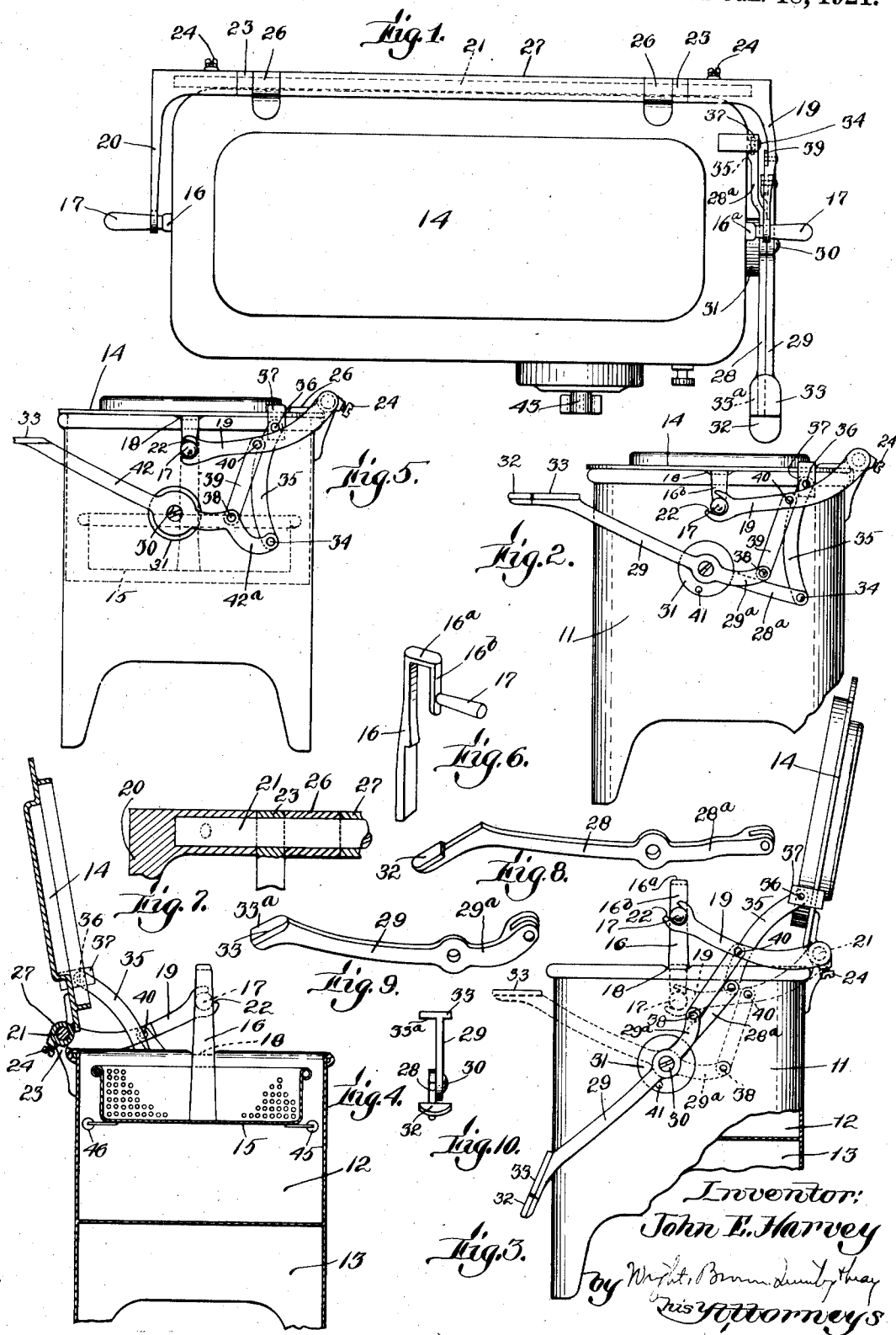


J. E. HARVEY.
STERILIZER.
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Patented Jan. 18, 1921.



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JOHN E. HARVEY, OF MILTON, MASSACHUSETTS.

