Dec. 12, 1967 R. K. KALLIO 3,357,777

PORTABLE PERISCOPE FOR VIEWING PUBLIC EVENTS

Filed July 30, 1963 2 Sheets-Sheet 1

FIG. 1.

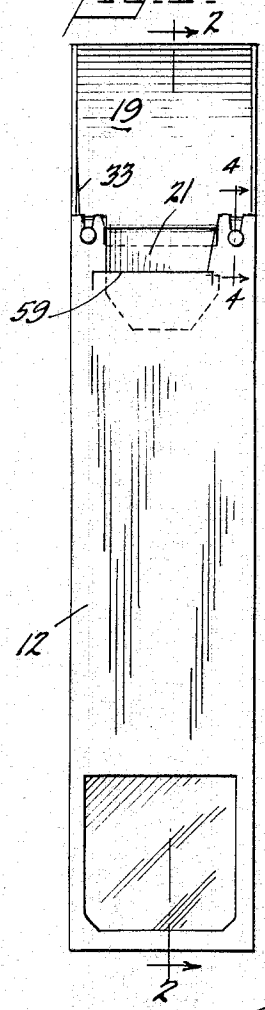


FIG. 2.

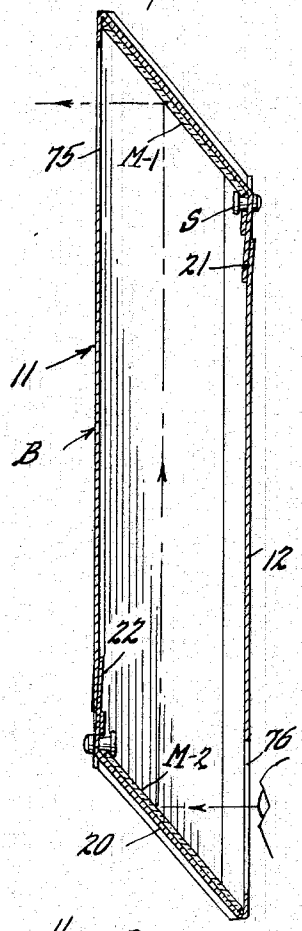


FIG. 3.

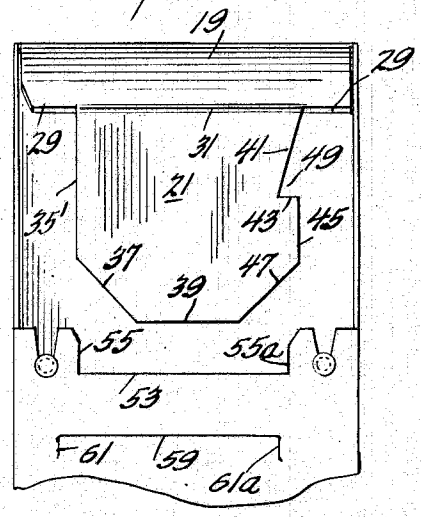


FIG. 4.

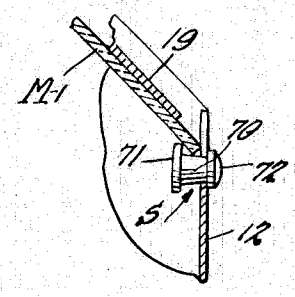
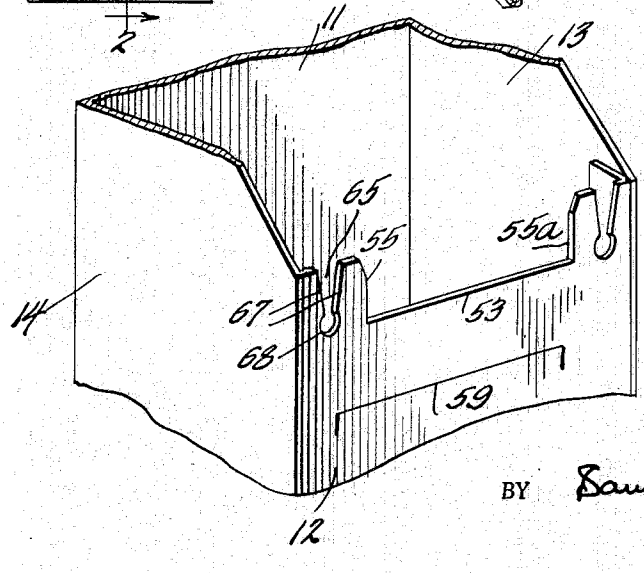


FIG. 5.



