Oct. 9, 1945. J. A. GRIER 2,386,394

BINOCULARS

Filed Jan. 7, 1942 2 Sheets-Sheet 1

Fig. 1.

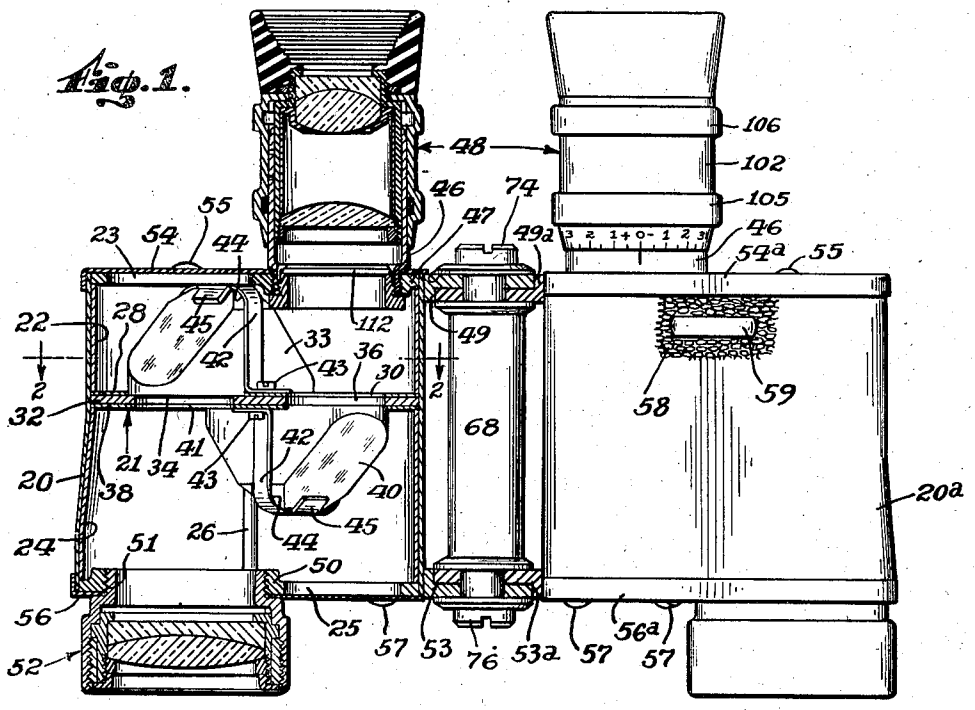


Fig. 2.

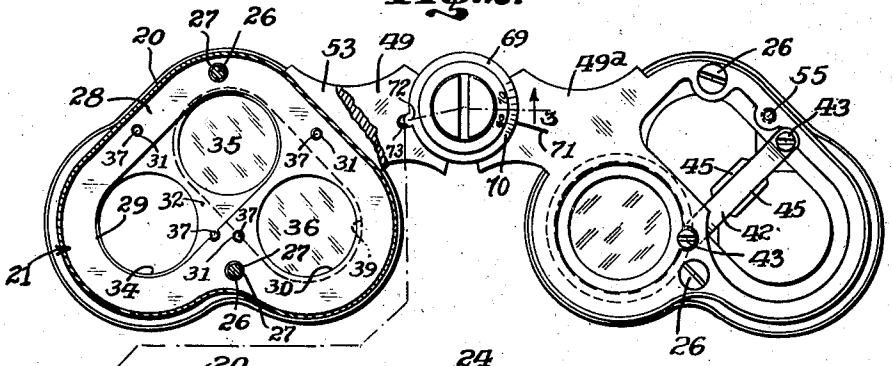
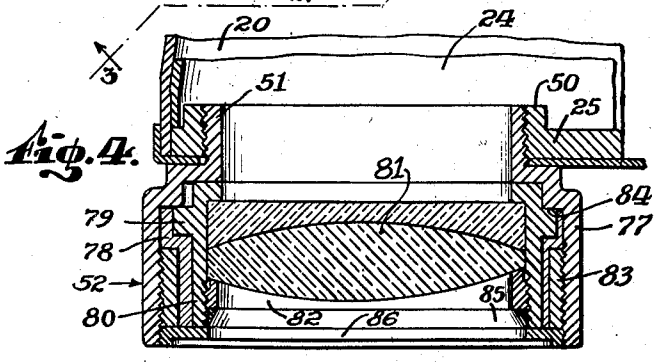


Fig. 4.



INVENTOR

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Oct. 9, 1945. J. A. GRIER 2,386,394

BINOCULARS

Filed Jan. 7, 1942 2 Sheets-Sheet 2

Fig. 3.

