

[54] **SPRING-LOADED SPECTACLE HINGE**

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[58] Field of Search351/113, 121, 114, 153; 16/128 A, 180

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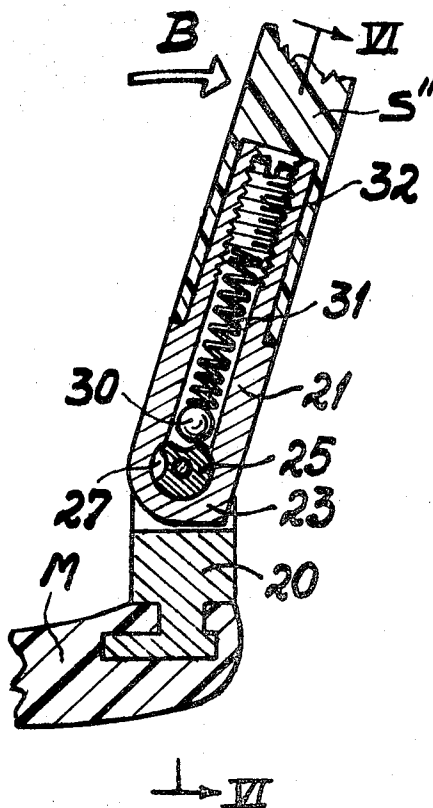
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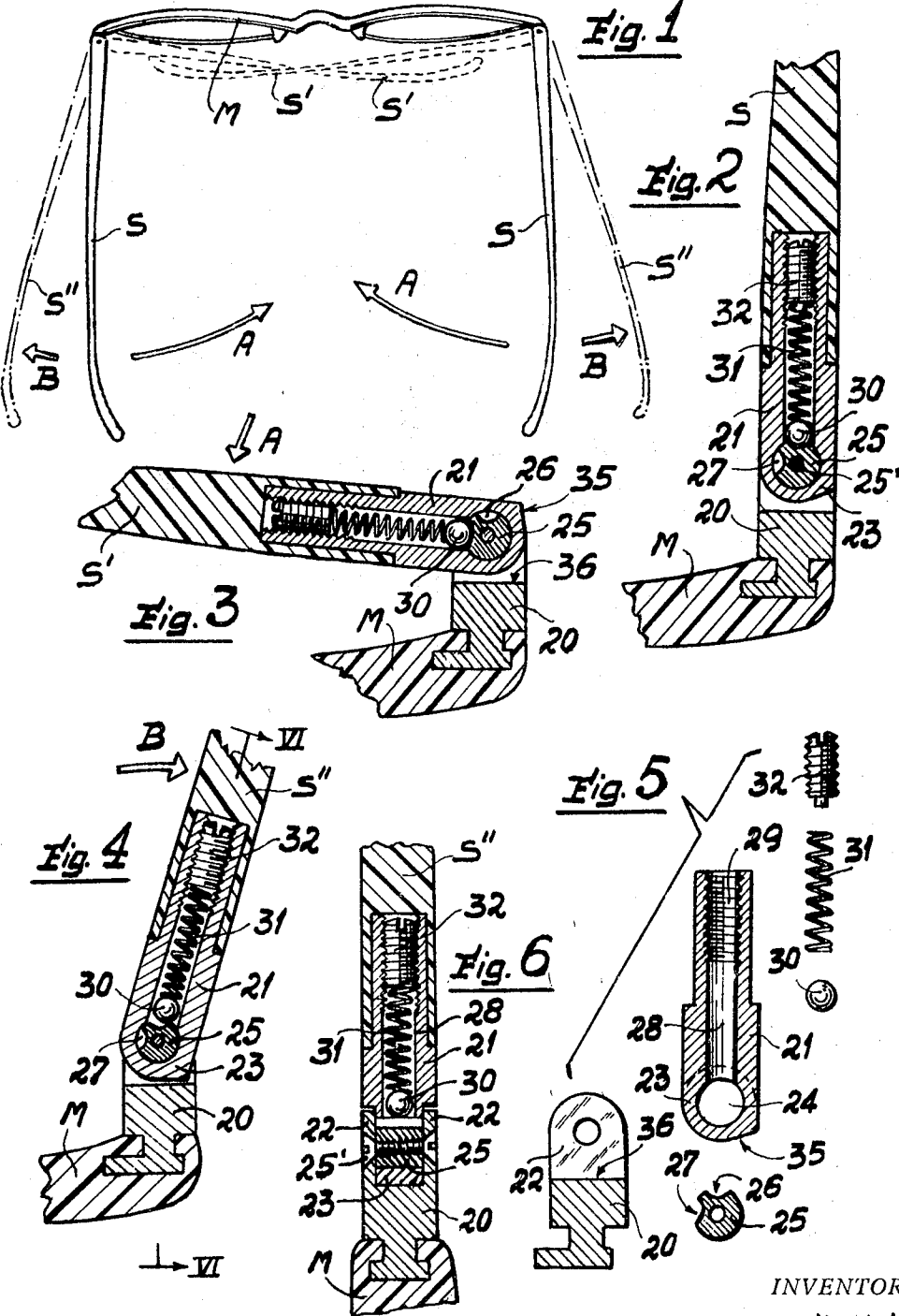
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[57] **ABSTRACT**

