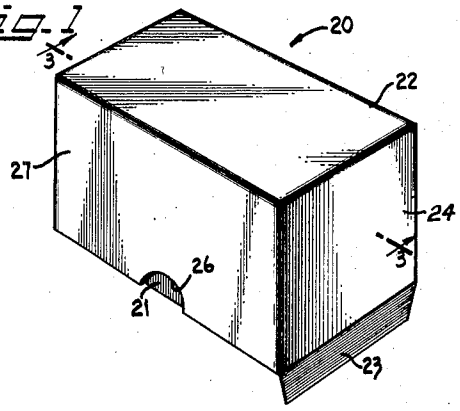
June 16, 1959 J. W. B. LADD 2,890,792

ART OF PACKAGING AND PACKAGE CONSTRUCTIONS THEREFOR

Original Filed July 30, 1953 4 Sheets-Sheet 1

Fig. 1



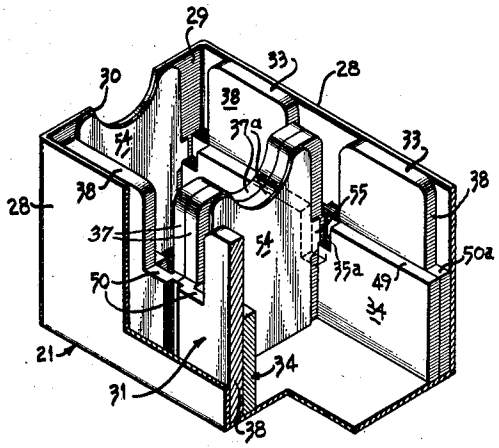


Fig. 2

Fig. 3

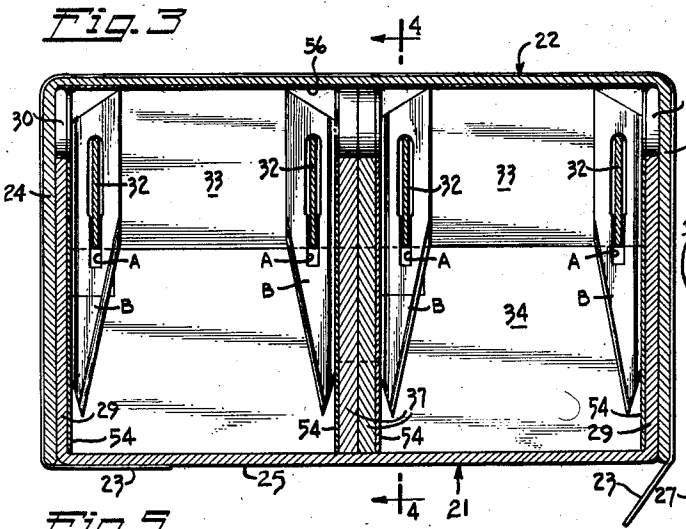


Fig. 4

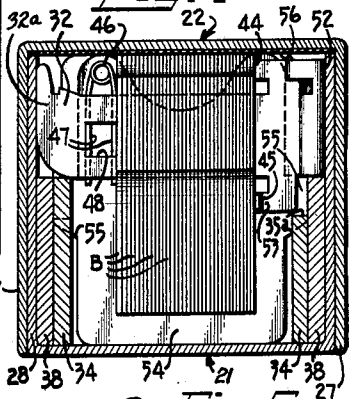


Fig. 5

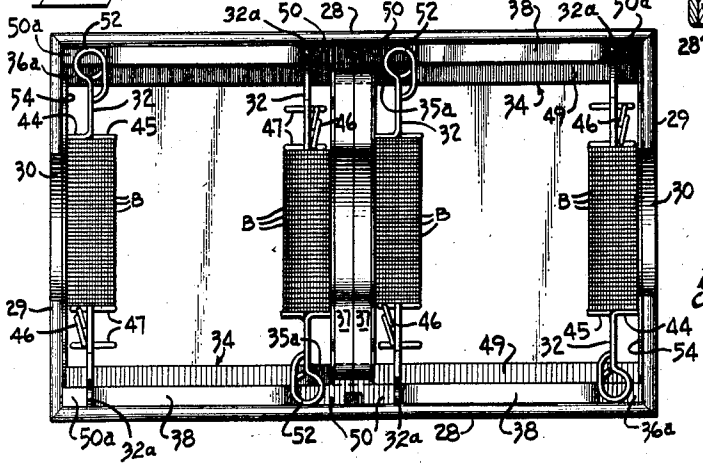


Fig. 6



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ART OF PACKAGING AND PACKAGE CONSTRUCTIONS THEREFOR

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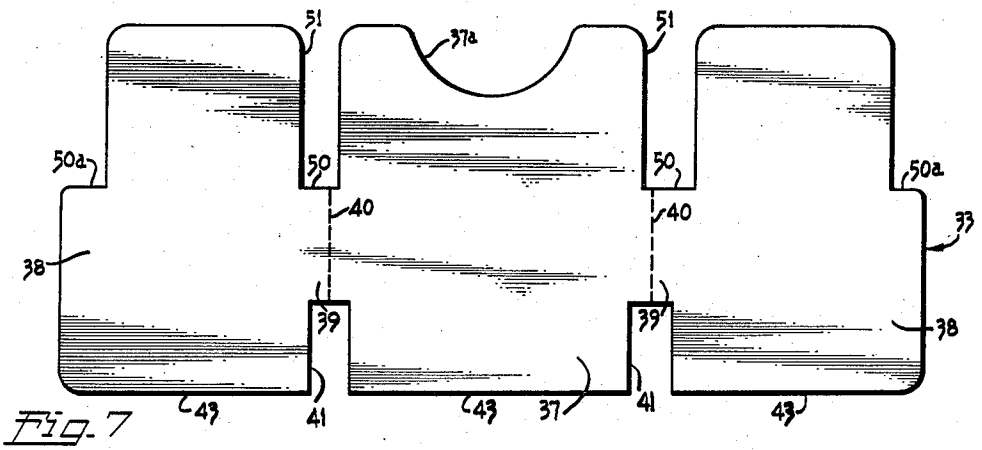