STERILIZER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN E. HARVEY, a citizen of the United States, residing at Milton, in the county of Norfolk and State of Massachusetts, have invented new and useful Improvements in Sterilizers, of which the following is a specification.

The present invention relates to sterilizers such as are used by medical and dental surgeons for sterilizing their instruments. Such sterilizers or sterilizing apparatus ordinarily comprise a box or case adapted to contain water, heating means maintaining the water at a temperature sufficiently high to destroy the life of micro-organisms, this temperature being generally that of the boiling point of water, and a basket or tray in which the instruments are contained for convenience in immersing them in and removing them from the hot water. The box also is open at the top and provided with a cover which is kept closed when the sterilizing action is going on, and of necessity must be opened in order to give access to the instruments when they are needed. Sterilizers of this character have already been known and used, and have been provided with means and mechanisms of different sorts whereby the operator may raise the cover of the apparatus and lift the tray from the water bath, but they have been more or less unsatisfactory for various reasons, including the following that, in most of such apparatus it is necessary to take hold of the cover in opening it; the tray is connected to the cover so that when the latter is opened the tray is necessarily raised; and in order to remove the tray, the operator must reach into the steam cloud issuing from the box and take hold of some part of the tray which is highly heated.

It is the purpose of my invention to overcome the objections existing in the devices heretofore used and to furnish among other improvements the following;—means for operating the cover without at the same time altering the position of the tray, means for raising and lowering the tray while the cover remains open without moving the latter; a mode of mounting the tray which provides handles outside of the sterilizer box which may be used to remove the tray

bodily from the box without requiring the hands to be plunged into a hot cloud of steam or to grasp a part of the tray which is so hot as to burn the flesh or even to cause discomfort; and a provision of means for preventing condensation of steam upon the cover hinge and dripping of water therefrom. The invention consists in the embodiment of means for carrying into effect the above stated purposes, hereinafter described in detail with reference to the drawing, and in all equivalents of such embodiment having the principles and characteristics thereof as hereinafter explained and pointed out in the claims. In the drawings,—

Figure 1 is a plan view of a sterilizer embodying the present invention. Fig. 2 is an elevation of the sterilizer as viewed from the right hand end of Fig. 1. Fig. 3 is an elevation from the same view point as Fig. 2, but showing the cover and tray raised. Fig. 4 is a cross section representing the sterilizer with the cover and tray raised, as viewed from the opposite direction to the view point of Fig. 3. Fig. 5 is a view similar to Fig. 4, but showing a modification in the operating means. Fig. 6 is a perspective view of one of the supports or handles for the tray. Fig. 7 is a detail view of a part of the cover hinge and one of the associated arms for lifting the tray. Figs. 8 and 9 are perspective views of the two levers used in the preferred embodiment of my invention for operating the cover and tray. Fig. 10 is a view of the operating ends of said levers as seen from the front of the sterilizer when one of the levers is partially displaced.

The same reference characters designate the same parts in all the figures.

Referring to the drawings, 11 represents the case of the sterilizer, which is formed as a substantially rectangular box having an upper compartment or chamber adapted to contain water, and a lower compartment or chamber adapted to contain a heating means. These compartments are shown in Figs. 3 and 4, but no heating means is shown, as I do not claim such means as part of the present invention. I may use any means suitable for the purpose, whether an electric heater, a burner or a steam heater, or anything else suitable, but

I prefer to use an electrical heater such as that described in my prior patent for automatic controlling means for electric heaters, granted February 29, 1916, No. 1,174,006. It is sufficient for the purposes of this invention to be understood that water may be contained in the compartment 12 and that suitable heating means are provided to bring the water to the required temperature and to maintain such temperature.

