

May 17, 1949.

A. B. KENNISON

2,470,494

SHIPPING PACKAGE OF SUTURE TUBES OR THE LIKE

Filed July 15, 1947

Fig. 1.

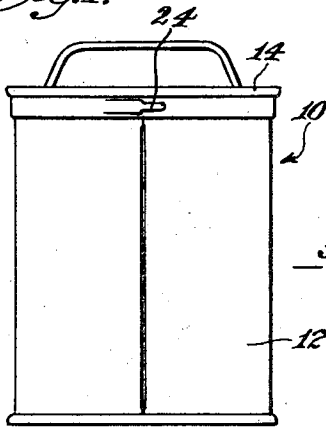


Fig. 2.

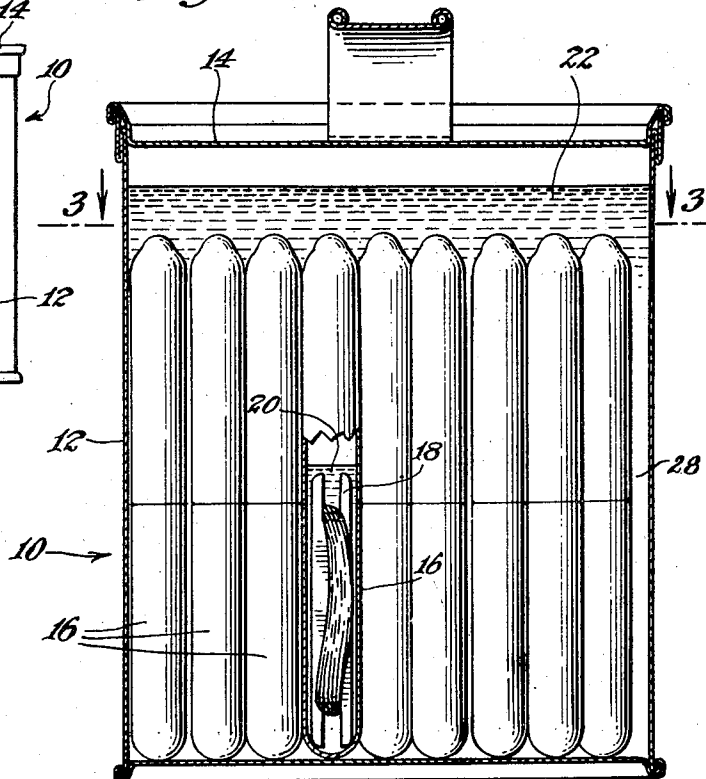
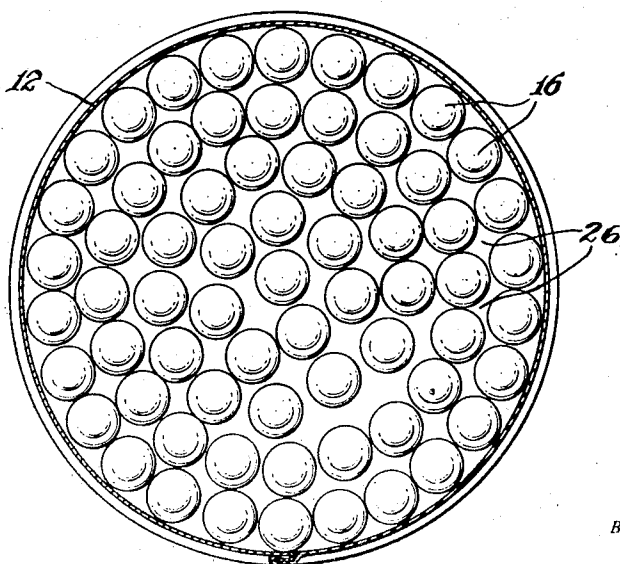


Fig. 3.