Fig. 7

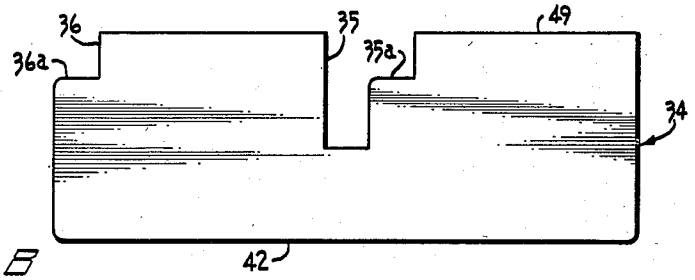


Fig. 8

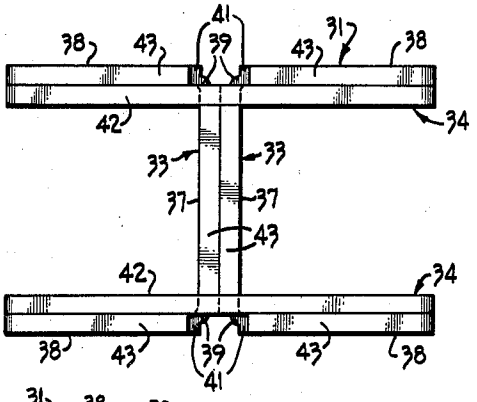
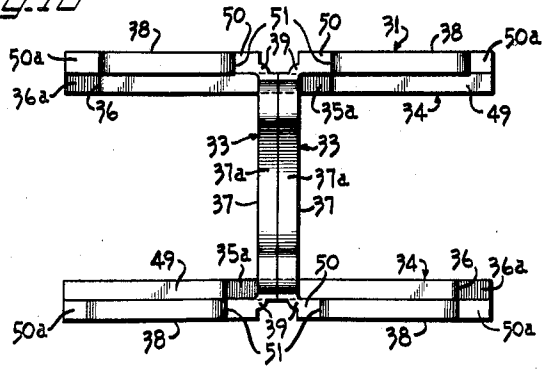


Fig. 9

Fig. 10



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ART OF PACKAGING AND PACKAGE CONSTRUCTIONS THEREFOR

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Fig. 11

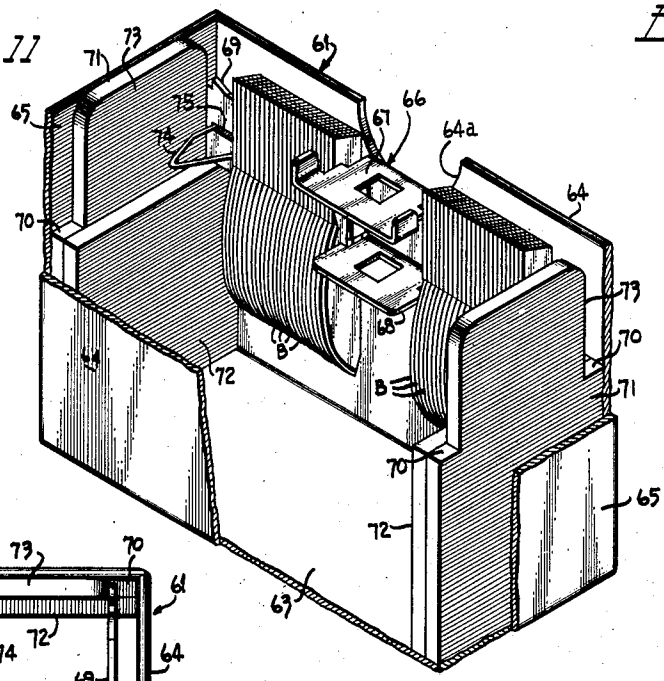


Fig. 15



Fig. 12

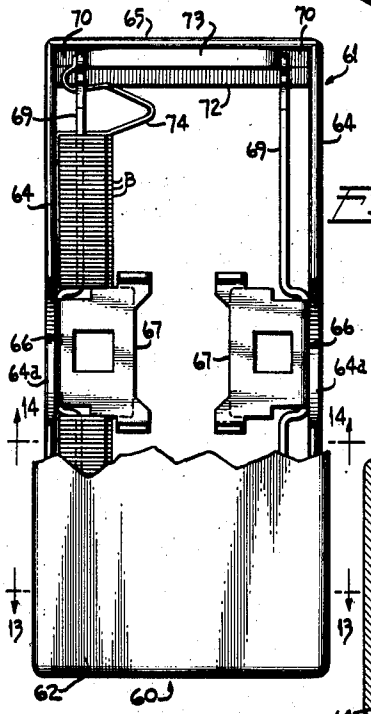


Fig. 14

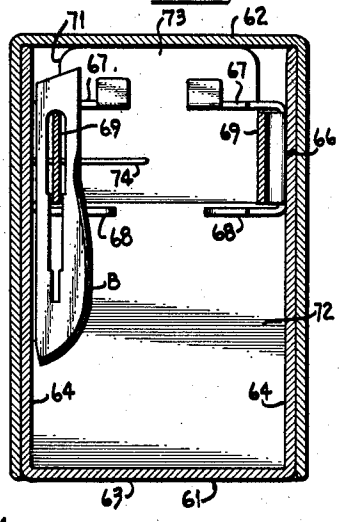
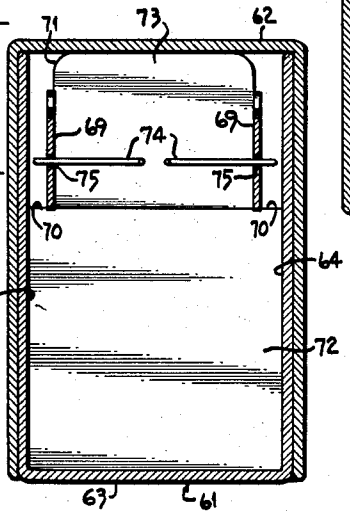


