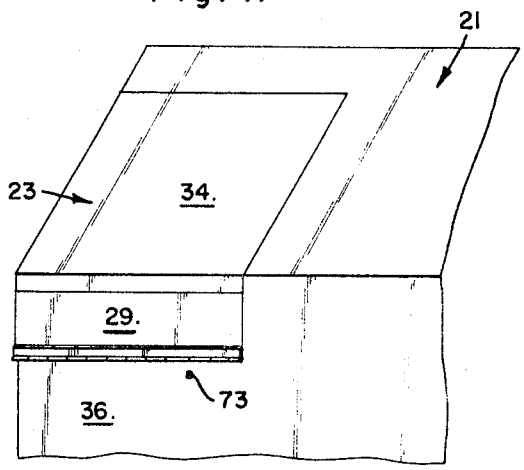
Sept. 13, 1966 W. E. BURTON 3,271,860

CABINET HAVING STERILIZABLE INSTRUMENT TRAY

Filed May 7, 1965 3 Sheets-Sheet 1

Fig. 1.



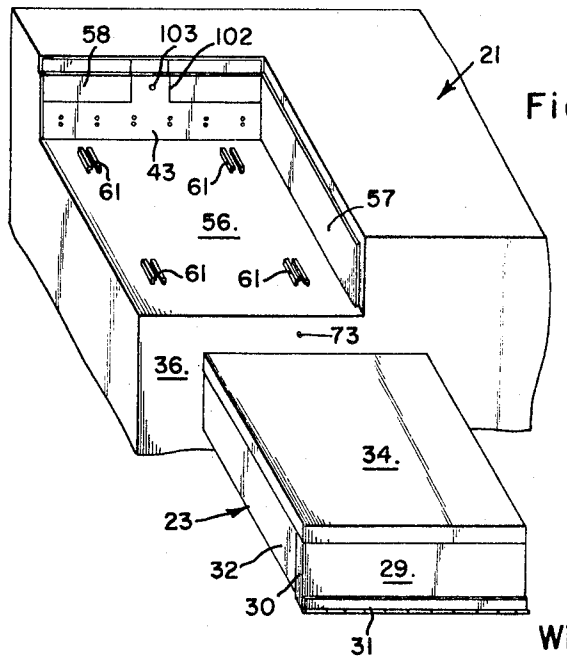


Fig. 2.

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CABINET HAVING STERILIZABLE INSTRUMENT TRAY

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Fig. 3.

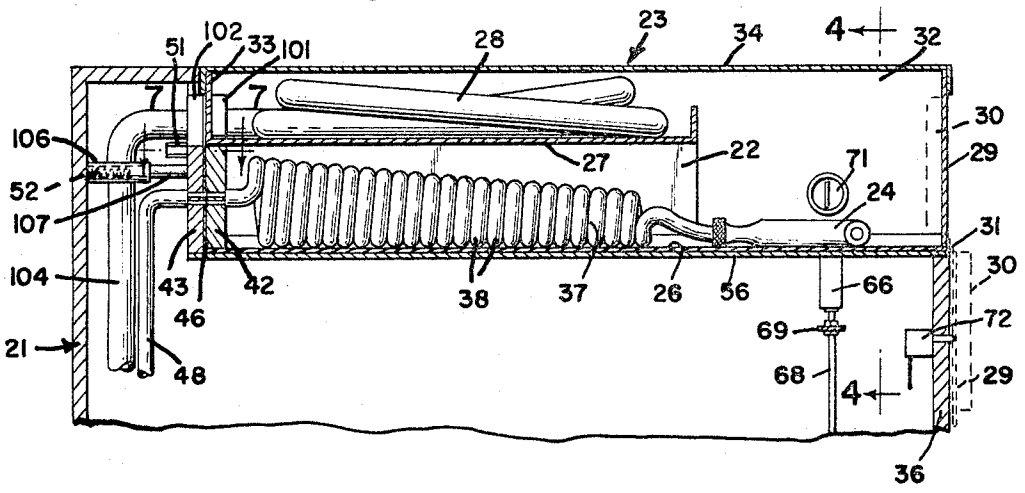
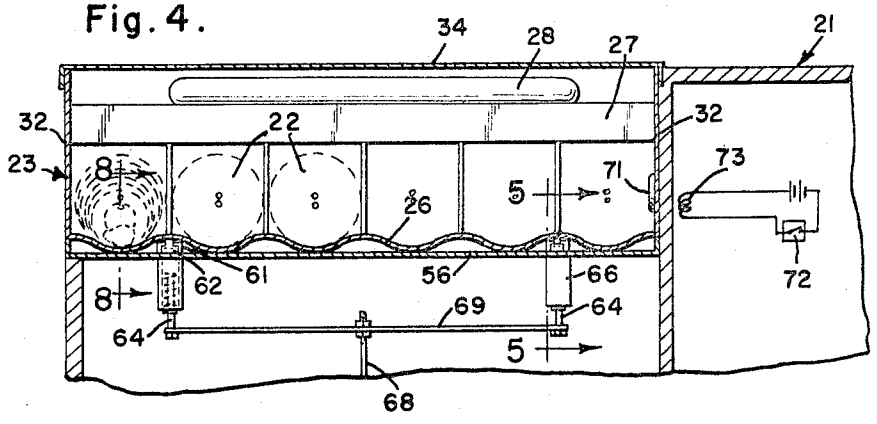


