpose sterilizer begins, the timer control knob 101 may be rotated to dispose its pointer adjacent the desired time interval as numerally depicted on the circular legend appearing therebehind on the panel 43. Thereafter, the bell (not shown) associated with the timer control knob 101 will ring to signal that the time allotted for either the steam sterilizing cycle or the dry heat sterilizing cycle has elapsed.

The present invention is concerned with the control mechanism as applied to the manipulation of the intermediate and lower control knobs 82 and 42, respectively. The lower control knob 42 may be described as a cycle-determining control knob and is associated with a circular legend 110 on which cycle-identifying indicia appear. The circular legend 110 indicates a plurality of selective positions—"power off," "fill," "sterilize," and "vent"—for the cycle-determining control knob 42. The intermediate control knob 82 may be described as a temperature control knob as it regulates a modulating thermostat 80 (FIGURES 3 and 8) and may be rotatably adjusted for changing the degree of temperature attained in the chamber 11 during a steam sterilization cycle or a dry heat sterilizing cycle as desired. The circular legend 111 associated with the temperature control knob 82 is bisected into a "steam sterilizing" sector 112 and a "dry sterilizing" sector 113 for properly adjusting the modulating thermostat 80 to regulate the temperature within the chamber 11 during a steam sterilizing cycle and a dry heat sterilizing cycle, respectively. It will be observed that the intermediate or temperature control knob 82 has an arcuate flange 114, having end edges 150, 152, affixed thereto for a purpose to be subsequently described.

The lower or cycle-determining control knob 42 is mounted on the outer end of a shaft or spindle 44 which extends through a suitable aperture in the panel 43, the center of the aperture coinciding with the center of the circular legend 110 appearing on the panel 43 and corresponding to the control knob 42. The spindle 44 carries a pair of spaced apart cam members 45, 46 which are adapted to actuate a valve control mechanism 47 for regulating fluid flow in the piping system between the chamber 11 and a reservoir tank 32, while also actuating a pair of switches 74, 75 in regulating energization of the heating elements 30, the actuation of the valve control mechanism 47 and the switches 74, 75 by the cam members 45, 46 being effected in the manner described in our copending patent application Serial No. 172,208, filed February 9, 1962. Referring to FIGURES 3 and 6, it will be observed that the spindle 44 also carries a cam wheel 115 and a collar member 116 having a notch 117 formed therein. The collar member 116 is located between the panel 43 and the cam wheel 115 on the side of the panel 43 opposite from the side on which the control knob 42

is located. The cam wheel 115 is provided with a plurality of pockets, there being four in number corresponding to the four selective positions identified on the circular legend 110 by the cycle-identifying indicia "power-off," "fill," "sterilize," and "vent," respectively. The cam wheel 115 is illustrated in FIGURES 3 and 6 in the position it assumes when the control knob 42 is rotated so as to dispose its pointer in the "vent" position, it being observed that pockets 120 and 121 are identically shaped and have uniform sidewalls, the pockets 120, 121 corresponding to the "power off" and "fill" positions of the control knob 42. Pockets 122 and 123 on the cam wheel 115 which correspond to the "sterilize" and "vent" positions of the control knob 42 are identically shaped so as to present an over-hanging ledge on one side wall thereof, respectively, to prevent rotation of the cam wheel 115 in a direction opposed to either of the over-hanging ledges, as will be presently understood.