14 represents the cover which is hinged at the rear end of the case in a manner presently to be described, and is adapted to be swung between the closed position, shown in Figs. 1, 2, and 5, and the open position shown in Figs. 3 and 4. 15 represents a tray adapted to contain the instruments to be sterilized. That here shown is a shallow box or basket made of sheet metal having numerous perforations through which the water may drain when the tray is lifted out of the water. I will explain here that I include within the meaning of the term "tray" as used in this specification and in the following claims, any receptacle of whatever form, dimensions and structure, which can be applied in an apparatus of this sort to hold the instruments to be sterilized, and whether or not it be called by some specifically different term, such as "basket", "cradle", "holder", or what not. Attached to the ends of the tray are upright pieces 16 which I will call hangers for the purposes of this description. One of such hangers is shown in detail in Fig. 6, and both are alike. The lower part of the hanger is fitted to the tray and secured by soldering or in any other suitable way firmly thereto. The other end of the hanger is carried outwardly and then down to form a substantially horizontal part 16^a and a depending part 16^b, the part 16^a passing across the edge of the adjacent end wall of the box, and the part 16^b hanging down outside of this wall. An outwardly projecting pin or handle 17 is fixed to the part 16^b. When the tray is lowered into the box, the cross members 16^a of the two hangers rest on the edges of the end walls and occupy depressions 18 in such edges, whereby they do not prevent complete closing of the cover. For raising and lowering the tray there are provided two arms 19, 20, respectively, which are fixed upon the ends of a rod 21 extending lengthwise of the box near the upper edge of the rear wall, and said arms project forwardly beside the opposite end walls respectively, and each arm has a forked end, or is formed with a socket 22, which receives the pin 17 of the nearest hanger 16. The rod 21 previously mentioned is supported by brackets

23 fixed to the rear of the box, and is the fulcrum or pivot for the arms 19 and 20, such arms being fixed by set screws 24 so that neither can be ordinarily turned independently of the rod.

The same rod is also a pivot for the cover, which is provided with hinge eyes 26 through which the rod passes. There is also provided a housing 27 for the rod which is closely united to the cover, being possibly soldered to the cover, or possibly an integral part of the sheet or plate out of which the cover is made, the part forming said housing being rolled into tubular form. Such union between the cover and housing is of a character to conduct heat and is provided in order to prevent condensation of steam on the hinge rod. I have observed that in the use of sterilizers which have an exposed hinge rod or pintle, hot vapor which escapes between the cover and the back wall (for it is impracticable to make the cover joints tight enough to prevent escape of vapor and it would indeed be dangerous to do so) and encounters such rod or pintle condenses thereon because the rod is unconnected with the box and far enough removed therefrom to remain at a temperature below the condensing temperature of the vapor. The water of condensation gathering in this manner is objectionable for various and obvious reasons. By the provision of the housing 27, which is in heat-conducting connection with the cover, such condensation is prevented because the temperature of the housing is maintained nearly at the same degree as the vapor in the box, and therefore the housing remains dry; while it completely surrounds the pintle rod so that the vapor can not reach the latter. The housing might be relied upon as the sole connection between the cover and the hinge rod, but I prefer to provide in addition the eyes 26 having butt straps which are soldered or otherwise securely attached to the cover; on account of the greater strength which is given thereby.

The preferred form of operating mechanism, here shown, comprises two levers 28 and 29 which are arranged side by side and are pivoted upon the same fulcrum stud 30, which is mounted in a boss 31 on the end wall of the box. These levers project forwardly from the fulcrum side by side throughout their length. On its forward end the lever 28 carries a finger piece 32 and the lever 29 also carries a finger piece which is designated 33 and lies close to the finger piece 32, having also a lip or ledge 33^a at one side overlying the forward part of the lever 28. These finger pieces are in fact preferably designed complementary to one another, together having the form of a single finger piece.

Lever 28 has a rearwardly extending arm 28^a which is connected by a pivot 34 to the link 35, the latter being in turn connected to a pivot 36 carried by a strap 37 which is attached rigidly to the cover 14. Lever 29 has a rearwardly extending arm 29^a connected by a pivot 38 with a link 39 which is connected by pivot 40 with the adjacent arm 19, which, as previously explained is one of the operating arms for the tray.

