March 2, 1971 F. SPEER 3,567,315

SPRING-LOADED HINGE FOR SPECTACLE FRAMES AND SYSTEM FOR ADJUSTMENT OF TEMPLE ANGULATION

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Fig. 1a.

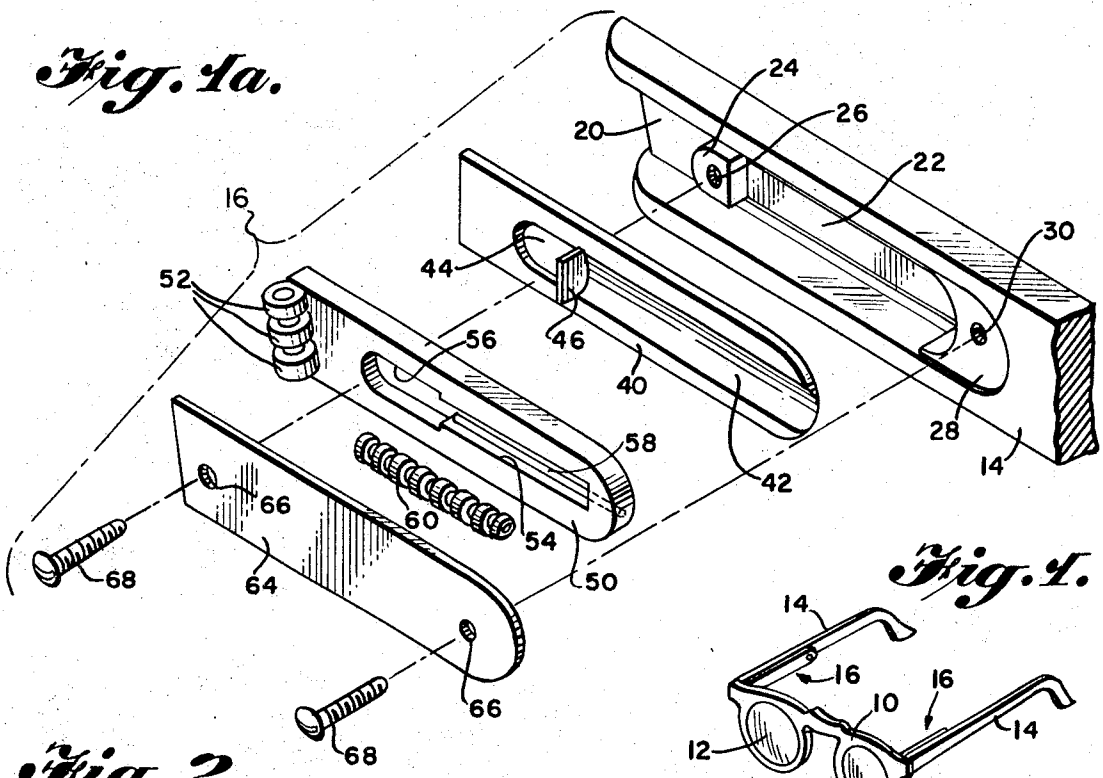


Fig. 4.

Fig. 2.

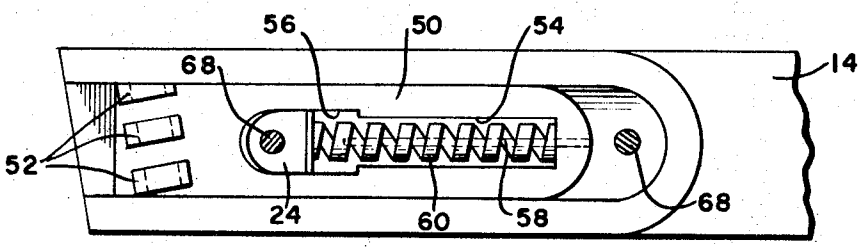


Fig. 3.

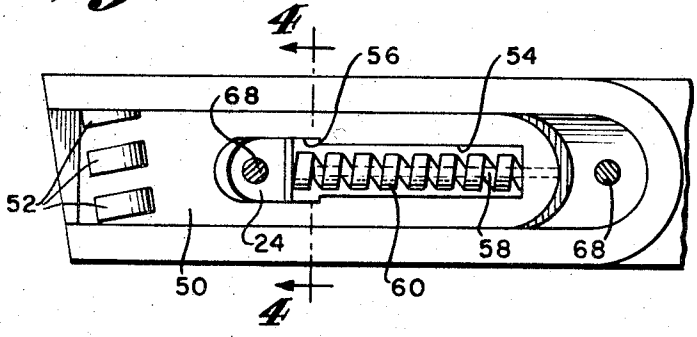
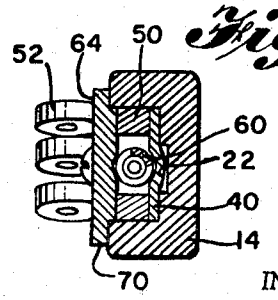


Fig. 4.