Fig. 4.



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CABINET HAVING STERILIZABLE INSTRUMENT TRAY

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Fig. 5.

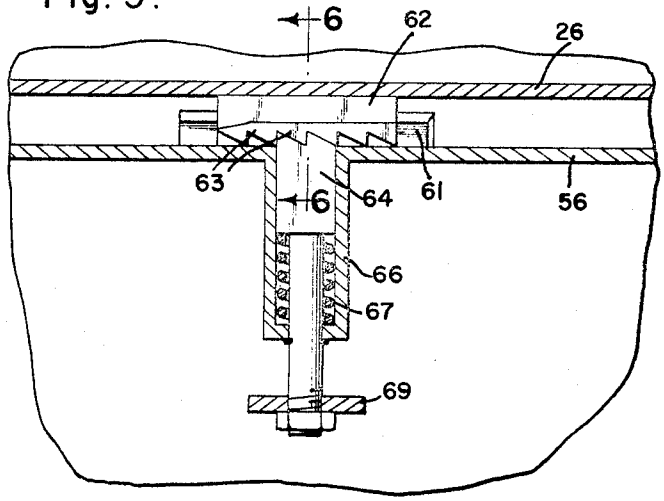


Fig. 6.

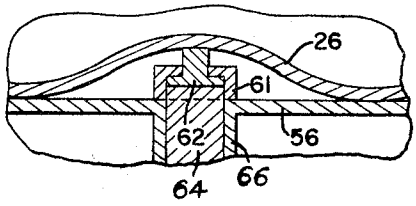


Fig. 7.

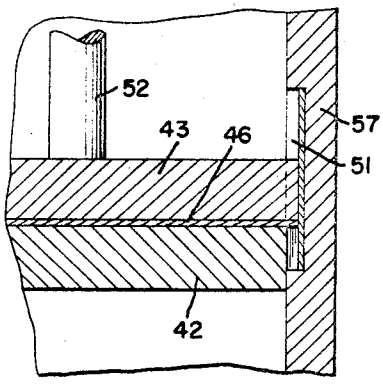


Fig. 8.

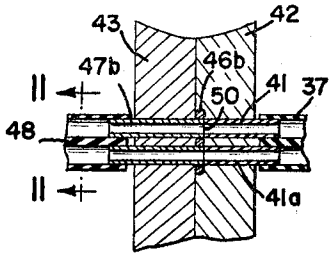
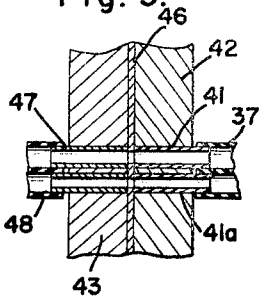


Fig. 9.



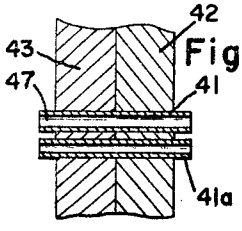


Fig. 10.

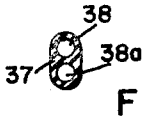


Fig. 11.

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3,271,860

CABINET HAVING STERILIZABLE INSTRUMENT TRAY

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Filed May 7, 1965, Ser. No. 453,929
10 Claims. (Cl. 32—22)

This application is a continuation-in-part of my copending application, Serial No. 153,161 filed November 17, 1961.