An improved hinge construction for spectacles, wherein two components are secured to the frontpiece and respectively the side arms of the spectacles' frame, the said components comprising cam means and spring-biased cam follower means for providing an elastic resistance to widening apart of the side arms, outside of a given service position, and planar faces complementary arranged for abutting on each other when a given excess-wide position is attained, providing a positive stop to further widening apart.

4 Claims, 14 Drawing Figures



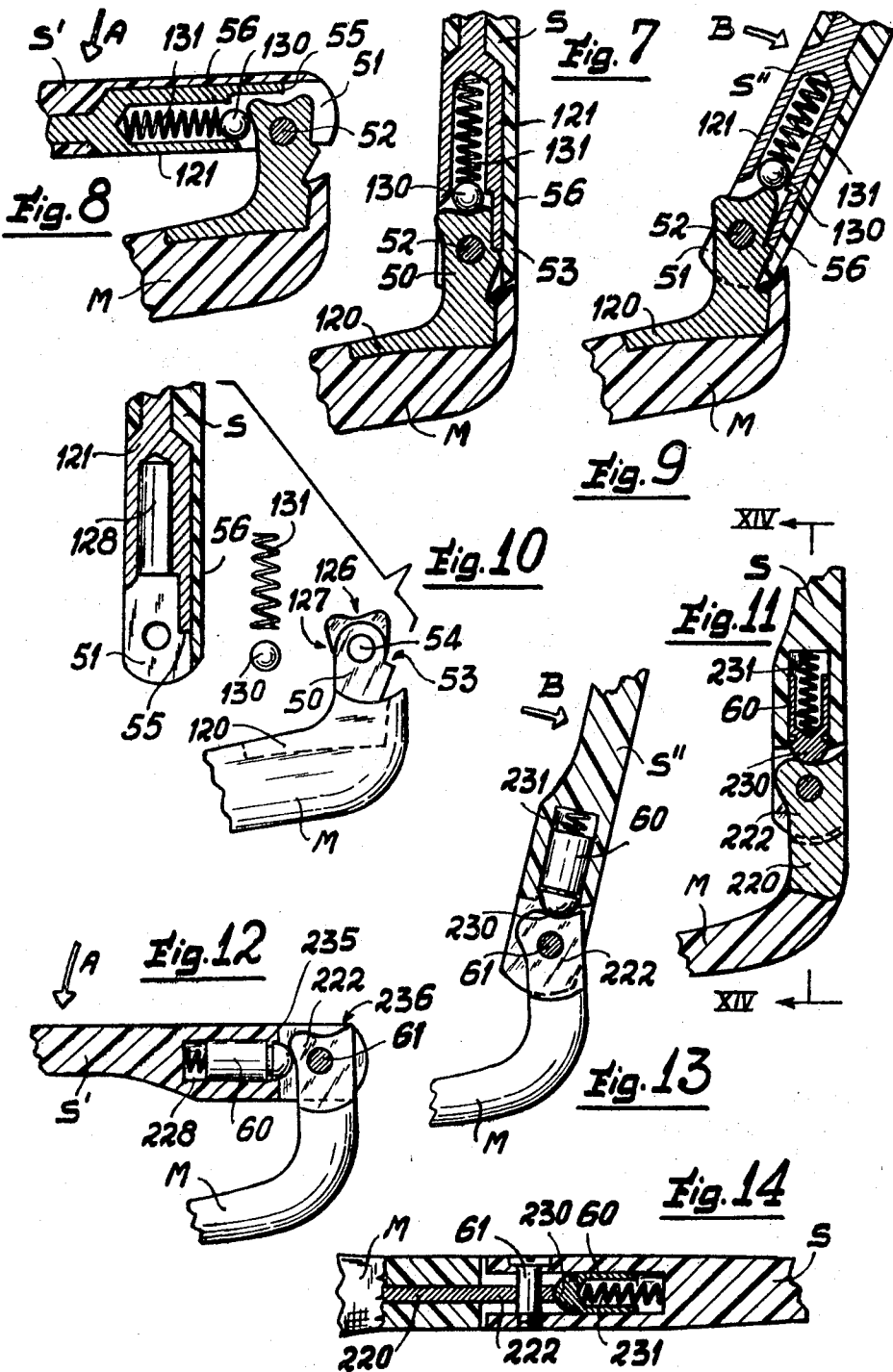


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SPRING-LOADED SPECTACLE HINGE