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Fig. 5.

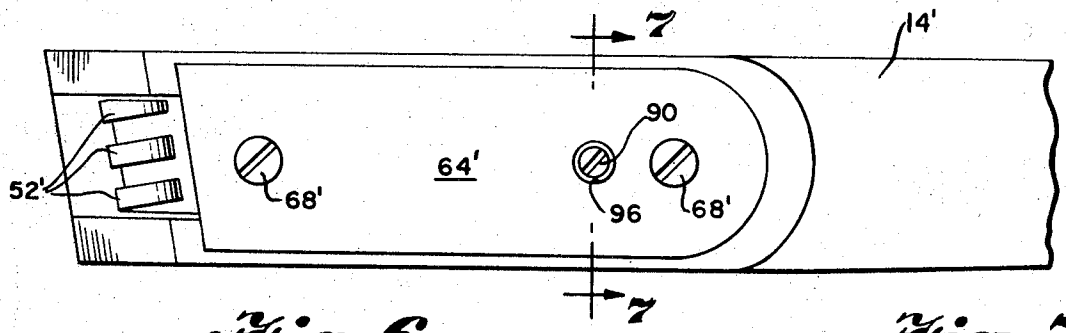


Fig. 6.

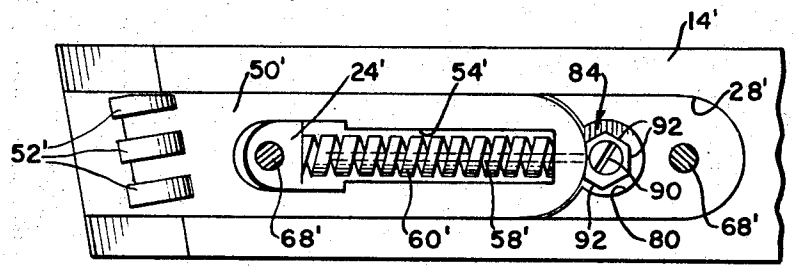


Fig. 7.

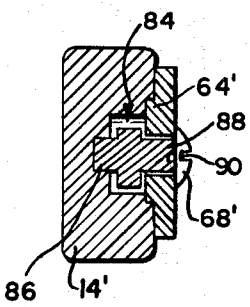


Fig. 8.

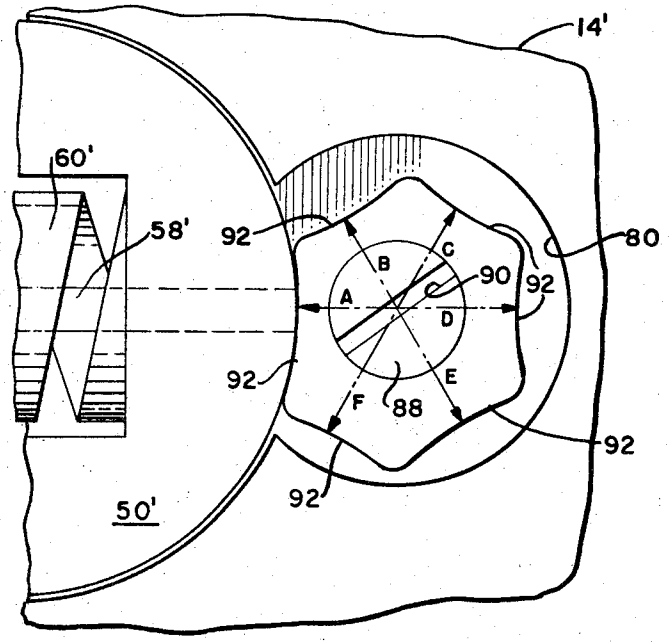
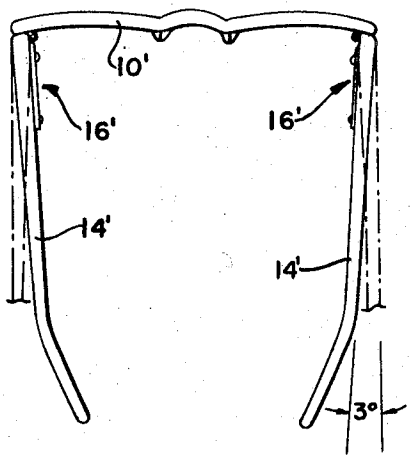


Fig. 9.