Fig. 13



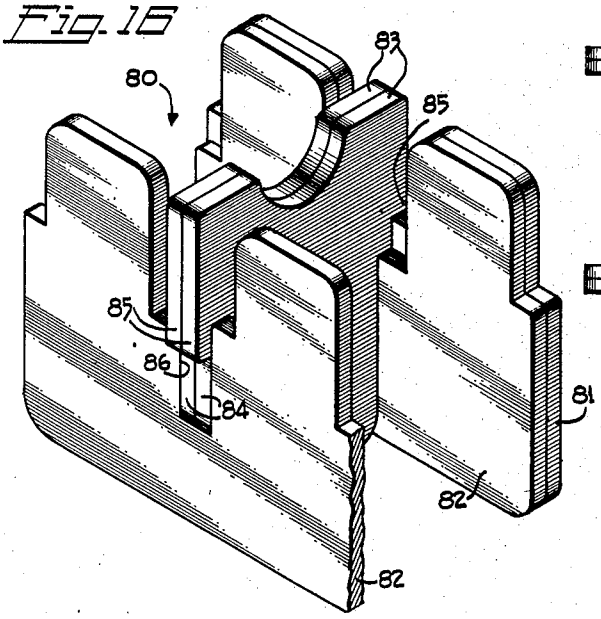
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ART OF PACKAGING AND PACKAGE CONSTRUCTIONS THEREFOR

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Fig. 16



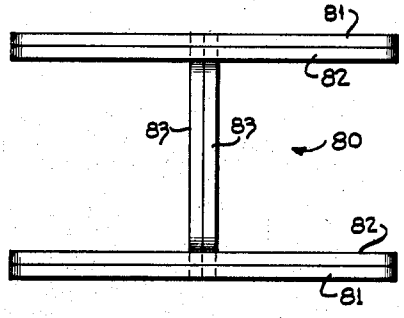


Fig. 17

Fig. 18

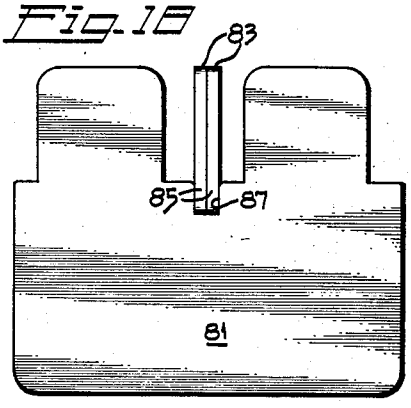


Fig. 19

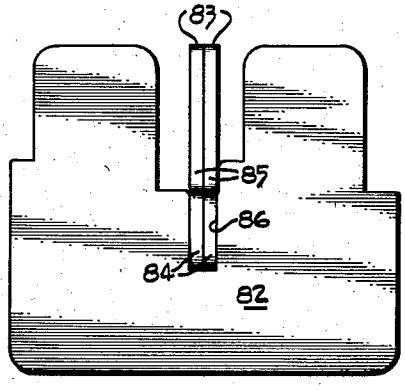
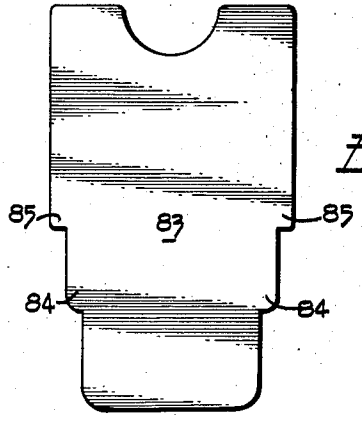


Fig. 20



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ART OF PACKAGING AND PACKAGE CONSTRUCTIONS THEREFOR

John W. B. Ladd, Ridgefield, Conn., assignor to Bard-Parker Company, Inc., Danbury, Conn., a corporation of New York

Continuation of abandoned application Serial No. 371,314, July 30, 1953. This application February 17, 1955, Serial No. 488,915

10 Claims. (Cl. 206—65)

This invention relates to the art of packaging and more particularly to packaging of relatively small, similarly shaped articles in pre-assembled groups in shipping containers. The invention has especial pertinence to packaging of surgical knife blades of the type designed for detachable mounting on a blade handle or holder. Such blades have carefully prepared surfaces, edges and other characteristics which it is essential to thoroughly protect against damage, particularly during transit from the point of manufacture to the point of ultimate use. In the case of these surgical knife blades, elaborate packaging arrangements are particularly undesirable on account of the undue amount of handling time required to disassociate the articles from their protective packing at the point of use and the inherent liability of damage to the articles in accomplishing this. Yet extremely effective protection is absolutely essential.

