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EXTERNALLY OPERATED HELMET HARNESS ADJUSTMENT REEL ASSEMBLY

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2 Sheets-Sheet 1

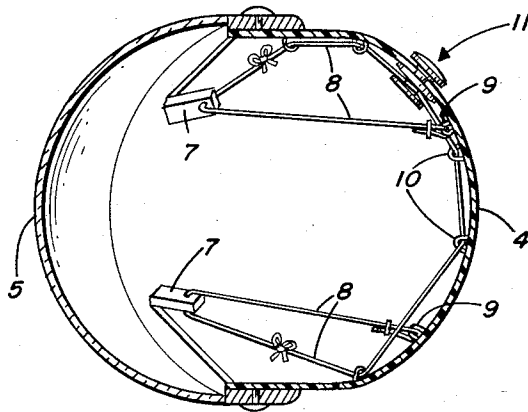


FIG. 2

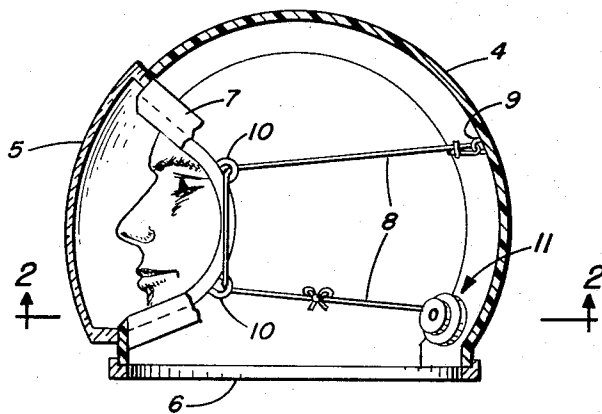


FIG. 1

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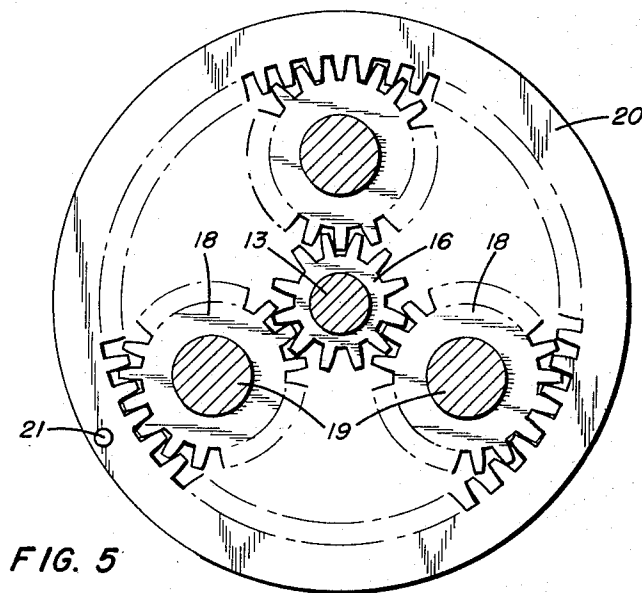
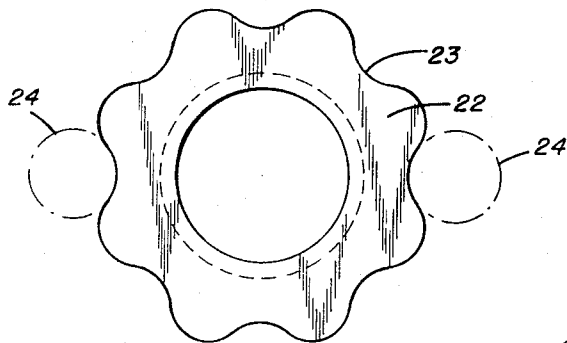
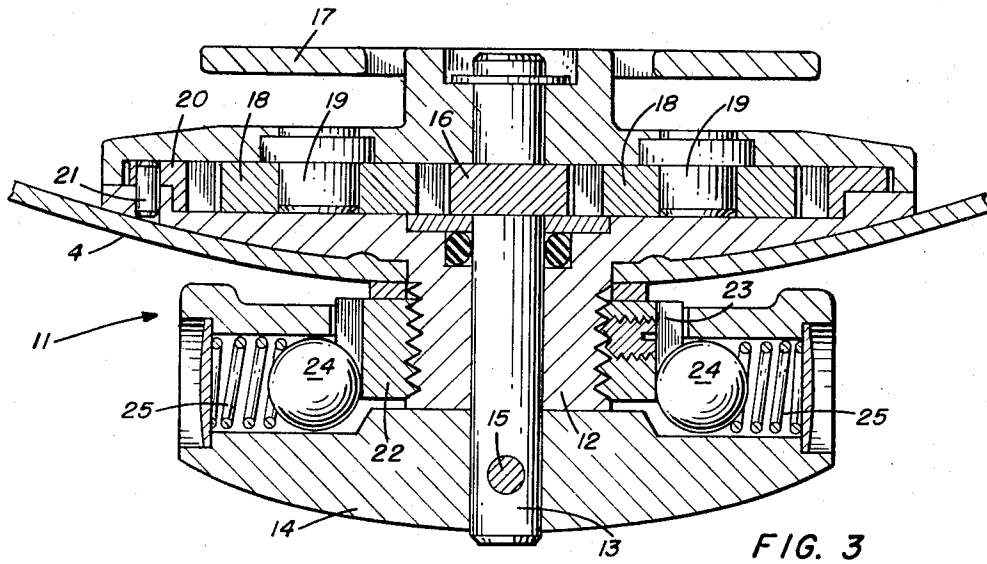
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**EXTERNALLY OPERATED HELMET HARNESS
ADJUSTMENT REEL ASSEMBLY**