This invention relates to a new and improved instrument tray which may be sterilized and installed in a cabinet having air, water and electrical connections which make connections with corresponding extensible conduits fixed on the tray leading to various instruments of the type used by dentists and physicians.

The present invention comprises a means for holding a plurality of instruments of the type used by dentists, and the like, including such instruments as high-speed and low-speed air turbine handpieces, air-water spray syringes, condensers for fillings, saliva ejector tubes, oral evacuation tubes, and the like. Each of the instruments is connected to a manifold carried by the tray by means of an extensible conduit. The manifold on the tray matches with a manifold in the cabinet. When the tray is inserted in the cabinet and held in position, communication is established between the two manifolds, so that air, water, vacuum and electrical connections are automatically made via the extensible conduits between the various instruments and permanent sources within the cabinet.

A particular feature and advantage of the present invention is the fact that the entire tray and the instruments carried thereby may be removed from the cabinet and sterilized in an oven, or the like, and after sterilizing reinstalled in the cabinet. Thus by providing two or more complete sets of instruments and trays, one tray and its contents may be sterilized while the dentist is treating a patient and then the trays may be switched while the next patient is treated.

An important advantage of the invention is the fact that all instruments, the conduit and all-exposed portions which come in contact with the mouth of the patient or the hands of the dentist are sterilized at the beginning of the operation thereby reducing the likelihood of transmitting infection from one patient to the other, or from the dentist to the patient, or vice versa.

Another feature of the invention is the provision of means whereby the entire set of instruments may be replaced.

A still further feature of the invention is the fact that the instruments and their conduits which supply air, water, vacuum, or electricity may be sterilized with a minimum of time and effort expended.

A still further feature of the invention is the provision of means for locking the tray in the cabinet and releasing the same.

Still another advantage of the invention is the provision of a thermometer-controlled indicator to indicate when the tray is sterile and to indicate that it is not sterile after it has been once used.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

FIG. 1 is a fragmentary perspective view showing the tray installed in a cabinet, the cover of the tray being closed.

FIG. 2 is an exploded view similar to FIG. 1, showing the tray removed.

FIG. 3 is a vertical sectional view through the tray.

FIG. 4 is a section taken substantially along line 4—4 of FIG. 3.

FIG. 5 is a fragmentary sectional view taken substantially along line 5—5 of FIG. 4.

FIG. 6 is a fragmentary sectional view taken substantially along line 6—6 of FIG. 5.

FIG. 7 is a fragmentary horizontal sectional view taken substantially along line 7—7 of FIG. 3.

FIGS. 8, 9 and 10 are enlarged fragmentary sectional views showing modified means of connection of the tray and cabinet manifolds as viewed substantially along line 8—8 of FIG. 4.

FIG. 11 is a transverse sectional view through a conduit taken substantially along line 11—11 of FIG. 8.

A portion of a dental cabinet **21**, which is positioned in proximity to the mouth of the patient is herein illustrated. It will be understood that the present invention may be used in other types of equipment, such as surgical equipment, but for convenience the present invention shows a plurality of compartments **22** on the corrugated bottom of a tray **23**, each compartment containing a dental instrument **24**, such as a high-speed air turbine handpiece used for drilling, a low-speed air turbine handpiece, an air-water spray syringe, a condenser handpiece which is used to compact fillings, a desiccator and fulgurator, a saliva ejector, and the like. Other instruments, of course, may be installed as required. Above the bottom **26** of tray **23** is an upper tray **27** which extends a portion of the length of the lower tray and on tray **27** may be coiled an oral-evacuation tube **28** and tip and other instruments as required. Several trays similar to tray **23** may be used. The front **29** of the tray is hinged by hinge **31** along the front edge of bottom **26**. Sides **32** and back **33** are fixed to bottom **26**. A cover **34** having downwardly extending side, front and rear edges fits over the back **33**, sides **32** and front **29** of the tray between uses. Flanges **30** on front **29** likewise fit over the forward edges of sides **32**. When cover **34** is removed, front **29** falls forwardly and downwardly (see dotted line position of FIG. 3), thereby providing a sterile surface on the front **36** of cabinet **21** adjacent to the tray, so that the hands of the dentist or a portion of the instruments or their conduits come in contact with this region of the cabinet, no infection will be transmitted. It will be understood that although in the preferred embodiment of the invention, tray **23** is installed in an appropriate recess in cabinet **21**, nevertheless, tray **23** is adapted for installation under various other conditions, such as a table.

