April 27, 1965 K. R. NEVITT 3,180,485

INSTRUMENT KIT

Filed Aug. 1, 1963

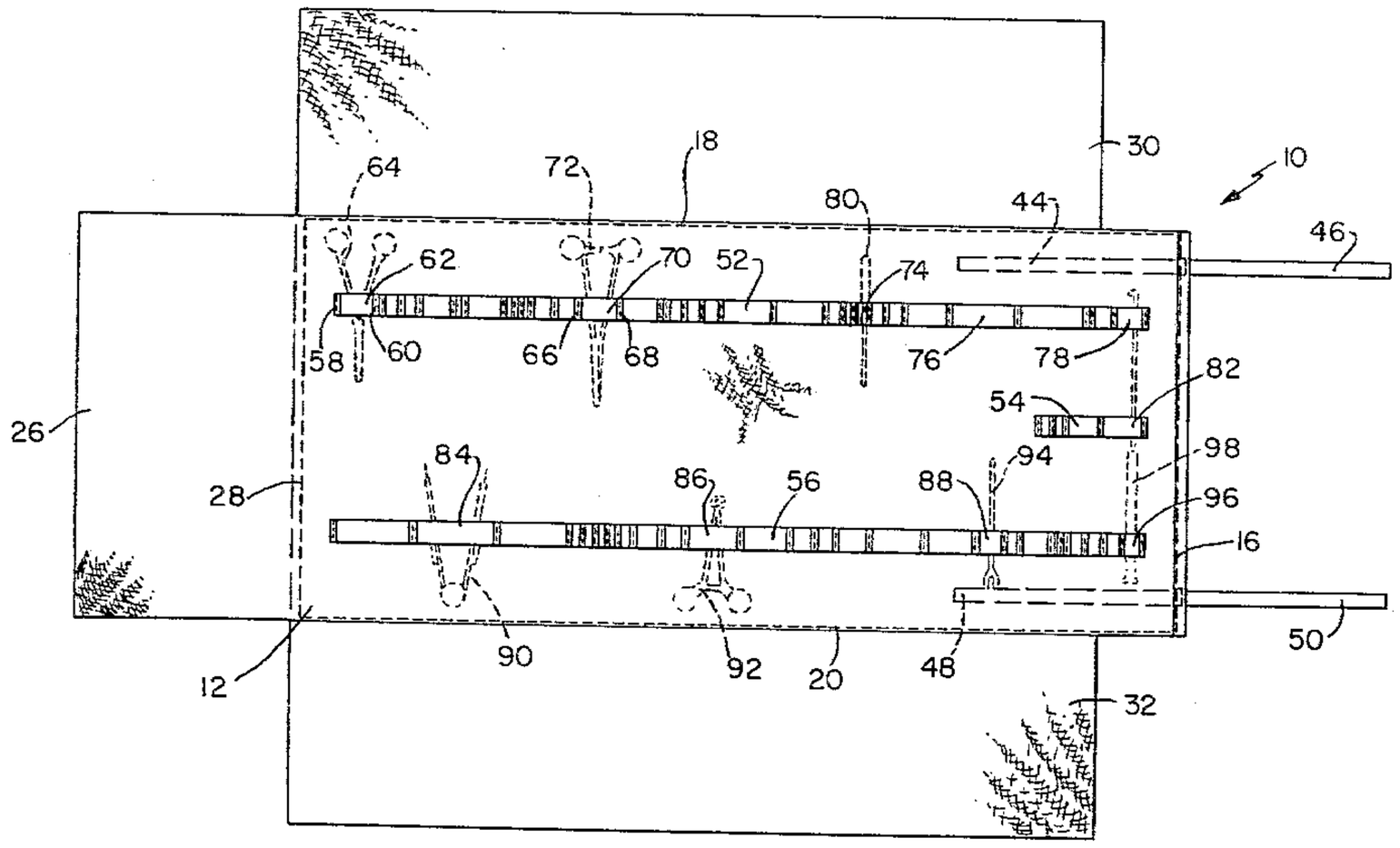

FIG. 1

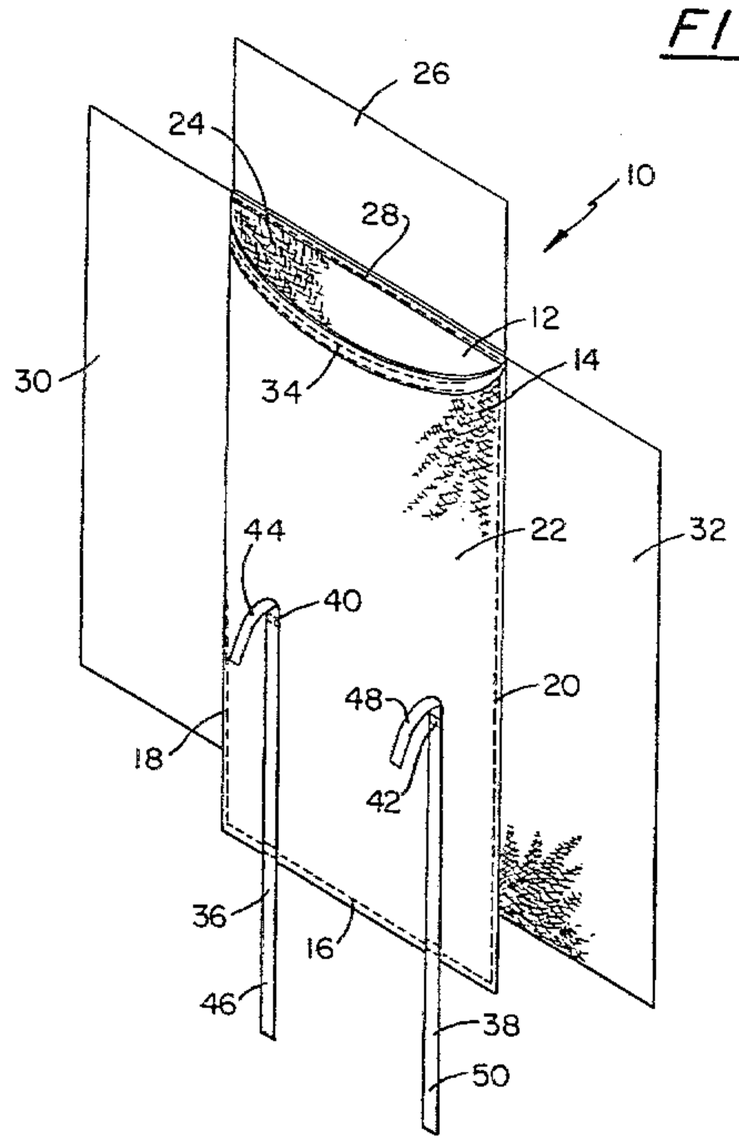

FIG. 2

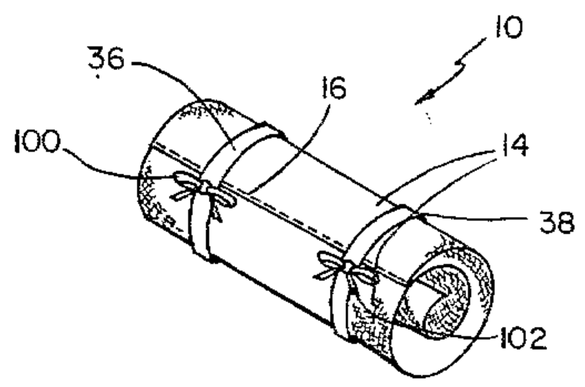

FIG. 3

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INSTRUMENT KIT

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This invention relates to new and useful improvements in instrument kits for holding surgical, obstetrical instruments and the like, for example, such as used in the practice of veterinary medicine as well as accessory materials such as towels, bandage materials, etc; and more particularly pertains to such a kit of the roll-type that can, along with the instruments and accessories contained therein, be steam sterilized and which will for a protracted period thereafter preserve the sterility of the instruments and accessories.