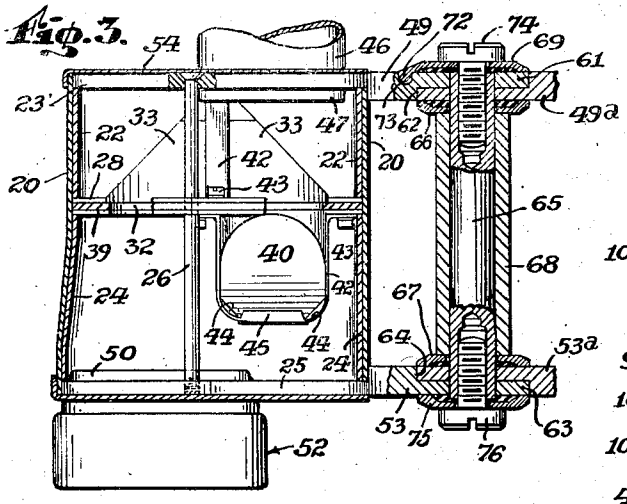


Fig. 5.

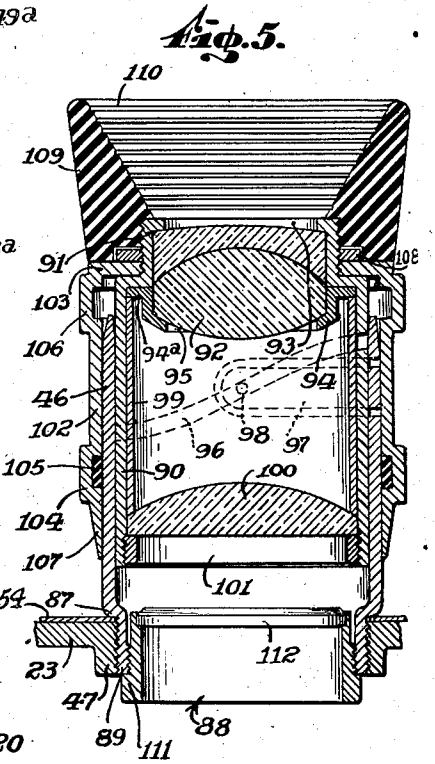


Fig. 7.

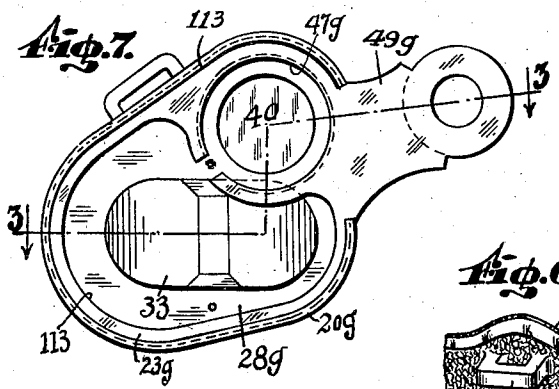


Fig. 6.

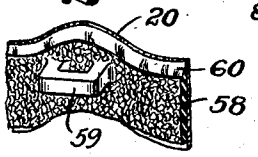


Fig. 8.

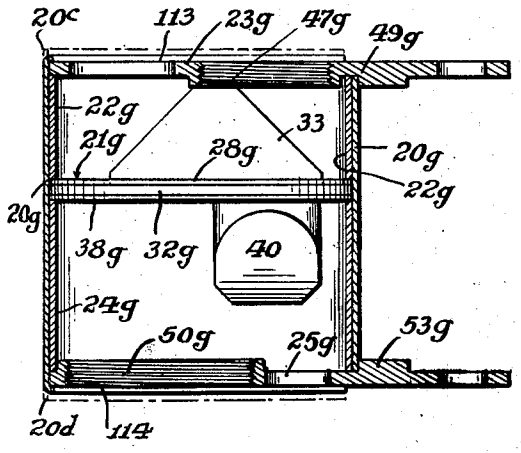
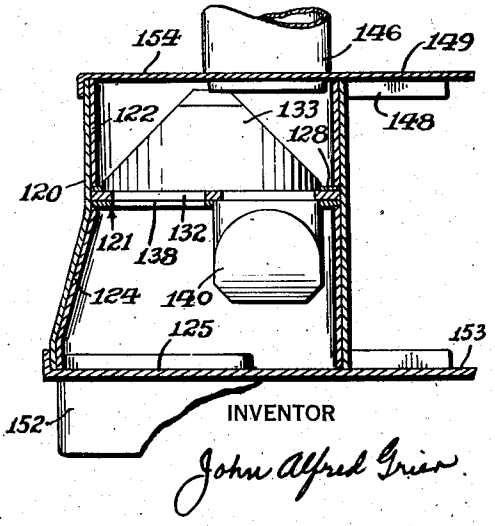


Fig. 9.