The instruments **24** in the lower tray compartments are each individually connected to a flexible conduit **37**. Such a conduit **37** is extensible and is preferably a synthetic tubing made of an elastomer of an elongated pigtail type having spiral coils **38**, which are of maximum diameter at the rear of the tray and diminish in diameter toward the front. Such a conduit is resilient and highly flexible. Hence when the dentist pulls the instrument **24** toward him, conduit **37** flexes and does not interfere with the "touch" of the dentist. Nevertheless when the instrument is released and replaced in its compartment **22** in the tray coils **38** of the conduit resume their initial position. The cross-section of the conduit may be a single tube **38**, or a plurality of tubes **38**, **38***a* (FIG. 11), depending upon the requirements of the particular instruments, or the tube may enclose single or multiple electrical conductors, or various combinations of conduits and conductors.

The conduit may be formed of a peroxide cured dimethyl-siloxane elastomer, such as Dow Corning Corporation, Silastic No. 2097. The material is extruded by use of conventional pin and ring dies in a manner

well understood in the art of forming tubing. Prior to extrusion the material is uncatalyzed and the rubber is freshened or broken down in a rubber mill. Catalyst is added to the rubber in the mill and thoroughly blended. After milling, the compound is cut into strips and fed into the extruder. Extruded tubing may be deposited on a table and then wrapped on a mandrel which is complementary to the form of a pigtail coil shown in FIG. 3 of the accompanying drawings. After having been wrapped on the mandrel the material is conveyed through a hot air vulcanizing oven. A satisfactory cure is for 57 seconds at 650° F. The coil of tubing is then post-cured. A satisfactory post cure is for sixteen hours at 280° F. in a circulating hot-air oven to remove the by-products of the peroxide cure.

The rearward ends of the conduits **37** are connected to nipples **41** which project forward from tray manifold **42** in the back **33** of tray **23**. Manifold **42** consists of an inverted T, having holes drilled therein for nipples **41**. Dual holes and dual nipples **41**, **41***a* may be used for conduits having two apertures **38**, **38***a* (see FIG. 8). Mating with the tray manifold **42** is a cabinet manifold **43** similar to the tray manifold. The cabinet manifold **42** may carry a gasket **46** (FIGS. 3 and 9) which seals against the tray manifold **42** when the tray is installed in the cabinet and insures against leakage between the tray manifold openings and the cabinet manifold openings. The cabinet manifold openings register with nipples **47** which are connected to conduits **48** leading to sources of air, water, vacuum, electricity, and the like, as required.

An alternate means of connecting the manifolds **42**, **43** are shown in FIG. 8. Thus nipple **47***b* extends forward of the front face of manifold **43** and a complementary recess **50** is formed in the rear face of manifold **42**. O-rings **46***b* are installed in recess **50** engaging nipple **47***b* and sealing same.

FIG. 10 shows a further alternate of FIG. 9, wherein gasket **46** is omitted and the abutting faces of manifolds **42**, **43** are milled very smooth so that they seal against each other.

Directing attention to FIGS. 2 and 3, when a tube **28** is installed in upper tray **27**, the upward extensions **101**, **102** of manifolds **42**, **43** have mating openings **103**, thereby connecting tube **28** to tube **104**.

Preferably, cabinet manifold **43** slides in horizontal tracks **51** installed in cabinet **21**. Spring **52** installed in housing **106** fixed to the back of cabinet **21** and bearing against stud **107** on manifold **43** received in housing **106** biases manifold **43** in a forward direction, so that manifold **43** pushes against tray manifold **42** when the tray is installed in the cabinet, thereby insuring tight connections.

Cabinet **21**, as best shown in FIG. 2, is preferably cut away at one corner complementary to tray **23**, the cabinet opening thus having a bottom **56**, side **57** and back **58** against which rest tray bottom **26**, one side **32** and back **33**, respectively.