Roll-type kits have long been used for surgical instruments, whether the latter be a general instrument assortment or a group of instruments for specific fields of use, as for example, eye surgery, obstetrics, rumenotomy, laparotomy, etc. Such extant kits are primarily for the purpose of keeping certain groups of instruments segregated (because of instrument class, differing ownership, etc.) and to protect the instruments from damage, especially such as may be occasioned by various instruments striking each other when the instruments are transported from one location to another. Accordingly, the principal functions of extant kits have been to segregate particular collections of instruments and to cushion and protect the instruments from damage.

Kits heretofore proposed have been unsuited to steam sterilization of such kits and their contents for any one or more of several reasons, the most important of which has been that the materials of which the kits have been made deteriorate or are otherwise deleteriously affected by repeated steam sterilization procedures, and when the kit and its contents have been sterilized the kit does not afford an adequate barrier against ambient environment to preserve for a reasonable period of time the sterile condition of the interior of the kit and its contents.

Also, conventional kits (if instruments are used directly therefrom and replaced therein in bloody or soiled condition as would be virtually essential to maintain anything approaching a sterile envinonment in the practice of veterinary medicine in the field) are objectionable in that they are ordinarily made of porous material or material having such a textured surface that blood is absorbed by or strongly adheres to the material with the result that such blood is difficult if not impossible to remove prior to sterilization whereby blood on the material is effectively permanently fixed to or permanently stains the material on subjecting the material to the elevated temperature involved in steam sterilization. Such fixed soil or stain not only presents an appearance of lack of sterility to onlookers but presents an appearance of downright untidyness; however, a more serious aspect of the situation is that such fixed soil or stain can mask from visual discovery the fact that foreign matter may have actually invaded the supposedly sterile interior of the kit through some unsuspected inadvertence and destroyed the supposedly sterile conditions.

Inasmuch as conventional kits and their instrument contents are not suited to joint steam sterilization, such that the instruments can be kept sterile by the kit while being carried to a location of use whereupon the kit can be opened to expose and display the instruments for use in a manner analogous to the display of surgical instruments for use on the instrument table or tray of a hospital operating room; it is ordinarily virtually impossible to transport instruments to a point of field use for the practice of veterinary medicine or so difficult that ineffective or at

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best unreliable safeguards are taken to preserve dry sterility and the possible serious consequences of such lack of proper safeguards is blinked away. It seems that the difficulties of practicing veterinary medicine in the field, especially under emergency conditions offering little or more likely no advance warning, has resulted in an extraordinarily slow extension of the benefits of scrupulous maintenance of sterile conditions to veterniary medicine as has been practiced in medicine for humans for quite a number of years. Too much reliance appears to have been placed on the largely unwarranted belief that animals are "tough."

Since conventional kits are unsuited to the uses outlined above, it has been customary and necessary to make special provision for transportiong accessory materials such as towels, bandages, suture thread, sponges, swabs, etc., even when such materials are of such character as to be susceptible to steam sterilization. The necessity for such separate provision is not only inconvenient, but the risk is always present that the accessory materials will be overlooked or forgotten in making a hasty departure to a remote location, with the serious consequence that such essential accessory materials will not be at hand or available nearby when needed along with the instruments.

Accordingly, an important object of this invention is to provide a roll-type instrument kit or container such that the entire kit and its contents (instruments and accessory materials) can be effectively sterilized by steam, with the kit in rolled or what may be termed closed or secured position, and thereafter will maintain the sterile condition of the interior of the closed kit and its contents for a protracted period.

