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[54] **COLD STERILIZATION UNIT**

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[52] **U.S. Cl.** **21/87,** 134/135, 312/271

[51] **Int. Cl.** **A61l 3/00,** A61l 7/00, A47b 81/00

[58] **Field of Search** 21/87, 103, 105, 99, 86; 312/271, 272, 272.5; 134/135

[56] **References Cited**

UNITED STATES PATENTS

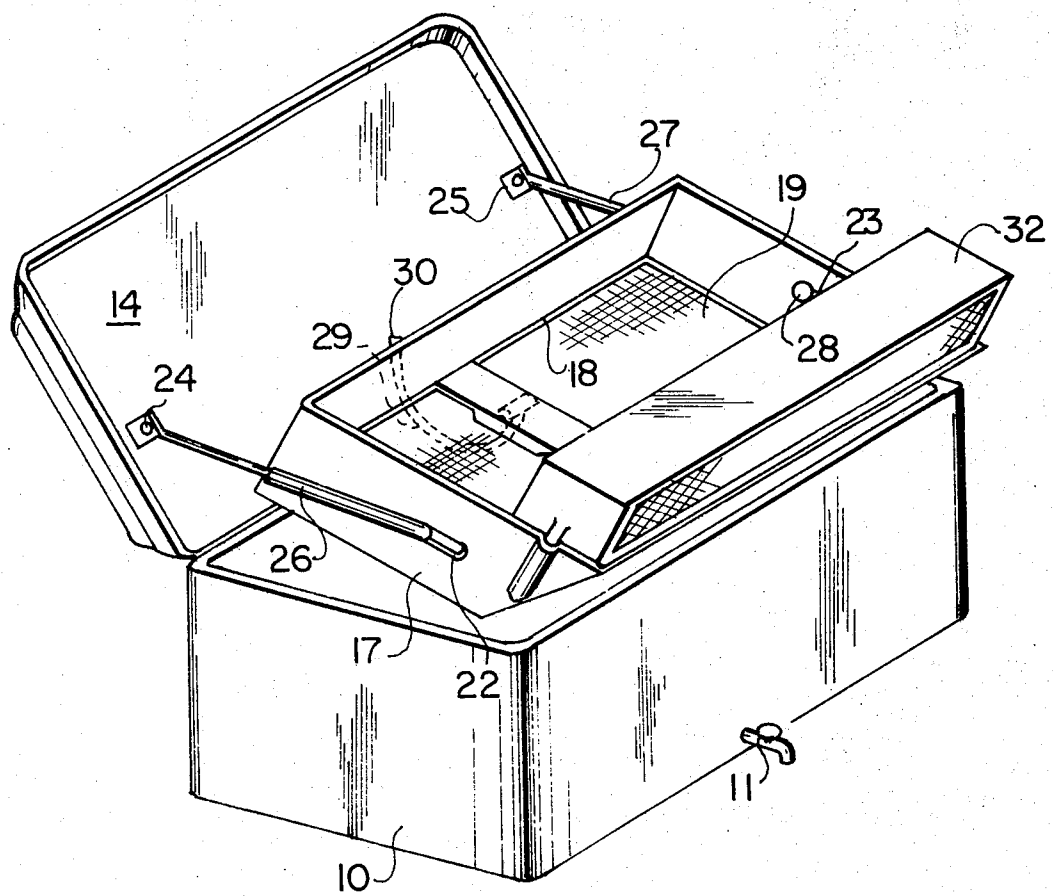
2,786,245	3/1957	Steinbock, Jr.	21/105
3,019,494	2/1962	Horie et al.	21/87

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Assistant Examiner—Arnold Turk
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[57] **ABSTRACT**

A cold sterilization unit comprises an open-topped tank having a closure lid hingedly attached thereto. An insert tray is disposed within the tank, and linkage means interconnect the tray to the lid to effect movement of the tray with movement of the lid. The linkage means includes means operative to lift the tray upwardly in substantially horizontal position, out of a sterilization liquid within the tank, during initial opening of the lid, and then operates to effect a tilting of the tray to an angular position during further opening of the lid beyond the predetermined opening position to effect a gravity dumping of implements in the tray into a collection receptacle which removably engages the tray.