Robert C. Wise, Stow, Ohio, and Melvin C. Case, Dover, Del., assignors, by mesne assignments, to the United States of America as represented by the Secretary of the Navy

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4 Claims. (Cl. 2-6)

This invention relates to helmets having face seals and more particularly to a reel assembly for adjusting these face seals.

Helmet assemblies for high altitude use by aviators and other individuals are generally made with rigid outer shells which fasten onto and place the interior of the helmet in communication with a pressurized high altitude suit. The helmet also includes a face seal which seals off the pressurized portion of the helmet and suit and allows the wearer's face to protrude into an area into which breathing oxygen is supplied. The helmets and the face seals incorporated therein are made in a considerable number of sizes, however, in order to fit each wearer exactly and to construct an efficient seal, it is necessary to incorporate into the helmet a means for adjusting the face seal so that it may be pulled tight against the wearer's face. Such a helmet construction is shown by U.S. Patent No. 3,130,415, entitled, "Helmet Assembly With Face Seal and Adjustment Means Therefor," by R. S. Colley, issued Apr. 28, 1964. The improved face seal adjustment reel assembly described herein is compatible with the design of the helmet in U.S. Patent No. 3,130,415 and similar helmets. The prior art devices have used face seal adjustment reels which are externally operated, but these have not proved entirely satisfactory under all conditions of service since they tended to be of cumbersome design and they depended upon the friction of the gearing as the only means to lock them into position. This meant that as the wearer moved about during his normal duties, the face seal could easily loosen, thus affecting the pressure control in the pressure suit and also the proper control of breathing oxygen in the other portion of the helmet.

The instant device is externally operated and is mounted on the periphery of the helmet. The reel portion is inside and parallel to the helmet shell to save space. The knob by which it is operated is provided with a locking means including a plurality of spring loaded cam follower balls and a cam with a sine wave periphery fixedly attached to the helmet. The interaction of balls and cam detents provides the locking action which prevents the reel from unwinding.

It is an object of the present invention to provide an improved face seal adjustment reel assembly for a helmet.

