June 20, 1967 W. J. DONEGAN 3,325,824

ADJUSTABLE HEAD BAND

Filed Oct. 23, 1965

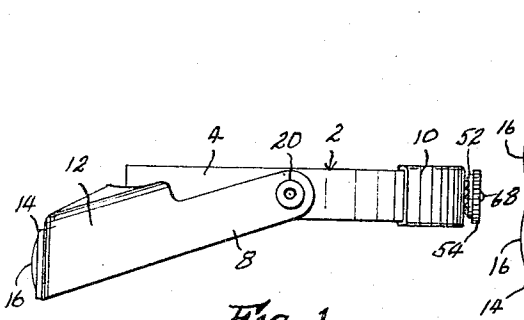


Fig. 1

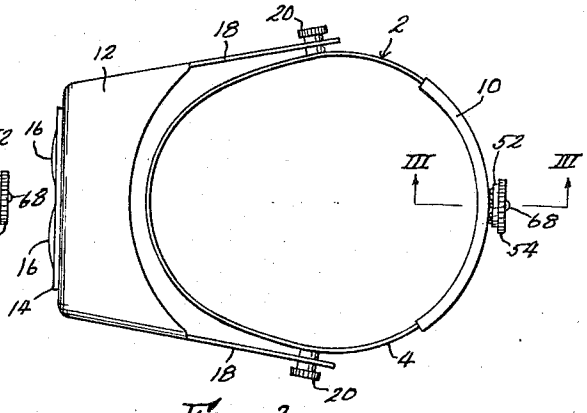


Fig. 2

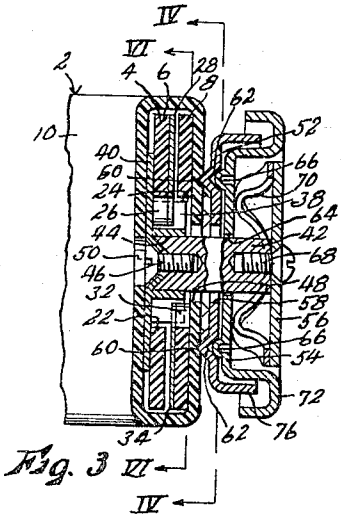


Fig. 3

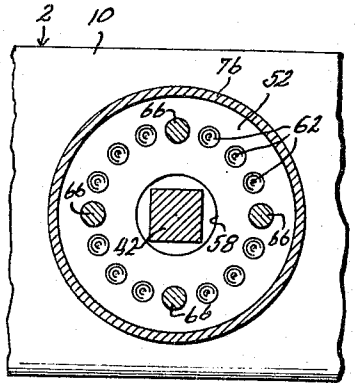


Fig. 4

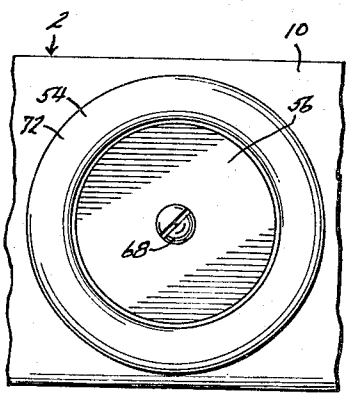


Fig. 5

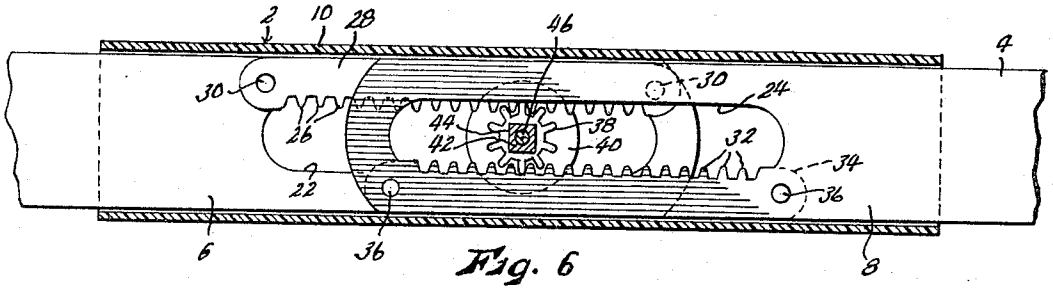


Fig. 6

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ADJUSTABLE HEAD BAND

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This invention relates to new and useful improvements in head bands, and has particular reference to head bands of the type commonly used in mounting magnifying viewers, welding masks, and the like on the users' heads.

