

"HINGE MECHANISM EMPLOYED TO THOSE PRODUCTS SUCH AS GLASSES"

5 Background of the invention:

Although they are small in size and volume, hinges for coupling temples to the lens frame of glasses are subjected to large forces whenever the temples are utilized, consequently the
10 hinge mechanism inevitably becomes loose with use.

The loosening of said hinge mechanism is a problem to be prevented and solved.

If it is intended only to prevent set screws in the hinges from falling off, front ends of these set screws may be
15 collapsed appropriately after having been set in the hinges. In use of the temples, however, the hinges of glasses must be both tight and smooth. A hinge mechanism made of metal only can not meet these demands.

There has been proposed a hinge having an elastic hollow
20 member interposed at that portion where its hinge body is contacted with its set screw. However, since the elastic hollow member is repeatedly subjected to stress every time the temples are utilized, it is likely to break and when it breaks, the hinge mechanism becomes loose or broken. The hinge of this type therefore has a
25 short life.

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The hinges employed with glasses, for example, are ideal when they enable the temples to be utilized with appropriate friction as well as with smoothness and this smooth and appropriate frictional utilization of the temples should be maintained. The present invention is intended to alleviate the drawback inherent in the hinge mechanism of elastic hollow member type, and to provide a small-sized hinge mechanism employed to those products such as glasses and lighters, and which are superior in construction and function and capable of being made by mass production with economy.

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According to the present invention there is provided

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a hinge mechanism comprising interlocking male and female mount portions provided with a common axial bore terminating at the lower most of said portions in a screw thread portion, said bore accommodating a set screw having a shaft and a terminal screw thread portion, and a tubular elastic member disposed about the set screw shaft and in abutment with the axial bore,

characterised in that the axial bore is formed with two diameters, a first wide diameter extending at least through a first female portion and into a male portion, and a second narrow diameter, and wherein the diameter of the shaft of the set screw approximates to the narrow diametral portion of the axial bore, whereby the wider diametral portion accommodates the elastic member.

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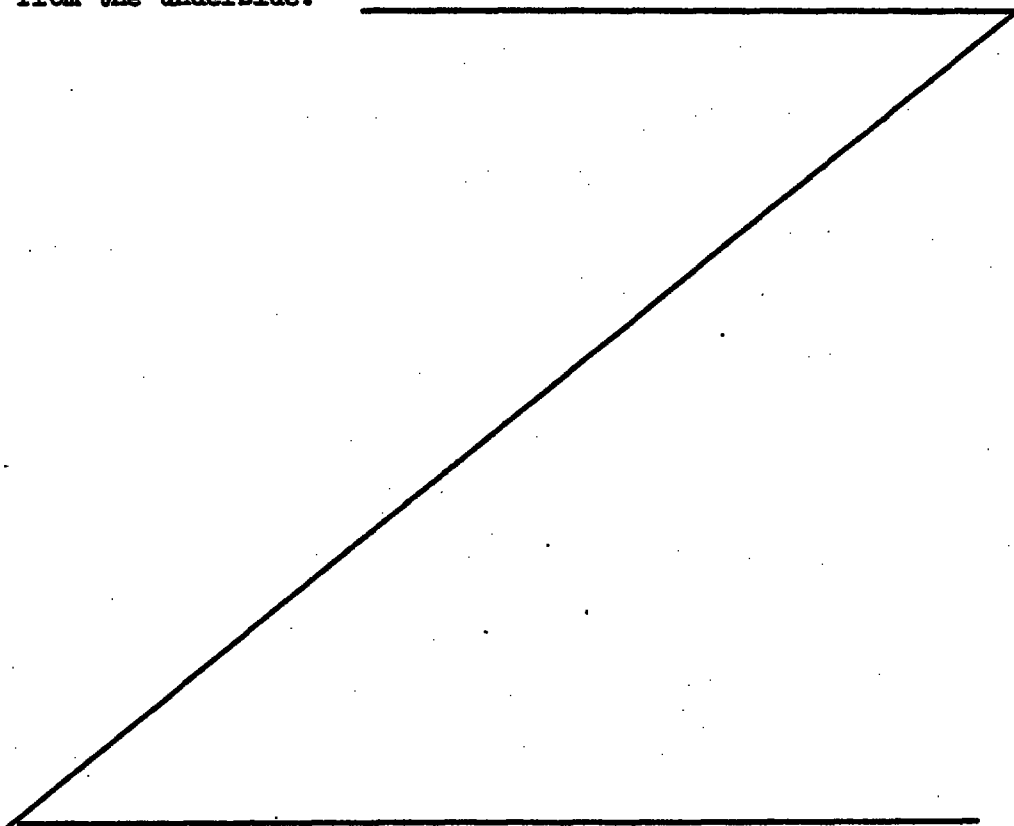
An object of the present invention is to provide a small hinge mechanism capable of preventing the set screws from becoming loose and falling off even after it has been used for a long time.