Another important object is to provide a kit of such character that instruments can be sterilized and subsequently transported in a sterile condition to a remote location for use all under conditions such that steam sterilization not only can be used, but especially such that cold or chemical sterilization (which can eventually not only tarnish or stain instruments, but necessitate their retirement) is not at all necessary and can definitely be avoided.

An object closely related to the foregoing objects is that the kit or container be of such material as to be capable of withstanding repeated sterilization procedures (each involving subjection to steam at about 275° F. under fifteen pounds pressure per square inch for about fifteen minutes) without substantial deterioration.

Another object of the invention is to provide an instrument kit or container according to the foregoing objects which is flexible throughout the range of temperatures of use in the field, and which will accommodate accessory materials for sterilization (and for preservation of sterility) segregated from the instruments.

Still another object of the invention is to provide an instrument kit or container that is resistant to the absorption and adherence of foreign substances such as blood, and from which such foreign substances can be readily flushed with water (with and preferably without detergents) and with little or no brushing or scrubbing being required.

A final object to be specifically enumerated herein is to provide an instrument kit or container made of a material resistant to permanent staining by blood and the like, or from which stains can be removed even after such material has been subjected to the elevated temperatures involved in steam sterilization procedures.

A broad aspect of the present invention comprises a rectangular panel of flat, flexible sheet material having an inside and an outside, rectangular end and side flaps of flat, flexible sheet material secured to one end and opposite side edges of the panel respectively and adapted to fold at their junctures therewith over the inside of such

panel, a plurality of flexible instrument retaining loops secured to the inside of the panel, and a tie string secured intermediate its ends to the panel adjacent the end of the latter opposite said one end, whereby the panel and the flaps folded over the inside thereof can be rolled from said one end thereof and secured in rolled condition by said tie string, said flat, flexible sheet material being imprevious to liquid and resistant to repeated steam sterilization procedures each involving contact with steam at about 275° F. under about fifteen pounds per square inch pressure for about fifteen minutes.

Another broad aspect of the invention resides in the sheet material referred to in the preceding paragraph being comprised of a woven fabric having a synthetic coating, said fabric being woven of fibers selected from the group consisting of nylon, polyester, and mixtures thereof, and said coating being selected from the group consisting of silicone rubber, neoprene, chlorosulfonated polyethylene, and mixtures thereof.

Another broad aspect of the invention comprises a pair of superposed inner and outer rectangular panels of flat, flexible sheet material, said panels being marginally secured to each other along opposite side edges and along one end and being detached from each other at the end thereof opposite said one end to define an entrance to a pocket defined between the panels, a plurality of instrument retaining loops fixed to the side of the inner panel opposite the outer panel, a rectangular end flap of flat, flexible sheet material marginally secured to one of said panels at the end thereof remote from said one end of said end flap being adapted to fold at its juncture therewith over the side of the inner panel remote from the outer panel, and a pair of rectangular side flaps of flat, flexible sheet material marginally secured to the opposite side edges of the panels and adapted to fold at their junctures therewith over the side of the inner panel remote from the outer panel in overlapping relationship with each other, and a tie string secured intermediate its ends to one of the panels adjacent said one end of the latter.

Other objects, features and aspects of the invention will become apparent as the following description of the preferred embodiment of the invention being illustrated in the accompanying drawings, wherein:

FIGURE 1 is a top plan view of the inside of the instrument kit opened up and with the side and end flaps extended, this view also showing in dotted outline a few surgical instruments disposed in the loops on the inside of the instrument kit illustrative of the use of the same;

FIGURE 2 is an isometric view of the outside of the instrument kit, the same being shown opened and with the side and end flaps extended and with the open end of the pocket opened; and,

FIGURE 3 is an isometric view on a reduced scale of the instrument kit in closed or rolled up condition and the same being secured by the tie strings.