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Dec. 12, 1967 R. K. KALLIO 3,357,777

PORTABLE PERISCOPE FOR VIEWING PUBLIC EVENTS

Filed July 30, 1963 2 Sheets-Sheet 2

FIG. 7

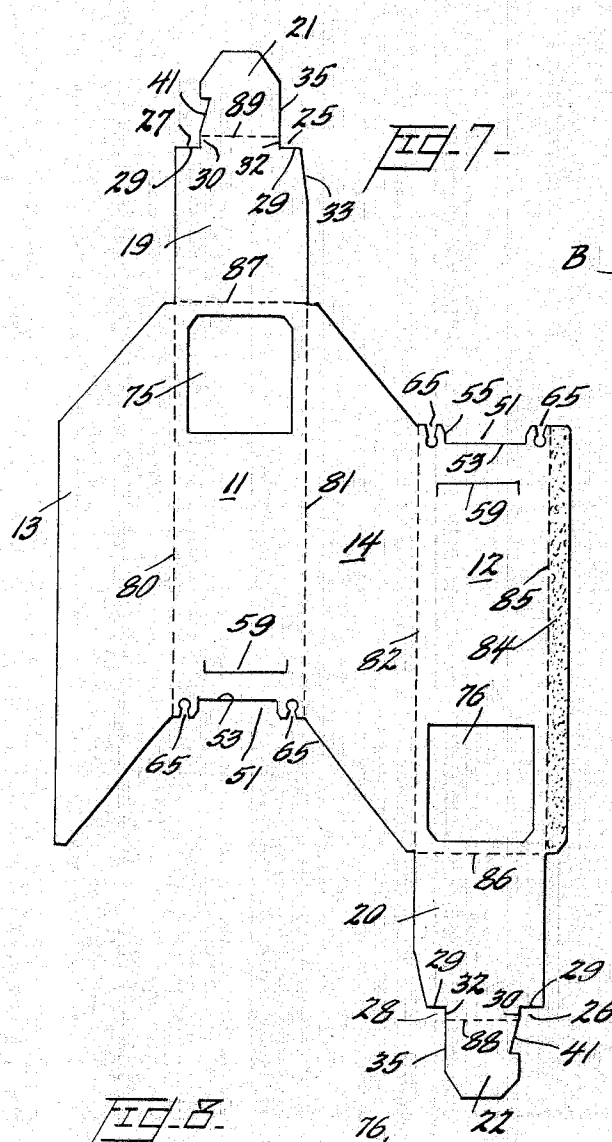


FIG. 6

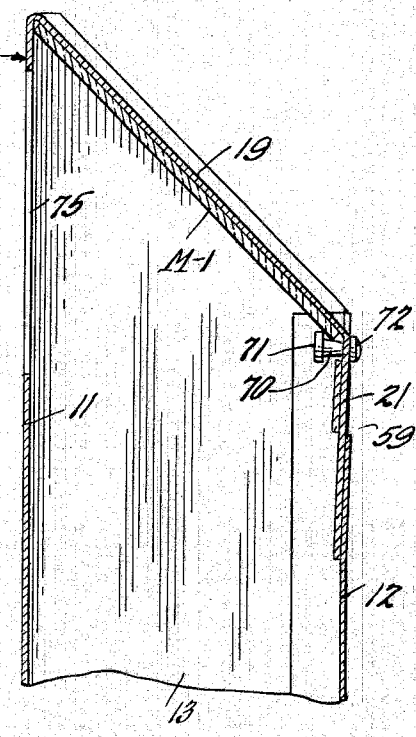
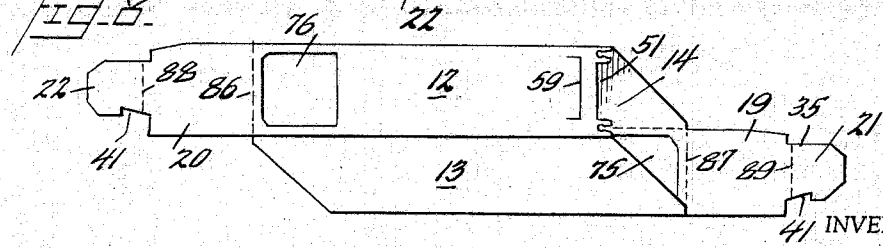


