June 7, 1960 A. L. FERRON 2,939,168

OPHTHALMIC MOUNTINGS

Filed Dec. 11, 1957

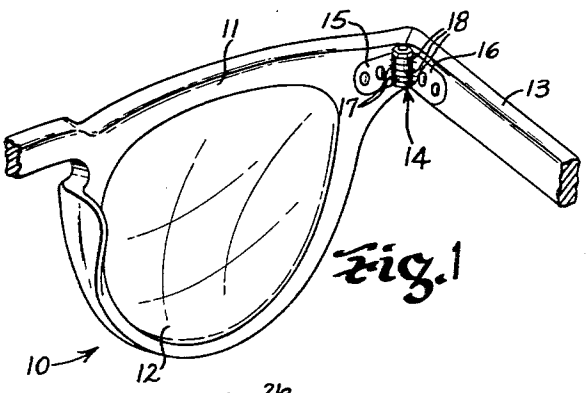


Fig. 1

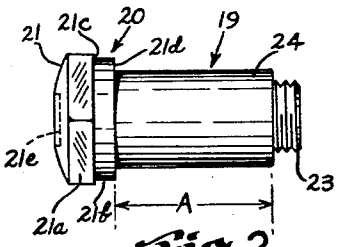


Fig. 2

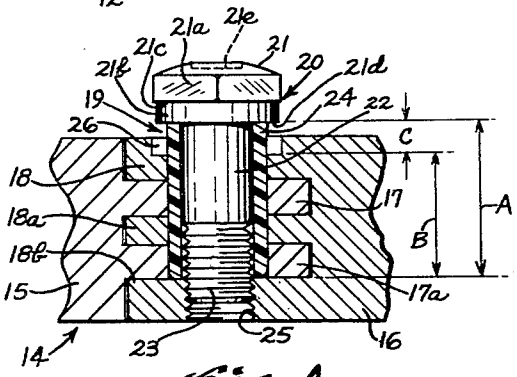


Fig. 4

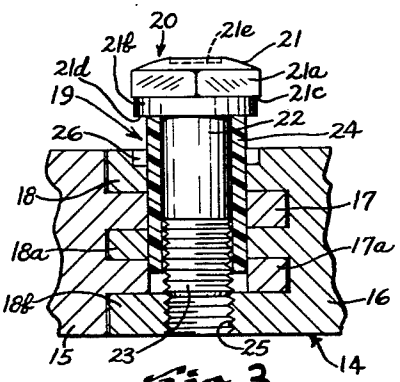


Fig. 3

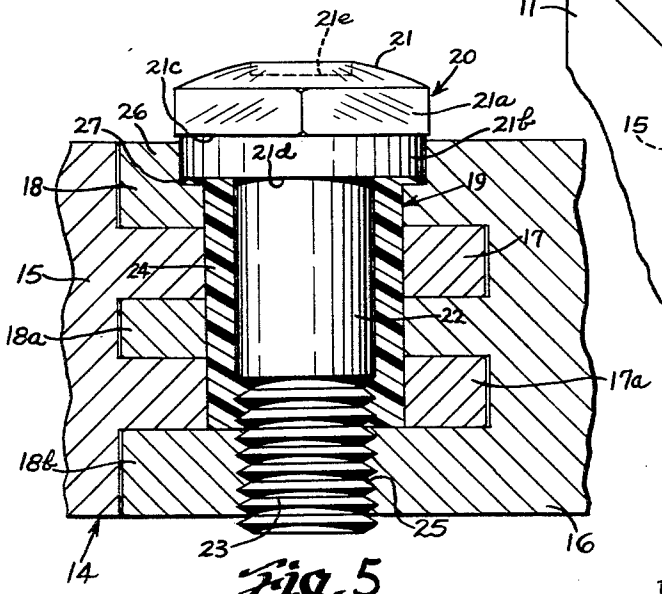


Fig. 5

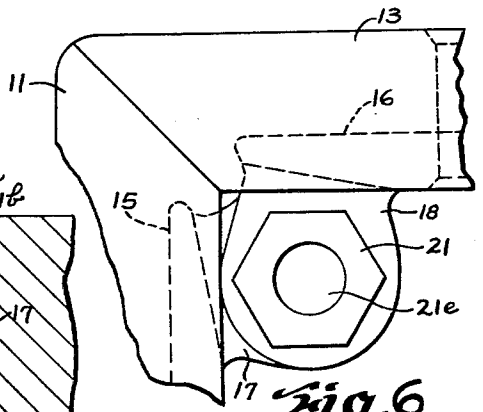


Fig. 6

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OPHTHALMIC MOUNTINGS

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This invention relates to improvements in ophthalmic mountings and has particular reference to the provision of novel hinge means for connecting the temples to the lens supporting fronts of such mountings.

One of the primary objects of the invention is the provision of an improved hinge connection for use in ophthalmic mountings which is adapted to provide and maintain a controlled frictional relationship between the movable parts of said hinge connection.

Another object is to provide means for supporting and retaining a wear resistant, resilient bushing member internally of the hinge ears of hinge means of the above character wherein said bushing will be so located and tensioned as to relatively permanently exert a controlled frictional force on certain parts of said hinge means to provide constant and positive functioning means for overcoming the defect of "drop temples" while further preventing freezing or binding of said parts of the hinge means.

Another object is to provide improved pivot means for operatively connecting the interfitting apertured ears of the hinge portion of an ophthalmic mounting wherein one of the outer apertured ears is provided with a counterbore and the other is provided with a threaded bore of a diameter less than the diameter of said aperture, said pivot means comprising a screw member having an enlarged head part having a portion adapted to extend into the counterbore and an elongated partially threaded shank portion of a size to fit the threaded bore, and a resilient cylindrical bushing of nylon material fitted on said shank portion so as to extend from said head part over a portion of the threads of said shank portion, said bushing being of an outer diameter substantially equal to that of the apertures in said hinge ears into which said bushing is to be fitted and being of a controlled length greater than the depth of said apertures so that when forced inwardly thereof by the threading of the screw member into the threaded bore the inner end of the bushing will engage the inner surface of the ear having the threaded bore therein and will be compressed and so deformed as to exert a predetermined outward frictional force against the side walls of the apertures in said hinge ears while filling in the major part of the area of the adjacent threaded portions of the screw and simultaneously form an annular flanged part between the head of the screw and the base of the counterbore to further aid in frictionally locking the screw in position of use.