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UNITED STATES PATENT OFFICE

2,386,394

BINOCULAR

John Alfred Grier, Yonkers, N. Y., assignor to Ordnance Instrument Corporation, a corporation of New York

Application January 7, 1942, Serial No. 425,816

17 Claims. (Cl. 88—33)

This invention relates to improvements in binoculars and has for an object the provision of instruments the casings or barrels of which are each composite structures formed of parts which when fitted and secured together inherently hold the various axes and plane surfaces therein in proper relation with each other.

In the structures herein shown and described, the parts forming my composite barrels are made entirely of parts which are punched and formed, and/or drawn. Likewise all of the parts of the eyelens mountings and the objective mountings are punched or drawn with the exception of the eye cap (which is preferably made of rubber or other plastic). In this specification the term "stamped" shall be taken to mean—made in a die, by punching, blanking, forming, or drawing, and/or combinations thereof; and the term "stampings" shall be taken to mean—stamped parts. The degree of accuracy can largely be insured by the care and exactitude exercised in the making of the dies.

Another object of the invention is the provision of a binocular barrel in which the prism shelf is formed of a plurality of flat stampings, the middle one of which forms the shelf—per se, and others on each side thereof, membering up therewith and conjointly forming depressions for accurately locating the "Porro" prisms with each other and with the optical axes of the eye pieces and the objectives.

A further object of the invention is the forming of a binocular barrel of a hollow outer shell, a prism shelf assembly in said shell, and upper and lower spacer members telescoping in said shell for holding said shelf a predetermined distance from at least one end of said shell and for rigidly maintaining said shelf therein with the plane surfaces thereof at right angles to the axis of said shell. It is obvious that if the ends of the shell are square with the axis, the surfaces of the prism shelf will be parallel to said ends.

Yet another object of the invention is the provision of a binocular barrel formed of, a hollow outer shell, a prism shelf assembly in said shell in a plane intermediate the end planes of said shell, a plate at one end adapted to support the eyepiece assembly, a plate at the other end adapted to support the objective mounting, spacer members within said shell for holding the prism shelf and said plates in parallel spaced relation to each other, and means for securing them in this relation.

The stack comprising the plates, the prism shelf and the spacer members therebetween is preferably as tall as the length of the hollow outer shell, so that after assembly the outer surfaces of said plates are flush with the ends of said outer shell. The parts may be secured together by welding, soldering, or by utilizing screws as will hereinafter be described. A modification contemplates making the shell longer than the stack and spinning or curling the ends of the shell over the top and bottom plates.

Another object of the invention is the provision of extensions of the top and bottom plates to extend outwardly and form hinge arms for the binocular.

A further object of the invention is the provision in the eyepiece structure of a binocular of novel means of sealing between the stationary and the movable parts to prevent the ingress of dust or moisture.

Another object is the provision of a novel double eccentric arrangement to facilitate the collimating of the binoculars after assembly.

Another object of the invention is the provision of a binocular upon which substantially no machine work is done and which is readily adaptable to rapid mass production.

Other objects and advantages of the invention will be apparent to those skilled in the art upon perusal of the following description of the invention.

Referring to the drawings which are given by way of example to illustrate one manner of practicing the invention;

Figure 1 is an elevation, partly in section, showing the structure of the composite barrel and the relation of the parts to each other;

Figure 2 is a plan view of the binocular of Figure 1, the left half of Figure 1 being taken along the line 2—2 of Figure 1, and the right half being a plan view of the barrel with the ocular and the top cover plate removed;

Figure 3 is a sectional elevation of the left barrel as seen in the direction 3—3 on Figure 2;

Figure 4 is a sectional elevation, enlarged, showing a double eccentric adjustment for the objective with respect to the optical axis of the instrument;

Figure 5 is a sectional elevation of the ocular assembly;

Figure 6 is a fragmentary view showing the strap loop formed of the rubber coating on the outer shell of the barrel;

Figure 7 is a drawing of a left barrel which is a modification of the showing in Figure 2, both as to the shape and as to the method of securing the parts together to form a composite structure;

Figure 8 is a sectional elevation of the modified barrel of Figure 7, showing details of construction, particularly in respect to the interior and the method of securing said parts together; and

Figure 9 is a sectional elevation of a further modification of the barrel structure.

