Aug. 13, 1957 W. S. FINKEN 2,802,212

HEADGEAR SUPPORTING STRUCTURE

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Fig. 1.

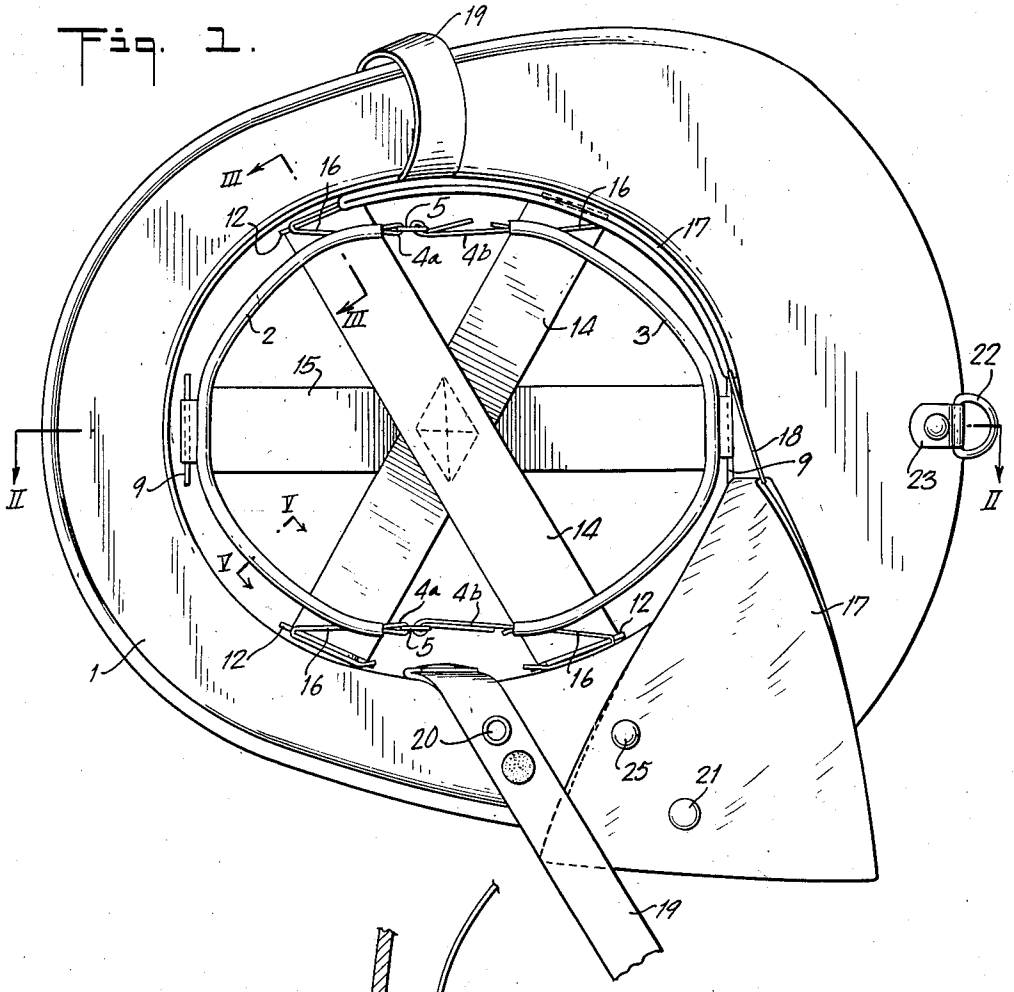


Fig. 6.

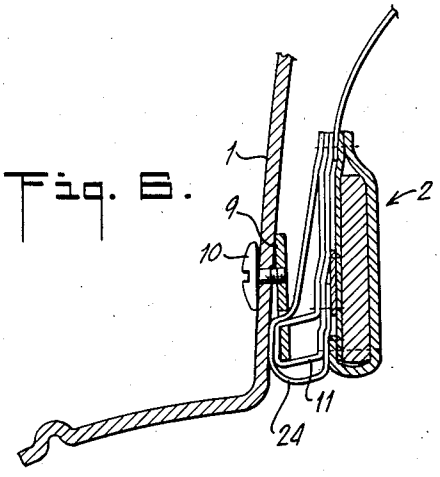
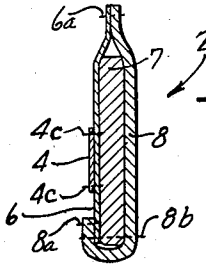


Fig. 5.