It is accordingly a specific purpose of the present invention to provide packaging arrangements for such articles which save valuable handling time by key or skilled personnel, as for example the operating room personnel in hospitals. The package presently to be described as illustrative of the inventive concept provides a far more simple and practical arrangement than has heretofore been available for the specific purpose. Furthermore, it now becomes practical to package, if desired, surgical knife blades in sterile condition ready for immediate use and in easily accessible form upon unsealing of the carton or other container in which they are shipped.

This application is a continuation of my copending application Serial No. 371,314, filed July 30, 1953, now abandoned. The subject matter of this invention is related to that disclosed in another copending application, Serial No. 371,377, also filed July 30, 1953, which is directed to various arrangements for supporting groups of surgical knife blades upon a bracket or mandrel adapted to form an arm of a rack by attachment to a standard of suitable design.

Surgical knife blades of the type having a shank angularly, non-circularly or otherwise apertured for firm and rigid, but detachable, securement to a blade holder or handle when used for making an incision, which are simply thrown away after use, have long been widely used by surgeons and others in the medical profession. One of the chief problems encountered to date in the use of such detachable blades has been the fact that, since the blades must be carefully protected during shipment to prevent damaging their finely prepared or sharpened edges and also since the blades may remain in storage for a protracted period of time during which they must be protected against rust or other corrosion, elaborate packaging means have heretofore been employed. Such practice has made it necessary for a nurse or other skilled attendant preparing blades for use each day to spend considerable time in unpacking the blades and performing the various other preoperative preparations that are required. In one of the more satisfactory packaging arrangements employed for such surgical blades heretofore, the blades have been inserted one at a time transversely in a strip or web of

paper having cooperative pairs of slits, each pair of slits permitting a blade to be threaded therethrough, whereby to temporarily secure the blade in the web. Subsequently, the web is rolled to provide a packet in which each blade is isolated from adjacent blades by intermediate portions of the rolled web. The rolled-up packet is then grouped with others in a protective cardboard container for storage and shipment. When the blades are to be used, the packet is first withdrawn from the shipping container, unrolled, and each individual blade withdrawn from the slits of the web for sterilization. It is common practice then to assemble the unwrapped blades in groups on an arm or arms permanently secured to a sterilizer stand. Since these blades are apertured in their shank portion as mentioned hereinabove in order to permit properly securing them to detachable scalpel handles, the blades are generally suspended from the arms of the standard by passage of the latter through the aforesaid apertured shank. The stand and blades are then subjected to sterilization and individual blades are removed as needed.

Surgical practice requires cutting instruments of a high degree of keenness and furthermore instruments which have a high degree of uniformity in their keenness so that the cutting action and depth of cut can be accurately controlled by the surgeon through his sense of touch. Detachable blades of the type discussed therefore are particularly suitable, as they may be economically discarded after a short period of use and a new blade substituted, all in line with the objective of securing uniformity of cutting action. Prior packaging arrangements, including the roll pack mentioned above, which have met the requirements of adequately protecting the blades during shipment have disadvantages from other standpoints, notably the time and care required in taking the blades from the shipping package and preparing them for sterilization. It is not at all uncommon for some hospitals to use as many as a gross of scalpel blades during an operating day and the nurse or other attendant preparing the blades must normally spend between one-half to three-quarters of an hour in performing the various operations of unwrapping and placing them individually on the sterilizer rack. And since many of the larger hospitals may use two hundred or more gross of the blades each year, the substantial amount of time expended by highly trained nurses required to ensure proper preparation of the blades is a matter of real expense, not to mention the fact that it takes these nurses away from other more important work for which they are needed.

By way of contrast, a gross of blades packaged in the manner disclosed herein may be taken from their sealed shipping container and placed on a sterilizer stand in a matter of 10 to 15 seconds. Moreover this can be done by comparatively inexperienced personnel without anywhere near the same liability of damaging the blades, or of the attendant getting cut, which is inherent in the old method of packaging.

In general, the novel packaging arrangement comprises the combination of a protective outer carton, a bracket or mandrel on which the apertured surgical blades are "threaded," and an internal nest structure within the carton on which the mandrel is designed to be demountably seated so as to suspend the blades in substantially immovable condition. The cross-sectional shape of the mandrel is such as to conform roughly with the contour of the blade apertures to prevent appreciable swinging of the blades thereon, while permitting slight upward movement of the blades relative thereto for reasons presently to be explained. Desirably, when the cover is secured to the carton, a non-critical portion, i.e., unsharpened edge, of the surgical blades grouped on the mandrel is contacted to press them firmly against the mandrel which in turn is pressed firmly into the aforesaid nest structure.

This further helps to prevent contact of the edges of the blades against any portion of the carton or adjacent blades. Another feature is the provision for retaining blades on a mandrel which has been removed from the shipping carton, whereby the blades may be conveniently transported as a group without danger of their falling off the mandrel accidentally. Yet by virtue of the aforesaid slight upward movement permitted the blades on the mandrel, they may be removed as desired, either individually or as a group, by withdrawal endwise of the mandrel. As an important optional feature of the invention, the bracket or mandrel used to support the grouped blades in the package may be provided with attachment means for securing it to a stand subsequent to its removal from the package as a convenient means of supporting the blades for use.

The carton and mandrel may be constructed of any suitably stiff sheet material such as paperboard, plastic or metal which has sufficient rigidity to prevent crushing and consequent damage to the blades. It is presently preferred to employ cardboard or paperboard for the carton and mandrel supports, while the mandrel itself is of light gauge metal. Where the mandrel is to form part of a sterilizer stand, it must obviously be of a material which will not be adversely affected by the sterilizing or germicidal solutions employed.