It will be appreciated that the cam wheel 115 acts in the nature of a ratchet for temporarily latching the spindle 44 and the control knob 42 affixed to the outer end thereof in one of the four cycle-identifying positions which may be assumed by the control knob 42. To achieve this temporary latching effect, a spring-biased roller 124 is disposed above the cam wheel 115, the roller 124 being carried in a pivotal lateral arm 125 having a U-shaped cross-section with the opposite ends of the roller 124 being journaled in the side walls of the lateral arm 125 at the end thereof opposite from the point about which the arm 125 pivots. The arm 125 and the roller 124 are continually biased so as to urge the roller 124 against the cam wheel 115 by means of a tension spring 126 (FIGURE 6). The pockets 120 and 121 corresponding to the "power off" and "fill" positions of the control knob 42 readily receive the roller 124 therein and have opposite side walls which offer only limited resistance to rotation of the control knob 42 imparting movement to the spindle 44 and the cam wheel 115 it carries in either a clockwise or counter-clockwise direction. On the other hand, the pockets 122 and 123 corresponding to the "sterilize" and "vent" positions of the control knob 42 each have one side wall provided with an obstructing over-hanging ledge which engages the roller 124 when the roller 124 is disposed in either pocket 122 or 123 for restricting movement of the cam wheel 115 in a direction opposed to the over-hanging ledge so as to prevent the rotation of the control knob 42 from "sterilize" back to "fill" position and from "vent" back to "sterilize" position—thereby avoiding possible harmful consequences if such rotary movement of the control knob 42 were allowed to take place.

As shown in FIGURE 6, the cam wheel 115 may be rotated along with the spindle 44 in response to the rotation of the control knob 42 in a counter-clockwise direction as indicated by the arrows associated with the cam wheel 115 throughout the complete sequence of the plurality of selective positions which may be assumed by the cycle-determining control knob 42 in starting and ending a steam sterilization treatment—proceeding from the "power off" position through the "fill," "sterilize," and "vent" positions of the control knob 42, respectively, and returning to the "power off" position. Additionally, the cam wheel 115 may be rotated along with the spindle 44 in response to the rotation of the control knob 42 in a reverse or clockwise direction from "fill" position back to "power off" position and from "power off" position directly to "vent" position—the latter sequence of rotary movement for the control knob 42 being important when sterilization within the chamber 11 is to be accomplished by sustained dry heat. The cam wheel 115 and the roller 124 cooperating therewith thereby restrict manual rotary movement of the cycle determining control knob 42 in certain instances where sterilization by steam under pressure is to be accomplished in the chamber 11 for assuring the orderly sequence of the cycles involved in the opera-

tion of the dual-purpose sterilizer for this purpose to prevent damage to the sterilizer and the articles to be sterilized which are loaded thereinto. The particularly restricted rotary movement of the control knob 42 also provides a safeguard against personal injury or damage to furnishings in the vicinity of the sterilizer which might otherwise be caused by an explosion or the ejection of superheated steam and water from the sterilizer, these disasters possibly occurring in instances where a control knob having a function similar to the cycle-determining control knob 42 can be freely rotated in either direction without restriction.

The control mechanism according to the present invention also provides for the prevention of indiscriminate rotary movement of the intermediate or temperature control knob 82 adjusting the modulating thermostat 80 between the "steam sterilizing" sector 112 and the "dry sterilizing" sector 113 of the circular legend 111 associated with the control knob 82. Referring more particularly to FIGURE 3, it will be seen that the arcuate flange 114 affixed to the control knob 82 is adapted to cooperate with a depressible button 130. The button 130 loosely penetrates an aperture formed in the panel 43 so as to extend through the panel 43 at a location below the control knob 82, but within the path of movement prescribed for the arcuate flange 114 upon rotation of the control knob 82. The control knob 82 is secured to the outer end of a spindle 131 extending through a suitable aperture in the panel 43 at a point spaced vertically above the button 130, the inner end of the spindle 131 being journaled within a bushing 128 secured to a housing 129 containing the modulating thermostat 89 and being affixed to an adjusting mechanism (not shown) within the housing 129 to preset the thermostat 80. It will be understood that the thermostat 80 may be preset by adjustment of the control knob 82 for obtaining a desired sterilizing temperature within the chamber 11 during the sterilization cycle, which may involve either steam under pressure or dry heat as a sterilizing agent depending upon the location of the pointer on the control knob 82 in either the "steam sterilizing" sector 112 or the "dry sterilizing" sector 113 of the circular legend 111 corresponding to the control knob 82.