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HEADGEAR SUPPORTING STRUCTURE

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Fig. 2.

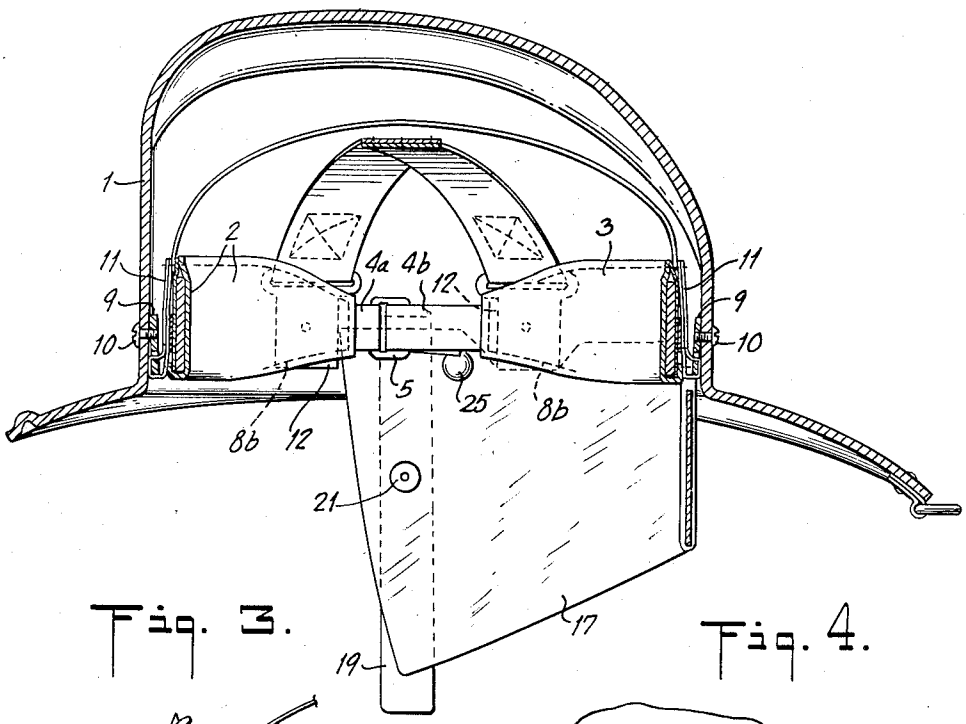


Fig. 3.

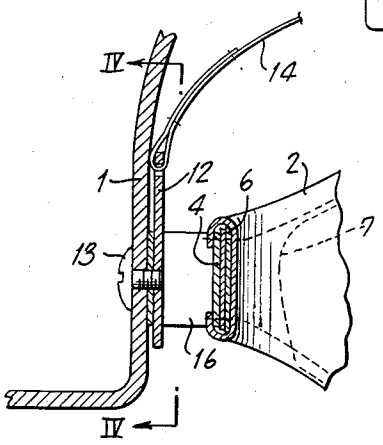
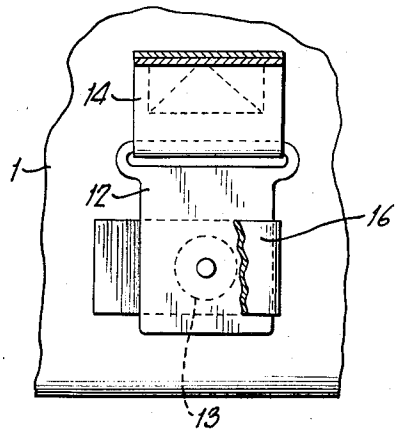


Fig. 4.



