No. 714,340. Patented Nov. 25, 1902.

W. R. WARNER & G. FECKER.

BINOCULAR GLASS.

(Application filed May 10, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1,

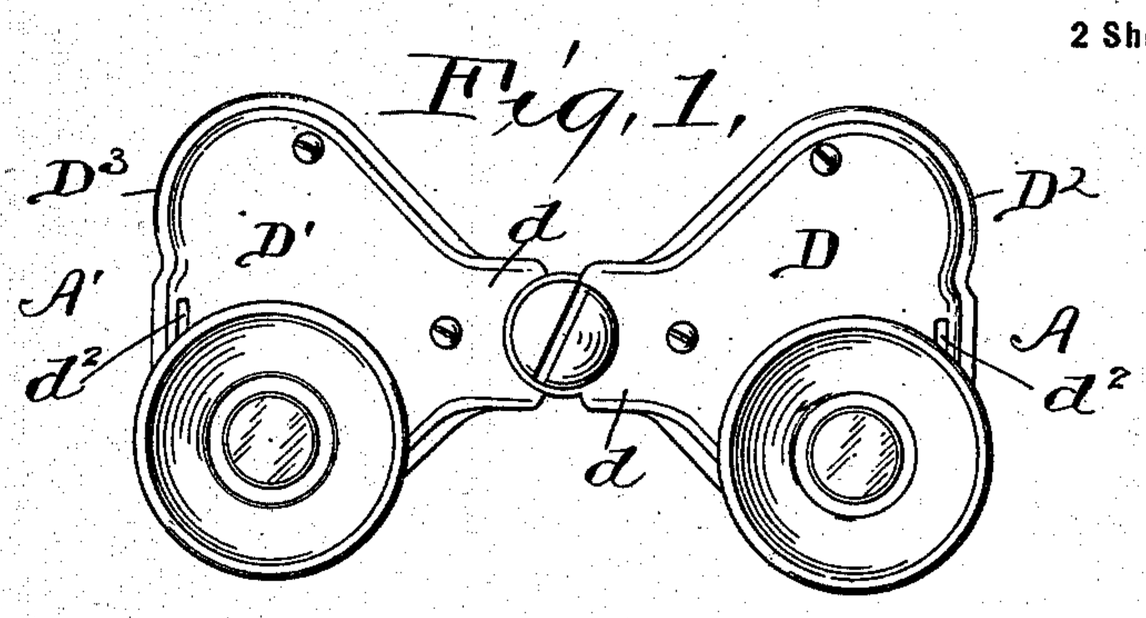
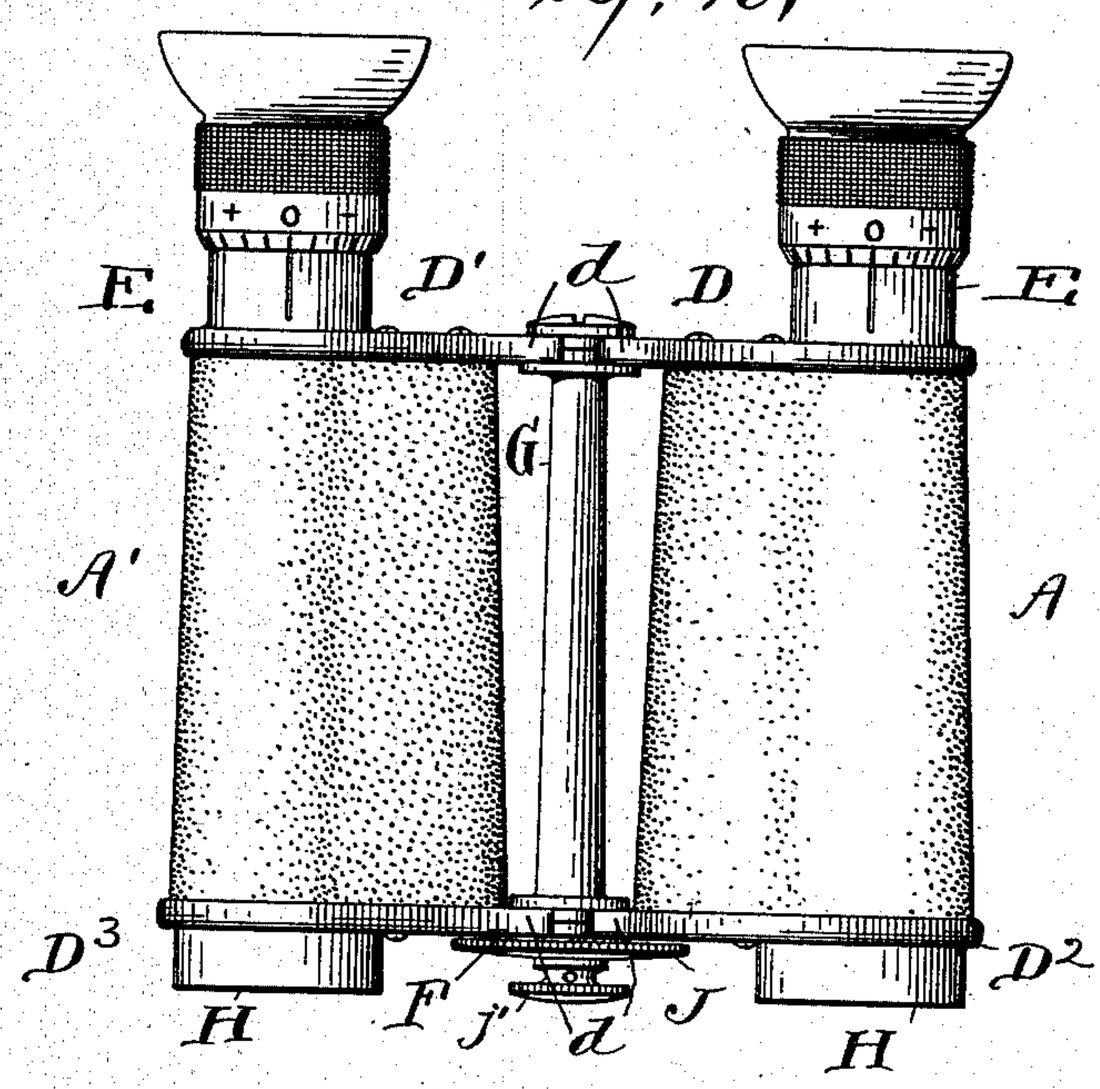