FIG. 8



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United States Patent Office 3,357,777
Patented Dec. 12, 1967

3,357,777

PORTABLE PERISCOPE FOR VIEWING PUBLIC EVENTS

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Filed July 30, 1963, Ser. No. 298,712
8 Claims. (Cl. 350—301)

This invention relates to a portable periscope, particularly of the type used in crowded places for viewing public events such as parades, sports exhibitions and tournaments, and the like, to enable the user to view these activities over the heads of other people.

The invention is more particularly concerned with a periscope, the body portion of which is composed of folded fiberboard or like material, and with the structure of such fiberboard body portion.

Periscopes of the aforementioned type are shown in the patents to Harris, No. 2,155,164 and Chaimson, No. 2,635,506.

Periscopes of this type are required to be erected at the point of use, since they are generally transported thereto in a flat folded or collapsed form. Unless the mirrors are adhered to portions of the body prior to shipment of the periscope, as in the case of the periscope disclosed in the above-mentioned Harris patent, it is also necessary to assemble the mirrors with the body portion at the point of use of the periscope. When initial use of the periscope has ended, such as after viewing a particular golf match, it is desirable that the periscope be disassembled and/or folded into flat form so that the parts may be conveniently stored, ready to be re-assembled for subsequent use.

A principal object of the invention is to provide a periscope of the general type described and which will, among other advantages, effectively meet the requirements for ready assembly of the body portion with the mirrors, and for disassembly and subsequent re-assembly thereof, without thereby weakening the parts of the body portion which support the mirrors in use.

Another object of the invention is to provide a periscope as aforesaid, so constructed as to firmly hold the mirrors in their assembled position in the body of the periscope, even though the latter may be subjected to severe jarring or other rough handling in use.

Still another object is to provide a periscope as aforesaid, so constructed as to enable the mirrors to be rapidly placed in proper position when assembling the device for use, and likewise to be rapidly separated from the body portion in disassembling the device for storage, and to enable such assembly, disassembly and subsequent re-assembly to be effected practically innumerable times without affecting the holding power of the parts or elements relied upon for holding the mirrors in position for use.

Yet another and important object of the invention is to provide a periscope as aforesaid, which will make possible its ready assembly, disassembly and re-assembly as above stated, notwithstanding the nonavoidable minor variations in the length of the mirrors furnished for use with any given size of periscope.

Briefly stated, the foregoing objects and advantages of the invention are achieved by providing a one-piece body portion which may conveniently be die-cut from suitable fiberboard or like material, the front wall of the body being formed with an enlarged opening adjacent one end thereof, the rear wall being offset longitudinally with respect to the front wall and being formed with a similar opening adjacent the opposite end of the body. Spaced key-hole slots are formed along the horizontal

edge of the front and rear walls remote from said openings, each of these slots being designed to receive a stud of the form hereinafter more fully described and serving as supports for the lower edge of the mirrors at the respective ends of the body when erected for use of the periscope. The body is provided with top and bottom closures, one foldable from the front wall and the other from the rear wall, into angular position so as to be disposed in contact with the rear surface of the mirrors when the latter have been inserted at opposite ends of the body with their lower edges supported by the aforementioned studs located at the respective ends of the front and rear walls. A locking flap is hingedly connected to each closure wall, these locking flaps being each constructed to hold the respective closure walls in contact with substantially the entire rear surface of the respective mirrors and to constrain the lower edge of the respective mirrors against the supporting portions of the aforementioned studs.