5 Claims, 7 Drawing Figures



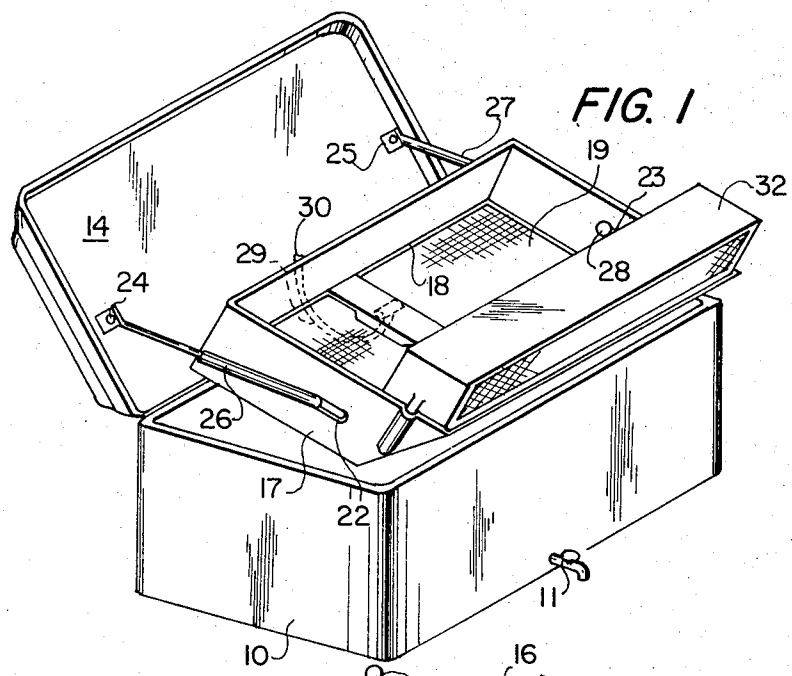


FIG. 1

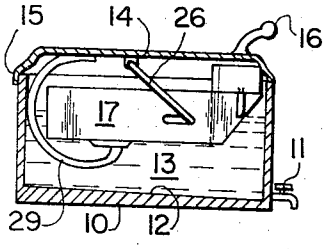


FIG. 2A

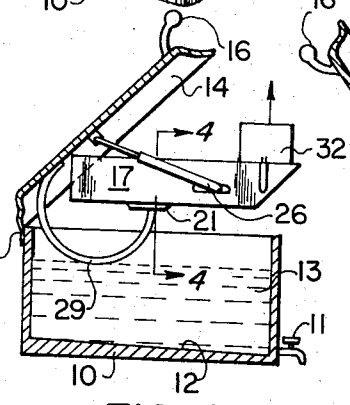


FIG. 2B

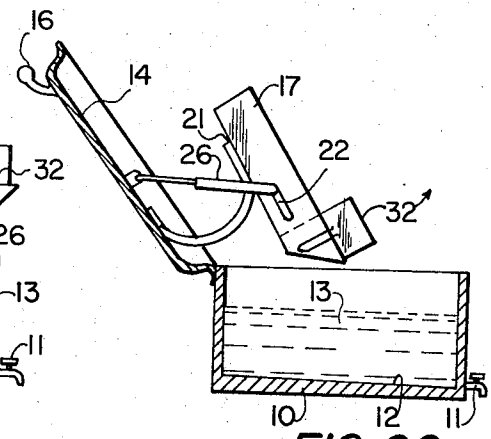


FIG. 2C

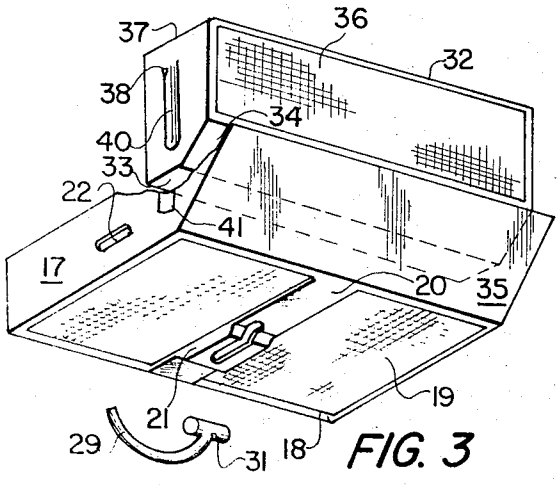


FIG. 3

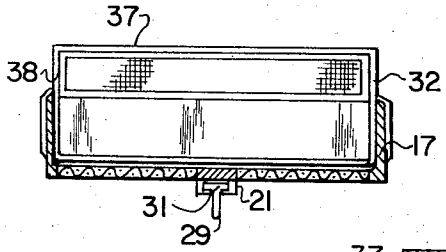


FIG. 4

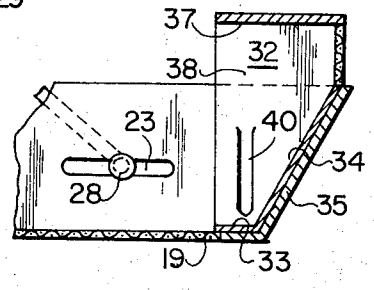


FIG. 5

COLD STERILIZATION UNIT

The present invention relates to sterilization equipment of the type used by physicians, dentists, chiropodists, etc., and is more particularly concerned with an improved cold sterilization unit adapted to effect sterilization of instruments in chemical germicide solutions.

At the present time, as is well known, there are two basic types of sterilization equipment. One typical form is adapted to effect so-called hot sterilization, and to that effect employs boiling water or steam. Such hot sterilization is normally required for the sterilizing of instruments which may come into direct contact with a patient's blood stream thereby to prevent the transmitting of spores or the like. The complications of hot sterilization need not be employed, however, in the case of hand instruments which do not ordinarily come into direct contact with the blood stream, e.g., instruments such as mouth mirrors or the like, employed by a dentist, and other hand instruments used in other professional fields; and in such cases it is common to employ a cold sterilization technique wherein the instruments are immersed for a period of, for example, between 15 and 30 minutes in a germicide such as Benzalkonium chloride and other such substances presently available on the market. It is with this latter type of equipment that the present invention is particularly concerned.