Fig. 2,



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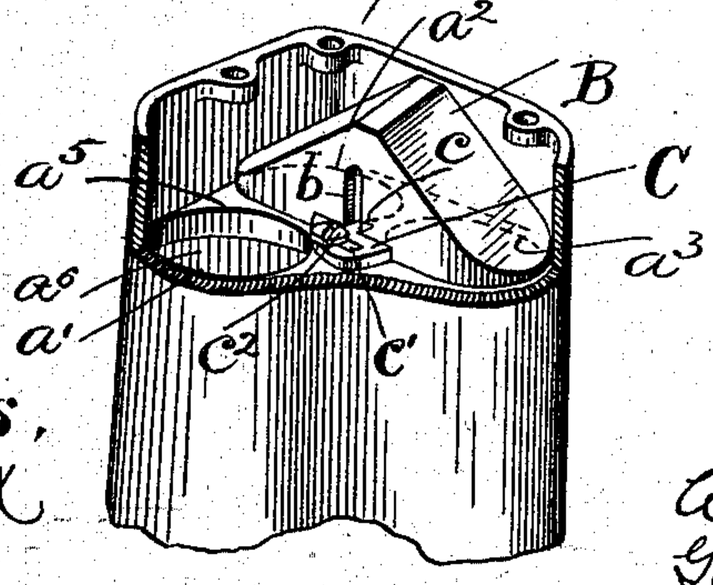

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Fig. 4.