By a packaging arrangement of this type designed specifically for surgical blades, not only is it possible to reduce very materially the amount of time required to prepare the blades for operative use, but also to reduce the cost to the manufacturer of packaging the blades in the first instance. Moreover, by treating interior surfaces of the carton with volatilizable anti-oxidants, all use of rust inhibiting oils or waxes applied directly to the surfaces of the blades can be dispensed with, so that all that is required for unpacking and preparing such blades for operative use is to remove them as a group on a mandrel from the package and then attach the mandrel to a stand for placement in a sterilizer. This may be even further simplified by providing a carton capable of retaining a germicidal or other antiseptic solution within which the blades are continuously suspended so that upon opening the package the blades are immediately ready for operative use, assuming of course that the steps of opening the package and removing a blade therefrom are carried out under aseptic conditions.

Further advantages of the arrangement and construction of the carton and resulting package here proposed will become apparent from the following description taken in connection with the accompanying drawings illustrating several particular forms of packages embodying the principles of this invention.

In the drawings:

Fig. 1 is a perspective view of a completed package except that one sealing flap has been left open for illustration purposes;

Fig. 2 is a perspective view of the inner carton member, the cover having been removed and parts being broken away to show the interior mandrel supporting arrangement;

Fig. 3 is a cross-sectional view in side elevation, on line 3—3 of Fig. 1, showing surgical blades and their supporting mandrels in nested position within the package;

Fig. 4 is a cross-sectional view in end elevation taken on line 4—4 of Fig. 3;

Fig. 5 is a top plan view of the package shown in Fig. 4, the cover having been removed;

Fig. 6 is an enlarged view of a spring clip used for retaining the blades on a mandrel during shipment;

Figs. 7 and 8 are plan views of blanks used in forming the mandrel support or nest structure for the carton;

Figs. 9 and 10 are bottom and top plan views, respectively, of the assembled mandrel support removed from the carton;

Fig. 11 is a perspective view of a modified package construction designed to accommodate a different type of mandrel, parts being cut away to show the interior in greater detail;

Fig. 12 is a top plan view of a package like that shown in Fig. 11, a portion of a cover member being shown here;

Fig. 13 is an end elevational view in cross section taken on line 13—13 of Fig. 12;

Fig. 14 is a cross-sectional view in end elevation taken on line 14—14 of Fig. 12;

Fig. 15 is a detailed view on enlarged scale, of a spring packing clip adapted for use with the type of mandrel illustrated in Figs. 11 through 15;

Fig. 16 is a perspective view of a modified mandrel support for mandrels of the type shown in Figs. 3 to 5, certain parts being cut away for greater clarity;

Fig. 17 is a plan view from below of the structure shown in Fig. 16;

Figs. 18 and 19 are side elevational views of the support, one of the outer side members having been removed in Fig. 19 to show the construction better; and

Fig. 20 is a plan view of a central panel in the support structure of Fig. 16.

Referring to the construction shown in Figs. 1 through 5, the assembled package **20** comprises complementary inner bottom, and outer top, members **21**, **22**, respectively, which fit into close sliding or telescoping engagement with each other. These members are, desirably, constructed of adequately stiff cardboard, paperboard, or similar fiber or plastic sheet material, but it will be apparent that sheet metal can be employed if desired. In the assembled package here illustrated, the two parts of the carton are secured together by adhesive-bearing tabs **23** extending from the end walls **24** of the cover **22**. Tabs **23** are adapted to be folded around the lower edges at the ends of the carton and to be glued to the bottom panel **25**, as shown best in Fig. 3. Cover **22** is provided with conventional thumb notches **26** in the lower edges of side walls **27** to facilitate withdrawal from the bottom member after breaking the sealed end flaps. The inner carton member **21** comprises upstanding side walls **28** and end walls **29**, the latter having thumb notches **30** in each of their respective upper edges for a purpose which will be explained presently.

An internal support **31** (Fig. 2) is disposed within the inner carton member **21**, and mandrels **32** each supporting a group of blades B are adapted to rest on and be positively held by this support against any movement within the box except that they may be withdrawn by simply lifting them straight up out of the open top of carton member **21** when the cover is removed. The internal support or nest structure **31**, in this instance, is formed of cardboard or fiberboard sheet material which is somewhat thicker than that of the carton members **21**, **22**. As seen more particularly in Figs. 7 through 10, the nest structure is composed of four components formed of the aforesaid sheet material including two U-shaped or channel members **33** and two flat members **34**. Each of the latter members is die-cut from sheet stock and has an inverted L-shaped notch **35** and a corner notch **36** in its upper edge. The supporting member **33** is die-cut from similar sheet stock to provide a blank such as that illustrated in Fig. 7, having a central panel **37** and opposite end panels **38** connected to the central panel by comparatively narrow necked or bridging portions **39**. Each of these latter portions is provided with a slit or score line **40** extending the width of the bridge portions and roughly halfway through the thickness of the material. In preparing this blank for assembly, the end panels **38** are bent along slits **40** to extend at right angles to the central panel **37**, the end panels remaining hinged thereto by the unslit portion of the material between the respective panels to form a channel. Two of these members are placed back-to-back with their central webs or panels **37** in contact