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HEADGEAR SUPPORTING STRUCTURE

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Fig. 7.

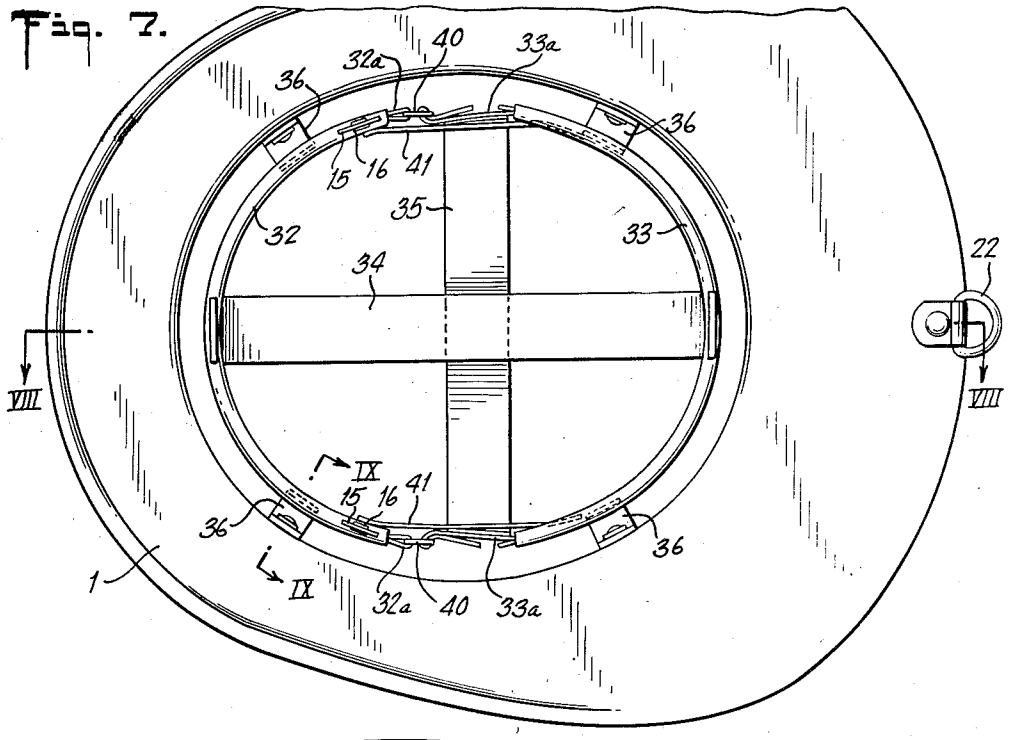
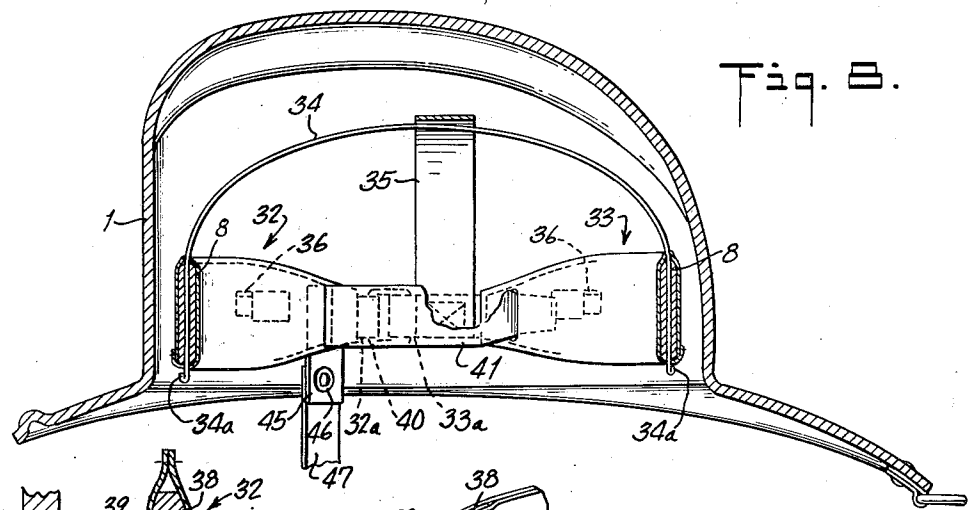


Fig. 8.