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SPRING-LOADED HINGE FOR SPECTACLE FRAMES AND SYSTEM FOR ADJUSTMENT OF TEMPLE ANGULATION

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Fig. 10.

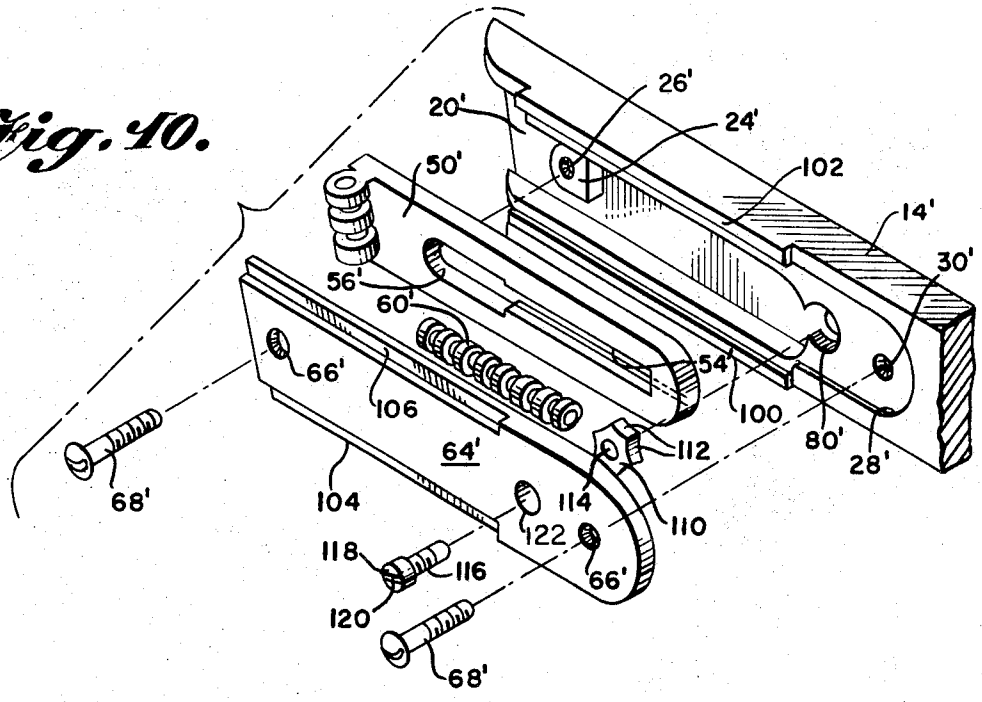


Fig. 11.

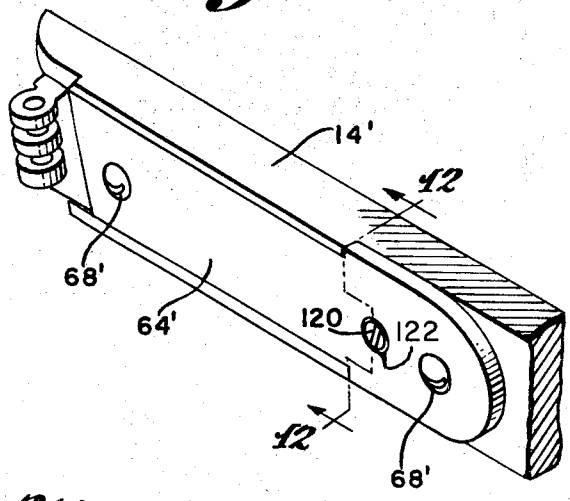


Fig. 12.

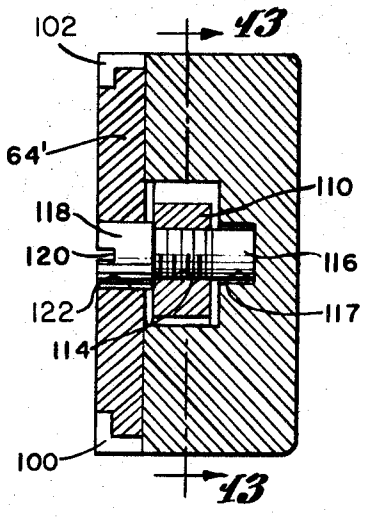
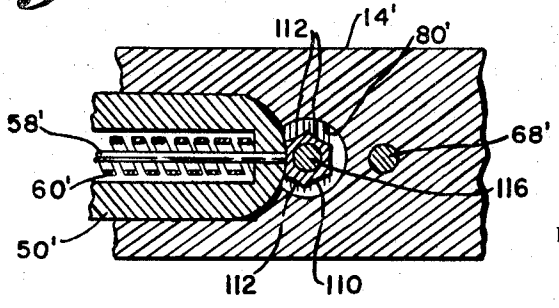


Fig. 13.