The foregoing and other objects and advantages of the invention will be more readily apparent from the detailed description below and from the accompanying drawings, in which:

FIG. 1 is a front view, in elevation, illustrating a periscope constructed according to a preferred embodiment of my invention;

FIG. 2 is a longitudinal cross-section thereof, taken along line 2—2 of FIG. 1;

FIG. 3 is a fragmentary view thereof, in elevation, and showing the upper end of the periscope with the closure wall in a partially closed position;

FIG. 4 is a detail view taken along line 4—4 of FIG. 1;

FIG. 5 is a fragmentary view, in perspective, showing the upper end of the periscope with certain of the parts removed;

FIG. 6 is a view, on an enlarged scale, similar to FIG. 2, showing the upper end of the periscope;

FIG. 7 is a plan view of a fiberboard blank from which the body portion of the periscope may be formed; and

FIG. 8 is a view of the periscope in folded or collapsed form for storage and shipment.

As illustrated in the drawings, the periscope consists essentially of three components, namely, a body or casing B of fiberboard or like foldable material; mirrors M–1 and M–2 insertable in and removable from the body B; and studs S constructed so as to coact with the body B as hereafter more fully described, for firmly securing the mirrors in parallel planes at the opposite end of the body.

The one-piece body B is relatively elongated longitudinally thereof and is of substantially rectangular cross-section transversely thereof. It comprises a front wall **11** of rectangular outline, a rear wall **12** of rectangular outline and offset longitudinally with respect to wall **11**, a side wall **13** hingedly connected to one longitudinal edge of wall **11**, an opposite side wall **14** interposed between and hingedly connected to opposite longitudinal edges of walls **11** and **12**, a top closure wall **19** hingedly connected to the upper edge of wall **11**, and a bottom closure wall **20** hingedly connected to the lower edge of wall **12**. Although the walls **11**, **12** are herein referred to as front and rear walls, respectively, and similarly, closures **19**, **20** are referred to as top and bottom closures, respectively, it will be evident that these terms are employed for convenience of reference and may be reversed, since the construction is such that, in use, either end of the periscope may be utilized as the viewing end, simply by reversing it end for end and face for face.

In accordance with one feature of the invention, the walls **11**, **12** are longitudinally offset with respect to each other a distance such that when the walls **19**, **20** are folded down into position for closing the ends of the

body, they will each extend in a plane, of approximately, and preferably at an angle slightly less than, 45° with respect to the walls **11**, **12**, respectively. Hence, the apex of each of these angles, indicated by A, will serve as a bight for exerting a substantial degree of holding pressure upon the transverse edge of the respective mirrors M–**1** and M–**2** positioned at the apex of these angles.

Further, in accordance with the invention, locking flaps **21**, **22**, hinged to the closure walls **19**, **20**, respectively, are formed for coaction with walls **12**, **11**, respectively, in a manner to securely hold the walls **19**, **20**, in their closed positions and to enable them to aid in supporting the respective mirrors M–**1** and M–**2**.

To the foregoing end, the closures **19**, **20** are each formed at the outer end thereof with opposed substantially right-angular notches **25**, **27** and **26**, **28**, (FIG. 7) respectively, the edges **29** on each of the closures being in horizontal alignment with one another and substantially longer than the transverse edges **30**, **32** thereof. The latter extend inwardly of the closure substantially at a right angle to the line along which the respective locking flaps **21**, **22** are hinged to the closures. Preferably, the outer portion of one or both of the side edges of each of the closures extends at a slight angle, as indicated at **33**, to facilitate rapid positioning of these closure walls when the mirrors M–**1** and M–**2** have been inserted in position for use of the periscope.

Furthermore, and for the purposes above mentioned, each of the flaps **21**, **22** is formed with a portion **35** of one side edge substantially in alignment with the edge **32** of the adjacent notches **25**, **28**, respectively, and with an outer portion **37** extending at an angle toward the transverse outer edge **39** of the flaps. The opposite side edge of each locking flap **21**, **22** is formed with a portion **41** inclined inwardly and meeting a transverse edge **43** extending inwardly from edge portion **45**. The latter portion joins edge portion **47** inclined oppositely to edge portion **37** and joining transverse outer edge **39** of the flaps. The re-entrant angle between the edges **41**, **43**, constitutes notches **49** for locking the closure flaps **20**, **21** in place, as hereinafter described.