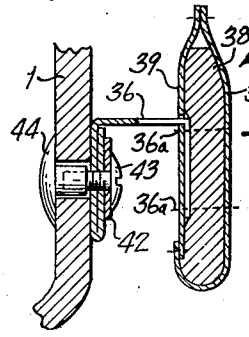


Fig. 9.

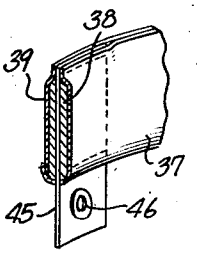


Fig. 10.

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2,802,212

HEADGEAR SUPPORTING STRUCTURE

Walter S. Finken, Brooklyn, N. Y., assignor to Leonard P. Frieder, Great Neck, N. Y.

Application May 10, 1954, Serial No. 428,492

3 Claims. (Cl. 2—3)

This invention relates to headgear structures and particularly to riggings for supporting safety helmets on the heads of the wearers.

Certain aspects of this invention are improvements on the safety helmets and supporting riggings therefor described and claimed in the copending U. S. patent applications of Leonard P. Frieder and Walter S. Finken, Serial No. 201,904, filed December 21, 1950, entitled, "Headgear Structure," now Patent No. 2,739,309, dated March 27, 1956, and No. 292,824, filed June 11, 1952, also entitled "Headgear Structure," now Patent No. 2,739,310 dated March 27, 1956.

Such safety helmets consist of an outer shell formed of a light, rigid plastic material and supported on the head of the wearer by means of a rigging which holds the shell spaced from the wearer's head, so that blows on the helmet shell are transmitted to the head only through the rigging, which is built of tapes or straps of flexible material.

The headgear supporting riggings described and claimed in said copending applications include front and rear headband elements, each of which is generally semi-circular. The two headband elements cooperate to form a complete headband encircling the wearer's head. Those riggings also include a plurality of head straps connected at their ends to the headband at diametrically opposite points and adapted to extend over the head of the wearer. The riggings of said copending applications are connected to the helmet by the use of loops of flexible material extending between the headband and the helmet at spaced points and also by extending the ends of the headband elements beyond the headband proper to the helmet and attaching those ends firmly to the helmet.

In the use of such helmets, particularly where the wearer of the helmet is a person, e. g., a fireman, who works at a hazardous occupation, it is fairly common for the helmet shell to be chipped or cracked as a result of external blows, while the rigging inside still remains in good condition. It has therefore been suggested to provide a rigging for such a helmet which is readily removable from the shell so that it may be inserted in a new shell.

It has also been proposed, for example, in the copending applications of Frieder and Finken mentioned above, to include in the rigging a headband of adjustable size so that the same helmet and rigging structure may be used for individuals having a wide range of head sizes.

In the helmet riggings of the prior art, these riggings which are removable and replaceable in new shells have not in most cases been adjustable as to head size. Where an adjustment as to head size has been incorporated, the adjustment mechanism has usually been so constructed that its setting is lost when the rigging is removed from the shell, and the mounting of such a rigging in a new shell requires readjustment of the head size.

In the prior art headgears, this removal of the riggings has been accomplished by manipulation of elements on

the outside of the shell. Such elements are subject to accidental contact with external objects which may result in a loosening of the rigging.

In the copending application, Serial No. 201,904, mentioned above, there is disclosed a rigging including a headband connected to the shell structure by inelastic elements. In such an arrangement, a blow on one side of the shell structure is transmitted through the rigid shell to the opposite side, where it acts through the inelastic elements to pull the headband and the head away from the side on which the blow was struck. While such an arrangement is completely effective to prevent contact between the shell and the wearer's head, it sometimes results in an uncomfortably high rate of acceleration of the wearer's head, when a blow is struck on the helmet.