5 Some preferred embodiments of the present invention are now described in detail by way of illustration only with reference to the accompanying drawings.

In the drawings:-

10 Figure 1 shows an example of hinge mechanism according to the present invention attached to glasses.

Figure 2 shows a portion of the temple in Figure 1 viewed from the underside.



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Fig. 3 is an enlarged perspective view showing the hinge mechanism in Figure 1.

Fig. 4 is an enlarged sectional view taken along a line IV - IV in Fig. 1 wherein the number of female and male pieces engaged with each other is three.

Fig. 5 is a view similar to Fig. 4 wherein the number of female and male pieces engaged with each other is five.

Fig. 6 is an enlarged view showing a set screw screwed into the examples of hinge mechanism shown in Figs. 4 and 5.

Fig. 7 is a sectional view showing another example of hinge mechanism wherein the number of female and male pieces engaged with each other is three.

Fig. 8 is a front view showing the set screw in Fig. 7 inserted through an elastic hollow member.

Fig. 9 is a sectional view showing the set screw in Fig. 8 screwed into the hinge mechanism shown in Fig. 7.

Fig. 10 is a sectional view showing a set screw provided with lubricating oil recesses and included in the hinge mechanism according to the present invention.

Fig. 11 is an enlarged cross sectional view showing the rod portion of said set screw shown in Fig. 10.

Fig. 12 is a front view showing another example of set screw provided with lubricating oil recesses.

Fig. 13 is an enlarged cross sectional view showing the rod portion of said set screw shown in Fig. 12.

Fig. 14 is a front view showing a further example of set screw provided with lubricating oil recesses.

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5. Detailed description of preferred embodiments

Fig. 1 shows an example of ^ahinge mechanism according to the present invention attached to glasses wherein (A) represents lens frames of glasses (G) ^{and} (B) ~~temples~~ thereof.

5 The temples (B) are attached to attachments (C) of said lens frames (A), respectively, through hinges (H). Fig. 2 shows a piece of ^{a temple (B)} ~~the~~ viewed from ^{the} underside. Fig. 3 is a perspective view showing in an enlarged scale the main portion of said glasses in Fig. 1. In Figs. 1, 2 and 3, (a) represents a
10 mount of female pieces (1), (1') of said hinge (H) which will be described later, (b) a mount of male piece (2) which will also be described later, and (5) a set screw. (D) denotes lens locking metals, which may have same arrangement as the hinge mechanism of the present invention.

15 Fig. 4 is a sectional view taken along a line IV - IV in Fig. 1 and shows the hinge mechanism according to the present invention. The number of said female and male pieces (1), (1') and (2) engaged with each other is three. A bore (h) penetrating these female and male pieces
20 and into which a set screw (5) is inserted has a larger diameter portion (3) extending through the first female piece (1) and to a point half-^{way through the} male piece (2), and a smaller diameter portion (3') further extending from the larger diameter portion (3) through the remaining of said male piece (2) and
25 the last female piece (1'). An elastic hollow member (4) made of rubber or plastics is fitted into the larger diameter portion (3) of said bore (h). The set screw (5) is inserted through the elastic hollow member (4) and screwed into the last female piece (1') to such an extent that the elastic

hollow member (4) is pressed and fixed by the underside of a screw head (6). The mounts (a) and (b) of said female and male pieces (1), (1') and (2) are welded to the temple (B) and the attachment (C) of the lens frame (A), as shown in Figs. 1, 2 and 3.

