March 1, 1960 G. Z. EDWARDS ET AL 2,926,406

LENGTH ADJUSTMENT MECHANISM

Filed March 27, 1959

FIG 1

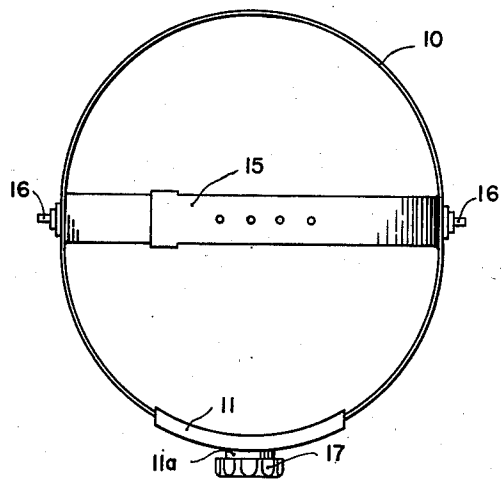


FIG 2

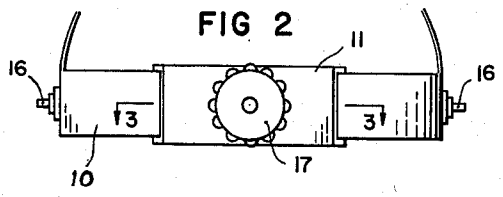


FIG 3

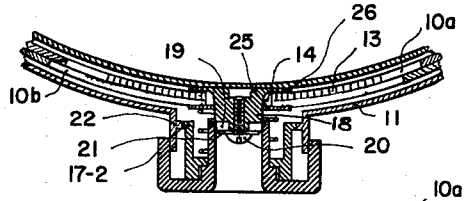


FIG 4

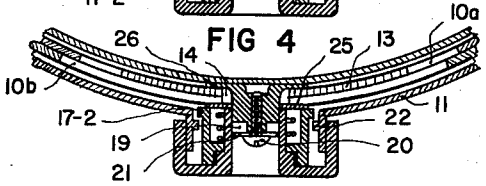


FIG 5

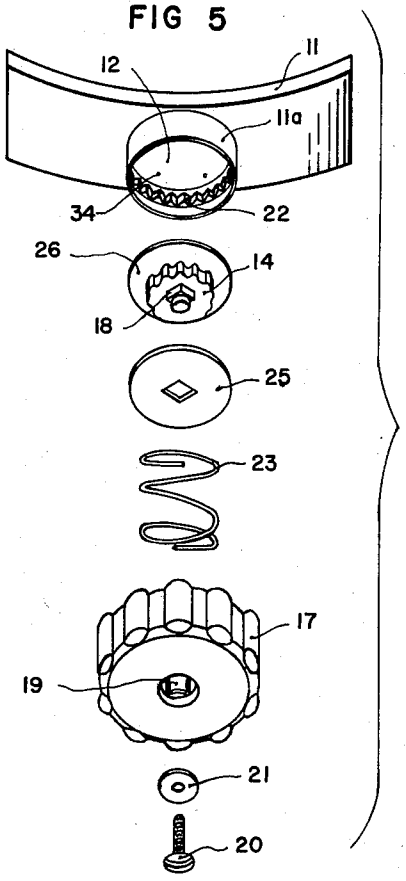


FIG 6

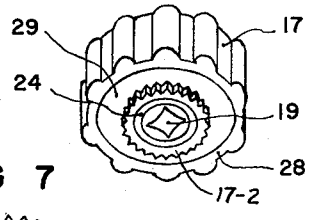


FIG 7

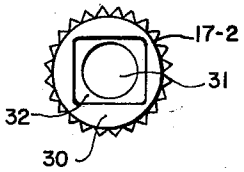
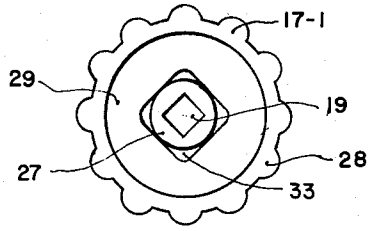


FIG 8



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LENGTH ADJUSTMENT MECHANISM

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8 Claims. (Cl. 24—68)

This invention relates to mechanism for adjusting the length of an article, such as a band forming a closed loop.

In the art of face-protective devices for welders, headgear of band type are commonly utilized to support and position face-protective shields or helmets relative to the faces of the wearers. Such a headgear ordinarily includes a headband of closed loop formation adapted to encircle and hug the head.

Various mechanisms have been developed heretofore for adjusting the length or head size of these headbands without disturbing the closed nature of the loop. For this purpose, the headband is of elongate strip formation having ends adapted to overlap and provided with respective gear racks in mutually spaced and opposing formation. The adjustment mechanism includes a pinion engaging both gear racks, so that rotation of the pinion in one direction by a conveniently accessible knob rigidly coupled thereto serves to lessen the extent of overlap of such band ends, thereby lengthening the headband, and rotation in the opposite direction serves to increase the extent of overlap, thereby shortening the headband.