Where a chin strap is used in connection with such a headgear, it has been common to connect the ends of the chin strap to the helmet shell.

The rigging of the present invention is particularly intended to improve the prior art riggings with respect to the comfort of the wearer, and with respect to safety. It is also intended to improve such riggins with respect to economy of materials and ease of manufacture.

An object of the invention is to provide an improved and simplified headgear supporting rigging of the type described. Another object is to provide a rigging of the type described having an improved headband structure. A further object is to provide a more comfortable headband structure.

Another object is to provide an improved headband structure which is generally tubular and includes an internal pad arrangement.

Another object is to provide an improved headband structure comprising front and rear headband elements connected at their ends by straps and length adjusting buckles, and means for protecting the wearer's head against contact with the buckles.

Another object is to provide an improved rigging of the type described including a headband and a chin strap attached at its ends to the headband.

Another object is to provide an improved rigging of the type described including a headband and improved connecting means extending betwen the headband and the rigid shell of the helmet.

An object of the present invention is to provide an improved rigging for a safety helmet, which rigging is removable from the helmet shell for the purpose of replacement in another shell.

Another object is to provide a rigging of the type described in which the adjustment of the headband size is not lost during the removal and replacement of the rigging. A further object is to provide such a rigging which is detachable only from the inside of the helmet.

Another object is to provide a rigging of the type described which is improved from the standpoint of the wearer's comfort.

Another object is to provide, in a headgear rigging of the type described, improved, simple, compact and inexpensive mechanism for adjusting the headband size.

Another object is to provide a headgear supporting rigging of the type described including improved shock absorbing mechanism.

The foregoing and other objects of the invention are attained in the supporting riggings described herein by providing a headband including front and rear generally semi-circular elements which are tubular and which enclose resilient pads of sponge rubber or the like. The ends of the head band elements are connected by straps and buckles for adjusting the size of the headband.

In one modification of the invention described herein,

this headband structure is attached to the helmet shell by means of elastic loops at the front and rear, extending between the headband and anchor plates removably fastened to the shell, and by means of elastic strap members which extend tangentially to the headband adjacent the opposite ends of the two adjusting mechanisms, and which are also attached to anchor plates removably fastened to the shell, so that the adjusting mechanism is held in tension at all times when the rigging is mounted in the helmet. Furthermore, when the size of the headband is properly adjusted, then the tension bands tend to hold the buckles away from compressive contact with the sides of the wearer's head. The rigging also includes three head straps extending over the top of the wearer's head. One headstrap extends from front to rear and is attached at its ends to the headbands. Two other headstraps extend diagonally from one side to the other of the helmet shell crossing each other at the center of the shell. The ends of these two headstraps are attached to the same anchor plates by which the tension bands supporting the headband are connected to the helmet shell. The entire rigging may be removed from the shell simply by removing all the anchor plates, so that no disturbance of the settings of the buckles is required.

In another modification of the invention described herein, the headband is connected to the helmet shell by means of single straps having one end anchored to the tubular headband, and the other end removably anchored to the shell by means of screw rivets, with the screw head on the inside of the shell. Between each strap and buckle assembly and the head of the wearer there is provided a guard which protects the head against contact with the straps or buckles. The rigging illustrated is provided with chin strap connections mounted on the headband itself. Head straps are provided extending diametrically across the rigging. The fore and aft headstrap is provided with simplified connections between its ends and the head band element.

Other objects and advantages of the invention will become apparent from a consideration of the following specification and claims, taken together with the accompanying drawings.

In the drawings:

Fig. 1 is a bottom plan view of one form of helmet embodying the invention, with certain detachable parts disconnected and moved away from their normal positions;

Fig. 2 is a sectional view taken on the line II—II of Fig. 1;

Fig. 3 is a sectional view taken on the line III—III of Fig. 1;

Fig. 4 is an elevational view taken on the line IV—IV of Fig. 3;

Fig. 5 is a fragmentary sectional view, taken on the line V—V of Fig. 1, on an enlarged scale;

Fig. 6 is a fragmentary sectional view, similar to a portion of Fig. 2, but on a larger scale, illustrating a modified form of construction.