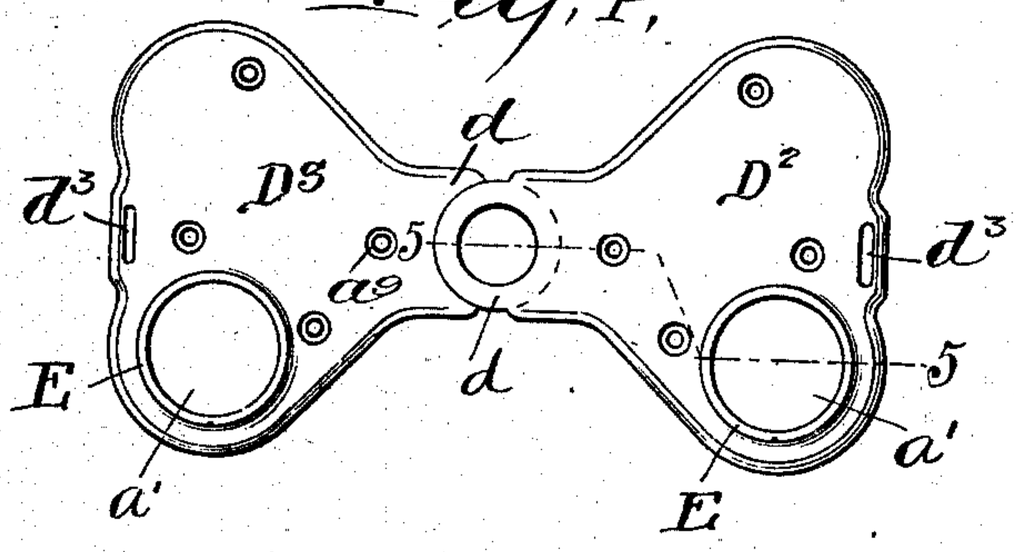


Fig. 5.