Typical of such adjustment mechanisms are those shown in Bowers U.S. Patent Numbers 2,205,741 and 2,205,742, both issued June 25, 1940 and entitled "Adjustable Headband." There, different detent arrangements are employed in connection with the adjustment knob for maintaining the headband in any given adjusted position.

Our invention is concerned with significantly improving the Bowers mechanism shown in the above Patent No. 2,205,742.

A principal object of our invention is to provide, in mechanism of this type, a positive locking arrangement which absolutely precludes any inadvertent loss of adjustment, and which adapts the mechanism for production almost entirely from plastic material.

A feature in the achievement of this object is the incorporation of a spur gear in the knob arrangement and a corresponding ring gear in the headband casing which houses the mechanism, and, further, the coupling of adjustment knob to pinion with a spring interposed therebetween so that spur gear and ring gear are normally intermeshed to provide a positive lock against rotative movement by either the pinion or the adjustment knob and so that the knob may be temporarily displaced axially of the pinion to disengage such gears and permit headband adjustment in the usual manner.

Further objects and features of the invention will become apparent from the following detailed description of the presently preferred specific construction illustrated by way of example in the accompanying drawing.

In the drawing:

Fig. 1 represents a top plan view of a headband type of headgear for welding shields or helmets, the headband of same being adjustable in length by means of the mechanism of this invention;

Fig. 2, a fragmentary rear elevation of the headgear of Fig. 1;

Fig. 3, a horizontal section taken on the line 3—3 of Fig. 2 and drawn to a considerably enlarged scale;

Fig. 4, a similar view showing the knob pushed out of locked position for headband adjustment purposes;

Fig. 5, a perspective view of the several component parts of the mechanism in exploded relationship;

Fig. 6, a detail perspective view of the knob and locking gear assembly, looking toward the inside face thereof; and

Figs. 7 and 8, elevations of the mating faces, respectively, of component molded plastic parts of the knob and locking gear assembly of Fig. 6.

Referring to the drawing:

The headgear shown in Figs. 1 and 2 is adapted to fit on a welder's head and mount a face-protective shield or helmet. It comprises a headband **10** formed from an elongate strip of suitable material, such as a tough and flexible plastic, and having its opposite ends **10***a* and **10***b*, Figs. 3 and 4, configurated in well known manner as elongate gear racks. Such opposite ends are received and housed in mutually overlapping formation by an open-ended, flat, tubular casing **11** having an aperture **12** in its rear wall and located preferably centrally thereof.

The gear racks, see **13**, Figs. 3 and 4, are disposed in mutually spaced, confronting relationship, being preferably formed along respectively opposite margins of elongate slots (not shown as such) provided similarly in the respective ends **10***a* and **10***b* of the headband strip. A pinion **14** of the length adjustment mechanism of this invention is disposed within such slots in mesh with the gear racks which are disposed above and below. Rotation of such pinion in one direction will increase the overlapping relationship of the ends **10***a* and **10***b* of the headband strip, while rotation of the pinion in the opposite direction will decrease such overlapping relationship.

In this way, headband strip **10** forms a closed loop, whose length is adjustable to accommodate a variety of different head sizes. A transverse strip **15** is provided in the usual manner to extend over the crown of the wearer's head, and tubular projections **16** of cylindrical formation extend outwardly from the headband for pivotally receiving face-protective shield or helmet connecting means (not shown).

The length adjustment mechanism comprises a knob and spur gear assembly **17**, see particularly Fig. 6, secured to but axially movable along a shaft **18** to which pinion **14** is secured and which extends from such pinion toward aperture **12**. It is intended that turning of such knob and spur gear assembly effects turning of the pinion for headband length adjustment purposes, and, to this end, the shaft is splined as shown and snugly but slidably fits a similarly configurated receiving opening **19** provided in the knob portion **17—1** of such assembly. A screw **20** and interposed washer **21** serve to secure the assembly to shaft **18** without preventing axial movement thereof along such shaft toward pinion **14**.

For cooperation with spur gear portion **17—2** of the assembly **17** in positively locking the knob, spur gear, shaft, and pinion against rotation once a given headband length adjustment has been made, a ring gear **22** is rigidly secured to casing **11** at and in encircling relationship with aperture **12** and in concentric relationship with knob, spur gear, shaft, and pinion.