Fig. 7 is a bottom plan view of a fireman's helmet provided with a modified form of rigging constructed in accordance with the invention;

Fig. 8 is a vertically sectional view taken on the line VIII—VIII of Fig. 7;

Fig. 9 is a fragmentary sectional view taken on the line IX—IX of Fig. 7, on an enlarged scale; and

Fig. 10 is a perspective view, with certain parts shown in section, and illustrating the attachment of the chin strap to the headband.

Figs. 1 to 5

There is shown in these figures a helmet including a shell **1** having a contour which is more or less conventional in the case of firemen's helmets. Inside the helmet **1** there is provided a supporting rigging which includes a front headband element **2** and a rear headband element **3**.

A detailed cross-sectional view of the headband element **2** appears in Fig. 5. The structural details of the headband element **3** are similar, with exceptions described in detail below. The headband element **2** comprises an elongated tape **4** which extends in a semicircle about halfway around the headgear and is formed at its opposite ends with loops **4***a* to receive adjusting links or buckles **5**, of conventional construction. There is mounted on the inside of the tape **4** a pad structure, best seen in Fig. 5 and including an outside cover **6** of woven material, a pad **7** which may be of sponge rubber and an inside cover **8** of some material which will be comfortable to the wearer, for example, soft leather. The tape **4** is stitched to the outside cover **6** throughout the length of the latter, as shown at **4***c*. The outside cover **6** and inside cover **8** are stitched together along their upper edge, as shown at **6***a*. The lower edge of the inside cover **8** is folded over the bottom of pad **7** and outside cover **6**, and is stitched to the outside cover throughout its length, as shown at **8***a*. Near the ends of the covers, another row of stitching **8***b* holds them and pad **7** together. This row of stitching **8***b* is omitted near the centers of the headband elements to increase the comfort of the wearer.

The pad **7** is somewhat shorter than the covers **6** and **8**, as shown in Fig. 3. The tape **4** on the rear headband element **3** has no loops at its ends, but is instead provided with extensions **4***b* adapted for insertion through openings in the links **5**. At least one opening in each link is provided with teeth for engaging the tape extension **4***b* to hold it against slipping, in a manner well known in the art. The size of the headband may be adjusted by sliding either extension **4***b* through its buckle **5**. By utilizing both extensions **4***b* and both buckles **5**, the size of the headband may be adjusted without disturbing the centering of the headband with respect to the shell.

Mounted on the inside of the helmet shell **1** at the front and rear thereof are a pair of anchor plates **9**. As best seen in Fig. 2, the anchor plates **9** are mounted by means of screws **10**, whose heads are accessible from outside the shell. The anchor plates **9** are provided with apertures to receive woven loops **11**, of elastic material, which are stitched to the headband elements **2** and **3**. The unstressed lengths of the loops **11** are such that the headband is normally held closely adjacent the shell **1** as illustrated in Fig. 2.

Four anchor plates **12** are attached to the shell **1** at the ends of two diagonal diameters of the shell. The anchor plates **12** are attached to the shell **1** by means of screws **13**, as illustrated in Fig. 3. Near its upper end, each anchor plate **12** is provided with an aperture to receive a loop formed on one end of a diagonal head strap **14**. The two diagonal head straps are stitched together where they cross at the center of the helmet. Another head strap **15** extends from front to rear of the helmet and is stitched at its ends to the headband elements **2** and **3**.

Near each end of each of the headband elements **2** and **3** there is attached, as by stitching (Fig. 3), an elastic band or strap **16** which extends in a generally tangential direction from the headband toward the shell **1** and passes behind the adjacent anchor plate **12**, being clamped between that anchor and the shell **1**. The four elastic bands **16** cooperate to maintain the band length adjusting mechanism in tension as long as the rigging is in place in the shell. This holds the adjustment mechanism against slipping. Furthermore, when the size of the headband is properly set, this tension arrangement tends to hold the buckles **5** and the tape ends **4***a* and **4***b* away from the wearer's head, thereby avoiding discomfort due to compressive engagement of these parts with the head.