The depressible button 130 is carried by an assembly comprising a flexible plate 132 having a bifurcated upper end defining a fork astride the aperture in the panel 43 through which the spindle 131 extends and a back-up plate 133 also having a bifurcated upper end defining a fork astride the aperture through which the spindle 131 extends, but spaced rearwardly of the bifurcated upper end of the flexible plate 132. The button 130 is secured to the flexible plate 132 and the back-up plate 133 by suitable means, such as a screw. It will be observed that the bifurcated upper end of the forward flexible plate 132 is provided with a pair of inwardly disposed recesses 134, 134 (shown in dotted lines in FIGURE 4) and that the bifurcated upper end of the back-up plate 133 is provided with a pair of inwardly opening grooves 135, 135 (FIGURE 4) coinciding with portions of the recesses 134, 134 in the bifurcated upper end of the flexible plate 132 corresponding thereto. The flexible plate 132 and the back-up plate 133 are suspended in place with their bifurcated upper ends straddling the spindle 131 by means of a substantially diamond-shaped mounting bracket 136 secured to the mouth of the housing 129 for the modulating thermostat 80 and a pair of spacer elements 137, 137 extending axially along opposite sides of the spindle 131. The rear ends of the spacer elements 137, 137 are suitably affixed to the diamond-shaped mounting bracket 136 (FIGURE 5) and the forward ends thereof bear against the oppositely disposed legs of the bifurcated upper end of the back-up plate 133. Each of the spacer elements 137, 137 includes a pin 138 extending axially forwardly thereof, the pins 138, 138 being respectively received within the corresponding one of the grooves 135, 135

formed in the bifurcated upper end of the back-up plate 133 for hanging the assembly comprising the flexible plate 132 and the back-up plate 133 from the spacer elements 137, 137.

The forward flexible plate 132 is longer in length than the back-up plate 133 and extends below the back-up plate 133 into proximity with the collar member 116 fixed on the spindle 44. A latching tab 140 integral with the lower end of the flexible plate 132 depends therefrom so as to be disposed in overlapping relationship with the collar member 116. The tab 140 is adapted to abut the collar member 116 whenever the control knob 42 is disposed in any of its four selective positions other than the "vent" position and thereby restricts depression of the button 130 in these positions assumed by the cycle-determining control knob 42. However, when the control knob 42 is disposed in the "vent" position, the collar member 116 will be so located as to align the notch 117 therein with the tab 140 on the flexible plate 132, thereby allowing manual depression of the button 130 to force the button-carrying assembly including the flexible plate 132 rearwardly with the tab 140 thereon being received within the notch 117.

An annulus 142 encircles the bushing 128 in which the spindle 131 is journaled, the annulus 142 being disposed adjacent the inner side of the panel 43 and being fixed against rotation by suitable means, such as a set screw 143 securing the annulus 142 to the bushing 128. The annulus 142 is provided with an axially extending prong 144 protruding outwardly through the aperture in the panel 43 receiving the spindle 131 and adapted to abut a lug 145 extending radially from the spindle 131 to limit further rotative movement of the control knob 82 in one direction.

It will be observed in FIGURES 2 and 3 that the disposition of the button 130 with respect to the arcuate flange 114 affixed to the control knob 82 is such that end edge 150 of the arcuate flange 114 will engage the button 130 along its length when the button 130 is not depressed to also limit further rotary movement of the control knob 82 in one direction. In this connection, the pointer on the control knob 82 cannot be disposed within the "dry sterilizing" sector 113 of the circular legend 111 corresponding to the control knob 82 unless the button 130 is depressed, but must be disposed within the "steam sterilizing" sector 112. It will be further understood that the button 130 cannot be depressed unless the lower cycle-determining control knob 42 is disposed in the "vent" position for aligning notch 117 in the collar member 116 with the latching tab 140 depending from the flexible plate 132 of the assembly to which the button 130 is secured. Upon placing the cycle-determining control knob 42 in the "vent" position and manually depressing the button 130 to flex the plate 132 backwardly for locating the tab 140 within the notch 117, the outer end of the button 130 will be disposed below the level of the arcuate flange 114, and the control knob 82 can then be manually rotated to dispose its pointer in the "dry sterilizing" sector 113. As shown in FIGURE 3, once the control knob 82 has been rotated to dispose its pointer in the "dry sterilizing" sector 113, the arcuate flange 114 will be arranged in overlying relationship to the button 130 to retain the button 130 in a depressed position. The retention of the button 130 in a depressed position by the arcuate flange 114 causes the tab 140 to be held within the notch 117 formed in collar member 116, thereby preventing rotary movement of the cycle-determining control knob 42 out of the "vent" position.