INVENTOR.
ADRIAN B. KENNISON

BY *Leroy F. Halley*
ATTORNEY

UNITED STATES PATENT OFFICE

2,470,494

SHIPPING PACKAGE OF SUTURE TUBES
OR THE LIKEAdrian B. Kennison, Plainfield, N. J., assignor to
Johnson & Johnson, a corporation of New
Jersey

Application July 15, 1947, Serial No. 761,064

14 Claims. (Cl. 206—63.3)

1

This invention relates to the packaging of sealed suture tubes, and particularly relates to a package containing sealed suture tubes wherein the tubes are maintained in a sterile condition and breakage of the tubes in transit is minimized.

It has become an accepted practice of the medical profession to use sterilized surgical sutures which have been sealed in glass tubes containing a sterile suture tubing fluid which maintains the suture in a soft and pliable condition. The outside surface of the glass tubes are not sterile as the tubes are received by the surgeon or hospital, and it is necessary that the exterior of the suture tubes be sterilized before the tubes are opened in order that the sutures may not become contaminated as they are removed from the opened tubes. The established practice used by surgeons and hospitals for sterilizing the outside surfaces of the tubes when non-boilable sutures are used has been to wash the exteriors of the tubes with germicidal soap and water or other solvent, followed by rinsing and drying. The tubes are then placed in a sterile glass storage jar, and a sterilizing solution is poured over them; the jar is then covered. It has been found necessary to place the tubes in a sterilizing solution at least 18 hours before they are to be opened.

Alcoholic solutions containing approximately 70 per cent alcohol have been found satisfactory as sterilizing solutions because the tubes will sink and remain submerged as their specific gravity is greater than that of 70 per cent alcohol. It is customary to add an additional bactericidal agent to the 70 per cent alcohol solution, and agents such as potassium mercuric iodide, formaldehyde solution, and a combination of iodine and sodium iodide have been used for this purpose. Aqueous solutions of the above bactericidal agents have also been used, but in this case the tubes may not sink as their specific gravity may be less than the specific gravity of the solution, and to insure that the tubes are submerged beneath the surface of the liquid, a sponge or fold of gauze is customarily placed on top of the solution. After the tubes have been in the sterilizing solution for at least 18 hours, they may be safely opened and used in the operating room without danger of contamination of the suture from the exterior of the tube.

This procedure for insuring against contamination of sutures upon opening of the suture tubes is disadvantageous because the many operations involved require a substantial amount of a surgeon's or a hospital nurse's time. The many operations necessary also result in a degree of

2

uncertainty as to the sterility of the exterior of the tubes, and the inconvenience of the 18-hour waiting period which is necessary for the tubes to spend in the sterilizing solution is a further disadvantage.

It is an object of this invention to supply the medical profession with a tubed suture in which the exterior of the tube is sterile.

It is another object of this invention to supply the medical profession with a tubed suture whose exterior surface is maintained sterile for an indefinite period of time.

It is still another object of this invention to package a plurality of tubed sutures in a hermetically sealed container containing a sterilizing solution which acts to maintain the exterior surfaces of the tubes sterile and in addition acts as a hydraulic cushioning agent to prevent breakage of suture tubes during shipment.

Still other objects will be apparent from the drawing, the following descriptive material, and the appended claims.

In the following description, reference will be made to the accompanying drawing forming part hereof and in which

Fig. 1 represents a side elevation of an assembled hermetically sealed container containing suture tubes and sterilizing solution;

Fig. 2 represents a vertical section of the container showing the suture tubes and sterilizing solution; and

Fig. 3 represents a horizontal section of the assembled container along the line 3—3 of Fig. 2.

The objects of this invention are accomplished by packaging a plurality of suture tubes immersed in a sterilizing solution within a hermetically sealed container.

Referring to the drawing, Figs. 1 and 2 show an assembled container unit 10 in which a plurality of sealed glass tubes 16 containing surgical sutures wound on a notched strip 18 and a sterile tubing fluid 20 are immersed in a sterilizing solution 22 contained in a container body 12 which is hermetically sealed to the container lid 14.