Another object is to provide a hinge connection of the type disclosed above wherein the filling in of the threaded area of the screw, as mentioned, will aid in the removal of the bushing during disassembly of the hinge parts.

Another object is to provide a hinge connection of the above character wherein simple and efficient means is provided for precisely controlling the frictional tension of said connection.

Another object is to provide improved means for supporting a bushing of nylon material under compression

in a hinge connection of the above character whereby the desirable characteristics of said material, such as its stability, resiliency, yieldability and its resistance to wear and smoothness of operation which requires no lubrication, may be most advantageously made use of to provide a desired tensioning of a hinge connection while simultaneously relatively permanently locking the parts of said connection in desired position of use.

A further object is the provision of a simple, highly effective, and economical hinge means for ophthalmic mountings which may be readily adapted to permanently provide any desired degree of positive tensioning of the movable parts of said hinge means while at all times providing a smooth acting pivot for the parts of said mountings.

A still further object is the provision of hinge connecting means embodying all of the above mentioned features which may be quickly and efficiently assembled or disassembled in a manner similar to a conventional screw.

Other objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a fragmentary perspective view of an ophthalmic mounting embodying the invention;

Fig. 2 is an elevational view of a part of the hinge connection of the invention;

Fig. 3 is an enlarged fragmentary vertical sectional view taken through the hinge connection of the mounting shown in Fig. 1 illustrating a first step in the assembling of said hinge connection;

Fig. 4 is a view similar to Fig. 3 illustrating a condition which takes place during the assembly of the hinge connection subsequent to the first step illustrated in Fig. 3;

Fig. 5 is a vertical sectional view similar to Figs. 3 and 4 but greater in magnitude and illustrating the relationship of the parts of the hinge assembly when in their final position of use; and

Fig. 6 is a fragmentary plan view of the hinge assembly.