Referring now to the drawings, wherein like numerals designate similar parts throughout the various views, the reference numeral **10** designates the instrument kit of this invention generally. The instrument kit **10** is comprised of superposed inner and outer rectangular panels of flat, flexible sheet material, the character of which will be set forth in detail hereinafter. The lower ends of the panels **12** and **14** as seen in FIGURE 2 are secured together by being folded and stitched together as indicated at **16**. The adjacent side edges of the inner and outer panels **12** and **14** are infolded and stitched together as indicated at **18** and **20**, the arrangement being such that the inner and outer panels **12** and **14** define a rectangular pocket **22** that is open at its upper end **24**. The upper end of the inner panel **12** is folded together with the adjacent edge of a rectangular end flap **26** and stitched together as indicated at **28**. The end flap **26** is made of the same flat, flexible sheet material as the panels **12** and **14**. The instrument kit also includes a pair of rectangular side flaps **30** and **32** that are also made of the same flat, flexible sheet material as the panels **12** and **14**. As will be evident on inspection of FIGURE 2, the side flaps **30** and **32** extend from the upper end of the inner panel **12** and terminate at their lower edges at a position spaced above the lower end of the inner and outer panels **12** and **14**. The side flaps **30** and **32** are secured to the inner and outer panels **12** and **14** by means of being interposed between the infolded side margins of such inner and outer panels so as to be secured thereto by the lines of stitching **18** and **20**. The upper marginal end of the outer panel **14** is folded upon itself and stitched along the line **34**.

A pair of flexible tie strings **36** and **38** are secured intermediate their ends to the outer panel **14**, both of the tie strings **36** and **38** being secured to the panels **12** and **14** adjacent the lower ends of the latter by the previously mentioned line of stitching **16**, and such tie strings **36** and **38** being stitched to the outer panel **14** at positions spaced thereabove at **40** and **42**. The arrangement is such that the tie string **36** has upper and lower free tying ends **44** and **46**, and the tie string **38** has upper and lower free tying ends **48** and **50**. The vertical spacing between the stitchings **40** and **42** and the line of stitching **16** is somewhat less than the circumference of the instrument kit **10** when the latter is in rolled condition as will be explained presently.

For reason hereinafter explained, the horizontal extent of each of the side flaps **30** and **32** from the inner and outer panels **12** and **14** is somewhat greater than one half but not greater than the horizontal extent of the inner and outer panels **12** and **14**. The vertical extent of the end flap **26** from the inner panel **12** is preferably approximately equal to the horizontal extent of the side flaps **30** and **32**, as shown. While it is preferred that the end flap **26** be secured to the upper end of the inner panel **12**, as shown, it will be apparent to those skilled in the art that the end flap **26** can, if desired or deemed expedient, be secured to the upper end edge of the outer panel **14** rather than the inner panel **12**. While the free exposed edges of the end flap **26** and the side flaps **30** and **32** can, if desired or deemed expedient, be folded and stitched (not shown), such a provision is not deemed necessary considering the strength of the flat, flexible sheet material from which such flaps are made, and in further consideration of the fact that such edges are subsequently free of the application of stress thereto during the use of the instrument kit **10**.

It will be appreciated by those skilled in the art that the flaps **26**, **30** and **32** can be integral with the panel **12** (cut as a single piece from stock sheet material) is desired, and the panel **14** sewn thereto.

Means is provided on the inside of the innner panel **12**, that is the side of the inner panel **12** remote from the outer panel **14**, for holding a plurality of surgical instruments and the like. Such means preferably takes the form of a plurality of elongated strips of flat, flexible sheet material **52**, **54** and **56** that are secured to the inner panel **12**. The strips **52**, **54** and **56** are made of the same flat, flexible sheet material as are the panels **12** and **14**, and the flaps **26**, **30** and **32**. Each of the strips **52**, **54** and **56** are stitched at spaced positions along their lengths in an arrangement such that the extent between adjacent positions of stitching of the strips is greater than the corresponding extent of the panel **12** intermediate such stitchings so that the extent of the strip intermediate such stitching defines loops spaced from the panel **12** in which various surgical instruments can be retained or positioned. For example, the strip **52** is stitched at **58** and **60** to the panel **12** to define a loop **62** for retention of mouse tooth hemostats indicated in dotted outline at **64**. Similarly, a strip **52** is stitched to the panel **12** at **66** and **68** to define a loop **70** for releasable retention of Kelly forceps (or hemostats) indicated at **72**. Inspection of FIGURE 2 will show that the strip **52** is stitched at a plurality of positions to the panel