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Fig. 14.

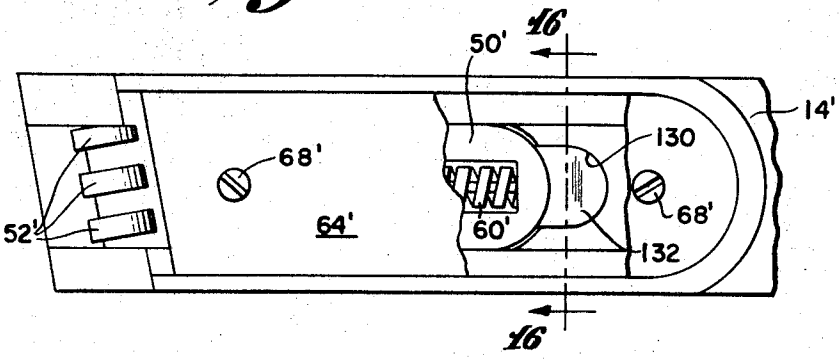


Fig. 15.

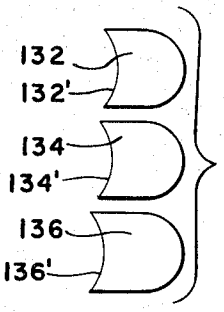


Fig. 16.

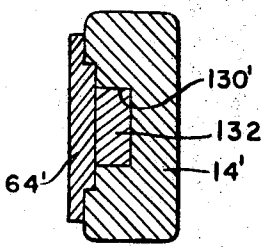


Fig. 17.

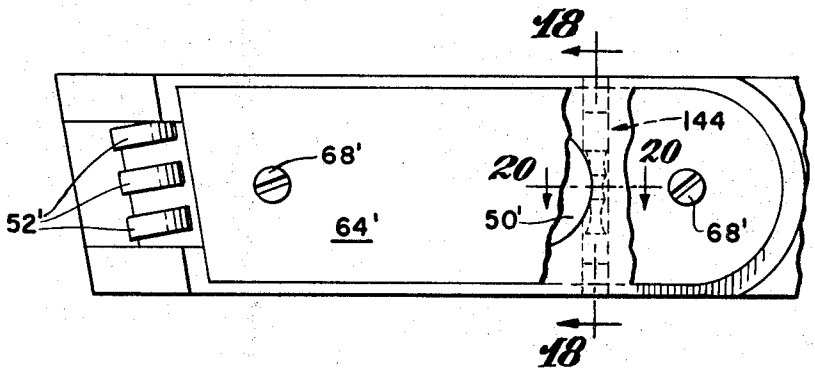


Fig. 18.

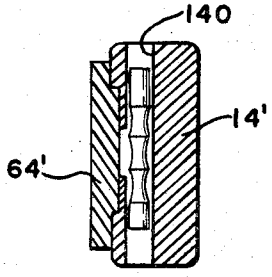


Fig. 19.

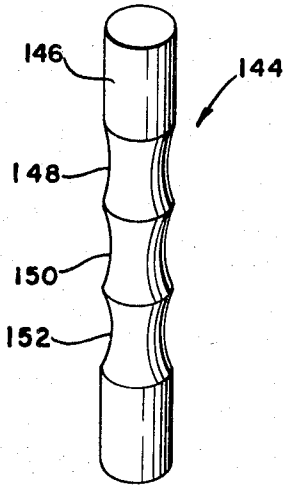
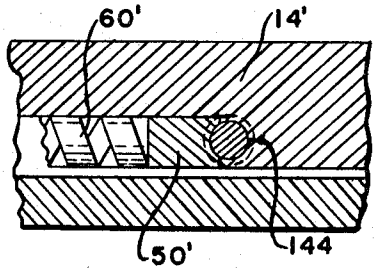


Fig. 20.