It may be seen that the entire rigging may be removed from the helmet shell by taking out the screws **10** and **13**, and that after such removal the rigging may be replaced in a new shell. Furthermore, it should be ap-

parent that during such removal and replacement the setting of the headband adjustment is not disturbed.

There is mounted on the inside of the rear portion of the helmet a neck shield consisting of two cloth wings **17** connected by an elastic band **18**. This shield may be removably attached to the helmet by any suitable means, such as conventional snap connectors **25**.

There are provided at the sides of the helmet a pair of chin straps **19** attached at their ends to the helmet shell and provided with snap connectors **20** for attachment to snap connectors **21** on the neck shield wings **17**. The chin straps **19** may be provided with the usual length adjusting and disconnecting mechanism (not shown).

The helmet shell is provided, adjacent the rearmost end, with a link **22**, pivotally attached to a plate **23** which is riveted to the shell **1**. The link **22** serves as a means for hanging the helmet on a hook when not in use.

Fig. 6

This figure illustrates a modified form of construction with respect to the connection between the front and rear headband elements and the shell **1**. Those parts in Fig. 6 which are the same as in Fig. 2 have been given the same reference numerals.

In Fig. 6, the headband element **2** is connected to the anchor plate **9** by means of an elastic loop **11** which may be the same as the elastic loop **11** of Fig. 2 and also by a parallel loop **24** of inelastic material. The loop **24** limits the maximum distance by which the headband element **2** can be separated from shell **1** as a result of a blow. The loop **24** at the front of the shell is effective to prevent contact between the rear of the shell and the wearer's head. Specifically, suppose that a forwardly directed blow is received on the rear of the helmet. It drives the shell forward, while the wearer's head and the rigging remain stationary. The elastic loop **11** stretches, and as it stretches, the rear of the helmet shell comes closer to the wearer's head. Before the shell can touch the head, however, the loop **11** stretches until it is the same length as inelastic loop **24**. Loop **24** then stops further separation of the shell from the front of the head, and thereby prevents the rear of the shell from approaching the head any closer. Similarly, the loop **24** at the rear of the shell prevents contact between the front of the shell and the wearer's head. Loops **24** will come into play only under extreme conditions as when a severe blow is applied to the exterior of the shell.

Figs. 7 to 10

Those parts in these figures which are similar to their counterparts in Figs. 1–5 have been given the same reference numerals and will not be further described.

The headgear supporting rigging of these figures includes a forward headband element **32**, a rear headband element **33**, headstraps **34** and **35** and four connecting straps **36** which extend between the headband and the shell **1**.

Each of the headband elements **32** and **33** comprises, as is best seen in Fig. 9, an inner cover **37** which is adapted to contact the head of the wearer and is formed of material such as soft leather which will be comfortable to the wearer. Each headband element also comprises a pad **38** of suitable compressible material such as sponge rubber, and an outer cover **39**, which may be of any suitable woven fabric.

Attached to each end of the front headband element **32** is a loop **32*a***, which receives one end of a link or buckle **40** of conventional form. Attached to each end of the rear headband element **33**, is an extending strap **33*a*** which passes through one or more apertures in the buckle **40**. One of the apertures in the buckle **40** is provided with teeth (not shown), in a well known manner, to prevent slipping of the strap **33*a***. Fastened to each end of the forward headband element **32** on the inner side thereof and extending rearwardly is a guard structure **41**, which lies along the inside of loop **32*a***, buckle **40** and straps **33*a*** and has its rear end projecting through a suitable aperture formed in the inner cover **37** of the rear headband element **33**. The rear end of the guard **41** is not fastened to the headband element **33**, but is free to slide therein as required by changes in the adjustment of the head size by means of the straps **33*a*** and buckles **40**. The guards **41** are preferably constructed of the same soft material as the inner covers **37** of the headband elements.