To secure the tray properly in position in the cabinet, there are preferably provided slideway sections **61**, here shown as four in number, installed on bottom **56** into each of which slides an inverted T-shaped bar **62** fixed to bottom **26**. This arrangement prevents upward displacement of tray **23** relative to cabinet **21**. Preferably, the bottom of one or more bars **62** are formed with ratchet teeth **63** (see FIG. 5). A pawl **64** vertically slidable in guide **66** mounted on bottom **56** and biased upwardly by spring **67** is installed in cabinet **21** to lock tray **23** against horizontal movement. By reason of the resilient mounting **52** of cabinet manifold **43**, a firm contact between manifolds **42**, **43** is insured, the gasket **46** providing air, water, and vacuum tight seals.

To release pawl **64**, various means may be employed. A manually actuated means (not shown) pulls downward rod **68** and horizontal bar **69** fixed to rod **68** and each pawl **64**, thereby retracting pawls **64** against the pressure of springs **67**.

It is desirable to indicate whether the contents of tray **23** are sterile. For such purpose, a thermometer **71** of the type wherein a magnetizable float on top of the mercury column is provided with feelers which tend to hold the float in position of maximum reading is used. Such a thermometer is installed in side **32** of tray **23** adjacent to cabinet side **57**. An electromagnet **73** is located in cabinet **21** adjacent the location of thermometer **71** when the tray is in place in the cabinet. Microswitch **72** is installed in cabinet front **36** in such position that when tray front **29** is opened it contacts switch **72**, closing a circuit which includes magnet **73**. Magnet **73** is so position that when energized it restores the thermometer float to "down" position, indicating tray **23** is no longer sterile.

Although the foregoing invention has been described in some detail, by way of illustration and example for purposes of clarity of understanding it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. In a container for sterilizable instruments, a tray, support means for supporting said tray, a first manifold positioned in said support means, a first port in said first manifold, at least one source of fluid under pressure differential for an instrument located in said support means and terminating in said first port, a second manifold on said tray, a second port in said second manifold, means for removably interconnecting said first and second ports, means mounting said tray in said support means with said first and second ports in registry, an extensible and contractable instrument conduit in said tray connected to said second port at one end and adapted for connection and transmission of fluid under pressure differential to an instrument at its end opposite said second port, and a cover for said tray enclosing said instrument, second manifold and conduit, whereby said tray, conduit, and second manifold may be sterilized and then kept in a sterile state when said cover is closed and said instrument conduit may be partially withdrawn from said tray by extension of said conduit when said cover is opened.

2. A container according to claim **1**, in which said conduit comprises a flexible, sterilizable, resilient tube.

3. A container according to claim **1**, in which said conduit comprises a flexible, sterilizable, resilient tube formed in a spiral shape of gradually reducing diameter proceeding from said second port to the end of said conduit opposite said second port.

4. A container according to claim **1**, which further comprises means sealing said first and second manifolds together to establish fluid-tight intercommunication between said first and second ports.

5. A container according to claim **1**, which further comprises latch means latching said tray in position in said support means and release means for said latch means.

6. A container according to claim **5**, which further comprises resilient means biasing said first and second manifolds toward each other.

7. In combination a cabinet, a cabinet manifold in said cabinet, a plurality of first ports in said cabinet manifold, a plurality of sources of air, water and vacuum, each of said first ports being connected to one of said sources, a tray shaped to receive instruments, a tray manifold on said tray, a plurality of second ports in said tray manifold corresponding in number and position to said first ports, means mounting said tray in said cabinet with corresponding first and second ports in registry, and a plurality of extensible conduits normally in said tray and partially extensible therefrom each communicating at one end with one of said second ports adapted for connection and transmission of power to an instrument connected to said conduit at its end opposite said second ports.

8. A cabinet according to claim 7, in which each said extensible conduit is formed of a flexible, resilient, sterilizable tube wound in an elongated spiral having maximum coil diameter adjacent said tray manifold and decreasing coil diameter proceeding away from said tray manifold.

9. A cabinet according to claim 7, which further comprises first latch means on said cabinet, second latch means on said tray, means biasing said latch means into engagements with each other and latch opening means for unlatching said latch means.

10. A cabinet according to claim 7, which further comprises a thermometer on said tray having a magnetizable float and a means tending to retain said float at a position of maximum temperature and an electro-magnet on said cabinet and means energizing said magnet to retract said float by magnetic attraction when said tray is opened to atmosphere.

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