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United States Patent Office 3,567,315
Patented Mar. 2, 1971

3,567,315

SPRING-LOADED HINGE FOR SPECTACLE FRAMES AND SYSTEM FOR ADJUSTMENT OF TEMPLE ANGULATION

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Filed June 2, 1969, Ser. No. 829,658
Int. Cl. G02c 5/16, 5/20
U.S. Cl. 351—113 5 Claims

ABSTRACT OF THE DISCLOSURE

A spectacle temple is pivotally connected to a lens support frame by a spring-loaded hinge. A recess is formed in the outer end of the temple, and an integral projection extends into this recess. A hinge plate is slidably supported in the recess and is biased in one direction by a spring. The hinge plate has a slot which receives the projection. A cover plate is secured in place over the hinge plate which, in turn, is connected with the lens support frame. In certain forms of the invention, adjustment means is provided for selectively prestressing the spring and thereby varying the normal angulation of the temple with respect to the lens support frame.

BACKGROUND OF THE INVENTION

The present invention relates to a spring-loaded hinge assembly for spectacle frames which normally biases the temples inwardly of the spectacle frame so that the temples positively engage the head of the wearer to retain the spectacle frame in position. This type of spectacle frame is designed to obtain a perfect fit of the sides of a person's head. Additionally, such a resilient biasing arrangement ensures that the spectacle frame will remain properly positioned high on the nose and will not slide down along the nose when a person bends forwardly.

Spring-loaded hinges of this nature in the prior art have been excessively complex in construction and have not held up well under extended use. Furthermore, it is rather difficult to assemble and disassemble such prior art constructions, and they may be of a somewhat awkward or mechanistic appearance. In many instances it is also desirable to provide a system or means of adjustment whereby the normal angle of "toe-in" of each temple may be varied, thus permitting the pressure exerted by the temples on a person's head to vary in accordance with the particular situation such as comfort considerations or requirements of positive retention.

SUMMARY OF THE INVENTION

In the present invention, the forward end of the temple has a recess formed therein for receiving a hinge plate which is slidable with respect to the temple. An integral projection is formed on the temple which extends into this recess, this projection being received within an elongated slot provided in the hinge plate. A cover plate which may be slidable into grooves formed in the temple material is disposed in overlying relationship to the hinge plate, and is secured in operative position by suitable attaching screws. In this manner, the supporting and retaining structure for the slidable hinge plate is formed essentially integrally with the temple itself thereby simplifying the over-all construction of the apparatus, and giving it a functionally attractive appearance. Further, several modified forms of an adjustment means for selectively prestressing the spring which biases the hinge plate for sliding movement with respect to the temple are provided. This adjustment means enables the spring to be prestressed so that the pressure exerted on a person's head by the temples of a complete spectacle frame assembly may be varied as desired. In substance, this is achieved by varying the normal angulation of the spectacle temples with respect to the lens support frame to which they are pivotally connected.

The nature and substance of the present invention as well as its objects and advantages will be more clearly perceived and fully understood upon referring to the following description and claims considered in connection with the accompanying drawings which are briefly described below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top perspective view of a complete spectacle frame incorporating spring-loaded hinges;

FIG. 1*a* is a top perspective exploded view of the hinge construction shown in FIG. 1;

FIG. 2 is an elevation view showing the assembled hinge with the cover plate removed and the loading spring in its fully extended position;

FIG. 3 is a view similar to FIG. 2 showing the hinge components with the spring under compression;

FIG. 4 is a sectional view taken substantially along line **4—4** of FIG. 3 looking in the direction of the arrows with the cover plate restored to operative position;

FIG. 5 is an elevation view of a spring-loaded hinge incorporating a mechanism whereby the normal prestressing or precompression of the loading spring may be varied;

FIG. 6 is a view similar to FIG. 5 with the cover plate removed from the hinge assembly;

FIG. 7 is a sectional view taken substantially along line **7—7** of FIG. 5 looking in the direction of the arrows;

FIG. 8 is an enlarged view of a portion of the structure shown in FIG. 6;

FIG. 9 is a top view of a complete spectacle frame incorporating the adjustable spring-loaded hinge of FIGS. 5–8 inclusive;

FIG. 10 is a top perspective exploded view illustrating another spring-loaded hinge according to the present invention including a two-piece cam adjustment means;

FIG. 11 is a top perpsective view of the hinge shown in FIG. 10 in assembled position;

FIG. 12 is a sectional view on an enlarged scale taken substantially along line **12—12** of FIG. 11 looking in the direction of the arrows;

FIG. 13 is a sectional view taken substantially along line **13—13** of FIG. 12 looking in the direction of the arrows;

FIG. 14 is an elevation view partly broken away of a further modified form of hinge according to the present invention;

FIG. 15 is an elevation view illustrating various spacer blocks for use in the hinge shown in FIG. 14;

FIG. 16 is a sectional view taken substantially along line **16—16** of FIG. 14 looking in the direction of the arrows;

FIG. 17 is an elevation view partly broken away of yet another modified form of hinge according to the present invention;