In Figures 1 and 2, the outer shell **20** has a prism shelf assembly **21** positioned therein intermediate the ends of the shell. A spacing member **22** telescopes in the shell and forms therein a ledge contacting the upper face of the prism shelf around the edges thereof.

In contact with the upper edges of the spacing member **22** is a top plate **23** which carries a threaded hole, to be presently described for supporting the ocular. The upper surface of this top plate is flush with the upper edges of the shell **20**.

A second spacing member **24** telescopes in the shell from the lower end thereof and the upper edges of this member contact and form a ledge for the lower face of the prism shelf **21**. In contact with the bottom edges of the spacing member **24** is a bottom plate **25**, the lower face of which is flush with the bottom edges of the shell **20**.

In other words, the height of the pile, comprised of the bottom plate **25**, the spacing member **24**, the prism shelf assembly **21**, the spacing member **22**, and the top plate **23**, is equal to the height of the shell **20**. These parts are positioned in the shell and secured therein in any suitable manner, such as, by soldering or welding; however, because certain advantages (to be presently described) are obtained, I prefer to secure these parts together by screws, as may be seen in Figures 1 and 2, and designated by the numeral **26**.

These screws preferably have flat heads countersunk in the top plate **23** and engage threaded holes, not shown, formed in the bottom plate **25**. These screws pass through clearance holes **27** formed in the prism shelf **21**.

In Figure 2, the left barrel is cut along the line **2—2** of Figure 1, and the upper spacing member **22** is omitted so that the entire upper surface of the prism shelf assembly **21** can be plainly seen.

The prism shelf **21** is actually formed of three stampings. The upper stamping **28** has an elongated hole **29** formed therein exactly the shape of the base of the prism and forming an exact fit with the prism, for example the prism **33**. A round hole **30** is also formed in the plate **28** to permit light to pass through to the ocular, as will hereinafter be described. The plate **28** also carries a plurality of holes **31** which clear the screws, to be described, for retaining the prisms.

The middle plate **32** is in contact with the lower face of the plate **28** and the upper surface of the plate **32** forms, with the hole **29**, a bottomed depression or socket for the prism. This middle plate has holes **34**, **35** and **36** formed therein through which the light passes as will be described hereinafter. This plate carries tapped holes **37** for securing the prisms to the shelf.

The lower plate or stamping **38** is like the stamping **28** except that it is reversed, an elongated hole **39** in contact with the lower surface of the middle plate **32**, forms a depression into which the lower prism **40** fits, and a hole **41** therein is aligned with the hole **34**.

The prism clamp springs **42** resiliently and firmly hold the prisms in the depressions **29** and **39**, and consist of portions spanning the apex of the prism and extending down on each side of the prism to points where they bend outwardly and form ears adjacent to the prism shelf. Screws **43** extend through holes **37** formed in the plate **32** for securing the prisms thereon. Due to the fact that the prisms have bevels formed on their apex ends, I am enabled to introduce extra resilience into my springs **42** by forming radii spanning these bevels as may be seen, by way of example, at **44**. Ears **45** formed on the springs engage the apex of the prism longitudinally thereof and prevent it from moving out of its socket endwise.

In the left barrel Figure 2, the upper telescopic spacing member **22**, and the prisms have been omitted so that a clear view of the upper side of the prism shelf assembly may be had.

The top plate **23** has a "struck in" portion **47** which is threaded to accommodate the stationary tube **46** of the ocular **48**. This ocular will be described in detail hereinafter in connection with Figure 5. The top plate **23** also has an arm **49** which extends outwardly through a notch in the outer shell **20** to cooperate with other parts to form a hinge connection between the barrels. These features are illustrated in Figure 3 and will hereinafter be described in detail. Portions of the top plate are cut away for lightening its weight, and at the same time permitting the prism to be inserted and mounted on the prism shelf.

The bottom plate **25** has a struck in portion **50** which is threaded to accommodate the shank **51** of the objective assembly **52**. One form of objective assembly is shown in Figure 1 and a modified form is shown in Figure 4. Both of these will be hereinafter described in detail. An arm **53**, preferably formed integral with the plate **25** extends outwardly to be included in the hinge joint between the barrels as will be hereinafter described.

A top cover plate **54** has a rim overhanging the top edges of the outer shell **20**. This cover plate has a clearance hole formed therein to clear the threaded shank of the stationary tube **46**, and a shoulder formed in the tube **46** bears down on the surface immediately about said clearance hole, and in addition to this the top cover plate may also be secured to the top plate by means of screws, one of which is shown at **55** in Figures 1 and 2.