Cold sterilization units of the types commonly available at the present time comprise a glass bottomed tray adapted to contain a bath of germicide, and associated with a lid, e.g., of stainless steel, provided with a rubber gasket adapted to effect a relatively tight closure around the periphery of the lid, thereby to prevent spilling of the germicide during operation of the equipment. The glass bottomed tray mentioned is in turn normally associated with an insert tray adapted to contain therein the instruments to be sterilized; and said insert tray in turn is provided with apertures, holes, or mesh-like portions to permit the ingress of germicide when said insert tray is dipped into the germicidal bath.

In practice, instruments are placed in the insert tray, whereafter the insert tray is manually immersed into the bath for an appropriate length of time. When sterilization is completed, the unit's lid is opened and the insert tray is manually lifted out of the bath. The bottom of the equipment is normally provided with protrusions, e.g., small glass extensions on the side of the tray, ledges, or the like, upon which the insert tray is then positioned, above the surface of the bath, for draining purposes. After excess germicide has thus drained off the instruments and back into the bath, the medical or dental assistant conducting the sterilization procedure will normally remove the instruments from the insert tray or take the insert tray with the instruments contained therein, to a faucet for rinsing purposes. Such rinsing of the cold chemical sterilization solution from the instruments is mandatory since many patients have been found to exhibit allergies to the germicidal solution, wherefore it is inadvisable to have the chemical remain on an instrument which may, for example, be placed in a patient's mouth.