The preferred type of container, as shown in the drawing, is preferably fabricated of metal and provided with a friction closure which has the advantage of lessening losses of the sterilizing solution by evaporation after the container has been opened initially. This type of closure also decreases the possibility of contamination of the sterilizing solution. It is also preferred that the assembled unit 10 be hermetically sealed and that it be fabricated in such a manner that it may be conveniently opened; one satisfactory fabrication

is to have a key-tear-strip combination opening element 24 as shown in Fig. 1.

Fig. 3 shows the arrangement of the tubes 16 in the container 12.

The sterilizing solution preferably having a specific gravity less than that of the specific gravity of the tubes is used in order that the tubes remain submerged at all times. The sterilizing solution used in the container may be an alcoholic solution containing approximately 70 per cent alcohol and a germicidal agent such as potassium mercuric iodide, formaldehyde, or iodine and sodium iodide. A sterilizing solution found particularly satisfactory consists of 70% isopropyl alcohol, 1% formaldehyde, 0.1% sodium nitrite, 0.1% sodium bicarbonate, and water q. s. ad 100%. In this solution the sodium nitrite and sodium bicarbonate serve as rust inhibitors, reducing corrosion of the metal container wall by the sterilizing liquid. This type of sterilizing solution (which is claimed in my copending application Serial No. 79,888, filed March 5, 1949) is particularly advantageous since it is self-sterilizing and therefore maintains the tubes in a sterile condition at all times. If the tubes are not opened and used within a short period of time, evaporation losses of the sterilizing fluid may occur; more sterilizing solution may then be added to bring the volume of the said solution to a satisfactory level.

It is an important aspect of this invention that the hermetically sealed tubes and sterilizing liquid may be transported or shipped without losses occurring through breakage of the tubes. The sterilizing liquid in the container acts as a hydraulic cushioning agent and prevents breakage of the tubes which would otherwise occur in shipping as a result of ordinary and normal handling shocks. As a further insurance against breakage of the tubes during transportation, a fibrous mat, such as beer mat stock, in the shape of a circular disk may be placed inside the container at each end to cushion the ends of the tubes which are normally the weakest points and at which breakage most often occurs.

The hydraulic cushioning action mentioned in the preceding paragraph may readily be visualized by simply turning the attached drawing upside down, thereby simulating the condition that might occur during shipment of the package if the container of Figure 2 should suddenly be inverted. From an inspection of the drawing, it will be apparent that, when the container is in the inverted position, the liquid 22 will immediately flow downwardly toward the newly presented lower surface 14; that because of the space 26 existing between the tubes (Fig. 3) and the space 28 between the tubes and the wall (Fig. 2), the tubes 16 will also move downwardly through the liquid in the container; that in so moving the tubes will retain their substantially parallel relation; that they will sink through the liquid until they come to rest against the newly presented lower surface; and that, even though the tubes in thus moving will be subject to direct impact, one against another and/or against the container wall, they will nevertheless be buoyantly supported and hydraulically cushioned against the shock of such impact by the liquid 22 which (as shown in Figure 2) covers the tubes and fills a substantial proportion of the volume of the container.

It will be obvious to those skilled in the art to which the invention relates that modification may be made in details of construction of the

container and details of composition of the sterilizing solution without departing from the spirit of the invention which is not limited in respect to such matters or otherwise than as the prior art and the appended claims may require.