A bottom cover plate **56** covers the bottom plate **25** and has a rim overlapping the bottom edges of the outer shell **20**, and has a clearance hole therein to clear the shank **51** of the objective assembly. A shoulder adjacent to said shank bears on an annulus immediately about this clearance hole. The cover plate is also secured to the bottom plate by means of screws **57**.

The parts of the right barrel are identical with the parts in the left barrel above described, except that they are "rights and lefts." The "rights" parts in the right barrel are indicated by numerals like those of the "lefts" in the left barrel with the addition of the letter "*a*". For example, the outer shell **20** in the left barrel, is referred to as **20***a* in the right barrel, etc.

The portion of the shells **20** and **20***a* between the flanges of the upper and lower cover plates carries a rubber coating **58** which may be molded on and in some instances the loop **59** may also be formed integral with the rubber of said coating, see Figures 1 and 6. The rubber coating may feather out at the top and the bottom of the shell **20**, as indicated at **60** in Figure 6, and when engaged by the flanges of the cover plates, a

water and dust tight seal is effected therewith.

Referring now to Figure 3 it will be noted that this is an elevation, partly in the section of the left barrel taken along the line 3—3 of Figure 2. The arm 49 has a portion 61 of reduced thickness, thereby forming a shoulder 62. Likewise the arm 53 has a portion 63 of reduced thickness and a shoulder 64. The shoulders 62 and 64 are arcuate in form, the centers of the arcs being on the centerline of the hinge.

The arm 49a of the right barrel has a portion cut away to match the portion 61 of the arm 49 and form therewith a flush knuckle joint, and likewise the lower arm 53a of the right barrel has a portion cut away to match the portion 63 of the arm 53 and form therewith a second flush knuckle joint. These knuckle joints have aligned holes therethrough into which is fitted a shaft 65.

Bearing against the lower surface of the upper knuckle joint is a cupped washer 66, and bearing against the upper surface of the lower knuckle joint is a similar cupped washer 67. Between the cupped washers 66 and 67 is a sleeve 68 which fits and surrounds the shaft 65.

Bearing against the upper surface of the upper knuckle joint is a cupped washer 69 which carries a scale 70 indicating the distance between the axes of the eyepieces. A line 71 on the arm 49a cooperates with the scale 70. A tail 72 on the washer 69 fits into a depression 73 in the arm 49, thereby maintaining the washer in fixed relation to the arm 49, and a screw 74 is threaded into the upper end of the shaft 65.

A cupped washer 75 bears against the lower surface of the lower knuckle joint, and a screw 76 extending therethrough is threaded into the lower end of the shaft 65. Within the hollows of the cupped washers I place washers formed of sheet "Neoprene" and, since the cupped washers are springy, I am able to adjust the screws 74 and 76 to obtain just the right friction in the knuckle joints.

The objective mounting 52 is shown enlarged in the sectional elevation Figure 4. The shank 51 of the outer shell 77 is screwed into the threaded hole in the boss 50 on the bottom plate 25. It will be noted that the outer shell 77 is stepped to house the lens cell and other parts comprising double eccentrics to facilitate collimating. Within the shell 77 is a stepped eccentric ring 78, the upper portion of which embraces a flange 79, and the lower portion of which embraces the body of the lens cell 80, which is also eccentric. Within the lens cell is the objective lens set 81 which is retained therein by a threaded ring 82. A clamping ring 83 is within the lower step of the eccentric ring 78 and threaded into the shell 77. The ring 83 bears against the eccentric ring, and it in turn presses the flange 79 into contact with the annular shoulder 84 formed in the shell 77.

A ring 85 is screwed into the lower end of the lens cell 80. It may be formed of plastic and its inner surface may be tapered as shown and may have diffraction rings formed therein.

The lower end of the lens cell 80 and the lower edge of the eccentric ring 79 may have slots or longitudinal holes formed therein to be engaged by a tool so that they may be moved circumferentially in the process of collimating the instrument. A closure ring 86, threaded into the shell 77 has an opening formed therein, through which light may pass to the objective lens, and forms a cover barring the user from access to the adjustments.

In Figure 5, details of construction of the eyepiece are shown. The stationary tube 46 has its lower end stepped and the portion 89 threadedly engages a threaded hole formed in the boss 47 of the top plate 23. The shoulder 87 resulting from the step may be seen bearing on the top cover plate 54. The upper end of the tube 46 is tapered inside and outside to facilitate assembling the cooperating parts therewith.

Telescoping in the tube 46 is a tubular member 90, the upper end 91 of which is stepped inwardly to form a socket of reduced diameter to engage the eyelens 92. A hole 93 is formed in the upper end of 91 to permit light to pass from the lens 92 to the eye. The outer surface of the socket 91 is threaded for purposes to be presently described.