BACKGROUND OF THE INVENTION

This invention relates to hinge means designed for tiltably connecting the lateral end portions of a frontpiece of spectacles to side arms thereof. More particularly, the invention is related with spectacles hinge means of the known type comprising spring-biased means and cooperating cam means adapted both for maintaining the side arms either in folded and in unfolded service position allowing the tilting of said arms between said two position upon overcoming of a slight resistance, and for allowing further widening apart of such arms, from said service position, upon overcoming of a slight spring bias.

Such mounting arrangement for spectacles tiltable arms or sidepieces is well known and appreciated. A known construction of a mounting arrangement of the type above has been described and shown in the patent specification U.S. Pat. No. 2,874,609, issued on Feb. 24, 1959 to Marcello Ducati, of Milan (Italy). Such known constructions require however an extremely precise and careful workmanship and assembling of parts made of precision-ground hardened metal, are subject to undesirable fast wearing and cannot withstand severe abuse. More particularly, when the side arms of the known mounting are spaced apart from their service position (where the arms form angles slightly greater than 90° with the front piece) the one means provided for limiting excessive spacing or widening apart consists of the increasing resistance of the spring which biases the cam follower means (generally, a small steel ball) on the cam profile. Such arrangement leads to an undesirable increase of the resistance to further widening apart as far as the side arms are outwardly tilted, and to promote an excessive specific pressure at the very tiny spot where the small ball abuts on the cam. These objectionable conditions require the above-indicated use of very hard materials in the manufacture of the hinge means and also the above indicated extreme precision of machining and of assembling of the components. As a matter of fact, spectacles can be comfortably used only if the side arms thereof exert a well-determined slight inwardly directed pressure on the wearer's temples. Owing to the said increasing of resistance to widening apart of the spectacles' side arms, such slight pressure occurs only when said side arms are widened apart at a strictly defined angle.

It is therefore an object of this invention to provide a new and improved hinge means for spectacles mounting of the type referred to above, which is not subject to the above and other objections, as it will be best apparent as this description proceeds.

SUMMARY OF THE INVENTION

Essentially, according to the invention, the new hinge means comprise a first component designed to be secured to the spectacles' frontpiece, a second component designed to be secured to (or forming part of) a spectacles' side arm, cam means secured to one of these components and a spring-biased member supported in the other of said components, said member having a rounded end portion urged by a spring against said cam means. Said cam means, spring-biased member and the spring-biasing said member cooperate to maintain the side arm at either its folded or service position and for providing an essentially constant bias to said arm, when further outwardly urged from said service position, said first and second components comprising further complementarily arranged rigid parts positioned for abutting on each other when said further widening apart of the arms attains a given amplitude, in excess to that necessary for actual service of the spectacles.

Said hinge means comprise further means for providing a positive stop when the widening apart of said side arms reaches an amplitude in large excess to the said service position, that is in an "excess-wide" position which is proper for easily putting on the spectacles about the wearer's temples.

According to the invention, the said positive stop is not provided by the cooperation of said cam and cam follower means, as according to current art, but, on the contrary, by the mutual abutment of rigid parts which, preferably, are integrally formed with the said first and second hinge components. Still further, such rigid parts are shaped to provide planar faces of substantial surface area, and are complementarily arranged in the said first and second hinge components so that such planar faces abut each other in parallel more particularly in coplanar juxtaposition so that the resulting stresses are distributed within the said substantial area and the resulting specific pressure (that is total pressure divided by the surface area) is very low and is most desirable.

According to a most preferred embodiment of the invention, the cam means consists of a member which is adjustably secured to one of said component, preferable to said first component to be secured to the spectacles' frontpiece. This provision allows easy and immediate adjustment of the spectacles' frame for any individual costumer and wearer. Still according to said preferred embodiment, the said cam member consists of a pin about which the two components are hingedly connected.

These and other features and advantages of the invention will be best understood from the following detailed description of few embodiments thereof, when taken in conjunction with the accompanying drawings, forming an essential component of this disclosure.