The knob and spur gear assembly **17** is normally urged away from pinion **14** and against washer **21** as a limit stop in order to place spur gear **17—2** in mesh with ring gear **22** and maintain positive locking of the adjustment mechanism. For this purpose, a coil spring **23** is interposed between pinion **14** and knob **17—1**, one end being received and retained by an annular recess **24** formed at the underside of knob **17—1** interiorly of spur gear **17—2** and the other end bearing against a washer

25 which protectively covers pinion 14. A second washer 26 is secured to the end of the shaft at the opposite side of pinion 14 for easing rotative movement of such shaft and pinion.

When it is desired to adjust the length of headband 10, it is only necessary to push knob 17—1 inwardly toward the headband. This disengages locking spur gear 17—2 from ring gear 22 and permits the knob, spur gear, shaft, and pinion to be turned in either direction. Upon release of the knob, knob and spur gear assembly 17 snaps back into locked position under spring tension.

This construction makes it possible to fabricate the major parts of the length adjustment mechanism from molded plastic material. Thus, ring gear 22 is advantageously integrally molded with casing 11 by providing an integral sleeve 11*a* for such casing extending outwardly therefrom in encircling relationship with aperture 12 and by molding the ring gear integrally with and interiorly of the sleeve, as shown.

Pinion 14, shaft 18, and washer 26 are advantageously integrally molded as a unit from plastic material, while knob and spur gear assembly 17 is molded from plastic material in two separate pieces 17—1 and 17—2, Figs. 7 and 8, respectively, which are frictionally secured together as in Fig. 6.

Knob portion 17—1 is molded with a cup-shaped hub 27 and overhanging rim 28 which define an annular recess 29 therebetween. Shaft-receiving aperture 19 is provided in the bottom of the hub.

Spur gear portion 17—2 is molded as a sleeve 30 with an internally projecting annular ring 31 as a spacer and with the spur gear proper projecting externally of the sleeve at one end thereof.

Sleeve 30 fits about hub 27, and a squared recess 32 formed at the opposite end of such sleeve mates with squared projections 33 molded externally of hub 27 so as to extend within annular recess 29. These mating projections and recess serve to rigidly lock spur gear portion 17—2 to knob portion 17—1 against rotation relative thereto.

In this arrangement of structure, the outer end of casing sleeve 11*a* telescopes into annular recess 29 and protectively houses the working parts of the mechanism.

It is preferred that a multiplicity of air-circulation holes 34 be provided through the inner wall of casing 11 to relieve body heat of the wearer of the headgear.

Whereas this invention is here illustrated and described with respect to a particular specific construction, it should be understood that various changes may be made by those skilled in the art without departing from the essential inventive concepts.

We claim:

1. Length adjustment mechanism for a device having elongate overlapping parts formed as respective gear racks disposed in mutually spaced, confronting relationship, said mechanism comprising a casing for receiving

and housing said overlapping parts, said casing being of open-ended tubular formation and having an aperture opening into its interior from the exterior thereof intermediate its length; a ring gear encircling the aperture and rigidly secured to the casing; a pinion within the casing in mesh with both said gear racks and having a shaft extending rigidly therefrom toward the aperture and concentric with the ring gear; a knob and spur gear assembly mounted concentrically on and engaging the shaft for rotating it and the pinion, the knob of said assembly being disposed externally of the casing at the aperture and being rigidly secured to the spur gear; resilient means normally urging said assembly so that the spur gear is brought into intermeshing engagement with the ring gear to lock said knob, spur gear, shaft, and pinion against rotation; and means retaining said assembly on the shaft, said assembly being slidable axially along the shaft against the urge of the resilient means for disengaging the spur gear from the ring gear and permitting rotation of said knob, spur gear, shaft, and pinion for length adjustment purposes.

2. The mechanism of claim 1, wherein the casing is provided with a sleeve encircling the aperture and projecting outwardly as a protective housing for the working parts.

3. The mechanism of claim 2, wherein the knob and spur gear assembly is annularly recessed interiorly of the knob and circumferentially of the spur gear to receive the outer end of the sleeve in telescopic relationship.

4. The mechanism of claim 3, wherein the entire casing is of integrally molded plastic material; and wherein the ring gear is of plastic material molded integrally with said casing.

5. The mechanism of claim 4, wherein the knob and spur gear assembly is of molded plastic material.

6. The mechanism of claim 5, wherein the knob is one molded part having a cup-shaped hub and the spur gear is another part of sleeve formation encompassing said hub and locked thereto.

7. The mechanism of claim 6, wherein the means retaining the knob and spur gear assembly on the shaft comprises a screw passed through the bottom of the hub and threaded into the other end of the shaft, the bottom of the hub being apertured to freely receive the shank of the screw.

8. The mechanism of claim 1, wherein the knob and spur gear assembly is annularly recessed interiorly of the spur gear and a washer is provided at the base of the shaft to protectively cover the spur gear; and wherein the resilient means is a coil spring having one end portion disposed in the annular recess of said assembly and the other end portion bearing against said washer.

No references cited.