The principal object of the present invention is the provision of a head band having novel means for adjusting it to the size of each individual user's head, and for clamping it as tightly as may be desired about the head, in order to support the weight of whatever apparatus may be supported by said head band.

Another object is the provision of a head band of the character described having a single control member constituting a rotatable knob, and operable both to adjust the circumference of the head band, and also to hold it firmly but releasably at any desired position in its adjustment.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability for use with head bands utilized for many different purposes.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing wherein:

FIG. 1 is a side elevational view of a binocular magnifier including an adjustable head band embodying the present invention,

FIG. 2 is a top plan view of the parts as shown in FIG. 1,

FIG. 3 is an enlarged, fragmentary sectional view taken on line III—III of FIG. 2,

FIG. 4 is a fragmentary sectional view taken on line IV—IV of FIG. 3,

FIG. 5 is a fragmentary rear elevational view of the head band, showing the control knob and related parts thereof, and

FIG. 6 is a reduced fragmentary sectional view taken on line VI—VI of FIG. 3, the plane of said section being curved with the horizontal contour of the head band.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies generally to the head band forming the subject matter of this invention, said head band comprising a flat strap 4 of flexible material such as plastic, the respective end portions 6 and 8 thereof being telescoped slidably into the opposite ends of a sleeve 10 of flat rectangular cross-sectional contour, and being disposed in overlapping relation in said sleeve. Said sleeve is also formed of a flexible material. The end portions 6 and 8 of the strap are secured adjustably in sleeve 10 by means which will presently be described. The head band is adapted to be worn horizontally about a person's head substantially at forehead level, and the flexibility of the strap and sleeve permit them to conform readily to the contour of the head.

Purely as an example of apparatus which may be carried by the head band, there is illustrated an eye shade member 12 adapted to be disposed in the line of sight of the wearer, there being mounted in the front wall thereof a lens holder 14 in which are fixed a pair of magnifying lenses 16. The eye shade is provided with a pair of rearwardly extending temple pieces 18 which are pivoted respectively to the strap 4 at opposite sides of the wearer's head, as by friction bolts 20, whereby the eye shade may be raised or lowered as desired. It will be apparent, however,

that many other types of apparatus, such as welder's masks, physician's circular mirrors, and the like, could also be mounted on the head band.

A pair of longitudinally elongated slots 22 and 24 are formed respectively in end portions 6 and 8 of strap 4, within sleeve 10. The upper edge of slot 22 is toothed as at 26 to form a straight gear rack, said teeth being reinforced by a thin, flexible metal plate 28 laid flat against end strap portion 6 and secured by flat head rivets 30, said plate having teeth corresponding to and overlying teeth 26. Similarly, the lower edge of slot 24 is toothed as at 32 to form a straight gear rack, and said teeth are reinforced by a flexible metal plate 34 secured to end strap portion 8 by rivets 36.

A toothed pinion 38 extends horizontally through strap slots 22 and 24, so as to mesh with racks 26 and 32 respectively at its top and bottom. Rigidly affixed to the forward end of said pinion, concentrically therewith, is a flat, circular plate 40 of greater diameter than said pinion, said plate abutting the forward surface of end strap section 6, but within sleeve 10. A short square or otherwise non-circular shaft 42 is disposed axially of pinion 38, being engaged non-rotatably in a correspondingly shaped socket 44 formed in said pinion, and secured therein by a screw 46 inserted from the forward side of the pinion. Said shaft extends rearwardly through a hole 48 formed in the rear wall of sleeve 10, said hole being large enough to permit rotation of said shaft therein. The parts thus far described may be assembled by first inserting strap 4 through sleeve 10, then overlapping end portions 6 and 8 thereof, and inserting pinion 38, then sliding the sleeve over the overlapping end portions 6 and 8 and finally inserting shaft 42 through sleeve hole 48 into pinion socket 44 and inserting screw 46, the forward wall of the sleeve being provided with an access hole 50 for admitting said screw.