Referring more particularly to the drawings wherein like characters of reference designate like parts throughout the various views, Fig. 1 illustrates one type of ophthalmic mounting **10** which embodies the invention. Mounting **10** comprises a conventional frame front **11** in which lenses **12** are mounted and to which temples **13** are pivotally attached by hinges **14**. The hinge comprises hinge plates **15** and **16** which are riveted or otherwise secured to the respective front and temple parts of the mounting.

It is to be understood that the invention is not restricted in use to the particular type of ophthalmic mounting shown in Fig. 1 and that the illustration is given by way of example only.

The invention, which relates more particularly to the construction of hinge **14** wherein the front hinge plate **15** and the rear hinge plate **16** each having interfitting apertured ear parts **17**, **17***a*, and **18**, **18***a*, **18***b* respectively. The hinge plate **15** is preferably attached to the frame front **11** and hinge plate **16** is attached to the temples **13** of the mounting **10** by rivets or the like generally in the manner illustrated in Fig. 1. When the hinge ears **17**, **17***a* and **18**, **18***a*, **18***b* are in proper interfitting relation with each other, the apertures therein are so located as to be in concentrically aligned relation with each other and are of substantially the same controlled diameter with the exception of one which is threaded. The apertured lugs are adapted to receive a pivot member **19** in the manner illustrated in Figs. 3–5. Pivot member **19** comprises a screw **20** having an enlarged head part **21** and an elongated body portion **22** which

is threaded adjacent its terminal end 23. Head part 21 of screw 20 is provided with a hex-shaped part 21*a* for receiving a suitable socket wrench or the like and a slightly reduced and shouldered part 21*b* adapted to interfit with a portion of hinge ear 18 in a manner which will become apparent from the description to follow. A nylon bushing 24 of controlled diameter similar to the diameter of the apertures and of a controlled length is snugly fitted about the body portion 22 so as to extend from the head 21 over the major portion of body 22 and cover a predetermined portion of the threaded end 23. The outer diameter of bushing 24 is initially controlled to be substantially equal to the diameter of the apertures in hinge ears 17, 17*a* and 18, 18*a* so as to permit easy insertion of pivot member 19 in the manner shown more particularly in Fig. 3.

The aperture 25 in lower hinge ear 18*b* of hinge plate 16 which is threaded is of a diameter less than the outer diameter of bushing 24 and threadedly receives the end 23 of screw 20. The material of the ear surrounding the aperture simultaneously provides an annular shelf-like portion with which the lower end of bushing 24 engages and which restricts the inwardly directed movement of said bushing when the screw 20 is threadedly advanced into ear 18*b*, Figs. 4 and 5. Furthermore, the aperture in the upper ear 18 of hinge plate 16 is provided with a counterbore 26 of a diameter substantially that of the diameter of the part 21*b* of head 21 of screw 20 and is of a depth so as to snugly receive said part 21*b* in the manner illustrated in Fig. 5 when the final assembly of the hinge plates 15 and 16 is completed.