12 in what may appear to be a random fashion; however, the variation in the spacing of the positions at which the strip 52 is stitched to the panel 12 is such as to afford a plurality of various sized loops such as loops 74, 76 and 78 for holding variously shaped surgical instruments in a definitely predetermined arrangement. For example, the loop 74 is of very small extent so as to accommodate a snook spay hook shown in dotted outline at 80. In a corresponding manner the strip 54 is stitched to the inner panel 12 to define loops such as the loop indicated at 82, and the strip 56 is stitched so as to define a plurality of loops such as indicated at 84, 86, and 88. The loops 84, 86 and 88 are respectively designed to accommodate large skin tweezers, towel clamp and groove director indicated in dotted outline at 90, 92 and 94. The strip 56 includes a loop 96 that cooperates with the loops 78 and 82 of the strips 52 and 54 for retention of a snook spay or porcine eye hook indicated in dotted outline at 98.

It will be noted that the strips 52, 54 and 56 are arranged in spaced parallelism and are in turn parallel to the vertical or major dimension of the inner panel 12.

The flat, flexible sheet material of which the panels 12 and 14, the flaps 26, 30 and 32, and the strips 52, 54 and 56 are made is considered very important. Such components of the instrument kit 10 are made of a woven fabric coated with a synthetic substance so as to be substantially impervious to liquid, be tear resistant, resistant to puncture, and so as to be resistant to any substantial deleterious effects resulting from repeated subjection to steam sterilization procedures, each of which procedures comprising subjecting the instrument kit to steam at about 275° F. under a pressure of about fifteen pounds per square inch for a period of about fifteen minutes. The fibers of the woven fabric are preferably selected from a group consisting of nylon, polyester, and mixtures thereof, with nylon being especially preferred. The woven fabric is coated so as to be impervious to liquids with a synthetic substance preferably selected from the group consisting of silicone rubber, neoprene, chlorosulfonated polyethylene, and mixtures thereof, with silicone rubber being especially preferred.

Coated fabrics of the character specified above are resistant to puncture and tearing, are light and remain flexible throughout the range of temperature of use, and can stand up without substantial deleterious effect from repeated sterilizing procedures. Also, the instrument kit 10 can be easily rinsed or scrubbed in clear or soapy water. An incidental advantage is that the coated fabric is somewhat resistant to staining, and can withstand treatments for removing stains. Preferably, the coated fabric is of a smooth finish so as to be especially resistant to the adherence thereto of body fluids and wastes, such as flesh, blood, urine, and feces.

A coated fabric sheet material found to be well suited for the purpose is marketed by the Connecticut Hard Rubber Company, 407 East Street, New Haven 9, Connecticut, under the manufacturer's designation FGAAO and specification BMS 1–17A, Type II, Grade B. This material has a thread count of 40 x 42 and a thickness of 0.006". Thread counts of somewhat less than this to about 48 x 42 are especially preferred and a thickness of somewhat less than this to about 0.009" is especially preferred. This same manufacturer makes a nylon resin coated nylon fabric that can also be used. The silicone rubber coated nylon fabric designated by such manufacturer as SGAOI is also useful.

Vinly plastics may also be useful provided the sterilization temperatures are not excessive. In general, selection of the fabric and the coating should be in keeping with the temperatures used during sterilization. If cold sterilization processes are to be used, choice or selection should be made on the basis of resistance to the sterilizing chemicals to be used. It is preferred that the instrument kit be suitable for steam sterilization because such mode of sterilization is deemed much superior and effective.