FIG. 18 is a sectional view taken substantially along line **18—18** of FIG. 17 looking in the direction of the arrows;

FIG. 19 is an enlarged top perspective view of the adjustment pin shown in FIG. 17 and FIG. 18, and

FIG. 20 is a sectional view on an enlarged scale taken substantially along line **20—20** of FIG. 17 looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail wherein like reference characters designate corresponding parts throughout the several views, as seen in FIG. 1 a complete

spectacle frame includes the usual lens support frame **10** having a pair of lenses **12** supported thereby. A pair of relatively conventional temples **14** are hingedly connected with opposite ends of the lens support frame by spring loaded hinges indicated by reference numbers **16**. Referring particularly to FIG. 1*a*, a recess **20** is formed at the outer end of the temple in the inner surface thereof, this recess opening through the forward end of the temple. An elongated groove **22** is formed in the bottom wall of the recess, and an integral temple projection **24** extends into the recess. A hole **26** is defined in projection **24** and is provided with suitable threads for receiving an attaching screw hereinafter described. A shallow recess **28** is formed rearwardly in the inner surface of the forward portion of the temple, and is in commounication with the deeper recess **20**. A hole **30** is formed in the bottom wall of recess **28**, and is provided with threads for receiving an attaching screw.

An insert **40** is also provided. While the components of the spectacle frame may be of many different materials, in the embodiment illustrated the temple **14** is formed of metal such as aluminum while insert **40** is also formed of metal of a possibly harder nature. This insert is characterized by an elongated indentation **42** which is adapted to fit within the groove **22** provided in the temple. An aperture **44** is provided through the insert, and a struck-up ear **46** extends substantially perpendicular to the plane of the main body portion of the insert. The insert is adapted to be mounted in such relationship that the indentation **42** thereof fits within groove **22** of the temple while temple projection **24** extends through aperture **44** in the insert with insert ear **46** coming adjacent one side of the projection.

A hinge plate **50** which may also be formed of metallic material is provided, this hinge plate having hinge connecting means **52** which are adapted to cooperate with conventional hinge connecting means provided on the lens support frame whereby the temple may be pivotally interconnected with the lens support frame around the usual pin. The hinge plate is characterized by an elongated slot **54** formed therethrough, this slot including an enlarged portion **56** adapted to receive projection **24** and ear **46**. A pin **58** is supported by the hingle plate within slot **54**, and serves as a retaining and guide means for a compression spring **60**. In the assembled relationship of the components one end of spring bears against a surface of ear **46** formed on insert **40** while the opposite end of the spring bears against an interior surface of the hinge plate which forms an end wall of the slot within which the spring is disposed. In this manner the spring which is under at least some compression at all times is disposed to urge the hinge plate into sliding movement to the right with respect to the associated temple.

A cover plate **64** which may be formed of a material similar to that of the temple is disposed in overlying relationship to the hinge plate, and is characterized by a pair of spaced holes **66** which are disposed to be aligned with the holes **26** and **30** formed in the temple. Attaching screws **68** extend through the cover plate in operative position on the temple. It will be noted particularly as seen in FIG. 4 that the cover plate is provided with a lateral flange **70** extending therearound whereby the cover plate includes a portion extending downwardly within the recess formed in the temple to locate the cover plate definitely in operative position independently of or previously to the securing effect of screws **68**. FIG. 2 shows the hinge components with the cover plate removed and spring **60** as fully extended; that is, with hinge plate **50** moved as far to the right as it can go against an internal shoulder or banking surface of temple **14**. As seen in FIG. 3, the hinge plate is moved somewhat to the left with respect to the temple by means not shown, thereby further compressing spring **60**.

Referring next to FIGS. 5–9 inclusive, a modified form of spring-loaded hinge assembly is illustrated. The construction of this form of the invention is identical in many respects to that previously described, and similar parts have been given the same reference numerals primed. In this embodiment of the invention, an adjustment mechanism is provided which enables the spring of the hinge to be prestressed so as to vary the position of repose of the temples to various degrees or angles of toe-in when biased inwardly by the spring means. For a typical example, the toe-in may be an angle of approximately —3°, as shown in solid line delineation of the temples of the spectacle frame assembly of FIG. 9, which will apply maximum pressure to a person's head when the temples are normally so set or adjusted. If the temples be adjusted so that their normal position of repose is one in which they are disposed substantially at 90° to the lens support frame, as shown in broken or phantom line delineation of the temples in FIG. 9, a minimum amount of pressure will be applied to a person's head when the spectacles are in use, assuming the same person, i.e., the same cranial dimensions, and same spectacles or spectacle dimensions in each case.