Thus, it is assured that sterilization by sustained dry heat can only take place within the chamber 11 when the control knob 82 for adjusting the modulating thermostat 80 is rotated so as to dispose its pointer in the "dry sterilizing" sector 113, such rotation of the control knob 82 requiring the cycle-determining control knob 42 to be initially disposed in the "vent" position and causing the

cycle-determining control knob 42 to be releasably locked in the "vent" position as long as the pointer on the control knob 82 is disposed in the "dry sterilizing" sector 113. Upon completion of a sterilization treatment by sustained dry heat, the control knob 82 may be further rotated in a counterclockwise direction until the button 130 is clear of the flange 144 and therefore end 150, whereupon the assembly comprising the flexible plate 132 and the back-up plate 133 will snap forwardly to force the button 130 carried thereby out of depressed position and to remove the tab 140 from the notch 117, thereby freeing the cycle-determining control knob 42 for rotary movement from "vent" position to "power off" position.

Where steam sterilization is to be used in the chamber 11, manual rotation of the control knob 82 in a clockwise direction is limited by abutment between end edge 150 of the arcuate flange 114 and the button 130, since the button 130 is not depressed, so that the pointer on the control knob 82 will lie within the "steam sterilizing" sector 112 of the circular legend 111 corresponding to the control knob 82.

Where dry heat sterilization is to be used in the chamber 11, manual rotation of the control knob 82 in a clockwise direction is limited by abutment between the lug 145 on the spindle 131 and the prong 144 on the annulus 142 (the button 130 being depressed in this instance) so that the pointer on the control knob 82 will lie within the "dry sterilizing" sector 113. Control over the control knobs 42 and 82 with regard to the particular sterilizing agent being employed in a sterilization treatment is thereby maintained by our safety control mechanism.

It will therefore be seen that we have devised a safety control mechanism for regulating an apparatus during its various operating cycles to assure that the intended sequence of such cycles will be observed and that improper switching of such cycles by inadvertent or careless manipulation of the control knobs for operating the apparatus cannot occur. In particular, the safety control mechanism is applicable to the dual-purpose sterilizer disclosed in our copending patent application Serial No. 172,208, filed February 9, 1962. Our safety control mechanism avoids dangerous or costly mistakes in operating the dual-purpose sterilizer and actually serves as a "silent teacher" directing the correct operation of the sterilizer for producing effective sterilization treatments by steam under pressure or by sustained dry heat even when the sterilizer is attended by inexperienced personnel.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

We claim:

1. In a control mechanism for regulating an apparatus during its various operating cycles, wherein the control mechanism includes a panel having cycle-identifying indicia thereon, a rotatable spindle extending through said panel, and a rotatable control knob disposed adjacent said cycle-identifying indicia on said panel, said control knob being affixed to an end of said spindle for imparting rotary movement thereto in response to manual rotation of said control knob between a plurality of selective positions; the combination therewith of

- (a) a depressible button mounted on said panel adjacent to said control knob,
- (b) resilient means urging said button outwardly with respect to said panel to an extended position,
- (c) a flange affixed to said control knob, said flange being in proximity to said button and having an end edge adapted to abut said button along its length to prohibit further rotative movement of said control knob in one direction,
- (d) said button being depressible beneath said flange to remove the prohibition against further rotative

movement of said control knob in said one direction, (e) whereby said control knob may be rotated in said one direction for disposing said flange in overlying engagement with the outer end of said button when depressed, and

(f) said flange when in said overlying engagement with said outer end of said button maintaining said button depressed.