The free end of each wall **11**, **12** is formed with a recess **51**, comprising an elongated transverse edge **53** and opposed longitudinal edges **55**, **55***a*. The latter edges are spaced from one another and so positioned as to receive, in frictional contact therebetween, the portion of the closure walls **20**, **21** intermediate the edges **30**, **32**. At a suitable distance from recess **51**, each of the walls **11**, **12** is formed with a slit or slot **59** for receiving and interlocking with the flaps **22**, **21**, respectively. Preferably, the slit is of inverted U-shaped outline, having its base portion parallel to edge **53** of the recess, and its leg portions **61**, **61***a* disposed in offset relation to the edges **55**, **55***a* thereof. This offset corresponds substantially to the length of the edge **43** of the notch **49** and extends in the direction opposite to that of the edge **43**, namely, so that the leg **61** is disposed outwardly with respect to edge **55** of the recess, and leg **61***a* is disposed inwardly with respect to the edge **55***a* thereof.

As above indicated, another important feature of the invention resides in the means for receiving and firmly supporting the lower edge of each of the mirrors, namely, the edge thereof opposite the one held at the apex of the angle A. For this purpose, walls **11** and **12** are each formed at the free end thereof with a pair of key-hole slots **65**, one disposed intermediate each of the side walls **13**, **14** of the body and the adjacent side edges **55**, **55***a*, respectively, of the recess **51**.

Each of these slots comprises opposed side edges **67** inclined inwardly toward one another and leading into a circular opening **68** of a diameter slightly larger than the distance between the innermost ends of edges **67**. Each slot **65** is adapted to receive and hold, within the circular portion **68** thereof, a stud S comprising a shank **70** connecting the opposed heads **71** and **72**. Preferably, as shown in the detailed view, FIG. 4, the shank **70** is of a tapered cross-section which increases gradually from adjacent smaller head **71** to adjacent the larger head **72**. In order to retain the studs S in place in the circular portions **68** of the slots **65**, the distance between the inner ends of the opposed edges **67** of each slot is slightly smaller than the smallest diameter of the shank **70**, and the diameter of the circular opening **68** is substantially the same as that smallest diameter.

The studs S are preferably composed of suitable plastic material, although they may be composed of a glass, metal, or like rigid material.

The walls **11** and **12** are each formed adjacent its connection with the closure walls **19**, **20**, respectively, with enlarged, substantially rectangular openings **75**, **76**, respectively, which serve as viewing openings in the use of the periscope.

The body component B of the periscope as above described may be conveniently die-cut from flexible sheet material such as fiberboard of the type commonly employed for the manufacture of containers or the like.

FIG. 7 shows a plan view of a die-cut blank from which the body B of the periscope may be formed. In this figure, reference numerals corresponding to those of FIGS. 1 to 6 and 8 indicate the panels or sections of the blank which constitute the front, rear and side walls of the body, the closure walls and locking flaps, the locking notches for the closure flaps, the flap-receiving slits, the key-hole slots for receiving the studs S, and the viewing openings in the panels constituting the front and rear walls of the body.

Parallel score lines indicated at **80**, **81** and **82** are formed in the blank to provide the hinged connections between the panels of the blank which constitute the front, rear and side walls of the body. A sealing flap **84** extends outwardly from the outer edges of panel **12** and is hinged thereto along a score line **85**. Transverse score lines **87**, **89** are formed in the blank to provide the hinged connection between wall panel **11** and closure **19**, and the hinged connection between closure panel **19** and its locking flap **21**. Corresponding transverse score lines **86**, **88** are formed in the blank to provide the hinged connection between wall panel **12** and closure **20**, and the hinged connection between the closure **20** and its locking flap **22**.

In actual practice, the blank is folded along longitudinal score line **81** and the sealing flap **84** is secured along the outer edge of side wall panel **13**, interiorly thereof, by means of suitable adhesive. The thus folded and glued blank may accordingly be shipped in the flat, collapsed form depicted in FIG. 8.