It is another object of the present invention to provide an externally operated helmet face seal adjustment reel which has a locking means to prevent the reel from unwinding.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevation view of a helmet assembly incorporating the invention;

FIG. 2 is a bottom section view of the helmet assembly of FIG. 1;

FIG. 3 is an enlarged view of the reel assembly;

FIG. 4 is a plan view of the locking cam; and

FIG. 5 is a plan view of the driving gear train.

The illustrative embodiment of a helmet assembly with which the present invention can be used is shown generally in FIGS. 1 and 2. The helmet comprises a rigid shell 4, a transparent helmet shield 5, and an attaching ring 6 by

means of which the helmet is attached to a high pressure suit, not shown. Mounted to the helmet 4 on the inside is a flexible face seal 7 which is adapted to fit snugly about the wearer's face to provide the seal between the pressurized portion of the helmet and that front portion of the helmet into which breathing oxygen is piped. Adjustment of the face seal 7 to suit each individual wearer of the helmet is accomplished by means of two adjustment cords 8 which are attached to opposite sides of the face seal. These cords 8 each have an upper portion which is fixedly attached to the inside of the helmet at point 9. The cords are then threaded through a plurality of cord guides 10, several of which are located on the face seal and several of which are attached on the inside periphery of the helmet, to guide the cord around the helmet to the adjustment means indicated generally at 11. Thus it is readily apparent that as the cords are adjusted by means of adjustment means 11, the length of the cords 8 will be varied and thus the position of face seal 7 can be altered.

This invention is directed particularly to the adjustment means 11 as shown in detail in FIGS. 3, 4 and 5. This adjustment means 11 is comprised of a housing 12 fixedly attached and protruding through the periphery of the helmet 4 advantageously in a position in the rear of the helmet where it is convenient for the wearer to reach the hand knob. Movably mounted for rotation in the housing 12 is a drive shaft 13 which has a knob 14 fixedly attached to it by a locking pin 15. This knob is external of the helmet shell 4. A sun gear 16 is fixedly attached on that portion of the shaft which is inside the helmet and a reel 17 is mounted on shaft 13 but is independently rotatable thereon. The driving gear cluster on the inside of the helmet comprises the aforementioned sun gear 16 mounted on drive shaft 13 and a plurality of planet gears 18 driven by sun gear 16 and interacting with a ring gear 20 which is fixedly fastened to the housing 12 by means of a dowel pin 21. The output to drive the reel 17 is taken from planet gears 18 by means of planet gear shafts 19 which are fixedly attached to rotate with the planet gears 18 and rotate loosely in but drive the reel 17. Therefore, as knob 14 is moved in either direction, sun gear 16 is driven by shaft 13 and the sun gear in turn, with the action of ring gear 20, causes the planet gears 18 to be driven and thus drive reel 17. Both of the cords 8 are attached to reel 17, being threaded around through helmet 4 by means of the guides 10. By driving reel 17 through the gear train, as described above, minute adjustment of the tension on cords 8 is possible. The application of power through the gears is very smooth by virtue of a planetary gear train which also provides an advantageous ratio of turns between the hand knob and the reel.

In order to provide a locking system for the reel adjustment assembly, there is provided a cam 22, as shown in FIG. 4, which is fixedly attached to the housing 12 external of the helmet and positioned such that the hand knob 14 encompasses it. This cam 22 is advantageously constructed with the periphery contoured in a sine wave configuration which provides a series of spaced detents 23 around the circumference. Knob 14 is provided with a plurality of cam follower balls 24 which are held in position by springs 25 in order that they may constantly engage cam 22 and through interaction with cam detents 23 provide locking of the reel assembly at any point.