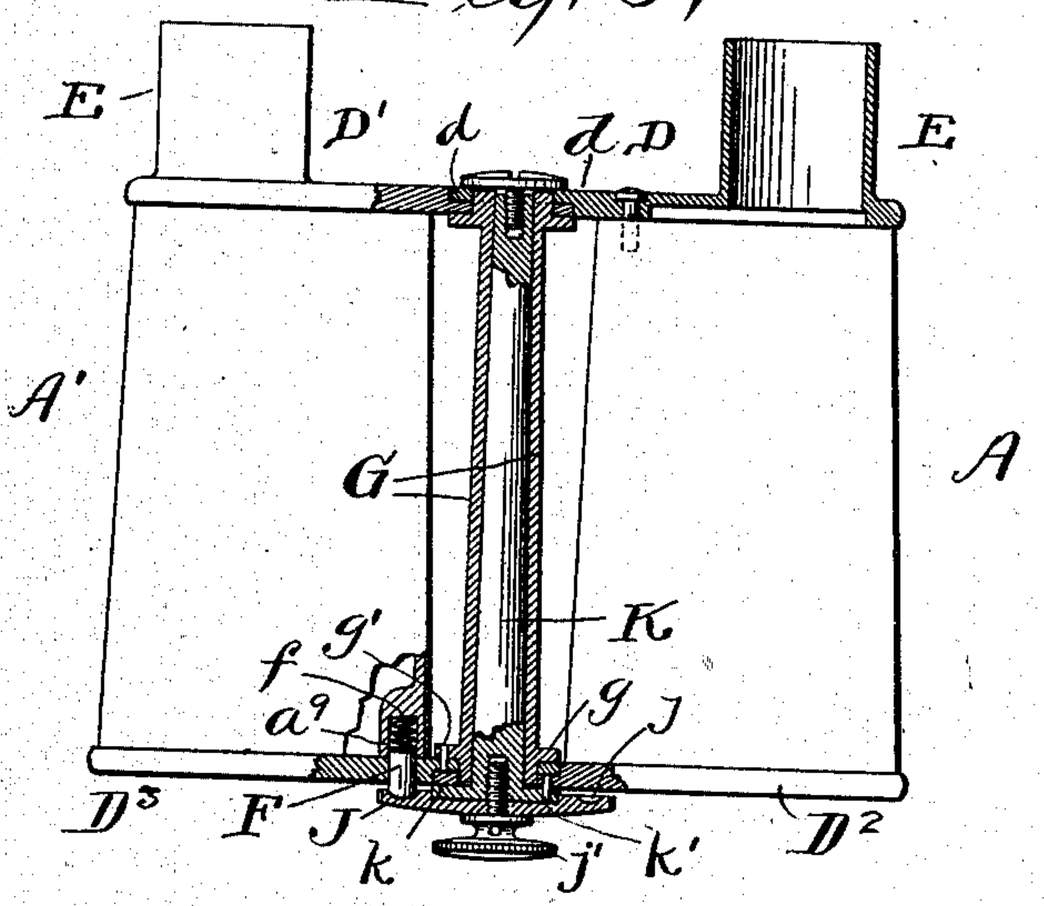


Fig. 9

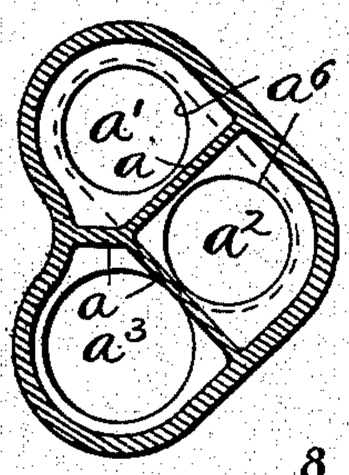


Fig. 7.

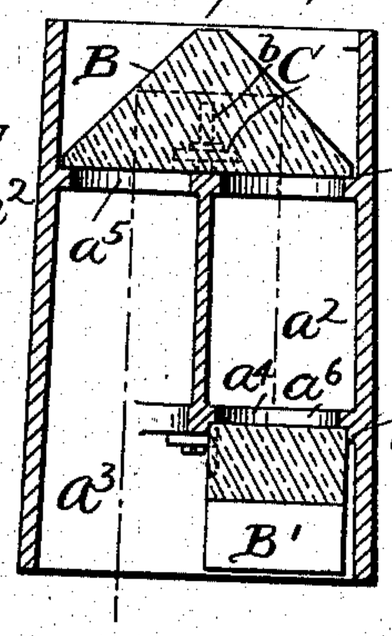


Fig. 8.

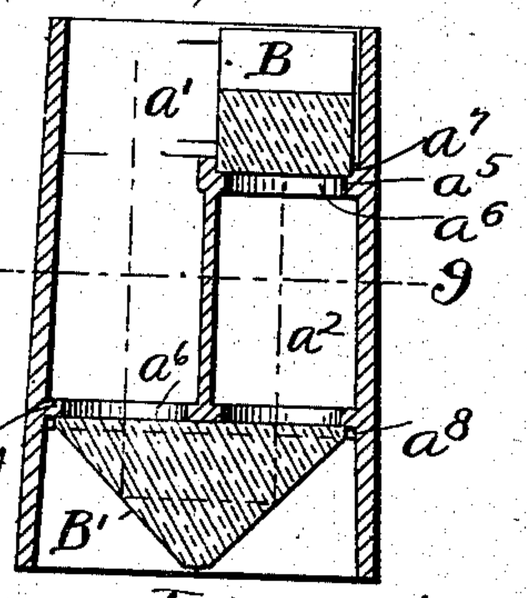
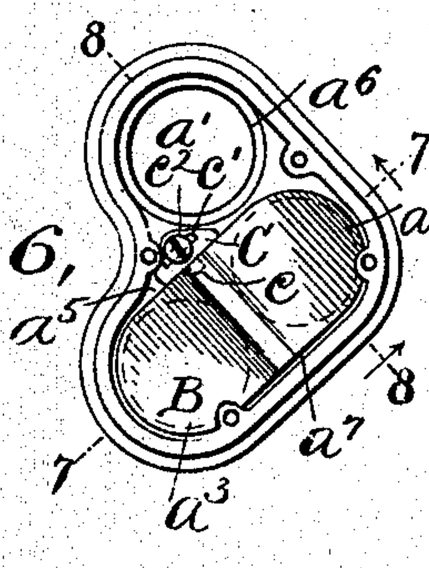