and are then locked together in this position by sliding the flat members 34 up along the inner faces of each set of oppositely-extending panels 38 transversely of the central panels 37. Notches 35 of panels 34 cooperate with the notches 41 formed by the bridging portions 39 to allow sliding interengagement of the several parts until the bottom edges 42 of panels 34 are flush with the lower edges 43 of panels 37, 38. Panels 38 and 34 thus cooperate to form opposed walls which extend between opposite sides of the carton when assembled therewith. This assembled nest structure is adapted to fit closely within the bottom or inner member 21 so that when the blades are placed therein in groups on their respective mandrels, there can be no lateral shifting of the various parts within the completed package. Central panels 37 of blank 33 form a partition dividing the lower carton member 21 into two compartments, each of which is adapted to contain two groups of mandrel-supported blades. As shown more especially in Figs. 4 and 5, mandrels 32 are in this instance substantially flat, plate-like brackets which pass through apertures A of the surgical knife blades B. Apertures A are conventionally keyhole-shaped, as seen in Fig. 3, and the mandrels are in general of such thickness and transverse width that the blades carried thereby, although so confined or encircled by the elongated or non-circular periphery of said apertures A as to be incapable of any substantial movement in planes transverse to the axis of the mandrel (except upwardly to the limited extent hereinafter indicated for purpose of removal), are nevertheless easily threaded on over an end 32*a* of the mandrel and are freely slidable longitudinally thereof to an extent controlled by the configuration of the upper edge of the mandrel. Each group of blades suspended on a mandrel is held during shipment as a compact unit against movement longitudinally thereon by abutment of the end blade at the inner end of the stack against a pair of shoulders 44, 45, positioned above and below, respectively, the central blade-supporting portion of the mandrel 32. A spring clip 46, having loops or bends 47 which fit into an aperture 48 in mandrels 32 and exert a pressure lengthwise of the mandrel against the outer blade of the group, maintains the blades in compact arrangement. Spring clip 46 is a temporary restraining member only, used simply in shipment of the blades in the aforesaid manner. After the package is opened and the blades have been removed as a group along with their mandrel, this clip is easily grasped by its upper end and pulled free of the mandrel to allow separation of the blades and removal of them individually from the group as desired by sliding them over the outer free end of the mandrel. As can best be seen in Fig. 4, the upper edge of the mandrel 32 is formed to provide a retaining depression which is effective to hold the blades from being accidentally spilled off the free end if the mandrel is inadvertently tipped in transporting the blades to the sterilizer. Apertures A are just sufficiently longer than the transverse width of the mandrel, however, to permit the blades to be lifted relative to the mandrel enough to remove them over the retaining lip at the outer end 32*a* of the mandrel when desired.

The nest or mandrel-supporting arrangement of the package shown in the drawings positions each group of blades in a depending position with the backs of the blades in each group held firmly against either an end wall 29 or a partition 37 so that the sharpened edges of the blades are held away from all of the components of the package and each other. This pressing of the backs of the blades against a wall of the carton is effected by pressure of the opposite ends of each mandrel against the vertical edges of notches in nest structure 31 at each corner of the carton as will be described more fully hereinafter. Thumb notches 30 in end walls 29 and similar notches 37*a* in partitions 37 allow access of the thumb and forefinger of a person to the upper ends of the blade shanks in each group to facilitate withdrawal of the group vertically from the carton.

As seen more particularly in Figs. 4 and 5, each mandrel rests at its opposite ends upon a shoulder or ledge formed by the upper edges of the nest structure 31 so that the tips of the blades are spaced from the floor of the carton. The free end 32*a* of the mandrel rests on the upper edge 49 of member 34, while the opposite end is supported by the upper edge 50 forming the bottom of the notch 51 between central panel 37 and panel 38. While it will be obvious that it is not a necessary feature of the invention, the particular form of mandrel 32 illustrated is formed at its inner end to provide a socket engaging portion 52 by which it is adapted to be affixed to a stand after removal from the package and thereby provide a supporting bracket or arm for the blades in use. This socket arrangement is described in more detail in the aforesaid copending application of Ladd and Arden, Serial No. 371,377. The recesses formed by the short leg of the L-shaped notch 35 and the corner notch 36 in members 324 allow the projection 53 of the mandrel, on which the lower abutment 45 for blades B is formed, to extend downwardly below the main body portion of the mandrel without interference from the support members. At the ends of the carton, the support for brackets 32 is similar to the arrangement adjacent partitions 37, but in this case is provided by shoulders 50*a* on panels 38 and the upper edges 49 of members 34.

In each instance as here shown, notches 35 and 36 serve merely as clearances for projections 53 on the mandrels, although the notches could be cut so that their respective horizontal shoulders 35*a*, 36*a*, are disposed at a level such that the mandrels do obtain additional support, if that is desired. Each stack or group of mandrel-supported blades is placed in the package so as to cause the sharpened edges to be directed away from the wall against which they are placed. The notches 35, 36, provided in members 34 are disposed accordingly in the assembled structure. In each case also, the vertical edges of the notches formed in the nest structure at each corner of the carton are so spaced from the adjacent wall as to force the ends of the bracket toward that wall when a complement of blades is carried thereon. This causes the backs of blades B to be pressed firmly against the wall and further prevents relative movement of the blades in the completed package.

To eliminate the necessity for using rust inhibiting oils or waxes on the blades, the interior of the carton and surfaces of the nesting members can be treated with one of the various types of vapor phase inhibiting materials available commercially, for example, under the trademark "VPI" of the Shell Oil Company. In general, these materials consist of a volatile organic nitrite such as dicyclohexylammonium nitrite or di-isopropylammonium nitrite. Or if desired a desiccant material can be employed. The treatment can consist in impregnating the walls of the carton and the nest with one of these materials or they may be applied in the form of a coating. In the latter case it is desirable to keep the blades from making direct contact with the surfaces thus coated as some of the material is inevitably scraped off onto the blades in placing them in or removing them from the carton as a group. In order to overcome this, a thin metal shield 54 is placed between the backs of the blades and the adjacent carton wall. As shown more particularly in Figs. 2 and 4, shields 54 are provided with projecting tabs 55 at each of their respective side edges, which tabs are held between the end edges of side members 34 and an end panel 29 of the inner carton, or between a partition 37 and an edge of notches 35 of members 34, so as to retain the shields in place in the carton. The shields are positioned in this manner simply by sliding them vertically down along the respective walls of the carton after the nest structure 31 has been placed in the carton.