The procedure thus commonly employed is, it will be appreciated, not automatic; and to the contrary, is rather cumbersome and most untidy. It requires that

the medical or dental assistant normally place her hands directly into contact with the sterilized instruments during a rinsing procedure and/or at the very least it requires that the medical or dental assistant get the germicidal solution on her hands. Moreover, it permits some instruments to be dropped during the handling thereof for rinsing purposes. In addition, the sterilization equipment is incapacitated during a draining and rinsing procedure since an essential portion of the equipment, i.e., the insert tray, is itself occupied during such draining and rinsing. In all these circumstances, therefore, cold sterilization techniques and equipments presently employed are far from satisfactory.

The present invention is concerned with a highly improved semi-automatic cold sterilization unit which is adapted to obviate the various disadvantages discussed above. As will appear hereinafter, the equipment itself comprises a main container or tank adapted to hold a germicidal bath. The tank is provided with a lid, as well as with an insert tray adapted to be moved into and out of said bath; and a linkage structure extends from the insert tray to the aforementioned lid (or to an appropriate operator member of other type) to effect certain movements of the insert tray in response to movement of the lid or operator member.

In a preferred embodiment of the invention, as will appear hereinafter, the arrangement is such that when the lid of the unit is in a closed position, the insert tray, and any instruments which may be contained therein, are caused to be immersed into the germicidal bath for sterilization purposes, as described. As the operator member is thereafter manipulated, and preferably as the lid is opened toward a 90° position, the insert tray is, by reason of the aforementioned linkage, caused to be lifted out of the solution and to be held in a substantially horizontal position above the surface of the bath, thereby to permit the draining of excess solution off the instruments and back into the bath.

The insert tray is associated with a separable collection receptacle, e.g., a small wire mesh basket adapted to clip onto or engage one end of the insert tray and adapted to be removable therefrom. The overall arrangement is such that, when the lid of the unit is opened beyond a 90° position and toward a 180° position, the linkage described previously operates to tip one end of the insert tray upwardly whereby instruments contained within said insert tray are caused to be automatically dumped, or moved under the influence of gravity, into the previously mentioned collection receptacle or basket. This receptacle or basket can then be removed by an attendant or nurse for purposes of rinsing the instruments contained therein, without requiring that the nurse or attendant handle the instruments themselves or contact the germicidal solution; and after rinsing, the said basket, and the instruments therein, can be allowed to drip drain on a sterile towel, and later carried to a cabinet drawer or the like, without ever being touched by hand. In a typical unit constructed in accordance with the present invention, extra collection receptacles or baskets can be provided so that the draining, rinsing and use of instruments in a given one of said baskets in no wise incapacitates the remainder of the equipment; and the remaining equipment can be used as before in a subsequent sterilization procedure simply by substituting a separate clip-on basket for that removed after a prior sterilizing procedure.

The overall unit can be mounted on a table top near a sink as a separate unit, or it can be combined with a holder and clamp structure adapted to clamp onto the side of an existing porcelain sink; or it can be built into a counter top next to a sink. In any of these cases, and in other arrangements to which the unit adapts itself, the sterilization unit itself is preferably provided with a drain and spigot structure to permit used germicidal fluid to be removed from the unit and replaced. However, in all of these arrangements, the important features reside in the fact that immersion of the tray and instruments and the subsequent removal of the tray and dumping of the instruments can, during normal operation of the equipment, be accomplished simply by manipulation of a manual operator or handle, preferably one associated with the equipment's lid.

The foregoing objects, advantages, construction and operation of the present invention will become more readily apparent from the following description and accompanying drawings, in which:

FIG. 1 illustrates in perspective view one form of equipment constructed in accordance with a preferred embodiment of the present invention.

FIGS. 2A, 2B and 2C are illustrative diagrams showing operation of the equipment as the lid thereof is manipulated from a fully closed toward a fully opened position.

FIG. 3 is a further perspective view of a portion of the equipment shown in FIG. 1, illustrating the insert tray and associated clip-on basket.