Fig. 6.



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UNITED STATES PATENT OFFICE.

WORCESTER R. WARNER AND GOTTLIEB FECKER, OF CLEVELAND, OHIO, ASSIGNORS TO THE WARNER AND SWASEY COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

BINOCULAR GLASS.

SPECIFICATION forming part of Letters Patent No. 714,340, dated November 25, 1902.

Application filed May 10, 1900. Serial No. 16,132. (No model.)

To all whom it may concern:

Be it known that we, WORCESTER R. WARNER and GOTTLIEB FECKER, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Binocular Glasses, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The invention relates to the class of binocular glasses whereof the two barrels are hinged together to permit variation in the distance between the eyepieces, and each barrel contains three tubes and two double-reflecting prisms by which the light-rays which enter one tube through the objective lens are turned four times at right angles, whereby they pass successively through the three tubes and enter the eyepiece in paths parallel to their original direction.

The object of the invention is to simplify the construction of binocular glasses of this class, to increase their efficiency and durability, and to minimize the danger of disarranging their adjustment and collimation.

The invention consists in the construction and in the various novel combinations of the parts, which are hereinafter described, for producing these results, as pointed out definitely in the claims.

In the drawings, Figure 1 is a top view of a binocular glass embodying our invention. Fig. 2 is a side elevation thereof. Fig. 3 is a perspective view of one end of one of the barrels with a part of its wall broken away. Fig. 4 is an end view of the eyepiece end of the instrument as it would appear if the hinge-tube G and the pintle K and asssociated parts and the caps on the eyepiece E had been removed. Fig. 5 is a front elevation, partly in section, with eyepieces removed. Fig. 6 is a plan view of one of the barrels with cap removed. Fig. 7 is a vertical sectional view of said barrel on the line 7 7 of Fig. 6. Fig. 8 is a vertical sectional view on the line 8 8 of Fig. 6, and Fig. 9 is a horizontal section of said barrel in the plane indicated by line 9 9 of Fig. 8.

Referring to the parts by letters, A A′ represent the two barrels of the instrument. These barrels are of approximately triangular form in cross-section, and each contains three tubes a' a^2 a^3, having parallel axes. The objective H lens is in line with the tube a^3, and the eyepiece is in line with the tube a'. Preferably these barrels are made of aluminium, and in the best construction the three tubes are separated from one another by the longitudinal partitions a a, which are integral with the wall of the barrel, although such longitudinal partitions are not essential. These partitions do not extend to the ends of the barrel, but only so near such ends that between them and the ends of the barrel spaces are left for the double-reflecting prisms B B′, which bend the light-rays and turn them four times at right angles, whereby they pass in parallel paths through the tubes a^3, a^2, and a' and into the eyepiece. At the ends of the longitudinal partitions a are the two horizontal partitions a^4 a^5, in which holes a^6 are cut in line with the three barrels. The double-reflecting prism B is inserted in the upper end of the barrel, with its base resting upon the partition a^5 in a depression a^7 therein, whereby it covers the holes in said partition in line with the two tubes a^3 a^2. The prism B′ is placed in the other end of the barrel, with its base parallel with the base of the prism B and resting against the partition a^4 and in a recess a^8 therein, whereby it covers the holes in said partition in line with the tubes a^2 a'. It is necessary to accurately adjust the position of these two prisms relative to one another and to the axes of the three tubes with which they are associated, as described. To effect this adjustment, it may be necessary to move the prisms endwise and when the adjustment is once effected it is necessary that they should be prevented from moving out of position. To permit adjustment and provide for fastening them when the adjustment is effected, each prism is provided in one side with a vertical groove b. A small adjusting-plate C has a slot c', through which passes a screw c^2, by means of which it may be made fast to the adjacent transverse partition a^4 or a^5. This plate C has a finger c, which enters the vertical groove b in the prism. When the