In order to assist in holding the blades firmly within the package, the edges or shoulders of the support upon which mandrels 32 rest are disposed at a height which will cause the upper ends of the blade shanks to project slightly above the open top of the inner carton member 21 prior to placing the cover 22 thereon and sealing the carton. The purpose of this is to cause the inner surface of the top of cover member 22 to contact the aforesaid upper edges of the blades and to force the blades downwardly against their mandrels when the cover is pressed fully down and the sealing tabs 23 are folded under the ends and secured to the bottom of the carton. Where the inner surface of the cover member 22 is also coated with one of the previously mentioned inhibitor materials, a metal shield 56 is fitted snugly against the upper inner surface of cover 22 against which the blade ends abut, thus preventing actual contact at this point between the blades and inhibitor material in the completed package. Naturally, plastic or other sheet material can be substituted for the metal shields specifically mentioned above.

The modified package construction illustrated in Figs. 11 through 15 is similar to that shown in the preceding figures but differs primarily in the type of mandrel employed to support the blades. The assembled package 60 comprises telescoping carton members 61 and 62, as before. Inner member 61 has a bottom panel 63 to which are attached upstanding side and end panels 64, 65, respectively. Mandrel 66 in this instance is double-ended, in that the means by which it is secured to a stand after removal from the package comprise horizontally extending flanges 67, 68, disposed substantially intermediate the oppositely projecting arms 69 upon which the blades B are suspended. When mandrel 66 and its associated blades are removed from the carton, the blades in each group at opposite sides of the flanges 67, 68, are adapted to be withdrawn over the respective free ends of arms 69 as required for use. Reference is again made to the aforesaid copending application of Ladd and Arden for a description of the type of stand with which this particular bracket or mandrel is designed to cooperate. When disposed in the package 60, mandrels 66 extend the full length of the inner carton 61 at each side thereof, the backs of blades B in each group being in contact with the inner faces of side walls 64. The mandrels are supported in this position by means of shoulders 70 of supporting members 71 which may simply be press-fitted or, if desired, glued or otherwise secured to the inner faces of ends 65. An auxiliary supporting block or wall 72 is also provided at each of the ends, the height of this block being just sufficient to bring its upper edge flush with the upper edge of shoulders 70. Each of these supporting blocks 71 has an integral portion 73 extending above the shoulders 70 so that there is a notch formed at each corner of the carton in which the ends of the mandrels are retained. When the ends of the mandrels are engaged in these notches, the vertical edges of portions 73 press the ends of the mandrels, and the backs of the accompanying blades, against the side walls of the carton. Thumb notches 64*a* in these walls adjacent the flanges 67 permit easy removal of the mandrel from the carton.

While the blades are supported on the mandrel within carton 60, they are retained in compact groups by means of a small spring clip 74 which is inserted into a narrow slit or aperture 75 adjacent the outer end of each arm 69 so that the legs of the clip bear against the outer blade of each group and press the group firmly against an inner abutment afforded by shoulders on flanges 67, 68. Here again, clips 74 are used only to prevent movement of blades longitudinally on the arms of mandrels 66 during shipment. When the mandrels are removed from the shipping carton preparatory to using the blades, the spring clips are withdrawn and discarded.

Although not illustrated in Figs. 11 through 14, the carton may be impregnated or internally coated with a rust or corrosive inhibiting composition. In the latter case protective shields similar to those described in connection with the package illustrated in Figs. 1 through 5 should be provided along each side wall 64 and the inner surface of the top panel of cover 62 to prevent rubbing of the blades directly against the coating composition.

The material from which the cartons hereinabove described are constructed has been referred to as being cardboard or similar fiber sheet material, since it is at present generally more economical to employ this type of material. As mentioned previously, however, it is possible to construct the containers including the internal support for the brackets of sheet metal or plastic. In such a case, a germicidal solution, to which the plastic or sheet metal employed is passive, can be placed in the carton itself to immerse the mandrels with their associated groups of blades directly in the solution. The cover member can then be sealed on to retain the solution in the carton and the blades, if the carton is opened under sterile conditions, are ready for immediate use.

Where the nest structure employed for supporting the brackets and blades is made of plastic, the mechanical arrangement thereof requires in some instances modification from that specifically illustrated hereinabove. In the construction shown in Figs. 11 through 14, the arrangement lends itself readily to the use of plastic material and while the construction shown in Figs. 2 through 10 may also be made in plastic as shown, it is better to preform members 33 in channel shape rather than bend them from flat stock. The presently preferred arrangement however, which may be made either of plastic sheet material or of cardboard, is shown in Figs. 16 through 20. The support 80 there illustrated is quite similar in most respects to that shown in Figs. 2 through 10 but by a slightly different arrangement of component parts it is possible to eliminate the bent or channel shaped pieces. In this construction, paired support members 81, 82, are disposed at each side to lie along opposite side walls of the carton member within which they are adapted to be placed. These paired members form a yoke for supporting a central transverse partition which, as here shown, comprises a pair of identical members 83. Each of the latter is provided with a set of lower shoulders 84 and upper shoulders 85. In the assembled structure, the lower shoulders are engaged by the side walls of a notch 86 formed in inner side members 82, the lower ends of the shoulders resting upon the bottom of notches 86. The upper shoulders, in turn, are confined primarily by the walls of notches 87 in the outer side members 81, but also to a small extent by a portion of notches 86, as seen in the drawings. The shouldering of the outer and inner side members 81 and 82 to provide the supporting shelf areas for the respective bracket-and-blade groups is identical with that in Figs. 2 through 10 and accordingly need not be further described here.