In operation, the two cords 8 from the face seal 7 are attached to reel 17 in such a manner that when the reel is turned in one direction it tightens both cords and when turned in the other direction it loosens both cords. The wearer need only put the helmet on and then rotate the knob 14 in the proper direction to tighten up on cords 8 until the face seal 7 fits snugly about this face. Due

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to the ball and detent locking feature of the instant device, the reel is held locked in the set position but is easily tightened or loosened at any time by the mere turning of hand crank 14.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

We claim:

1. In a helmet assembly comprising:

a rigid shell adapted to receive the head of an individual and having a transparent portion on the one side thereof, means securing said face seal means to the interior of the shell adjacent the transparent portion and including a part engageable about the periphery of the individual's face; and flexible inextensible tension means interconnecting said face seal means and portions of said helmet shell remote from said face seal means;

the improvement comprising adjusting means adapted for mounting on said helmet shell at a location remote from said face seal means, said adjusting means including positive locking means for positively locking said adjusting means in any position; said adjusting means further including

a hand knob;

a shaft driven by said hand knob;

a sun gear driven by said shaft and mounted thereon;

a plurality of planet gears adjacent to, interacting with, and driven by said sun gear, each of said planet gears having a planet gear shaft fixedly attached thereto;

a ring gear fixedly attached to said helmet shell and disposed about said planet gears to interacting communication therewith; and

a reel mounted for free rotation on said drive shaft, said tension means being wound upon and adjusted by the action of said reel, said reel being in driving communication with said planet gear shafts and being driven in rotation thereby, whereby manual action of the hand knob results in rotation of the reel through the gear drive train and thus adjustment of the position of the face seal.

2. The helmet assembly as defined in claim 1 in which said positive locking means comprises

a cam fixedly mounted on said helmet shell, said cam having a plurality of detents therein; and

spring-loaded cam followers on said adjusting means and cooperating with said cam, whereby said spring-loaded cam followers interact with said cam detents to positively lock said adjusting means in the set position.

3. In combination with a helmet having a rigid shell with a transparent portion and face seal means disposed adjacent said transparent portion, adjustment means for adjusting the position of said face seal means comprising:

flexible inextensible tension means interconnecting said face seal means and portions of said rigid shell opposite said transparent portion;

a hand knob;

a shaft driven by said hand knob;

a sun gear driven by said shaft and mounted thereon;

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a plurality of planet gears adjacent to, interacting with, and driven by said sun gear, each of said planet gears having a planet gear shaft fixedly attached thereto;

a ring gear fixedly attached to said helmet shell and disposed about said planet gears in interacting communication therewith;

a reel mounted for free rotation on said drive shaft, said tension means being wound upon and adjusted by the action of said reel, said reel being in driving communication with said planet gear shafts and being driven in rotation thereby, whereby manual action of the hand knob results in rotation of the reel and thus adjustment of the position of the face seal;

a cam fixedly mounted on said helmet shell, said cam having a plurality of detents thereon; and

spring-loaded cam followers on said adjusting means and cooperating with said cam, whereby spring-loaded cam followers interact with said cam detents to positively lock said adjusting means in the set position.

4. A mechanism for adjusting the length of flexible members attached thereto comprising

a hand knob;

a shaft driven by said hand knob;

a sun gear driven by said shaft and mounted thereon;

a plurality of planet gears adjacent to, interacting with, and driven by said sun gear, each of said planet gears having a planet gear shaft fixedly attached thereto;

a ring gear fixed against movement with relation to said sun gear and said planet gears and disposed about and interacting with said planet gears; and

a reel mounted on said drive shaft and freely rotatable thereon, said flexible members being secured and wound upon said reel and adjusted by said reel, said reel being in driving communication and interaction with said planet gear shafts and being driven in rotation thereby, whereby rotation of the hand knob results in rotation of the reel and thus adjustment of the lengths of said flexible members;

a cam fixedly mounted with relation to said shaft driven by said hand knob, said cam having a plurality of detents thereon; and

spring-loaded cam followers on said hand knob and cooperating with said cam, whereby said spring-loaded cam followers interact with said cam detents to positively lock the adjusting means in the set position.

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