When the body has been erected, in well-known manner, from its flat or collapsed form into its open form of rectangular cross-section, the studs S and the mirrors M–**1** and M–**2** may be rapidly assembled therewith for use of the assembly as a periscope.

In assembling these parts, a stud S is first inserted in each of the key-hole slots **65**. As the shank **70** of a stud is pushed into the converging portion of the slot **65** formed by edges **67**, the inner end of this portion of the slot will spread sufficiently to enable the shank to enter the circular opening **68**, even though, as stated above, the distance between the inner end of the edges **67** is slightly less than the diameter at the smaller end of the shank. Thus, the stud may be snapped into place, with its larger head **71** disposed interiorly of the wall **11** or **12**, as the case may be, and its shank held in firm engagement with the circular opening **68**.

In this position, the smaller head **72** of the stud is held in contact with the outer surface of the wall **11** or **12**, and each stud is disposed with its axis at an angle of substantially 90° with respect to the plane of the wall. Axial movement of the stud is substantially prevented by the frictional engagement of the shank with the edges of opening **68**, particularly when the shank of the stud

is tapered as above described. The length of the shank **70** is such that the larger head **71** of the stud will be disposed at a substantial distance, say three-sixteenths to three eighths of an inch, inwardly of the wall **11** or **12**, sufficient to enable the shank and the peripheral edge of head **71** to accommodate and support the lower margin of the mirror M–1 or M–2.

Mirror M–1 (or M–2) is inserted through one open end of the body so that the inner or bottom edge of the mirror is disposed in contact with the shanks of the pair of aligned studs S at that end of the body.

When the mirror has thus been inserted at one end of the body, the closure wall **19** (or **20**) at that end is then folded so as to be brought into surface contact with the rear surface of the mirror. This enables the upper edge of the mirror to be seized at the apex of the angle A between the wall and the closure. Thereupon, the closure wall may be locked in place by inserting the outer end of the flap through the locking slit **59** until the edge **43** of notch **49** has passed slightly beyond the slit, thus enabling the portion of the flap below the edge **43** to snap into position for interlocking engagement with the slit **59** at the intersection between the slit and the adjacent leg portion **61***a* thereof. This interlocking engagement of the flap with the slit causes the closure wall **19** (or **20**) to be held down firmly against the back surface of the mirror.

The same operation is repeated for installing the other mirror at the opposite end of the body.

As will be evident, one transverse edge of each mirror is firmly gripped at the apex of angle A and its opposite transverse edge is securely supported on the studs by the locked flaps, as above described. This, together with the surface contact between the respective closure walls and mirrors substantially throughout the area of the latter minimizes movement of the mirrors if the assembled periscope is jarred or subjected to similar rough handling.

The positioning of the studs within the slots **65**, and the placing of the mirrors, as well as the folding and locking of the closure at each end of the body may be quickly accomplished while the body B is held horizontally, i.e., with its longitudinal axis extending in a generally horizontal direction. This may conveniently be accomplished when the body B is held in that position on the lap of a seated person assembling the parts.

As will be evident from the foregoing description and the drawing, by providing the studs above described for supporting lower ends of each of the mirrors M–1 and M–2, it becomes unnecessary to rely, for such support, upon tabs formed in the wall of the body, as in the structure shown in the above-mentioned Chaimson patent. In such structure, the tabs must be pushed a certain distance into the interior of the body in order to receive and hold the edge of the mirror. If such tabs are initially pushed into the body either an insufficient or an excessive extent, it becomes necessary to reach into the body with the fingers in order to restore the tabs to the correct position. Moreover, repeated movement of the tabs necessarily weakens their holding strength. Furthermore, when such tabs are utilized for support of the lower edge of the mirror, the proper placing of the mirror in assembling the periscope requires that this be done more or less by "feel," or while holding the body or casing in a vertical position, thereby rendering the assembling operation rather awkward.