In assembling the pivot member 19 with the hinge plates 15 and 16, the ears 17, 17*a*, 18, 18*a* and 18*b* are first positioned in interfitting relation with each other so as to cause the apertures therein to be concentrically aligned with each other and the pivot member 19 is inserted in said apertures so as to cause the threaded end 23 of screw 20 to engage the upper end of the threaded aperture 25 of hinge ear 18*b* as illustrated in Fig. 3. At this point, it is to be noted that the lower end of bushing 24 is spaced a controlled distance from the upper surface of hinge ear 18*b* and by threading screw 20 into aperture 25 the lower end of the bushing 24 will ultimately engage the upper surface of hinge ear 18*b* (Fig. 4) and be confined between said upper surface of hinge ear 18*b* and the lower side 21*d* of head 21 of screw 20 prior to the full threading of the screw inwardly of the aperture 25. The major portion of the bushing 24 is also confined within the walls of the apertures in the hinge ears. Further threading of the screw 20 into the threaded aperture 25 will cause a compressing force to be initially imparted upon the upper end of bushing 24 and will force the material of said bushing in a downward direction a controlled amount prior to the lower contour edge of the part 21*b* of head 21 of the screw being brought into communicating relation with the upper edge of the counterbore 26. From this point on and during the further threading of the screw into aperture 25 of the lower ear 18*b* the material of the bushing is completely confined so that when the screw is threaded to its final depth the material of the bushing will be displaced a controlled amount in accordance with its initial length A, Figs. 2 and 4, and the distance B, Fig. 4, between the base of the counterbore and the upper surface of the lower ear 18*b* of the hinge plate 16. With the screw 20 in its final tightened position, Fig. 5, the material of bushing 24 will be permanently retained in its displaced condition in frictional contact with the walls of the apertures substantially as illustrated in Fig. 5. In this respect, a certain portion of the material of bushing 24 is displaced inwardly of the adjacent threads of the end 23 of screw 20 and another portion 27 thereof is forced outwardly between the part 21*b* of head 21 of screw 20 and the base of counterbore 26 to set up a controlled amount of friction in the hinge assembly and to simultaneously

provide friction means beneath the head of screw 20 for aiding in retaining it against backing out during the use of the device.

By longitudinally compressing the bushing 24 within the confines of the space between the walls of the apertures in hinge ears 17, 17*a*, 18 and 18*a* and the body parts 22 of screw 20, a lateral frictional force is exerted by the material of bushing 24 against the side walls of said apertures in the hinge ears. This laterally directed frictional force then tends to resist relative movement of the hinge ears and thus overcomes the adverse effect of "drop temples" which is common to many conventional ophthalmic mountings.

Due to the fact that the bushing 24 is, as stated above, preferably constructed of the polyamide commonly known as nylon which is characteristically wear resistant, yieldable but tending to return to its initial set, stable under various temperatures and humidity conditions and requires no lubrication, a relatively permanent and smooth acting frictional force controlled according to the initial related dimensions of the parts as set forth above will be maintained on the hinge ears of the hinge 14 throughout the normal useful life of an ophthalmic mounting with substantially no binding action.

Referring more particularly to Fig. 5, it can be seen that while the mentioned frictional force of bushing 24 is exerted outwardly against the hinge ears of hinge plates 15 and 16, a similar force is directed inwardly against the body part 22 of screw 20 which in combination with the gripping effect of the flanged part 27 and the filling in of the screw threads 23 of screw 20, causes the bushing 24 and screw 20 to rotate with the hinge plate 16 since the area of contact of bushing 24 with the hinge ears 17 and 17*a* of hinge plate 15 is considerably less than the combined area of contact of bushing 24 with screw 20 and hinge ears 18, 18*a* and 18*b*. Furthermore, screw 20 is threadedly engaged with ear 18*b* of hinge plate 16 and is further retained by the resilient gripping action of the flanged upper parts 27 of bushing 24 with hinge ear 18.

It is particularly pointed out that with the bushing 24 initially being of a diameter substantially that of the diameters of the apertures in the hinge ears and in close fitting relation with the body 22 of screw 20, precise control of the degree of frictional force desired of the hinge connection 14 is obtained by controlling the length of bushing 24 in accordance with the dimensional characteristics of the apertures. To be more specific, the length A, Fig. 4, of bushing 24 is controlled to cause said bushing to initially extend a predetermined distance C above the depth B of the combined apertures in hinge ears 17, 17*a*, 18 and 18*a*. By increasing the distance C through elongation of the bushing, greater frictional tension will be provided in the hinge connection 14 when screw 20 is in its final threaded position as shown in Fig. 5 and by decreasing the length or distance C, a lesser tension will be provided in the finally assembled hinge connection. By advancing screw 20 into the apertures of the hinge ears to a point wherein the screw reaches its desired final threaded position it will be seen that by controlling the length of bushing 24 in the manner stated above precise control of the compressing force on bushing 24 is automatically accomplished.