Within the tubular member at the top thereof is a cupped disc 94 having a hole 95 therethrough. The cup matches the socket formed in 91 and they cooperate to properly align and mount the eyelens 92.

The tubular member 90 has a helical slot 96 formed in the wall thereof, and this slot is engaged by a radial stud 98 which is carried by an arcuate tongue 97 formed in the wall of the stationary tube 46, so that as the tubular member 90 is rotated it will (at the same time) be moved longitudinally in the stationary tube 46.

The upper end of a spacing tube 99 telescoping in the tubular member 90 engages the rim 94a of the cupped disc 94, and the lower end of said spacing tube is engaged by the field lens 100. A threaded ring 101 is screwed into the lower end of the tubular member 90, maintaining the lens 100, the tube 99, and the cupped disc in the relation shown.

The outer barrel 102 has its upper end turned in radially to form a ledge 103, and the hole therein snugly fits the outer surface of the socket 91. The wall of the barrel 102 is deformed outwardly to form a raised ring 104, and inside the barrel an annular hollow is formed for containing a packing ring 105. The packing ring may be formed of any suitable material, but at present I use an artificial rubber such as "Neoprene," because it effects a water tight seal with the outer wall of the stationary tube 46, does not "chafe" the metal of said wall and is not affected by climatic condition or by oils, etc.

A second raised ring 106 is formed in the barrel 102 spaced apart from the ring 105, and both have their outer surfaces knurled.

The skirt 107 of the barrel is tapered and carries a diopter scale.

A locking ring 108 threadedly engages the threads on 91 and is screwed down against the flange 103 for clamping it to maintain the diopter setting.

A non-metallic eyecap 109 threadedly engages the threads on 91 and bears against the upper surface of the flange 103, and at the same time encloses the locking ring 108. A series of grooves 110 is formed in the conical opening in the eyecap. The interior of the portion 89 is also threaded to accommodate the reticle cell 88. This cell has a portion forming a shoulder 111 which abuts the lower end of the portion 89 and accurately positons the reticle 112 with respect to the focal point. In practice the reticle is used only in connection with the left eyepiece.

In the modification shown in Figures 7 and 8, the parts forming the composite barrel are similar to those described above, and the method of supporting the prism shelf is also similar. The

outer shell **20***g* is left sufficiently longer than the sums of the parts mounted therein to permit the excess length to be spun over to permanently secure the parts together as will presently be described.

The shell **20***g* may have straight sides, in which the top plate **23***g* and the bottom plate **25***g* may be the same size. If it were not for the fact that the eyepiece boss **47***g* in the top plate is smaller than the objective boss **50***g* in the bottom plate, these plates could be identical.

The prism shelf consists of three members **28***g*, **32***g*, and **38***g* which are identical with the members **28**, **32**, and **38** except for the outside outline. This shelf is positioned in the shell **20***g*, and between it and the top plate **23***g*, is a spacer member **22***g* telescoping in the shell **20***g* and accurately spacing and paralleling the prism shelf and the top plate.

Between the prism shelf and the bottom plate **25***g* is a second spacing member **24***g* accurately spacing and paralleling said shelf and said bottom plate.

The outer shell has straight sides normally terminating along the dotted lines and notched to accommodate the hinge arms **49***g* and **53***g*. After the prism shelf, the spacing members and the top and bottom plates are assembled in the shell **20***g* as described, the structure may be clamped together and the ends **20***c* and **20***d* of the shell **20***g* are "curled over," in any suitable manner, thereby forming beads **113** and **114**. A barrel structure constructed in this manner is light, exceedingly rigid, and inseparable.

A further modification is shown in Figure 9, wherein the outer shell **120** has a composite prism shelf therein, comprised of three members, as is the case in the forms previously described, designated by the numerals **128**, **132**, and **138**. An upper spacer member **122** contacts the upper surface of the prism shelf and extends upwardly to the top of the outer shell. The upper edge of the spacer member is flush with the top end of the shell **120**.

A lower spacer member **124** has its upper end in contact with the under side of the prism shelf and its lower end is flush with the bottom of the outer shell **120**. In assembling the barrel, the parts are placed together in the relation described, then clamped with suitable means for holding the mentioned ends in parallelism. The parts may then be soldered, silver soldered, or welded (spot) to maintain them in such relation.

The upper cover **154** carries the eyepiece barrel **146**, and has its outer end **149** extended to form an upper hinge arm. By bending the sides of the end **149** downwardly (as shown at **148**) to form a channel, sufficient strength may be obtained for extremely light duty binoculars.