It will be appreciated that whenever the finger piece of lever 28 is depressed the cover is raised; and that when the finger piece 33 of lever 29 is depressed the tray is raised, because the rigid connection of the arms 19 and 20 with the hinge rod 21 causes the arm 20 to move in unison with arm 19. Both levers can be operated in unison by the pressure of a single finger of the operator, for the combined outline and area of the two finger pieces 32 and 33 conforms sufficiently to the end of a finger for that purpose. By limiting the pressure application to the finger piece 32 alone, the lever 28 can be operated alone so as to raise the cover, leaving the tray and the lever 29 in their former positions, as illustrated by dotted lines in Fig. 3. But if the finger piece 33 alone is pressed upon, both levers are operated in unison on account of the overhanging ledge 33^a, and then the cover is opened and the tray raised all at one time, as shown by full lines in Fig. 3. This is a desirable result because, of course, the tray can not be lifted until the cover has been opened, and it is neither desirable that the force for opening the cover should be transmitted through the tray or the hangers 16 nor possible to open the cover fully by force so transmitted. On the other hand it may be of advantage to open the cover without moving the tray, and this may be done by pressing on the finger piece 32 alone. A stop 41 is mounted on boss 31 to limit the movements of the levers, and particularly to make it impossible for the tray to depress lever 29 still further and drop into the box unexpectedly after the arm 29^a has passed the dead point with link 39. It is intended that when the levers arrive at this stop the pivots 34 and 38 shall have moved across respectively the line from the fulcrum to the connection 36 and that from the fulcrum to the connection 40, whereby the cover and tray are positively and rigidly held in their respective raised positions.

I have designed a modification of this mechanism, however, by which the cover and tray can move only in unison, and this construction is shown in Fig. 5. Here there is a single lever 42 which has a forwardly projecting operating arm and a finger piece or handle, and it has a single rearwardly projecting arm 42^a which is connected with

both links 35 and 39 by pivots 34 and 38, respectively, located in substantially the same relative positions as the corresponding pivots described in respect to Figs. 2 and 3. The action resulting from depressing the finger piece of this lever is the same as takes place when the finger piece 33 previously described is depressed.

With either form of the invention, when the cover has been raised, the tray may be removed by the operator grasping the handle pins 17 and lifting them from the notches of the supporting arms 19 and 20. This may evidently be done without exposing the hands to the hot vapor in the sterilizing chamber, and without need of the operator grasping the hot tray, for the pins are so far removed from the heat within the box as to be comparatively cool to the touch; at least not hot enough to cause discomfort to the unprotected fingers.

The embodiment of the invention herein illustrated is made of sheet metal in a manner and form well understood by workers in that material, but I may make it of other materials and by other methods. Various modifications may likewise be made in the dimensions and proportions of the apparatus as a whole and of the several parts thereof, provided always the essential principles underlying the embodiment of the invention hereinbefore specifically described are retained.

The character of the sterilizer as an electrically heated apparatus is indicated by the switch shown at 43 in Fig. 1, which is provided to make and break the circuit of the electric heater, but as I have previously stated, I do not restrict the protection which I seek to an apparatus so heated, or to the heating of the same by that or any other means specifically. In fact so far as the broad invention is concerned, it involves operating means adapted to move a cover and a tray, without reference to whether or not the box with which the cover and tray is associated is heated.

In order to prevent interference of the tray with the walls of the sterilizer, in case the tray should be tipped or tilted by a preponderating weight in front or in rear of the vertical plane through the supporting handles, I provide rolls 45 and 46 which are mounted upon hangers secured to the bottom of the tray and projecting to the front and to the rear therefrom respectively. Such rolls are adapted to contact with the front or back wall of the box in case the tray should be swung slightly out of its even position. These rolls prevent any such accident from occurring as would take place if the tray were free to swing without limit and all the instruments to be sterilized were placed in the front or back part of the tray;

in other words they prevent the lip of the basket from being interfered with by the edge of the box.

What I claim and desire to secure by Letters Patent is:

1. The combination in a sterilizer of a box, a hinged cover for said box, a tray adapted to be raised and lowered in the box, and separate operating levers mechanically connected independently to the cover and to the tray respectively and operable either to move the cover independently of the tray or to move both the cover and tray simultaneously.