What is claimed is:

1. A shipping package of glass suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon removal of the tubes from the package at shipping destination, said package comprising: a plurality of hermetically sealed glass suture tubes in substantially parallel relation in a hermetically sealed container, and a sterilizing liquid surrounding the tubes, substantially covering the tubes and substantially filling the container, whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

2. A shipping package of rigid but frangible hermetically sealed tubes adapted to be ruptured for removal of the contained material, whose outer surfaces are sterile, and which are ready for immediate surgical or medical use of the contained material upon the removal of the tubes from the package at shipping destination, said package comprising in combination: a hermetically sealed container; a plurality of such tubes vertically sustained in substantially parallel relation within said container, said tubes being movable within said container without substantial disturbance of their parallel relation and subject in the normal use of a package to direct impact one against another; and a sterilizing liquid surrounding and substantially covering the tubes, and filling a substantial proportion of the volume of said container, whereby said tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

3. A shipping package of glass suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon the removal of the tubes from the package at shipping destination, said package comprising: a hermetically sealed, substantially rigid container of substantially uniform horizontal cross-section; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within said container; and a sterilizing liquid surrounding and completely covering the tubes and filling a substantial proportion of the volume of said container; whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

4. A shipping package of suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon the removal of the tubes from the package at shipping destination, said package comprising: a hermetically sealed substantially rigid container of substantially uniform horizontal cross-section; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within said container, said tubes being movable within the container without substantial disturbance of their parallel relation; and a sterilizing liquid surrounding and completely covering said tubes and filling a substantial proportion of the volume of said container, whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

5. A shipping package of rigid but frangible

5

hermetically sealed glass tubes adapted to be ruptured for removal of the contained material, whose outer surfaces are sterile and which are ready for immediate surgical or medical use of the contained material upon removal of the tubes from the package at shipping destination, said package comprising: a substantially rigid liquid-and-gas-tight sealed shipping container of substantially uniform horizontal cross-section; a plurality of such tubes vertically sustained in substantially parallel relation within said container, said tubes being movable within the container without substantial disturbance of their parallel relation and subject in the normal use of the package to direct glass-to-glass impact one against another; and a sterilizing liquid having a specific gravity less than the apparent specific gravity of the tubes, surrounding and substantially covering the tubes and substantially filling the container, whereby said tubes, notwithstanding the possibility of said glass-to-glass impact, are hydraulically cushioned against the shock of such impact during shipment and maintained continuously under the effective influence of the sterilizing liquid.

6. A shipping package of suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon the removal of the tubes from the package at shipping destination, said package comprising a substantially rigid and substantially infrangible container of substantially uniform horizontal cross-section; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within said container and hermetically sealed therewithin, said tubes being movable within the container without substantial disturbance of their parallel relation; and a sterilizing liquid surrounding and substantially covering said tubes and filling a substantial proportion of the volume of the container, whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

7. A shipping package of glass suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon the removal of the tubes from the package at shipping destination, said package comprising: a hermetically sealed, substantially infrangible container having substantially rigid side walls and opposed resilient ends, said container being of substantially uniform horizontal cross-section; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within said container; and a sterilizing liquid surrounding and completely covering the tubes and filling a substantial proportion of the volume of the container, whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

8. A shipping package of rigid but frangible hermetically sealed glass tubes adapted to be ruptured for removal of the contained material, whose outer surfaces are sterile and which are ready for immediate surgical or medical use of the contained material upon removal of the tubes from the package at shipping destination, said package comprising: a substantially infrangible rigid, gas-and-liquid-tight sealed shipping container of substantially uniform horizontal cross-section; a plurality of such tubes vertically sustained in substantially parallel relation within

6

said container, said tubes being movable within the container without substantial disturbance of their parallel relation and subject in the normal use of the package to direct glass-to-glass impact one against another; and a sterilizing liquid having a specific gravity less than the apparent specific gravity of the tubes, surrounding and substantially covering the tubes and substantially filling the container, whereby said tubes, notwithstanding the possibility of said glass-to-glass impact, are hydraulically cushioned against the shock of such impact during shipment and maintained continuously under the effective influence of the sterilizing liquid.