It may be arranged that the elastic hollow member (4) is made a little longer than the length of said larger diameter portion (3) to project outside from the first female piece (1) and that this projected portion of said elastic hollow member (4) is forcedly spread outward by the screw head (6), which is larger in diameter than the elastic hollow member (4), and sandwiched between the first female piece (1) and the screw head (6) (see Fig. 6).

With a hinge mechanism in which the number of said female and male pieces (1), (1'), (1''), (2) and (2') is five, the larger diameter portion (3) of said bore (h) extends till halfway the second male piece (2') (see Fig. 5).

According to the embodiments of the present invention shown in Figures 4 to 6, the elastic hollow member (4) inserted into the larger diameter portion (3) of said bore (h) is forcedly interengaged therewith by the screw head (6) to thereby impart an elastic force thereto. This serves to enable a close contact to be established between female and male threads of said female piece (1') and set screw (5).

In addition, the elastic hollow member (4), the set screw (5) and the bore wall of said male piece (2) are closely contacted, without clearance, with one another, so that the temple (B) can be utilized with steadiness



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as well as with smoothness. Further, the male piece (2) directly contacts the set screw (5) except at the larger diameter portion (3). The temple (B) can be readily used, preventing that portion (m) of said temple (B) which is made of metal from bending when the temple (B) is moved.

According to a hinge mechanism shown in Fig. 7 to 9 the larger diameter portions of said bore (h) which are denoted by (3a) and (3a') extend through the female piece (1) and ^{through} halfway the male piece (2). However, these larger diameter portions are made the largest in diameter at the starting area of said bore (h) in the first female piece (1) so that the screw head (6) may be housed in the largest diameter portion (3b). The depth (t_1) of said larger diameter portion (3a') in the male piece (2) is made equal to or smaller than the depth (t_2) of said larger diameter portion (3a) in the female piece (1). The screw / ^{shaft} (7) is inserted into the elastic hollow member (4), which is made of rubber or plastics and which is longer than the sum ($t_1 + t_2$) of depths of said larger diameter portions (3a) and (3a') in the female and male pieces (1) and (2), and then screwed into the last female piece (1') so as to combine the female pieces (1) and (1') with the male piece (2), as shown in Fig. 9.

The outer diameter of said larger diameter portions (3a) and (3a') in the female and male pieces (1) and (2) is substantially equal to that of said elastic hollow member (4) while the length of said elastic hollow member (4) is made larger than the sum of depths of said larger diameter portions (3a) and (3a'). When the set screw (5) is screwed into the

last female piece (1') as shown in Fig. 9, therefore, the elastic hollow member (4) is pressed by the underside of said screw head (6) and pushed into ^{the space} between the set screw (5) and the wall of said larger diameter portions (3a) and (3a'). In addition, the upper end of said elastic hollow member (4) is pressed and spread outward by the screw head (6) to serve as a spring washer.

In other words, the elastic hollow member (4) is pushed to close contact ^{with} the screw ^{shaft} (7) as well as the inner wall of said larger diameter portions (3a) and (3a'). In addition, the upper end of said elastic hollow member (4) is kept in close contact with the underside of said screw head (6) and the bottom of said largest diameter portion (3b). As the result, the set screw (5) is prevented from becoming loose and falling off, thus enabling the temples to be utilized with appropriate tightness as well as with smoothness.

The hinge mechanism shown in Fig. 9 has a merit of good appearance because the screw head (6) does not project from the first female piece (1).

Fig. 10 shows a set screw (5a). The screw (5a) has a plurality of longitudinal recesses (8) formed on its shaft (7) which corresponds to the larger diameter portion (3) of said bore (h). The screw ^{shaft} (7) provided with the longitudinal recesses (8) is closely fitted into the elastic hollow member (4), made of rubber or plastics and a little longer than the larger diameter portion (3). Oil component (E) is held between the longitudinal recesses (8) of said screw rod (7) and the elastic hollow member (4). The set

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screw (5a) thus oiled is screwed into the bore (h) of said hinge (H).

Fig. 11 is a cross-sectional view showing the shaft (7) of said set screw (5a) shown in Fig. 10. Fig. 12 shows a further set screw (5b) whose shaft(7) is provided with a plurality of dot recesses (9). Fig. 13 is a cross-sectional view showing the shaft (7) of said set screw (5b). Fig. 14 shows a still further set screw (5c) whose shaft(7) has a threaded portion (10).