2. A sterilizer comprising a box adapted to contain hot liquid, a tray in said box movable up and down therein for immersion in and removal from such liquid, a cover, a single instrumentality movable by pressure, and separate motion-transmitting connections running from said instrumentality to the cover and to the tray each of said connections being independent of the other, whereby movement of said instrumentality is effective to open the cover and raise the tray at the same time.

3. A sterilizer comprising a box adapted to contain boiling water, a tray occupying said box for carrying instruments to be sterilized, mechanism for raising and lowering said tray with which the tray is detachably engaged in a manner permitting it to be lifted clear of said mechanism, and handles passing from the tray to the outside of the box whereby their temperature is maintained at a degree less than hot enough to burn the fingers of a person grasping them while the tray itself is enveloped in hot vapors.

4. A sterilizer comprising a box, a tray adapted to be raised and lowered in said box, swinging arms located adjacent opposite walls of the box and having open sockets, hangers rising from said tray and occupying said sockets, the hangers and sockets being constructed to permit removal of the former by lifting the tray, and finger pieces forming parts of said hangers extending outside of the box and removed from the path of the heated vapors which rise from the box when the latter contains boiling water.

5. A sterilizer comprising a box adapted to contain hot water, a tray receivable in said box and movable therein for immersion in and resurgence from the water, hangers rising from the opposite ends of said tray and extending outwardly over the edges of the adjacent walls of the box, said outwardly extending portions being handles removed from the internal heat of the box, arms engaged detachably with said handles, and means for swinging said arms to raise and lower the tray.

6. A sterilizer comprising a box, a hinge rod supported by said box, a cover fitting

the box and engaged with said rod, arms rigidly fixed to the ends of said rod and extending beside the opposite walls of the box, a tray within the box, hangers connected to said tray and extending over the adjacent box walls into connection with said arms, an operating lever, and a link connecting said lever with the cover for opening and closing the cover.

7. A sterilizer comprising a box, a cover hinged to said box, a tray arranged in the box having a hanger extending over a wall of the box, an arm pivoted upon the box engaged with said hanger, and means for raising and lowering the box and tray comprising a lever arm, a link connected to said lever arm and to the cover, a second lever arm, and a link connected to said second arm and to the arm which is engaged with the tray, said links and the lever arms being movable into line whereby to brace the cover and tray in their raised positions.

8. A sterilizer comprising a box, a cover hinged to the box, arms extending beside the opposite walls of the box, a tray within the box, hangers connected to said tray and extending over the adjacent box walls into connection with said arms, an operating lever connected with said cover for opening and closing it, a second lever and a link connecting said second lever to one of said arms for moving the latter to raise and lower the tray.

9. A sterilizer comprising a box, a cover fitting and hinged to the box, arms extending beside the opposite walls of the box, a tray within the box, hangers connected to said tray and extending over the adjacent box walls into connection with said arms, a lever having connection with said cover for opening and closing the same, a second lever and a link connecting said second lever to one of said arms for moving the latter to raise and lower the tray, the former of said levers being operable independently of the other.

10. A sterilizer comprising a box, a cover fitting and hinged to the box, arms extending beside the opposite walls of the box, a tray within the box, hangers connected to said tray and extending over the adjacent box walls into connection with said arms, an operating lever and a link connecting said lever with the cover for opening and closing the cover, a second lever and a link connecting it to one of said arms for moving the latter to raise and lower the tray, the said second lever having a portion arranged to interfere with the first lever, whereby both are moved when pressure is applied to the second lever.

11. A sterilizer comprising a box, a cover for the box, a tray within the box, and separate operating means for respectively opening and closing the cover and raising and lowering the tray, the latter means being

arranged to compel operation of the former whenever it is independently actuated.

12. In a sterilizer the combination of a box, a tray within the box, a cover for the box, a lever and connections therefrom to said cover for opening and closing the latter, a second lever and connections therefrom to the tray for raising and lowering the

same, and a finger piece on the second lever having a portion arranged to interfere with the first lever in such manner that when operated to raise the tray it compels operation of the first lever to raise the cover.

In testimony whereof I have affixed my signature.

JOHN E. HARVEY.