Still further, where tabs formed in the wall of the periscope are relied upon for supporting the lower ends of the mirrors, difficulty is frequently encountered when initially assembling the parts, or in subsequent re-assembly thereof, by reason of slight but unavoidable variations in the dimensions of the mirrors as delivered by the manufacturer thereof for use with a particular size of periscope. Although the width of the mirror is not critical, the length thereof is critical. If the mirror to be assembled with the body is of a length slightly in excess of that specified, the lower edge of the mirror during or after positioning of the same in the body causes the tabs to be forced inwardly beyond the position in which they exert their maximum holding effect, thus enabling the mirror to become displaced from its proper angular position for use. On the other hand, if the length of the mirror is slightly less than that specified, it is held only loosely even though the supporting tabs may be properly positioned. In either instance, the mirror is likely to be displaced and fall from its intended position during handling of the periscope.

All of the foregoing defects or difficulties are avoided in the periscope constructed according to my invention. Thus, normal variations in the length of the mirrors are automatically accommodated since the mirrors are supported at one transverse edge by the shank of the studs and confined by the enlarged end **71** thereof. Further, the holding power of the studs is not affected by repeated use, as is the case with tabs formed in the wall of the body and which are substantially weakened in their holding strength after undergoing only a relatively few repeated handlings.

By employing the studs S in the construction according to my invention, the periscope may be disassembled after a given use and re-assembled for subsequent use practically innumerable times. As stated above, the holding power of the studs is not thereby affected.

This is an important consideration in the merchandising of periscopes of the type herein referred to, particularly when a number of the periscopes on hand for sale at a parade or other such event remain unsold and must accordingly be disassembled for storage and subsequent re-assembly for sale or use on a later occasion.

Disassembly of my periscope may be readily affected by unlocking the flaps **20**, **21** with a twisting movement thereof in a direction toward edge **35** thereof, then folding back the closures, removing the mirrors, and collapsing the body into a flat form such as illustrated in FIG. 8. For that purpose, the studs S need not be removed from the slots **65** and can remain in place therein in the collapsed form of the body and during handling, storage and shipment thereof.

What is claimed is:

1. A periscope of the character set forth, and comprising in combination:

(A) an elongated body foldable to provide a body comprising a front wall, a rear wall, a pair of side walls each connected to said front and rear walls, and a closure at each end of the body, one of said closures being hingedly connected to an end of the front wall and the other of said closures being hingedly connected to the opposite end of the rear wall, corresponding ends of said front and rear walls being longitudinally offset with respect to one another to dispose each of said closures at an angle of approximately 45 degrees with respect to said front and rear walls when said closures are positioned to close the respective opposite ends of the body;

(B) means formed with each of said closures for interlockingly engaging the wall opposite the wall to which each closure is connected;

(C) mirror supporting means disposed along the transverse end edges of said front and rear walls remote from the end thereof connected to one of said closures;

(D) a mirror disposed at each end of the body at an angle of approximately 45 degrees with respect to said front and rear walls when said closures are positioned as aforesaid, each of said mirrors being supported at one of its edges by the last-named means disposed at said end of the body and being held at its opposite edge in the apex of said angle formed by said closure at the corresponding end of the body, said interlocking means serving also to hold the closure at each end of the body in surface contact with the mirror at said end of the body; and

(E) said front wall and said rear wall being each formed with a viewing opening adjacent one end of the body.

2. A periscope as defined in claim 1, wherein said mirror supporting means comprises a double-headed stud frictionally held in each at a pair of spaced key-hole slots formed along said transverse end edge of the front and rear walls.

3. A periscope as defined in claim 2, wherein said interlocking means and said studs cooperate to constrain said first-named edge of each mirror into contact with the shanks of said studs and to hold the closure at each end of the body in surface contact with the mirror at said end of the body.