Mounted on the portion of shaft 42 extending outwardly to the rear of sleeve 10 are, successively, an anchor plate 52, a detent plate 54, and a retainer plate 56. Anchor plate 52 is circular, essentially, planar, and has a central hole 58 through which shaft 42 passes, said anchor plate being both rotatable and longitudinally movable with respect to said shaft. Portions of said anchor plate are offset forwardly to form a series of sharp-pointed forward projections 60 arranged in a ring concentric with shaft 42, and a series of corresponding sockets 62 at the rearward face of said anchor plate. Detent plate 54 is also essentially flat and circular, having a square central aperture 64 in which shaft 42 is slidably but non-rotatably engaged. Said detent plate is provided at its forward face with a series of rounded detent projections 66 which are also arranged in a ring concentric to shaft 42 and which engage sockets 62 of the anchor plate. Retainer plate 56 is also flat and circular, and is rigidly affixed to the rearward end of shaft 42 by a screw 68. Disposed between detent plate 54 and retainer plate 56 is a spring washer 70, which functions to urge said plates away from each other. As best shown in FIG. 3, it will be seen that detent plate 54 is provided at its periphery with a lip 72 which is turned rearwardly and then forwardly. Retainer plate 56 and spring washer 70 are enclosed in the rearwardly opening socket formed by said lip for the protection thereof, and the outer periphery of said lip is knurled, as indicated in FIGS. 1 and 2, to provide a good finger grip whereby said detent plate may be manually rotated. Anchor plate 52 is provided at its periphery with a rearwardly turned lip 74 which projects within the lip 72 of detent plate 54 to inhibit the entry of dirt and the like between said plates.

Spring washer 70 serves to urge detent plate 54 firmly against anchor plate 52 to hold detent projections 66 of

the former in operative engagement with sockets **62** of the latter, and also to urge anchor plate **52** tightly against the outer surface of the rear wall of sleeve **10**, whereby sharp points **60** of the former are caused to indent sleeve **10** sharply, as shown in FIG. 3, whereby to secure said anchor plate against rotation relative to the sleeve. The plastic material of which the sleeve is formed is sufficiently soft to be indented in this manner. A full ring of points **60** is provided on the anchor plate, in order that regardless of the angular position of the anchor plate and regardless of the degree of curvature to which sleeve **10** may be formed, there will always be two or more points engaging said sleeve. Thus rotation of shaft **42** and pinion **38** is resisted yieldably by whatever rotative force is required to dislodge the rounded projections **66** of the detent plate from the sockets **62** of the anchor plate. This resistance to rotation of the pinion is sufficiently great that strap **4** may be drawn tightly enough about the wearer's head to support any reasonable load imposed thereon by the eye shade **12** or other apparatus to be carried thereby, and will retain this degree of tightness. However, sufficient additional torque may be applied manually to detent plate **54**, which may be termed a "knob," to cam detent projections **66** out of sockets **62**, whereby shaft **42** and pinion **38** may be rotated to adjust the effective circumference of the head band.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. An adjustable head band comprising:

(a) a flexible strap adapted to encircle the wearer's head with the end portions thereof disposed in overlapping relation and having a pair of cooperating longitudinally elongated slots formed respectively in said end potrions, relatively opposite edges of said slots being toothed to form straight gear racks extending longitudinally of said strap,

(b) a flexible sleeve enclosing the overlapping end portions of said strap, said strap end portions being longitudinally slidable in said sleeve,

(c) a gear pinion carried rotatably by said sleeve and disposed therein, the axis of said pinion being disposed generally radially to the loop of said strap, said pinion being meshed at opposite sides thereof with the respective gear racks of said slots,

(d) a shaft affixed to said pinion and extending axially therefrom to a point external to said sleeve,

(e) an anchor plate carried for rotation and axial sliding movement on said shaft externally to said sleeve and normally to said shaft, said anchor plate having a series of outwardly opening sockets formed therein and arranged in a ring concentric with said shaft,

(f) means preventing rotation of said anchor plate relative to said sleeve,

(g) a detent plate carried on said shaft outwardly from said anchor plate, said detent plate being axially slidable on said shaft but secured against rotation thereon, and having a series of rounded inward projections formed thereon in coinciding relation to the sockets of said anchor plate, said detent plate constituting a manually rotatable knob, and

(h) resilient means urging said detent plate toward and against said anchor plate, whereby the projections of the former are engaged in the sockets of the latter to resist yieldably any relative rotation of said plates.

2. An adjustable head band as recited in claim **1** wherein said sleeve is formed of relatively soft, indentable material, and wherein said means for preventing rotation of said anchor plate relative to said sleeve constitutes a plurality of sharp projections formed on the surface thereof adjacent said sleeve, said resilient means being operable to force said sharp points into indenting relationship to said sleeve.

3. An adjustable head band as recited in claim **2** with the addition of a retainer plate affixed to said shaft in outwardly spaced relation from said detent plate, said resilient means constiuting a compression spring interposed between said detent and retainer plates, whereby said detent plate is urged resiliently against said anchor plate, and said anchor plate is urged against said sleeve.

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