screw c^2 is loosened, the prism may be moved endwise until it is in its desired location. The plate will move with it and is permitted to so move because of its slot. The screw is then screwed down, whereby the plate is fastened to the partition, and further endwise movement of the prism is thereby prevented.

The ends of the barrels are closed, respectively, by the cap-plates D D′ D^2 D^3, which are fastened to the barrels by screws. The two cap-plates D D′ at the eyepiece end of the instrument have the eyepiece-tubes E formed integral with themselves. It has been customary heretofore to screw these eyepiece-tubes into the cap-plates. This method is objectionable, because it is not easy to so attach them accurately. The necessary thinness of the cap-plate makes the attachment weak, and therefore any blow upon the eyepiece-tube is liable to throw them out of alinement, which of course spoils the accuracy of the instrument. These eyepiece-tubes E are in line with the tubes a' in the barrels. The objective-lens boxes H H are screwed into the other caps D^2 D^3 in line with the tubes a^3. It will be noticed that each of these caps D D′ D^2 D^3 has a laterally-extended arm d, which several arms form the hinge-leaves by means of which the two similar parts of the instrument are hinged together. These several arms d extend each from one corner of its cap-plate and preferably from that corner thereof which is equidistant from the axes of the eyepiece and the objective when the cap-plates are secured to the ends of the barrels. Heretofore in binocular glasses in which the two barrels are hinged together the hinge-leaves have been devices wholly unnecessary to the integrity of the barrels, and they have been secured to the barrels by screws. These old means for providing for the hinging of the two barrels together is objectionable, because they increase the number of parts of which the instrument is composed and also because these hinge-leaves had to be attached to the barrel with absolute accuracy, or otherwise the collimation of the axes of the tubes in said two barrels would not be accurate. Furthermore, if the connections between these hinge-leaves and the barrels become disturbed by accident or design the ordinary owner of the instrument cannot readjust them. It requires the services of an expert to properly connect these hinge-leaves with the barrels. All of these objectionable features are eliminated by the construction described, wherein the hinge-leaves are integral parts of the cap-plates. The two barrels may be hinged together in proper relation to one another by less skilful workmen, and if said barrels be afterward unhinged and the cap-plates removed from the barrels said cap-plates may be replaced and the two barrels hinged together by any one of ordinary skill and intelligence. Moreover, the placing of the hinge in the position shown, where its axis is equidistant of the axes of the eyepiece and the objective, is desirable, because thereby the instrument is made more compact and sightly. It is well nigh impossible to put the hinge in this relation to said axes if the hinge-leaves are separate devices secured to the barrel. At any rate it has been the universal custom heretofore to attach the hinge-leaves or frame, of which the hinge-leaves are parts, to one side or the other of said barrels.

The hinge-leaves d are perforated, and the perforations are so placed in said four hinge-leaves that when the parts are assembled and connected in the manner to be described the axes of the perforations in said hinges coincide and are parallel with the axes of the tubes in both barrels. The ends of a hinged tube g pass through and fit said perforations. Just inside the hinge-leaves are flanges g, against which they rest. The hinge-pintle K passes through the hinge-tube and has at its lower end a head k, which engages with the lower hinge-leaf. A screw screws into the opposite end of this pintle and bears against the upper hinge-leaf. It will be noticed that the lower hinge-leaf on the left-hand barrel is fastened to the flange g of the hinge by a pin g', while the head k of the pintle is fastened by pin k' to the hinge-leaf of the right-hand barrel. As the barrels are turned about the axes of the hinge the pintle turns inside of the hinge-tube, and all wear is therefore between these two parts. The hinge-pintle, however, is slightly tapered, whereby it may be drawn farther into said tube to take up the wear without in any wise affecting the exact parallelism between the hinge-axes and the axes of the tubes in the barrel. Because these two barrels are thus hinged together the eyepieces may be brought near together or farther apart to suit the individual user.