The lower cover **125** carries the objective **152**, and has its outer end **153** extended to form a lower hinge arm, the sides being bent to form a channel for strengthening said lower arm. The prisms **133** and **140** are shown positioned on the prism shelf and suitable means, such as for example, the spring **42** may be provided for retaining said prisms thereon.

The objective assembly shown in Figure 1 is similar to the one shown in Figure 4 with the exception that it does not have the eccentric member **78**, therefore the arrangement shown in Figure 4 is preferable.

Although the parts forming the composite barrel structures have been described as secured together in various ways, I prefer to secure them together with screws **26** in the manner shown in Figures 1, 2, and 3, because; after the parts are made, the barrels **20** may be sent to the vulcanizers to have the coating **58** bonded to the outer surface thereof and the strap loops **59** formed thereon. While this is being done, another department may blacken the surfaces of the other parts, including the screws **26** and **43** and the prism springs **42**, by lacquering and/or plating.

After all the parts are finally finished, they may be assembled, collimated, packed and shipped at a rate many times as rapidly as has been heretofore known in the art.

It will be understood that the forms of the invention herein described are given by way of example and are therefore not limitative, as many changes may be made in the arrangements shown and described without departing from the spirit of the invention as set forth in the appended claims.

I claim:

1. In a prism telescope, a barrel including an outer shell, a prism shelf positioned within said shell, an upper spacer member positioned within said shell with its lower end in contact with a portion of the upper surface of said shelf and having its upper end adjacent to and parallel with the upper end of said shell, a lower spacer member positioned within said shell with its upper end in contact with a portion of the lower surface of said shelf and having its lower end adjacent to and parallel with the lower end of said shell, and means for securing said shell, said spacer members, and said shelf together with said shelf substantially parallel with the ends of said shell.

2. In a binocular, an outer shell, separate means telescoped into each end of and forming opposed ledges within said shell, and a prism shelf positioned between and contacted by said ledges.

3. In a prism binocular, an outer shell, a prism shelf positioned within said shell, a spacer member telescoped into said shell and extending from said shelf to the top of said shell, a second spacer member telescoped into said shell and extending from said shelf to the bottom of said shell, and means for securing said shell, said members, and said shelf together to form a composite structure.

4. In a binocular, an outer shell, separate hollow members telescoped into and forming opposed ledges and opposite ledges within said shell, a prism shelf positioned between and contacted by said opposed ledges, a lens support in one end of said shell in contact with one of said opposite ledges, and a second lens support in the opposite end of said shell and in contact with the other of said opposite ledges, said prism shelf and said lens supports being maintained in parallelism by said separate means.

5. In a binocular, an outer shell, separate means telescoped into and forming opposed ledges and opposite ledges within said shell, a prism shelf positioned in said shell between and in contact with said opposed ledges, a top plate engaged by one end of said shell and in contact with one of said opposite ledges, said top plate being adapted to carry an eyelens assembly and having a hinge arm projecting therefrom, a bottom plate engaged by the opposite end of said shell and in contact with the other of said opposite ledges, said bottom plates being adapted to carry an objective lens assembly and having a hinge arm projecting therefrom, and means for securing said shell and the recited elements

therein together to form a composite structure.

6. In a binocular, an outer shell, a prism shelf within said shell, a top plate in said shell in spaced parallel relation to one face of said shelf, a spacer member telescoped in said shell between said top plate and said shelf for maintaining said relation, a bottom plate in said shell in spaced parallel relation to the opposite face of said shelf, a second spacer member telescoped in said shell between said bottom plate and said shelf for maintaining said relation, means for securing said shelf, said spacers, said plates and said shell together to form a composite structure, and hinge arms extending laterally from said plates to points outside said shell.

7. In a binocular, an outer shell having aligned notches formed in each end thereof, a prism support in said shell, a top plate positioned within one end of said shell and having a hinge arm extending therefrom through one of said notches, means within said shell and in cooperative relationship with both said support and said top plate for maintaining the outer surface of said top plate substantially parallel to and in definite space relation to said prism support, and a bottom plate positioned within the opposite end of said shell and having a hinge arm extending through the other of said notches, and a second means within said shell and in cooperative relationship with both said support and said bottom plate for maintaining the outer surface of said bottom plate substantially parallel to and in definite space relation to said prism support.

8. In a binocular, a top plate forming a support for an ocular lens assembly, a bottom plate forming a support for an objective lens assembly, a prism shelf, a spacer member between said shelf and said top plate for spacing them apart in parallel relation to each other, a second spacer member between said shelf and said bottom plate for spacing them apart in parallel relation to each other, and means for rigidly maintaining all said parts in the relations set forth.