The fore and aft headstraps **34** is attached at its ends to the headband elements **32** and **33**. Attachment is best shown in Fig. 8. The headband elements **32** and **33** are provided with central apertures extending vertically through the pads **38** and at their lower ends through the covers **37**. The headstrap **34** is provided at its ends with folded hems **34*a***, which are thicker than the apertures in the headband elements, and prevent the headstrap from sliding through those apertures.

The lateral headstrap **35** is stitched at its ends to the strap extensions **33*a***, as best seen in Fig. 8.

The rigging including the headband structure and the headstraps is mounted on the helmet shell **1** by means of four connecting straps **36**, one of which is shown in detail in Fig. 9. The inner end of strap **36** extends through a suitable aperture in the outer cover **39** of the headband element and is stitched to that outer cover **39** at spaced localities, as indicated at **36*a***. The outer end of strap **36** is attached to the helmet shell **1**, having a folded hem clamped between a washer **42** and the shell **1**. The washer **42** is held in place by means of a screw **43** cooperating with a screw rivet **44**. The straps **36** may be either elastic or inelastic. The advantages of making them elastic are explained in connection with Fig. 1.

By removing all the screws **43**, the entire rigging may be removed from the helmet shell and transferred to a different helmet shell. Such a transfer of the rigging is commonly desirable when the helmet shell becomes cracked or chipped as a result of blows or impacts. Note that all the screws **43** are located on the inside of the helmet shell, where they are not subject to contact with external objects which might loosen them.

Fig. 10 illustrates an arrangement for connecting a chin strap tab **45** to the headband element **32**. The tab **45** extends through suitable apertures in the headband cover **37** and in the pad **38**, the tab, cover and pad being stitched together at the upper and lower edges of the headband element **32**. The tab **45** is provided with a snap fastener **46**, by which it may be attached to a suitable chin strap structure **47** (Fig. 8).

By mounting the chin strap on the headband rather than on the helmet shell, shocks or impacts applied to the shell are not transmitted to the wearer's face and chin through the chin straps but are instead absorbed in the headband and headstraps. The comfort of the wearer is thereby greatly increased.

While I have shown and described certain preferred embodiments of my invention, other modifications thereof will readily occur to those skilled in the art, and I therefore intend my invention to be limited only by the appended claims.

I claim:

1. A headgear comprising an outer shell, means forming a headband spaced inwardly of the shell and adapted to encircle closely the head of a wearer, flexible spacer means connecting said headband means to the shell, said headband means comprising inner and outer covers of sheet material, said covers being disposed vertically and attached to each other adjacent their top and bottom edges, a pad of resilient material enclosed between said covers, a chin strap member, said covers and said pad having vertically aligned central apertures adapted to receive an end portion of said chin strap member, said chin strap member extending from below through said

apertures, and stitching means fastening said chin strap member to said headband.

2. A headgear comprising an outer shell, means forming a headband spaced inwardly of the shell and adapted to encircle closely the head of a wearer, flexible spacer means connecting said headband means to the shell, said headband means comprising inner and outer covers of sheet material, said covers being disposed vertically and attached to each other adjacent their top and bottom edges, a pad of resilient material enclosed between said covers, said flexible spacer means comprising a plurality of elongated straps spaced around said shell, and extending substantially radially between the shell and the headband means, means attaching the outer ends of the straps to the shell, said outer cover being slotted to receive the inner ends of the straps, and stitching means fastening said inner ends to said outer cover.

3. A headgear comprising an outer shell, means forming a headband spaced inwardly of the shell and adapted to encircle closely the head of a wearer, flexible spacer means connecting said headband means to the shell, said headband means including end portions movable toward and away from each other to vary the size of the headband, a buckle fixed to one of said end portions and adapted to receive and adjustably hold the other end portion so that the size of the headband may be fixed, and an elongated guard member of flexible sheet material

attached at one end to said one end portion of the head-engaging side thereof and extending along and beyond the side of the buckle nearest the wearer's head, to protect the head against contact with the buckle, a portion of said headband adjacent said other end portion being hollow, said hollow portion having a slot in its head-engaging side to receive the free end of said elongated guard member.

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