As shown in FIGS. 6 and 7, a further recess **80** is provided in temple **14'** which receives a one-piece rotatable cam device indicated generally by reference number **84**. This cam device includes a stub shaft or hub portion **86** which is journaled within a corresponding bearing recess or aperture formed in the temple in the bottom of recess **80**. A further and opposite hub portion **88** of cam device **84** is provided with a kerf **90** in its outer end so that the actual cam element may be adjusted rotatably by a suitable tool such as a screw driver. FIG. 8 in particular shows that the cam element of device **84** is characterized by a plurality of concave peripheral surface segments or portions **92** which are disposed at different minimum distances from the axis of rotation of the device. These distances are indicated by reference characters A, B, C, D, E and F as seen in FIG. 8, and in a typical example may be respectively .035, .038, .041, .044, .047, and .050 inch. The surfaces **92** themselves serve as successively selective banking surfaces for hinge plate **50'** which is urged steadily to the right by the force of compression spring **60'**.

As shown in FIGS. 5 and 7, cover plate **64'** is provided with a hole **96** wherethrough cam hub portion **88** extends and whereat one can gain access to the kerf **90** therein so that the cam device may be adjusted with the hinge assembly cover plate in place. It is apparent that by rotating the cam device to different angular positions the amount of prestress of spring **60'** of the hinge may be selectively adjusted as the location of the effective banking surface of hinge plate **50'** is shifted. The farther that hinge plate **50'** is moved to the left (cam surface F being in use, for example) the more prestress or precompression is imposed on spring **60'**. With more prestress the normal toe-in angle of temple **14'** is reduced, and the spectacles of which it is a component will fit more comfortably yet firmly on a person having a relatively wide head.

Referring next to FIGS. 10–13 inclusive, a hinge construction is shown which is in many respects similar to that shown in FIGS. 5–9, and here again with reference to the showings in FIGS. 1–4 the same parts have been given the same reference numbers primed. In this form of the invention each temple is provided top and bottom with a pair of parallel flanges **100** and **102** extending toward one another, these flanges cooperating with flanges or narrowed edge regions **104** and **106** formed on opposite sides of the cover plate **64'** so that the cover plate may be slid into operative position on temple **14'** shouldering against the rear ends of flanges **100** and **102**. Thereafter it is secured in place as before by means of attaching screws **68'**. For convenience of assembly of this embodiment or construction, the cam means is formed in two pieces including a first or actual cam element **110** having a plurality of concave peripheral surface segments or por-

tions **112** identical with the peripheral portions **92** of the cam means or device **84** previously described. Cam element **110** is characterized by a threaded bore **114** extending therethrough.

The entire cam means or assembly includes a second part in the nature of a shaft or axle having a threaded shank **116** which is adapted to be threaded into the bore **114** in cam portion **110**. An enlarged head **118** is formed on threaded shank **116**, and a tool engaging means such as a kerf **120** is defined in this head. As in the embodiment shown in FIGS. 5–9, a hole **122** is provided in the cover plate to enable the cam device to be adjusted while the cover plate is secured in operative position. Here again, it is apparent that by suitably turning the cam means the hinge plate **50'** in spring-loaded abutting relationship with the outer periphery of the cam element may be moved or allowed to move longitudinally along the temple to apply a desired degree of prestress to the associated spring **60'**, and the normal angulation of temple **14'** with respect to the lens support frame be varied accordingly.

Referring next to FIGS. 14–16 inclusive, a hinge construction is shown which is in at least some respects similar to that shown in FIGS. 5–9, and, accordingly, with reference to the showings in FIGS. 1–4 similar parts have been given the same reference numbers primed. In this form of the invention each temple is provided with a recess **130** which is adapted to receive a spacer block intended to provide a banking surface for spring-loaded hinge plate **50'**. As seen in FIG. 15, spacer blocks **132**, **134** and **136** of different sizes, i.e., different lengths, may be provided, and while three spacer blocks are illustrated it is apparent that any number of spacer blocks may be furnished according to the range and fineness of size graduations desired. By employing different ones of these spacer blocks the amount of prestress applied to compression spring **60'** may be selectively adjusted, it being understood that when an adjustment is to be made one spacer block is taken out of recess **130** and another spacer block substituted therefor. Normal angulation of temples **14'** is varied accordingly. Each of spacer blocks **132**, **134** and **136** has an arcuate surface **132'**, **134'** and **136'**, respectively, which is substantially complementary to the abutting right-hand end of the hinge plate for snugly engaging that plate.