FIG. 4 is a view taken on line 4—4 of FIG. 2B; and

FIG. 5 further illustrates the assembly of clip-on basket and insert tray in accordance with one embodiment of the present invention.

Referring now to the several figures, like numerals of which refer to like parts throughout, it will be seen that a unit constructed in accordance with the present invention comprises a main tank **10**, constructed for example of stainless steel. Tank **10** is preferably provided with a spigot or drain **11**, and with an internal bottom surface **12** of slightly inclined configuration, whereby a germicidal bath **13** located within said tank **10** can be drained and replaced as desired. The upper portion of tank **10** is adapted to be closed by a lid **14** mounted on an appropriate hinge structure **15** at its back end, and provided with an appropriate handle structure **16** at a forward end thereof. Hinge structure **15** or portions of the tank **10** adjacent said hinge structure, may also be provided with appropriate detents and stops thereby to permit the lid **14** to assume a generally stable configuration when opened to substantially 90°, and also to limit the completely open movement of the lid to substantially 150°, or any other degree of opening consistent with the particular linkage selected.

Within the tank **10** is disposed an insert tray **17**, again preferably constructed of stainless steel. The bottom surface of insert tray **17** includes appropriate apertures for ingress and egress of germicidal solution, e.g., a stainless steel frame **18** framing a stainless mesh structure **19** (see FIGS. 1 and 3). Tray **17** further includes a centrally disposed bracket **20** positioned across its bottom surface and provided with a slot and channel arrangement **21** to be described hereinafter. A pair of additional slots **22-23** are provided in opposite sides of insert tray **17** adjacent its forward end; and the slot and channel arrangement **21** as well as the slots **22–23**, cooperate with a linkage structure to be described hereinafter to effect the insert tray manipulation and instrument draining and dumping operations which characterize the equipment of the present invention.

To effect the insert tray manipulation and dumping operations, the lid **14** is provided on its internal surface with a pair of pivot structures **24** and **25** adapted to engage one end of a pair of telescopic arms or links **26** and **27** extending respectively between said pivot structures **24** and **25** and the aforementioned side slots **22** and **23**. As is best shown in FIG. **5**, each of the telescopic arms **26** and **27** is provided at its tray end with a roller **28** adapted to be positioned adjacent the inner surface of the tray sides, and adapted moreover to extend through slot **22** and/or **23** into engagement with a corresponding arm **26** or **27**. During manipulation of the lid **14**, as will appear hereinafter, the telescopic arms **26** and **27** are caused to open and close, and in addition, the rollers **28** are adapted to move in the tray slots **22** and **23** all for purposes which will become apparent.

Lid **14** is further provided with an arcuate arm **29** which is fixedly attached at one end **30** thereof to a centrally located interior portion of lid **14**. The other end of arcuate arm **29** is provided with a substantially cylindrical cross bar **31** (see especially FIGS. **3** and **4**) adapted to be disposed within the slot and channel arrangement **21** provided on the bracket **20** adjacent the bottom of insert tray **17**; and arm **29**, cross bar **31**, and slot and channel arrangement **21** in bracket **20**, cooperate with one another as well as with the telescopic arms **26** and **27** previously described, to effect tray manipulations during movement of lid **14**, again as will be described.

As was mentioned previously, the equipment operates in its preferred embodiment to cause the insert tray to be lifted out of the germicidal bath as the lid **14** is opened toward a 90° position; and movements of the lid beyond its 90° position and toward a limiting position of, for example, 150° or 180°, cause the rear end of insert tray **17** to be lifted upwardly thereby to dump any instruments contained therein toward a forward end of the tray. The forward end of insert tray **17** is in turn associated with a removable basket member adapted to collect instruments so dumped, thereby to permit the instruments to be removed as a group for purposes of rinsing, further draining, use, and/or storage.