The owner of every instrument desires to be able to adjust the instrument for his own use in the shortest time, and to that end a device is provided which can be set so as to indicate when the instrument is adjusted with respect to the relative position of the eyepieces. This device consists of a disk J, which is clamped, by means of a screw j', to the lower end of the hinge-pintle, and this disk has on its under side a shallow depression j. A pin F projects from a socket a^9 in that barrel which is attached to the hinge-tube, and a spring f in this socket tends to force the pin outward. This pin is so placed that it may enter the depression in the disk. Now to adjust this part of the device the disk is loosened and the two barrels are turned upon the hinge until their eyepieces are the required distance apart. The disk by reason of the engagement of the pin in the depression will turn relative to the pintle and the pin will remain in said depression. When the barrels are properly adjusted, this disk is again clamped to the pintle by turning up the screw. Obviously it is possible to turn the two barrels out of the position in which they are at that time by the application of a

little additional power, because the lower end of the pin is beveled, and it will be forced out of the said depression into its socket in opposition to its spring; but when it is desired to turn the barrels into this relative position again the pin, when this position is reached, will slide into the depression, and further relative movement of the barrels will be sufficiently impeded to indicate that they are in the desired position.

Having described our invention, we claim—

1. In a prism binocular glass, the combination of one barrel thereof with a prism having a groove in its side, and a plate adjustably secured to the barrel and projecting into said groove, substantially as and for the purpose specified.

2. In a prism binocular glass, the combination of the barrel having an inwardly-projecting transverse flange, and a double-reflecting prism resting upon said flange and having a groove in its side, with a plate adjustably secured to said barrel and projecting into said groove, substantially as and for the purpose specified.

3. In a binocular glass, the combination, a barrel having a transverse partition in which are three perforations, and a double-reflecting prism set against said partition spanning two of said perforations, which prism has a vertical groove in one side, with a plate which is adjustably secured to said partition and has a finger which enters the groove in the prism, substantially as and for the purpose specified.

4. In a binocular glass, the combination, a barrel having a transverse partition in which are three perforations, and a double-reflecting prism set against said partition spanning two of said perforations, which prism has a vertical groove in one side, with a plate having a slot, a screw passing through said slot to fasten the plate to said partition, and a tongue integral with said plate which enters the groove of the prism, substantially as and for the purpose specified.

5. In a binocular glass, the combination of two barrels each having two cap-plates which close its ends, which cap-plates have each a laterally-extended arm which serves as a hinge-leaf, which hinge-leaves are perforated, a hinge-tube which passes through said perforations and is secured to one of said hinge-leaves, a hinge-pintle which passes through said tube and is fastened to one of the hinge-leaves attached to the other barrel, substantially as and for the purpose specified.

6. In a binocular glass, the combination of two barrels, caps closing the ends of said barrels and having laterally-extended perforated arms, a hinge-tube passing through perforations in said arms and made fast to an arm of one barrel, a hinge-pintle in said tube and made fast to an arm of the other barrel, a disk which has a depression in its inner face, a screw clamping the same to the hinge-pintle, and a spring-pin which is carried by the barrel to which the hinge-tube is fastened and is adapted to engage in the said depression in said disk, substantially as and for the purpose specified.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

WORCESTER R. WARNER.
GOTTLIEB FECKER.

Witnesses:
JOHN WEBER,
L. B. STOUFFER.