Referring finally to FIGS. 17–20 inclusive, yet another hinge construction is shown which incorporates a number of features substantially identical to those of the construction shown in FIGS. 5–9, and thus once more with reference to the showings in FIGS. 1–4 similar parts have been given the same reference numbers primed. In this form of the invention, the adjustment means or system includes a bore **140** extending through the temple and in communication with the recess which receives the slidable hinge plate. Slidably disposed within bore **140** is an adjustment pin indicated generally by reference number **144**. This pin is characterized by a substantially cylindrical body portion **146** having distinguishable portions **148**, **150** and **152** of different dimensions formed thereon. Each of portions **148**, **150** and **152** is of generally arcuate longitudinal cross-sectional configuration, portion **148** having a maximum diameter, portion **150** having an intermediate diameter, and portion **152** having a minimum diameter. Each of these portions **148**, **150** and **152** is adapted to engage the right-hand end surface of the associated slidable hinge plate **50'**. It may be seen that by adjusting the position of the pin within the associated bore, with accompanying adjustment of the position of hinge plate **50'**, the amount of prestress applied to spring **60'** may be adjusted to thereby alter the normal angle of the temple with respect to the associated lens support frame.

As this invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, the present embodiments are therefore illustrative and not restrictive, and since the scope of the invention is defined by the appended claims, all changes that fall within the metes and bounds of the claims or that constitute their functional as well as conjointly cooperative equivalents are therefore intended to be embraced by those claims. In particular, while this invention has been generally illustrated and described in relation to spectacle temples made of metallic material it may be practiced just as well in relation to temples made of a suitably hard plastic material. Such an arrangement would differ from the ones illustrated mainly in that the temples would be provided with metallic core wires or pieces having tapped holes to receive the attaching screws **68** and **68'** rather than threads being cut in the base plastic material. Further, there might be certain metal inserts provided to furnish durable bearing surfaces.

What is claimed is:

1. In combination, (1) a spectacle temple characterized by a recess in one end thereof with said recess having an open end at said one end of said temple, (2) a hinge plate having one end and another end and slidably supported by said temple within said recess and including hinge connecting means at its end nearer to said open end of said recess cooperable with hinge connecting means on a spectacle lens support frame, (3) a compression spring within said recess engaging said hinge plate and normally biasing the same for movement in a direction away from said open end of said recess, and (4) an adjustment means mounted on said temple for selectively prestressing said compression spring and simultaneously varying the normal position of said hinge plate with respect to said temple by holding said hinge plate in a plurality of positions against the thrust of said compression spring, said adjustment means including a cam device providing a variable banking surface for an end surface of said hinge plate at its end farther from said open end of said recess.

2. Apparatus as defined in claim **1** wherein said cam device is rotatable with respect to said temple and hinge plate and is characterized by a plurality of concave peripheral portions disposed at varying distances from its axis of rotation.

3. Apparatus as defined in claim **2** including means for selectively rotating said cam device with respect to said temple and hinge plate.

4. In combination, (1) a spectacle temple characterized by a recess in one end thereof with said recess having an open end at said one end of said temple, (2) a hinge plate having one end and another end and slidably supported by said temple within said recess and including hinge connecting means at its end nearer to said open end of said recess cooperable with hinge connecting means on a spectacle lens support frame, (3) a compression spring within said recess engaging said hinge plate and normally biasing the same for movement in a direction away from said open end of said recess, and (4) an adjustment means mounted on said temple for selectively prestressing said compression spring and simultaneously varying the normal position of said hinge plate with respect to said temple by holding said hinge plate in a plurality of positions against the thrust of said compression spring, said adjustment means including a plurality of substitutable spacer blocks of different sizes each providing a banking surface for an end surface of said hinge plate at its end farther from said open end of said recess.

5. In combination, (1) a spectacle temple characterized by a recess in one end thereof with said recess having an open end at said one end of said temple, (2) a hinge plate having one end and another end and slidably supported by said temple within said recess and including hinge connecting means at its end nearer to said open end of said recess cooperable with hinge connecting means on a spectacle lens support frame, (3) a compression spring within said recess engaging said hinge plate and normally biasing the same for movement in a direction away from said open end of said recess, and (4) an adjustment means mounted on said temple for selectively prestressing said compression spring and simultaneously

varying the normal position of said hinge plate with respect to said temple by holding said hinge plate in a plurality of positions against the thrust of said compression spring, said adjustment means including an elongated pin having a plurality of spaced longitudinal portions of different dimensions each providing a banking surface for an end surface of said hinge plate at its end farther from said open end of said recess.

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