To this effect, a separate removable tray or basket **32** is provided. Basket **32** includes a surface **33** at one side thereof adapted to overlie a portion of the mesh surface **19** at the bottom of insert tray **17**, and is also provided with an inclined surface **34** adapted to overlie an inclined portion **35** at the forward end of insert tray **17**. Each of the surfaces **33** and **34** is preferably solid, and each preferably comprises a material such as stainless steel. Tray or basket **32** is also provided with a mesh surface **36** extending upwardly above the upper edge of insert tray **17** and designed to act as a bottom for the basket **32** when it is removed; and is provided with still further solid surfaces **37** and **38** at the ends and side thereof, all designed to complete the structure of basket **32**.

The overall arrangement of basket **32**, it will be appreciated, is such that it is provided with an open surface facing the rear edge of insert tray **17**. Upon lifting of said rear edge of tray **17** and the consequent inclin-

ing of the tray **17** toward its forward edge, instruments are accordingly dumped into the open portion or "top" of insert basket **32** onto mesh surface **36**; and surface **36** thereafter becomes the bottom of the basket **32** upon removal of said basket **32** from insert tray **17.** To facilitate the insertion, retention and positioning of basket **32** within and at the forward end of insert tray **17,** the side surfaces **38** of said basket are preferably provided with elongated protrusions **40**; and protrusions **40** are in turn designed to slidably engage complementary depressions **41** formed at the forward end of insert tray **17.** Basket **32** may be placed in and removed from insert tray **17** by a simple sliding operation; and the arrangement of protrusions **40** and depressions **41** nevertheless gives the basket significant stability even when the structure is tipped into position for a dumping operation.

It will be appreciated, of course, that other clipping, retaining, and separable collection arrangements can be employed, provided in each case a portion of the insert tray structure is made removable and replaceable, thereby to facilitate removal and handling of instruments away from the remainder of the sterilization unit.

In the operation of the overall structures, best illustrated in FIGS. 2A, 2B and 2C, the various arms **26, 27,** and **29** cooperating with their corresponding slots **22, 23** and **21,** are so arranged that, with the lid **14** in a fully closed position (see FIG. 2A) the insert tray **17** is maintained in a substantially horizontal position, and in completely immersed relation to the bath **13.** In this condition, portions of the bath can penetrate to the interior of tray **17** via mesh **19** thereby to effect sterilization of any instruments or equipment contained therein.

Upon completion of a sterilization procedure, the handle **16** can be grasped and the lid **14** moved about its hinge **15** toward an open position. During the initial portions of this movement, as will be best seen by comparison of FIGS. 2A and 2B, the transverse bar **31** at the lower end of arm **29** is caused to move upward and slightly rearward; and thereby lifts tray **17** out of the germicidal bath **13.** During this lifting procedure, which is accomplished primarily by arm **29,** the telescopic arms **26–28** open somewhat, and their lower ends move rearwardly somewhat in slots **22** and **23,** thereby to stabilize the forward end of insert tray **17.** The operation described continues with tray **17** being lifted, and with the lower ends of arms **26, 27** and **29** sliding rearwardly, until the lid **14** reaches some predetermined degree of opening, e.g., 90°. At this time the insert tray **17** is caused to be removed completely from the bath and held in a generally horizontal position (although it may tip slightly forward without detriment to the operation) above the surface of bath **13,** thereby to permit excess germicide to immediately drain back into the bath **13.** Moreover, at this predetermined position of lid **14,** the lower ends of arms **26, 27** and **29** reach their rearwardmost position in their corresponding slots **22, 23** and **21.**

Further manipulation of lid **14** beyond its 90° position and toward a 180°, causes the parts to assume a configuration such as is best illustrated in FIG. 2C. With this additional manipulation, the arm **29** moves upwardly to such position that, what was previously its lower end **31,** now moves to a position to the rear of and above the center of gravity of tray **17.** Arm **29** thus forcibly lifts the rear end of the tray upward a significant distance above its forward end, and the tray **17** is, under the influence of gravity, thereby caused to pivot about point **31** in such manner that the forward end of said tray **17** slopes downwardly. It will further be noted that, in the course of effecting this tipping or dumping operation, a portion of arm **29** itself enters the slot and channel assembly **21**; and to permit this, the forward end of channel assembly **21** is open, as best illustrated in FIG. **3.** The portion of arm **29** which thus enters assembly **21** aids in stabilizing tray **17,** when said tray is inclined as shown in FIG. 2C.