As hereinbefore used, the term polyester has reference to synthetic polyester fibers such as marketed by E. I. du Pont de Nemours of Wilmington, Delaware, under the trademark "Dacron;" and chlorosulfonated polyethylene makes reference to such synthetic coating materials as marketed by the same company under the trademark "Hypalon."

The tie strings 36 and 38 can be cotton or woven of fibers of the character indicated as suitable for the sheet material. The thread used for stitching can be cotton or made of such fibers as indicated suitable for the sheet material.

The use of the instrument kit 10 will be readily understood. An assortment of medical or surgical instruments of desired character are positioned on the inside of the inner panel 12 by the retaining means constituted of the strips 52, 54 and 56, and the flaps 30 and 32 folded thereover, it being noted that the dimensions of the flaps 30 and 32 are preferably such that they overlap each other when folded over the inner panel 12. The end flap 26 is also folded over the inner panel 12, and such end flap 26 can be folded over the inner panel 12 either under, in between or over the side flaps 30 and 32, as desired. The instrument kit 10 is then rolled about an axis normal to the junctures of the side flaps 30 and 32 with the panels 12 and 14 commencing from the end of the latter to which the flap 26 is secured. If desired, and before rolling the instrument kit 10, various accessory materials for use in conjunction with the instruments secured to the inner panel 12, such as towels, bandage materials, etc., can be positioned within the pocket 24 and distributed more or less uniformly about the interior thereof. After the instrument kit has been rolled upon itself for its entire vertical or longitudinal extent, the same is secured in rolled condition such as shown thereof in FIGURE 3 by the tie string ends 44 and 46 being secured by a bowknot 100 and the tie string ends 48 and 50 being secured by a bowknot 102. The instrument kit 10 can be rolled into the general cylindrical configuration shown thereof in FIGURE 3, or if desired the folding can be done in such a manner that the closed or rolled configuration of the same is more or less flat, either rolled condition being at the option of the person using the same. Preferably, the horizontal or transverse extent of the outer panel 14 can be somewhat greater at its upper end than at its lower end (tapered throughout its longitudinal extent), as shown, so that the open end of the pocket 24 can be easily opened to a greater extent; however, this provision is not by any means necessary, and the dimensions of the inner and outer panels 12 and 14 can be substantially identical, if desired.

With the instrument kit and its contents (instruments and accessories in the pocket 24) secured in closed or rolled condition as shown in FIGURE 3, the instrument kit can be wrapped or folded in a fabric towel of porous or pervious character (which can be cotton, not shown), and placed in a conventional steam sterilizing autoclave, not shown, for sterilizing treatment at 250° F. under a pressure of about fifteen pounds per square inch for fifteen minutes, such severity of sterilizing environment being sufficient to sterilize not only the instrument kit 10 itself but also the contents thereof. Of course, if desired the instrument kit 10 and its contents can be sterilized for a longer period or the severity of the sterilizing conditions can be increased in order to obtain such absolute assurance of sterility as may be desired. After the instrument kit 10 and its contents have been sterilized, the same can be removed from the steam autoclave and the interior of the instrument kit 10 and its contents will remain in a sterilized condition for a protracted period upon observing a bare minimum of reasonable precautions against contaminating the same.

Upon transporting the instrument kit 10 and its contents to a place of use, the knots 100 and 102 are untied and the instrument kit 10 opened to the condition shown thereof in FIGURE 1 and placed upon some flat support. The instru-

ments are then displayed in a convenient position for use, and accessory materials can be removed from the pocket 24 for use with a minimum of difficulty.