BRIEF DESCRIPTION OF THE VIEWS OF THE DRAWINGS

FIG. 1 is a diagrammatical plan view of a spectacles frame of the type considered, wherein the side arms of the frame are shown in different positions indicated by indicia accompanying the capital letter by which said parts are generally indicated;

FIG. 2 is a cross-sectional view, in greatly enlarged scale, of the most preferred embodiment of the hinge of the invention, in the service position of the side arm connected thereto, the view being taken in a plane perpendicular to the pivotal axis of the hinge;

FIGS. 3 and 4 are views similar to the view of FIG. 2, in the folded position and respectively in the most outwardly tilted position of the arm;

FIG. 5 is an exploded view of the components of the hinge means of FIGS. 2 to 4;

FIG. 6 is a cross-sectional view of same hinge means, taken in the planes indicated at VI—VI in FIG. 4;

FIGS. 7, 8 and 9 are views similar to these of FIGS. 2, 3 and 4, respectively, illustrating a first modified embodiment of the invention;

FIG. 10 illustrates the components of the hinge of FIGS. 7 to 9;

FIGS. 11, 12 and 13 are views similar to these of FIGS. 7, 8 and 9, respectively, illustrating a second modified embodiment of the invention; and

FIG. 14 is a cross-sectional view in the plane indicated at XIV—XIV in FIG. 11.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

For best understanding of the invention, a brief discussion of the general character of a spectacles' frame, provided with hinge means of the type considered, will now be made with reference to FIG. 1, where the front piece of the frame is generally indicated at M and the tiltable side arms indicated at S. Such side arms are shown in full lines at their "service" position, where they form angles of 90° or a little more with the front piece M. As known, such arms can be inwardly folded by tilting them in direction A to their folded position, indicated in dotted lines at S', adjacent to the frontpiece, and where said arms are maintained by an easily surmountable spring force. In addition, said side arms S can be spread apart,

from said service position, by urging them in direction B, to an excess-wide position, such as indicated at S'', where a in dash-dot lines positive stop prevents further spreading.

By providing a spectacles' frame as above with hinge means improved according to the invention, the urging of the side arms in direction B, towards the position S'', will encounter an essentially constant spring bias or resistance. Such feature is extremely advantageous because any position, intermediate between position indicated at S and S'', is proper for comfortable and sure fit and wearing of the spectacles about the wearer's temples, whereon a well-predetermined pressure is exerted. Such feature, therefore, provide a very ample latitude of adaptation of the spectacles' frame to wearers whose intertemplar spacing to intereye spacing ratio can widely vary.

Further, the improved hinge means of the invention provide positive stop to further spreading apart beyond position S'', said stop being at its turn provided by abutment between rigid parts and not involving the cooperation of the spring and cam means providing the said bias. Therefore, no excess load and stresses can be applied to the said latter means.

FIGS. 2 to 6 illustrates a most preferred construction of one hinge means improved according to the invention. The hinge means comprises a first component 20, conventionally secured to the front piece M, preferably but not necessarily of nonmetallic material, and a second elongated component 21, conventionally secured to one side arm S, preferably but not necessarily of nonmetallic material. The component 20 has two spaced braces 22 integrally formed therewith, wherein an end portion 23 of the second component 21 slidably fits. Said end portion 23 is traversed by a bore 24 (FIG. 5) wherein a hinge pivot member 25 rotatively fits.

Said pivot member 25 consists of a small metallic essentially cylindrical piece located between the braces 22 and secured thereto by small axial screws 25', so that, upon loosening of said screws, said member 25 can be rotated about its axis relatively to component 20. The cylindrical surface of said member 25 is discontinued by notches or recesses 26 and 27, and, therefore, said surface acts as and actually is a camming surface.

The second component 21 has a longitudinal bore 28 perpendicular to bore 24 and provided with a thread 29 at its portion far from said bore 24. A small ball 30 of hard metal is slidably located in the bore 28 and it is urged by a spring 31 against said camming surface of member 25, located in the bore 24. This spring 31 reacts on a screw plug 32 adjustably screwed in said threaded portion 29. Therefore the load of spring 31 can be adjusted at will. Said spring 31 is pretty long with relation to the amplitude of the motions of ball 30 along the bore 28, when said ball acts as a cam follower relatively to the camming surface of member 25, that is when said ball 30 goes in and out of the recesses 26 and 27, upon tilting of the side arm S about the axis of member 25 and of bore 24.

It is evident that fitting of ball 30 in the recess 26 (FIG. 2) defines the service position S of the side arm. Such service position can be angularly adjusted, relatively to the front piece M, by rotatively adjusting the pivot-and-cam forming member 25. The directions at which the recesses 26 and 27 outface diverge at an angle greater than 90°, so that the folded position of the side arms (at S', FIGS. 1 and 3) can be maintained by the ball 30, urged into recess 27, irrespective of the above said adjustment, within practical limits, of the service position at S.