It will be noted from the drawings that the head 21 of screw 20 is provided with a conventional hex-shaped part 21*a* whereby the tightening of the screw during assembly of the hinge connection may be accomplished with a common and readily available socket type tool and therefore does not require the use of special or complicated and expensive tools. However, if desired, the head 21 of screw 20 may be provided with any required shape such as a screw driver slot in which case, a conventional screw-driver could be used.

In instances where the temples of an ophthalmic mounting must be replaced after having been mounted,

the pivot member 19 may be removed from the hinge ears by backing screw 20 out of the threaded aperture 25 to a point where the threaded end 23 of screw 20 just clears the aperture 25. At this point, certain of the lowermost threads of screw 20 will be threadedly engaged with the lowermost end of bushing 24 which was said to have been displaced inwardly into the screw threads 23 during assembly of the hinge structure. Removal of pivot member 19 may then be accomplished by lifting screw 20 from the hinge assembly and the engagement of the lowermost threads of screw 20 with bushing 24 will tend to cause the bushing to lift from the hinge structure along with screw 20. If for any reason the bushing remains in the hinge ears when the screw is lifted out, it may be simply removed by threading a screw tap of a size slightly greater than the inside diameter of the bushing into said bushing and lifting the bushing from the hinge ears.

Although the hinge 14 of the drawings is of the so called "five barrel type" having five hinge ears, it is to be understood that the invention may be equally as well adapted for use in hinges having a lesser or greater number of hinge ears such as the commonly known "three barrel" or "seven barrel" opthalmic hinges.

It is pointed out that the top of head 21 of screw 20 is provided with a recess 21*e* which may be filled with a suitably colored point or the like for trade identification purposes.

With a simple and inexpensive hinge connection of the character described, a permanent and smooth acting predetermined positive frictional force may be provided to prevent a free swinging of the temples of ophthalmic mountings with substantially no binding or freezing action.

From the foregoing it will be apparent that all of the objects and advantages of the invention have been accomplished. However, many changes in the details of construction and arrangement of parts shown and described may be made without departing from the spirit of the invention as expressed in the accompanying claims. Therefore, it is to be understood that all matter shown or described herein is to be interpreted as illustrative and not in a limiting sense.

Having described my invention, I claim:

1. A hinge connection for connecting a temple to a supporting part of an ophthalmic mounting, said hinge connection comprising a plurality of interfitting ears provided on the adjoining portions of said temple and said supporting part and having substantially aligned openings therein, the opening in one of the outer of said ears being of a diameter smaller than the openings in said other ears and having a threaded bore and a pivot member within said openings, said pivot member comprising a screw having an enlarged head portion and having a reduced shank with a threaded end portion adapted to threadedly fit within the reduced threaded bore of said outer ear, a cylindrically shaped bushing of plastic material characterized by its inherent resiliency and ability to return to its initial size and shape when altered therefrom having a bore of a diameter such that it may be initially easily and relatively intimately fitted on the shank portion of the screw and being of an initial outer diameter such that when assembled with said screw it may be freely and relatively intimately fitted within the aligned openings of said other ears, said bushing being of an initially controlled length greater than the length of the aligned openings in said other ears as measured from the inner surface of said outer ear having the threaded opening therein to the exposed outer surface surrounding the opening in the opposed outer ear so that when said screw is threaded into said aligned openings and is tightened into position of use the enlarged head of the screw will initially engage the adjacent end of the plastic bushing and will exert a longitudinal compressing force on said plastic bushing between it and the inner surface of the outer ear having the threaded opening therein with which the inner end of the bushing engages and which force increases as said screw is further threaded into said aligned openings and the distance between said enlarged head and said inner surface decreases, said force ultimately being of an amount controlled according to the initial greater length of the bushing and the extent to which the screw is threaded into said aligned openings so that a compressing force will be exerted and retained, by said enlarged head and said inner surface, on said bushing sufficient to cause its main body portion to expand and retain a frictional contact with the adjacent side walls of the openings in said other ears.