After the instrument kit 10 and its contents have been used, such of the accessories as may be ordinarily reused are cleaned sufficiently to remove soil, and the instruments are given a preliminary cleaning by flushing or washing soil therefrom with water or soapy water. It will be noted that such preliminary cleaning of the instruments can conveniently be accomplished by such a simple expedient as hosing the same off as well as the interior of the kit 10 when the instruments are fixed by the strips 52, 54 and 56. On completion of such preliminary cleaning of the accessories positioned in the pocket 24 and the instruments, the kit 10 and its contents are rolled and secured as previously described and sterilized by steam for reuse.

It will be appreciated that providing an instrument kit that not only accommodates such surgical and medical instruments as will ordinarly be used, but which in addition provides a container for accessory materials so as to prevent inadvertent failure to transport such accessory materials to the point of use along with the instruments is not only convenient but may very well be of critical importance in conducting surgical veterinarian procedures at a position remote from where such accessory materials may be obtained. Also, not only does the instrument kit 12 provide a common receptacle for the surgical instruments and associated accessories, it will preserve sterility of both such instruments and accessories for a protracted period.

Inasmuch a the invention is obviously susceptible in numerous variations and modifications of the illustrated and described preferred embodiment, the latter having been described in extensive detail only to convey a full and complete understanding of the basic principles of the invention; attention is directed to the appended claims in order to ascertain the actual scope of the invention.

I claim:

1. A sterile instrument kit comprising a pair of superposed inner and outer rectangular panels of flat, flexible sheet material, said panels being marginally secured to each other along opposite side edges and along one end and being detached from each other at the end thereof opposite said one end to define an entrance to a pocket defined between the panels, surgical equipment disposed in said pocket, a plurality of instrument retaining loops fixed to the side of the inner panel opposite the outer panel, surgical instruments releasably retained in said loops, an end flap of flat, flexible sheet material marginally secured to one of said panels at the end thereof remote from said one end with said end flap being adapted to fold at its juncture therewith over the side of the inner panel remote from the outer panel, a pair of side flaps of flat, flexible sheet material marginally secured to the opposite side edges of the panels and adapted to fold at the junctures therewith over the side of the inner panel remote from the outer panel in overlapping relationship with each other, and a tie string secured intermediate its ends to one of the panels adjacent said one end of the latter, whereby the panels with the flaps folded over the inner panel can be rolled from an end thereof and secured in rolled condition by said tie string, said flat, flexible sheet material being impervious to liquid and is comprised of a fabric woven from fibers of nylon and coated with silicone rubber, and said material being resistant to deterioration by repeated steam sterilization procedures each involving contact with steam at about 275° F. under about fifteen pounds per square inch pressure for about fifteen minutes.

2. A roll-type container for sterile instruments comprising a pair of superposed inner and outer rectangular panels of flat, flexible sheet material, said panels being marginally secured to each other along opposite side edges and along one end and being detached from each other at the end thereof opposite said one end to define an entrance to a rectangular pocket formed between the panels, said pocket being open at the upper end, a plurality of instrument retaining loops fixed to the side of the inner panel opposite the outer panel, a generally rectangular end flap of flat, flexible sheet material marginally secured to one of said panels at the end thereof remote from said one end with said end flap being folded at its juncture therewith over the side of the inner panel remote from the outer panel, a pair of generally rectangular side flaps of flat, flexible sheet material marginally secured to the opposite side edges of the panels and folded at the junctures therewith over the side of the inner panel remote from the outer panel in overlapping relationship with each other, and a tie string secured intermediate its ends to one of the panels adjacent said one end of the latter, said panels with the flaps folded over the inner sides thereof being rolled into a generally spiral configuration from the end opposite said one end with the inner side of the panels being innermost, and with the open end of the pocket positioned within the spiral and closed by the rolled panels and flaps, the rolled panels and flaps being secured in rolled condition by the tie string, said flat, flexible sheet material being impervious to liquid and is comprised of a fabric having a synthetic coating thereon, and said material being resistant to deterioration by repeated steam sterilization procedures each involving contact with steam at about 275° F. under about fifteen pounds per square inch pressure for about fifteen minutes.

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