9. In a binocular, an outer shell, a top plate fitting in said shell and forming a support for an ocular, said plate having a hinge arm extending laterally therefrom, a bottom plate also fitting in said shell and forming a support for an objective and having a hinge arm extending therefrom in alignment with said first hinge arm, a prism shelf, a casing, a pair of members, each having its ends parallel, one of said members being positioned between said top plate and said shelf and the other being positioned between said bottom plate and said shelf for maintaining said shelf between and in spaced parallel relation with said plates.

10. In a binocular, a top plate forming a support for an ocular lens assembly, a bottom plate forming a support for an objective lens assembly, a prism shelf, a spacer member between said shelf and said top plate for spacing them apart in parallel spaced relation to each other, a second spacer member between said shelf and said bottom plate for spacing them apart in parallel relation to each other, and means extending through said top plate said shelf and said bottom plate for securing them together to form a rigid composite structure.

11. In a binocular, a top plate forming a support for an ocular, a bottom plate forming a support for an objective, a prism shelf, a spacer member between and in contact with said shelf and said top plate for spacing them apart in parallel relation to each other, a second spacer member between and in contact with said shelf and said bottom plate for spacing them apart in parallel relation to each other, and a casing embracing said parts and engaging said plates to form a composite structure.

12. In a prism telescope, a stationary tube secured thereto, an eyepiece draw tube reciprocally carried in said stationary tube, means partially carried on said stationary tube and partially carried in said draw tube to cause the latter to move longitudinally in said stationary tube as said draw tube is rotated, a diopter scale tube settably mounted on said draw tube and embracing said stationary tube, said diopter scale tube being provided with an inwardly facing annular depression, a synthetic rubber sealing ring in said depression contacting said stationary tube and maintaining a fluid tight seal between the latter and said diopter scale tube.

13. In a prism telescope, a stationary tube secured thereto, a draw tube reciprocably carried in said stationary tube, a curved slot formed in the wall of said draw tube, an arcuate arm formed integral with said stationary tube, a stud carried by said arm and engaged by said slot, a lens socket formed at one end of said draw tube, a cupped member cooperating with said socket for holding an eyelens therein, a field lens in said draw tube spaced apart from said eyelens, a spacing tube within said draw tube covering said arcuate slot and maintaining a definite spacing between said field lens and said eyelens, an outer tube secured to said draw tube and embracing said stationary tube, and an artificial rubber ring carried in said outer tube and forming a sealed joint with said stationary tube for sealing the interior of said telescope against the ingress of extraneous matter.

14. In a prism binocular, an outer shell, a prism shelf positioned within said shell, a separate spacer member telescoped into said shell and in contact with and extending from said shelf to a point adjacent to the top of said shell, a second separate spacer member telescoped into said shell from the opposite end thereof and in contact with and extending from said shelf to a point adjacent to the bottom of said shell, the top of said shell being spun over the upper end of said first spacer member, and the bottom of said shell being spun over the lower end of said second spacer member for securing said members and said shelf rigidly within said shell.

15. A binocular according to claim 6 in which the upper end of the outer shell extends slightly beyond said top plate, and in which the bottom end of the outer shell extends slightly below the bottom of said bottom plate; and in which the means for securing said members together, to form a composite structure, constitutes the spun-over ends of said outer shell onto said top plate and said bottom plate.

16. In a prism telescope, a barrel including an outer shell, a flat prism shelf telescoped into said shell, a separate member shorter than said shell, and telescoped into said shell from one end thereof to present a ledge in contact with one face of said prism shelf, a second member also shorter than said shell telescoped into the other end thereof and presenting a ledge in contact with said prism shelf, the lengths of said members, plus the thickness of said shelf, being no longer than the height of said shell.

17. In a prism telescope, a stationary tube secured thereto, a draw tube reciprocably carried in said stationary tube, a curved slot formed in

the wall of said draw tube, stud means carried on said stationary tube and engaged by said slot, a lens socket formed at one end of said draw tube, a cupped member cooperating with said socket for holding an eyelens therein, a field lens in said draw tube spaced apart from said eyelens, an imperforate spacing tube within said draw tube for both covering said arcuate slot and maintaining a predetermined spacing between said field lens and said eyelens, an outer tube secured to said draw tube and embracing said stationary tube, said outer tube having an inwardly facing annular groove formed therein, and a ring of rubber-like material carried in said groove and forming a sealed joint with said stationary tube for sealing the interior of said telescope against the ingress of extraneous matter.

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