2. In a control mechanism for regulating an apparatus during its various operating cycles, wherein the control mechanism includes a panel having cycle-identifying indicia thereon, first and second rotatable spindles extending through said panel, and first and second rotatable control knobs disposed adjacent cycle-identifying indicia corresponding thereto on said panel, said first and second control knobs being affixed to respective ends of said first and second spindles for imparting rotary movement thereto in response to manual rotation of said first and second control knobs between a plurality of respective selective positions; the combination therewith of

- (a) a collar member encircling said first spindle and fixedly secured thereto adjacent said panel on the inner side thereof opposite from said first control knob,
- (b) said collar member having a notch formed therein,
- (c) a depressible button mounted adjacent to said second control knob and extending through an aperture formed in said panel,
- (d) resilient means urging said button outwardly with respect to said panel to an extended position,
- (e) a tab operably connected to said button and movable therewith, said tab extending below said button for reception within the notch formed in said collar member,
- (f) said tab being disposed in overlying relation to said collar member and out of alignment with the notch formed therein when said first control knob is located in all but one of the plurality of selective positions it may assume to restrict depression of said button by abutment of said tab with said collar member,
- (g) a flange affixed to said second control knob, said flange being in proximity to said button and having an end edge adapted to abut said button along its length when in its extended position to restrain said second control knob against further rotative movement in one direction,
- (h) said tab being aligned with the notch in said collar member upon rotation of said first control knob to said one of the plurality of selective positions it may assume for releasing the restriction on the depression of said button,
- (i) said tab being moved backwardly from said panel and within the notch in said collar member in response to depression of said button when the restriction thereagainst has been released, and
- (j) said button being depressible beneath said flange to remove the restraint against further rotative movement of said second control knob in said one direction,
- (k) whereby said second control knob may be rotated in said one direction for disposing said flange in overlying engagement with the outer end of said button when depressed to prevent said button from being returned to extended position from depressed position by said resilient means and to restrain said first control knob from rotary movement out of said one selective position in which said first control knob is located, and
- (l) said resilient means returning said button from depressed position to extended position upon rotation of said second control knob in a direction opposite to said one direction and to an extent disposing said flange out of overlying relationship with said button.

3. In a control mechanism for regulating an apparatus during its various operating cycles, wherein the control mechanism includes a panel having cycle-identifying indicia thereon, first and second rotatable spindles extending through said panel, and first and second rotatable control knobs disposed adjacent cycle-identifying indicia corresponding thereto on said panel, said first and second control knobs being affixed to respective ends of said first and second spindles for imparting rotary movement thereto in response to manual rotation of said first and second control knobs between a plurality of respective selective positions; the combination therewith of

- (a) a collar member encircling said first spindle and fixedly secured thereto adjacent said panel on the inner side thereof opposite from said first control knob,
- (b) said collar member having a notch formed therein,
- (c) a depressible button mounted adjacent to said second control knob and extending through an aperture formed in said panel,
- (d) a flexible plate bearing against the inner side of said panel and said button and urging said button outwardly with respect to said panel to an extended position,
- (e) a tab integral with said plate and extending below said button for reception within the notch formed in said collar member,
- (f) said tab being disposed in overlying relation to said collar member and out of alignment with the notch formed therein when said first control knob is located in all but one of the plurality of selective positions it may assume to restrict depression of said button by abutment of said tab with said collar member,
- (g) an arcuate flange affixed to said second control knob, said arcuate flange being in proximity to said button and having an end edge adapted to abut said button along its length when in its extended position to restrain said second control knob against further rotative movement in one direction,
- (h) said tab being aligned with the notch in said collar member upon rotation of said first control knob to said one of the plurality of selective positions it may assume for releasing the restriction on the depression of said button,
- (i) said plate bending backwardly from said panel in response to depression of said button when the restriction thereagainst has been released for moving said tab within the notch in said collar member, and
- (j) said button being depressible beneath said arcuate flange to remove the restraint against further rotative movement of said second control knob in said one direction,
- (k) whereby said second control knob may be rotated in said one direction for disposing said arcuate flange in overlying engagement with the outer end of said button when depressed to prevent said button from being returned to extended position from depressed position and to restrain said first control knob from rotary movement out of said one selective position in which said first control knob is located, and
- (l) said flexible plate returning said button from depressed position to extended position upon rotation of said second control knob in a direction opposite to said one direction and to an extent disposing said flange out of overlying relationship with said button.