In the particular arrangement of parts illustrated in FIG. 2C, the tray is caused to assume substantially a 60° position; but the actual angular position of the tray depends upon the relative dimensioning of parts, and can assume lesser inclinations or even greater inclinations approaching 90°. In any event, with such manipulation of the lid **14,** and resulting tipping of insert tray **17,** gravitational forces cause a dumping of instruments and equipments contained within the tray **17** toward the forward end of said tray and into basket **32,** whereafter the instruments can be removed for the purposes and in the manner described previously.

While I have thus described a preferred embodiment of the present invention, many variations will be suggested to those skilled in the art, some of which have already been described. It must therefore be emphasized that the foregoing description is meant to be illustrative only and should not be considered limitative of my invention; and all such variations and modifications as are in accord with the principles described, are meant to fall within the scope of the appended claims.

Having thus described my invention, I claim:

1. A cold sterilization unit comprising an open-topped tank adapted to contain a sterilizing liquid bath therein, a closure lid hingedly attached to said tank for closure thereof, a perforated insert tray disposed in said tank, said perforated insert tray having a perforated collection receptacle removably attached thereto, both said tray and said attached collection receptacle being adapted to be substantially fully immersed in said bath when said closure lid is in closed position, connecting means interconnecting said tray to said lid to effect movement of both said tray and its attached collection receptacle with movements of said lid, said connecting means including means operative to lift said tray and its attached collection receptacle upwardly in substantially horizontal position to a position above the normal surface level of said bath during initial opening of said lid thereby to effect a drainage of liquid via said perforated insert tray into said bath, said connecting means being further operative to effect tilting of said tray and its attached collection receptacle to a position angularly inclined to horizontal and located above the normal surface level of said bath during further opening of said lid beyond a predetermined opening position thereby to effect a gravity dumping of implements in said tray toward said collection receptacle and to effect further drainage of liquid into said bath via the perforations in said collection receptacle, whereafter said collection receptacle may be detached from said insert tray to permit the removal of instruments from said sterilization unit without manual handling of said instruments.

2. The unit of claim 1 wherein said perforated collection receptacle comprises a basket having walls adapted to overlie and to removably engage walls of said tray adjacent and along a forward edge of said tray, said basket having at least one wall thereof formed of a perforated mesh material, said connecting means comprising linkage means operative to lift the rearward edge of said tray to a position above said forward edge of said tray during said tilting operation and to position the mesh wall of said basket above the surface of said bath and generally below other portions of said basket.

3. A cold sterilization unit comprising an open-topped tank adapted to contain a bath of germicidal solution therein, a lid adapted to be moved between closed and open positions relative to the open top of said tank, holder means adapted to be immersed within the bath in said tank for supporting instruments to be sterilized within said germicidal bath, said holder means including a perforated collection receptacle removably attached thereto for immersion into said bath along with said holder means and instruments, and linkage means responsive to movement of said lid from its said closed to its said open position for lifting both said holder and its attached receptacle from said bath and for depositing any instruments supported by said holder means into said collection receptacle at a position above the normal surface level of bath, whereby germicidal solution adhering to said instruments drains into said bath via the perforations in said collection receptacle whereafter said collection receptacle may be detached from said holder means for removal of said instruments from said sterilization unit without manually contacting instruments contained in said collection receptacle.

4. The unit of claim 3 wherein said holder means comprises a tray having slot-and-channel means on the bottom thereof and a slot on each of a pair of opposite sides thereof, said linkage means comprising arms extending from said lid and slidably engaging each of said slot-and-channel and slot means.

5. The unit of claim 4 wherein the one of said arms which engages the slot-and-channel means on the bottom of said tray is curved in configuration, the other two arms which engage the slot means on opposite sides of said tray being telescopic.

* * * * *