4. A periscope of the character set forth and comprising in combination:

(A) an elongated body of flexible material folded to provide a body of substantially rectangular cross-section transversely thereof, said body having:

(1) a front wall, a rear wall, a pair of side walls hingedly connected to said front and rear walls, said front wall being formed with a viewing opening adjacent one end thereof, and said rear wall being formed with a viewing opening adjacent the opposite end thereof;

(2) a closure hinged to said one end of said front wall and a closure hinged to said opposite end of said rear wall; and

(3) a locking flap formed with each of said closures for interlocking engagement respectively, with said rear wall and said front wall;

the respective corresponding ends of said front and rear walls being offset longitudinally a distance such that each of said closures is disposed, when said locking flap thereof is engaged as aforesaid, at an angle of approximately 45 degrees with respect to the wall to which the closure is hinged, the transverse edge of said front wall and said rear wall at the end thereof opposite that to which the respective closures are hinged, being each formed with a key-hole slot disposed adjacent each of said side walls;

(B) a double-headed stud removably positioned in each of said slots and having its shank extending interiorly of said body and held in frictional engagement at the inner end of the slot; and

(C) a mirror removably positioned at each end of said body at an angle of approximately 45 degrees with respect to said front and rear walls when said closures are positioned as aforesaid, one edge thereof being supported by the shanks of the studs positioned at each end of the body, and its opposite edge being gripped in the apex of said angle at the corresponding end of the body.

5. A periscope as defined in claim 4, wherein said longitudinal offset of said front and rear walls is such that each of said closures is disposed at an angle of slightly less than 45 degrees with respect to the wall to which the closure is hinged.

6. A periscope as defined in claim 4, wherein the shanks of said studs are of a tapered cross-section which gradually increases axially in the direction toward the interior of said body.

7. A periscope of the character set forth, consisting essentially of:

(A) a body portion of fiberboard folded to provide a body of substantially rectangular cross-section transversely thereof, said body comprising:

(1) one wall having an enlarged opening adjacent one end of the body and a locking slit adjacent the opposite end thereof;

(2) an opposite wall having an enlarged opening adjacent said opposite end of the body and a locking slit adjacent said first-named end of the body, the corresponding ends of said walls being longitudinally offset with respect to each other;

(3) a closure hinged to said first-named wall and extending at an angle slightly less than 45 degrees thereto and formed with a flap for interlocking with the locking slit of said opposite wall;

(4) a closure hinged to said opposite wall and extending at an angle slightly less than the 45 degrees with respect thereto and formed with a flap for interlocking with the locking slit of said first-named wall;

each of said walls being formed along the edge thereof remote from said opening therein with spaced slots each of which is defined by side edges inclined inwardly toward one another and leading into a circular opening connecting the inner ends of said side edges, said opening being of a diameter slightly larger than the distance between the innermost ends of said edges;

(B) double-headed studs disposed in each of said slots, the heads of said studs being spaced from one another by a tapered shank whose smallest diameter is slightly larger than said distance, the diameter of each of said heads being greater than that of said circular opening; and

(C) a mirror disposed at each end of the body at an angle of approximately 45 degrees with respect to said front and rear walls when said closures are positioned as aforesaid, each of said mirrors being supported at one edge thereof by the studs disposed at said end of the body and being held firmly in place by the interlocked closure at said end of the body, the apex of said angle between each of said closures and the wall to which the enclosures are respectively hinged serving as a bight for one edge of said mirror at said end of the body.

8. In a periscope, a one-piece, collapsible body, formed of flexible paperboard and comprising:

(A) a front wall, a rear wall offset longitudinally with respect to said front wall, and opposed side walls, each hingedly connected to said front wall and said rear wall;

(B) an enlarged opening adjacent one end of said front wall, and an enlarged opening adjacent the opposite end of said rear wall;

(C) a closure hinged to one transverse edge of said front wall at said one end thereof and a closure hinged to one transverse edge of said rear wall at said opposite end thereof;

(D) a flap hinged to said first-named closure and formed for interlocking engagement with said rear wall, and a flap hinged to said second-named closure and formed for interlocking engagement with said front wall; and

(E) key-hole slots formed in the front wall along the edge thereof opposite the said opening therein, and key-hole slots formed in the rear wall along the edge thereof opposite the said opening therein, the slots along each of said edges being each disposed laterally outward with respect to the side edges of the flap on the closure hinged to the opposite wall and being each formed with side edges tapering toward one another in the direction away from the edge along which the slot is formed.

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