4. In a control mechanism as defined in claim 3, and further including means restricting manual rotation of said first control knob between the plurality of selective positions it may assume to a limited number of predetermined sequences, said means comprising

- (a) a cam wheel affixed to said first spindle on the

side of said panel opposite from said first control knob,

- (b) said cam wheel having a plurality of circumferentially arranged pockets formed therein corresponding in number to the plurality of selective positions which may be assumed by said first control knob,

- (c) a roller mounted in proximity to said cam wheel for reception within each of said plurality of pockets formed therein,

- (d) means biasing said roller against said cam wheel for selectively disposing said roller within each of said plurality of pockets depending upon the selective position assumed by said first control knob, and

- (e) restraining means associated with at least one of said pockets for abutting said roller to oppose rotation of said cam wheel in one direction and require manual rotation of said first control knob to take place in the other direction only.

5. In a control mechanism as in claim 4, wherein said flexible plate has a bifurcated upper end disposed astride said second spindle and engaging the inner side of said panel, and further including

- (a) a back-up plate engaging the side of said flexible plate distal from the inner side of said panel,

- (b) said back-up plate having a bifurcated upper end disposed astride said second spindle,

- (c) screw means interconnecting said button and said plates, and

- (d) means including a substantially diamond-shaped bracket securing said bifurcated upper ends of said plates astride said second spindle.

6. In a control mechanism for regulating a combination dry-heat and steam-heat sterilization apparatus having means for selecting any desired one operating condition of said apparatus from among alternative "power off," "fill," "sterilize" and "vent" operating conditions; means for selecting any desired temperature of said apparatus from among a plurality of temperature values within a first temperature range effective to produce steam sterilization when said apparatus is in a "sterilize" operating condition, and for selecting any desired temperature of said apparatus from among a plurality of temperature values within a second temperature range effective to produce dry-heat sterilization when said apparatus is in a "vent" operating condition; a manually rotatable temperature control knob, said last-mentioned means including said temperature control knob and said temperature control knob being rotatable to and through alternative steam-heat sterilization and dry-heat sterilization arc-positions; a manually rotatable operating condition control knob, said first-mentioned means including said condition control knob and said condition control knob being rotatable to alternative "power off," "fill," "sterilize" and "vent" positions; the combination thereof of

- (a) means operatively connected to said control knobs for prohibiting rotation of said condition control knob out of its "vent" position while said temperature control knob is in its dry-heat sterilization arc-position, and for prohibiting rotation of said temperature control knob to its dry-heat sterilization arc-position while said condition control knob is in any position other than its "vent" position; and

- (b) means operatively connected to said condition control knob for prohibiting rotation thereof from its "sterilize" position to its "fill" position and from its "vent" position to its "sterilize" position while permitting rotation thereof from its "power off" position to its "fill" position and from its "fill" position to its "sterilize" position and from its "sterilize" position to its "vent" position and from its "vent" position to its "power off" position and from its "power off" position to its "vent" position.

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References Cited in the file of this patent

UNITED STATES PATENTS

548,599	Valley	Oct. 22, 1895
2,239,525	Johnson et al.	Apr. 22, 1941
2,503,226	Turner et al.	Apr. 4, 1950
2,748,910	Klecker	June 5, 1956
2,762,876	Glogan et al.	Sept. 11, 1956

2,798,468
2,855,795
2,878,601
2,891,784
2,918,155

5

761,858

12

Heidner	July 9, 1957
Beal	Oct. 14, 1958
Burmeister et al.	Mar. 24, 1959
Taylor	June 23, 1959
Stelzer	Dec. 22, 1959

FOREIGN PATENTS

Germany	Aug. 16, 1954
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