When the arm S is outwardly urged in direction B, the resistance is nearly constant and is due to the running of the ball 30 up along the slanting side of recess 26, such running causing the spring 31 to be compressed for a small amount relative to its length.

The said end portion 23 of the second component 21 has a generally outer cylindrical configuration discontinued by a slanting planar face at 35 (FIG. 5). The first component 20 has a planar face 36 (FIGS. 3 and 5) forming the bottom of the space between the braces 22. Such planar faces 35 and 36 are positioned for abutting on each other when the arms S reach the excess-wide position indicated at S'', providing the desired positive stop against further spreading.

It is evident that the described cam, cam follower and spring means do not cooperate to provide said positive stop but that the latter is provided by mutual abutment of rigid parts of a pretty large planar surface area of contact and abutment, such the area of the planar faces 35 and 36, thus obtaining the most desirable low-specific pressure at the abutting faces.

The modified embodiment of FIGS. 7 to 10 provides only part of the advantageous features of the above described preferred embodiment shown in FIGS. 2 to 6. Said modified embodiment is advantageous when a so-called "concealed hinge" is desired, that is a spectacle frame wherein no metallic component can be seen from the outside, when the spectacles are put on.

The first component 120 has a shaped outer portion 50 provided with a camming surface having recesses 126 and 127 and with a bore 54 for the pivot pin 52. The second component 121 has a bore 128 wherein the ball 130 biased by the spring 131 is located for cooperating with the camming surface, substantially as above described. The second component has also a forked end portion 51 wherein the outer portion 50 of first components is hingedly fitted. The said second component is conventionally secured to the side arm S which has a depending elongated part 56 which conceals the metallic components.

In the modified construction of FIGS. 7 to 10 the positive stop at the excess-wide position S'' (FIG. 9) is provided also by abutment on each other of rigid parts. Such parts consist of the end portion 55 of a projection of the second component 121 and of a step 53 formed in the outer portion 50 of first component 120. Said parts 53 and 55 provide planar surfaces abutting on each other.

The other modified construction of FIGS. 11 to 14 is of interest when an extremely economical structure is desired, such as, for example, in cheap sunglasses or the like. The first component 220 consists of a metallic flat-shaped piece having an end portion 222 providing the camming surface and pivoted between braces integrally formed with a nonmetallic arm S, such as a plastic made side arm, bored at 228 for slidably housing a cam follower 60 and its biasing spring 231, a pivot 61 hingedly connecting the components. Said cam follower has a rounded head 230 engaging the camming surface and is essentially cylindrical for providing an ample frictional surface within the bore 228, so that the wearing of the bore surface (of not metallic material) is minimized.

The positive stop at excess-wide position S'' (FIG. 13) is provided by abutment of the outer nearly planar portion 236 (FIG. 12) of the camming surface on a planar portion 235 of the end portion of the side arm S which, in this construction, embodies the second component of the hinge means.

What is claimed is:

1. A spectacle frame comprising, in combination, a front-piece having opposite lateral ends; a pair of side arm; first and second hinge components respectively fixed to said opposite ends of said frontpiece and ends of said side arms for connecting said side arms to said opposite ends of said frontpiece tiltably between a folded position substantially parallel to said frontpiece, a service position substantially normal to said frontpiece and an extreme spread position beyond said service position; cooperating cam means and spring-biased follower means for yieldably maintaining said side arms in either said folded or service position, said cam means comprising for each of said side arms a member having a camming surface having a pair of spaced recesses in which said spring-biased follower means respectively engages when the respective side arm is in said folded or in said service position, said member being angularly adjustable to thereby adjust the service position of the side arm; and positive stop means for preventing spreading of said side arms beyond said extreme spread position.

2. A spectacle frame as defined in claim 1, wherein said member is of generally cylindrical configuration and adjustably secured to said first hinge component and fitted for pivotal movement in a bore of said second hinge component to provide a hinge pin for said hinge components.

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3. A spectacle frame as defined in claim 2, wherein said first hinge component has a pair of spaced brace portions, said second hinge component has an end portion provided with said bore and being located between said brace portions, said member being angularly adjustable secured to said brace portions.

4. A spectacle frame as defined in claim 3, wherein said first and second hinge components are formed from metal, and

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wherein one of said planar faces of said stop means is formed between said brace portions of said first hinge component and the other of said planar faces is formed on said end portion of said second hinge component, said planar faces abutting over substantially the whole area thereof against each other when said side arms reach their extreme spread position.

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