9. A shipping package of rigid but frangible hermetically sealed tubes adapted to be ruptured for removal of the contained material, whose outer surfaces are sterile, and which are ready for immediate surgical or medical use of the contained material upon the removal of the tubes from the package at shipping destination, said package comprising in combination: a hermetically sealed metal can; a plurality of such tubes vertically sustained in substantially parallel relation within said can; and a sterilizing liquid surrounding and substantially covering said tubes and filling a substantial proportion of the volume of said can, whereby said tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

10. A shipping package of rigid but frangible hermetically sealed tubes adapted to be ruptured for removal of the contained material, whose outer surfaces are sterile, and which are ready for immediate surgical or medical use of the contained material upon the removal of the tubes from the package at shipping destination, said package comprising in combination: a hermetically sealed metal can of substantially uniform horizontal cross-section; a plurality of such tubes vertically sustained in substantially parallel relation within said can, said tubes being movable within the can without substantial disturbance of their parallel relation; and a sterilizing liquid surrounding and completely covering said tubes and filling a substantial proportion of the volume of said can, whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

11. A shipping package of suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon the removal of the tubes from the package at shipping destination, said package comprising: a hermetically sealed metal can of substantially uniform horizontal cross-section; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within said can; and a sterilizing liquid surrounding said tubes, substantially covering the tubes and substantially filling the can, whereby said tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

12. A shipping package of suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon the removal of the tubes from the package at shipping destination, said package comprising: a hermetically sealed metal can of substantially uniform horizontal cross-section; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within said can, said tubes being movable

within the can without substantial disturbance of their parallel relation; and a sterilizing liquid surrounding said tubes, substantially covering the tubes and substantially filling the can, whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

13. A shipping package of suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon the removal of the tubes from the package at shipping destination, said package comprising: a hermetically sealed metal can of substantially uniform horizontal cross-section; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within said can, said tubes being movable within the can without substantial disturbance of their parallel relation and subject in the normal use of said package to direct impact one against another; and a sterilizing liquid surrounding said tubes, substantially covering the tubes and substantially filling the can, whereby the tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

14. A shipping package of suture tubes whose outer surfaces are sterile and which are ready for immediate surgical use of the contained sutures upon removal of the tubes from the package at shipping destination, said package comprising:

a hermetically sealed metal can of substantially uniform horizontal cross-section and provided with tear-strip opening means; a plurality of hermetically sealed glass suture tubes vertically sustained in substantially parallel relation within the can, said tubes being movable within the can without substantial disturbance of their parallel relation and subject in the normal use of the package to direct impact one against another; and a sterilizing liquid having a specific gravity less than the apparent specific gravity of the tubes, surrounding said tubes, substantially covering the tubes and substantially filling the can, whereby said tubes are hydraulically cushioned against shock and continuously under the effective influence of the sterilizing liquid.

ADRIAN B. KENNISON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
799,166	Johnson	Sept. 12, 1905
1,983,031	Himebaugh	Dec. 4, 1934
1,997,443	Waugh	Apr. 9, 1935
2,006,045	Hopkins	June 25, 1935
2,051,349	Goldberg	Aug. 18, 1936
2,142,707	Austin	Jan. 3, 1939
2,318,379	Davis et al.	May 4, 1943

Certificate of Correction

Patent No. 2,470,494.

May 17, 1949.

ADRIAN B. KENNISON

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 3, line 27, column 4, line 19, claim 1, line 56, claim 3, line 74, claim 4 and column 6, line 60, claim 11, for "stetrilizing" read *sterilizing*; column 4, line 33, claim 2, for "a" before "package" read *the*; column 5, line 22, claim 5, for "hudraulically" read *hydraulically*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of September, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.

Certificate of Correction

Patent No. 2,470,494.

May 17, 1949.

ADRIAN B. KENNISON

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows:

Column 3, line 27, column 4, line 19, claim 1, line 56, claim 3, line 74, claim 4 and column 6, line 60, claim 11, for "stetrilizing" read *sterilizing*; column 4, line 33, claim 2, for "a" before "package" read *the*; column 5, line 22, claim 5, for "hudraulically" read *hydraulically*;

and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of September, A. D. 1949.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.