2. A hinge connection for connecting a temple to a supporting part of an ophthalmic mounting, said hinge connection comprising a plurality of interfitting ears provided on the adjoining portions of said temple and said supporting part and having substantially aligned openings therein, the opening in one of the outer of said ears having an enlarged counterbore communicating therewith and the opening in the opposed outer ear being of a diameter smaller than the openings in said other ears and having a threaded bore and a pivot member within said openings, said pivot member comprising a screw having an enlarged head formed with a shouldered portion of a diameter substantially equal to the diameter of the counterbore and having a reduced shank with a threaded end portion adapted to threadedly fit within the reduced threaded bore of said outer ear, a cylindrically shaped bushing of plastic material characterized by its inherent resiliency and ability to return to its initial size and shape when altered therefrom having a bore of a diameter such that it may be initially easily and relatively intimately fitted on the shank portion of the screw and being of an initial outer diameter such that when assembled with said screw it may be freely and relatively intimately fitted within the aligned opening of said other ears, said bushing being of an initially controlled length greater than the length of the aligned openings in said other ears as measured from the inner surface of said outer ear having the threaded opening therein to the exposed outer surface of the counterbore surrounding the opening in the opposed outer ear so that when said screw is threaded into said aligned openings and is tightened into position of use the shouldered portion of the screw will intially engage the adjacent end of the plastic bushing and will exert a longitudinal compressing force on said plastic bushing between it and the inner surface of the outer ear having the threaded opening therein with which the inner end of the bushing engages and which force increases as said screw is further threaded into said aligned openings and the distance between said enlarged head and said inner surface decreases, said force ultimately being of an amount controlled according to the initial greater length of the bushing and the extent to which the screw is threaded into said aligned openings so that a compressing force will be exerted and retained, by said shouldered portion, on said bushing sufficient to cause its main body portion to expand and retain a frictional contact with the adjacent side walls of the openings in said other ears, said screw being threaded into said aligned openings by an amount sufficient to cause said shouldered portion of the screw to extend into said counterbore and confine the bushing within said aligned openings.

3. A hinge connection for connecting a temple to a supporting part of an ophthalmic mounting, said hinge connection comprising a plurality of interfitting ears provided on the adjoining portions of said temple and said supporting part and having substantially aligned openings therein, the opening in one of the outer of said ears having an enlarged counterbore communicating therewith and the opening in the opposed outer ear being of a diameter smaller than the openings in said other ears

and having a threaded bore and a pivot member within said openings, said pivot member comprising a screw having an enlarged head formed with a shouldered portion of a diameter substantially equal to the diameter of the counterbore and having a reduced shank with a threaded end portion adapted to threadedly fit within the reduced threaded bore of said outer ear, a cylindrically shaped bushing of plastic material characterized by its inherent resiliency and ability to return to its initial size and shape when altered therefrom having a bore of a diameter such that it may be initially easily and relatively intimately fitted on the shank portion of the screw and being of an initial outer diameter such that when assembled with said screw it may be freely and relatively intimately fitted within the aligned openings of said other ears, said bushing being of an initially controlled length greater than the length of the aligned openings in said other ears as measured from the inner surface of said outer ear having the threaded opening therein to the exposed outer surface of the counterbore surrounding the opening in the opposed outer ear so that when said screw is threaded into said aligned openings and is tightened into position of use the shouldered portion of the screw will initially engage the adjacent end of the plastic bushing and will exert a longitudinal compressing force on said plastic bushing between it and the inner surface of the outer ear having the threaded opening therein with which the inner end of the bushing engages

and which force increases as said screw is further threaded into said aligned openings and the distance between said enlarged head and said inner surface decreases, said force ultimately being of an amount controlled according to the initial greater length of the bushing and the extent to which the screw is threaded into said aligned openings so that a compressing force will be exerted and retained, by said shouldered portion, on said bushing sufficient to cause its main body portion to expand and retain a frictional contact with the adjacent side walls of the openings in said other ears, said screw being threaded into said aligned openings by an amount sufficient to cause said shouldered portion of the screw to extend into said counterbore and confine the bushing within said aligned openings and to simultaneously cause the upper end of the bushing to flange outwardly beneath said shouldered portion and the base of the counterbore to function as a friction lock washer to further retain the screw in adjusted position.

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