Holding of oil between the elastic hollow member (4) and the shaft(7) of said set screw (5a), (5b) or (5c) which is closely fitted into the elastic hollow member (4) is achieved in such a way that the set screw (5a), (5b) or (5c) fitted into the elastic hollow member (4) is put in an oil vessel and that the oil is heated to about 50°C. When the oil is heated to this temperature, air between the screw shaft (7) and the elastic hollow member (4) is expanded to escape therefrom so that oil component (E) can be allowed to come into between the screw shaft(7) and the elastic hollow member (4). When the set screw (5a), (5b) or (5c) thus oiled is screwed into the hinge (H) (see Fig. 10), the lower end of said elastic hollow member (4) is supported by a step (11) of said larger diameter portion (3). In addition, the elastic hollow member (4) ^{which is} longer than the larger diameter portion (3), is ^{up by} pushed / the underside of said screw head (6). Therefore, the inner face of said elastic hollow member (4) is forced to come into the recesses on the screw shaft(7) to thereby urge oil component (E) out of the recesses. Oil component (E), thus urged, flows to the smaller diameter portion (3') of said

bore (h) while to the joint between the male and female pieces (2) and (1) form an oil film all over the joint, so that the male piece (2) can be rotated with excellent smoothness.

The embodiments shown in Figures 10 to 14 enable an oil
5 film to be easily formed on the contacted faces between the male and female pieces, without using any other lubricator. With the conventional small-sized hinges employed in glasses and lighters for example, the contact faces between the male and female pieces are lubricated by a lubricator which acts as an injector to allow
10 the hinges to be opened and closed smoothly. However, each of clearances between the male and female pieces is extremely narrow. Therefore, lubrication of the contact faces between the male and female pieces is troublesome, time-wasting and inefficient.

Particularly with the hinges of glasses, at least three
15 separate lubrications are needed during processing. When the set screws screwed in after plating; and at the time of final adjustment. When the embodiments shown in Figures 10 through 14 are employed, however, it is sufficient only to weld the hinges to the temples, and subsequently put them in an oil vessel and heat
20 the oil to about 50°C. When the oil is heated to this temperature, the oil component enters between the elastic hollow members and the screw shaft to be held in the recesses on the screw shaft. When the set screws are then fastened, therefore, oil components contact the faces between the male and female pieces to thereby
25 form an oil film thereon. As described above, lubrication of the hinge mechanism can be achieved in this simple manner.



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Therefore, production efficiency is increased, producing the hinges which can be opened and closed smoothly because their male and female pieces are lubricated sufficiently between their contact faces.

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CLAIMS:

1. A hinge mechanism comprising interlocking male and female mount portions provided with a common axial bore terminating at the lower most of said portions in a screw thread portion, said bore accommodating a set screw having a shaft and a terminal screw thread portion, and a tubular elastic member disposed about the set screw shaft and in abutment with the axial bore,
characterised in that the axial bore is formed with two diameters, a first wide diameter extending at least through a first female portion and into a male portion, and a second narrow diameter, and wherein the diameter of the shaft of the set screw approximates to the narrow diametral portion of the axial bore, whereby the wider diametral portion accommodates the elastic member.
2. A hinge mechanism according to claim 1 wherein the length of the tubular elastic member exceeds the length of the wider diametral portion of the axial bore, whereby, in use the head of the set screw bears upon the elastic member to axially compress the same.
3. A hinge mechanism according to claim 2 wherein the uppermost mount portion is provided with a screw-head accommodating recess, and wherein a portion of the tubular elastic member is, in use, deformed radially by the screw head into the screw head accommodating recess.





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4. A hinge mechanism according to any preceding claim wherein the shaft of the set screw is provided with a plurality of lubricant accommodating recesses.
- 5 5. A hinge mechanism according to any preceding claim wherein there are three or five interengaging mount portions, and wherein the wider diametral portion of the axial bore extends to a point intermediate the lower male mount member.
- 10 6. A hinge mechanism as claimed in claim 1 and substantially as herein described with reference to and/or as illustrated in any one of the accompanying drawings.
- 15 7. A method of lubricating a hinge mechanism according to claim 4 which comprises assembling the hinge, and immersing the hinge so formed in a lubricant bath at a temperature of 50°C. to allow the oil to enter the recess thereby.
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