Modifications of the various specific examples illustrated in the foregoing description will be obvious. Thus, internal supports or so-called nest structures of the foregoing types can be formed as an integral unit in plastic by molding or casting, for example. Similarly the entire carton with nesting or other internal supporting structures can be cast or injection molded as an integral unit. The invention therefore is to be construed as encompassing all such modifications which are mere equivalents and which properly fall within the scope defined by the following claims.

What is claimed is:

1. In a package construction, the combination, with a carton, of plurality of detachable surgical knife blades each having an elongated aperture of substantially continuous periphery in its shank portion, a mandrel passing through the aperature of each blade and so encircled thereby that the blades may not be removed transversely of the mandrel, support means provided in said carton upon which said mandrel rests to suspend said blades with their tips spaced from the bottom of said carton, and retaining means on said mandrel for said blades com-

prising a retaining depression formed in the upper edge of the mandrel within which the upper margins of said blade apertures are normally engaged, said mandrel having a cross-sectional shape conforming approximately with the shape of said blade apertures but sufficiently smaller in size to permit blades to be freely slid longitudinally of the mandrel and over an end thereof into and out of said depression, while preventing appreciable swinging movement of the blades about said mandrel.

2. A package construction as defined in claim 1, wherein said mandrel is provided with a fixed abutment beyond which said blades may not be slid.

3. A package construction as defined in claim 2, which further includes resilient means for temporarily compacting said blades in a group on the mandrel against said fixed abutment, said resilient means being detachably secured to said mandrel.

4. A package construction as defined in claim 1, wherein a plurality of blade groups, each supported on one of said mandrels, is contained in said carton, said support means for said mandrels having retaining notches within which the ends of each mandrel are laterally confined to hold said blade groups in spaced relation to each other to prevent contact between the sharpened edges of blades in adjacent groups.

5. A package construction as defined in claim 4, wherein each of said blade groups is supported by its respective mandrel with the backs of the blades in each group pressed against a carton wall.

6. In a package construction for shipping detachable surgical knife blades having apertured shank portions, the combination, with a carton having complementary bottom and cover members, of means for securing said cover member to said bottom member in the completed package; mandrels supporting groups of said blades by passing freely through their apertured shank portions; retaining means associated with each said mandrel for retaining said blades thereon independently of said carton; a nest structure within said bottom carton member on which said mandrels are removably seated to suspend respective groups of blades within said carton, said nest structure having partitions dividing said bottom carton member into compartments and having members extending across opposite walls of said compartments, said nest structure having notches formed in its upper edges adjacent each corner of said compartments; each of said mandrels in the assembled package being disposed substantially parallel to a compartment wall and having its opposite ends engaged in a cooperating set of said notches, whereby the unsharpened backs of the blades in the group supported by each mandrel are pressed against a wall of a compartment.

7. In a package construction for shipping detachable surgical knife blades having apertured shank portions, the combination, with a carton within which the blades are packed, of a mandrel supporting a group of said blades by passage freely through their apertured shank portions and by which they are removable as a group from said carton; retaining means associated with said mandrel for retaining said blades thereon independently of said carton; mandrel supporting means within said carton comprising an internal nest structure forming supporting walls across opposite inner faces of said carton, said walls having notches adjacent the corners of said carton and said mandrel being disposed with its ends in opposed notches so as to span said carton and suspend said blades adjacent a carton wall, said blades having their unsharpened back edges pressed firmly against said carton wall by abutment of the ends of the mandrel against the vertical edges of said notches; a cover for said carton, which cover in the assembled package contacts an unsharpened portion on the periphery of said blades to compress them against their supporting mandrel and the mandrel against upper edges of the notches in said supporting walls; and means for holding said cover on said carton in position to maintain such compressive coaction between the cover and blades and thereby retain said blades in substantially immovable suspension on said mandrel to prevent contact of their sharpened peripheries with any component in the completed package.

8. A carton for use in shipping apertured detachable surgical knife blades grouped upon a supporting mandrel capable of passing freely through the blade apertures, said carton comprising complementary inner and outer members fitting in close telescoping engagement; a nest structure disposed within said carton for supporting a mandrel and its group of blades, said structure including two U-shaped spacer members disposed in back-to-back relation to cause the legs thereof to extend oppositely along opposite inner faces of said inner carton member, said U-shaped spacer members having shoulders disposed adjacent opposite corners of said carton between which said mandrel is adapted to extend to support its group of blades; locking members adapted to retain said U-shaped members in said back-to-back relation, said locking members having notches extending downwardly from the upper edge thereof and said U-shaped members having notches extending upwardly from the bottom edge thereof, said locking members being assembled with said U-shaped spacer members so that their respective notches interengage and said locking members lie along the inner faces of two oppositely extending legs of said U-shaped members.

9. In a package construction for shipping detachable surgical knife blades having apertured shank portions, a carton, a mandrel supporting a group of said blades by passage through their apertured portions, a nest structure upon which said mandrel is removably seated to suspend said blades within said carton and retaining means associated with said mandrel and engaging the opposite ends of said group of blades, including a removable retaining spring engaging said mandrel and at least one of the ends of said group of blades for retaining the latter in a compacted group on said mandrel independently of said carton.

10. A package construction as defined in claim 9, wherein said mandrel is provided with a fixed abutment adjacent one end against which said blades abut, and having an aperture adjacent its other end; said retainer spring being inserted in said aperture and held in compression between the outer edge thereof and the outer face of the group of blades to resiliently hold the latter against said abutment.

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