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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

W. G. HOLDINGS, LLC; a California Limited Liability Company; CARSAR, LLC, a California Limited Liability Company; and ASPEN MEDICAL PRODUCTS, INC., a California Corporation,

Plaintiffs,

vs.

OPTEC USA INC, a Georgia corporation, and DOES 1 through 10, inclusive,

Defendants.

Case No. SACV14-01142 JVS (ANx)

COMPLAINT FOR INJUNCTION AND DAMAGES FOR PATENT INFRINGEMENT

DEMAND FOR JURY TRIAL

Plaintiffs W. G. Holdings, LLC, Carsar, LLC and Aspen Medical Products, Inc. (collectively, "Plaintiffs"), for their Complaint against defendant Optec USA Inc. ("Optec"), and DOES 1 through 10, inclusive (collectively, "Defendants"), allege as follows:

JURISDICTION AND VENUE

1. This is an action involving claims of patent infringement under Title 35, United States Code. This Court has jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

2. Venue is proper with this Court pursuant to 28 U.S.C. §§ 1400 and 1391(c). On information and belief, Defendants reside in this judicial district because, among other things, they are subject to personal jurisdiction within this judicial district, and Defendants have committed acts of infringement and have a regular and established place of business in this judicial district.

THE PARTIES

3. W. G. Holdings, LLC is a California Limited Liability Company with a principal place of business at 6481 Oak Canyon, Irvine, California.

4. Carsar, LLC is a California Limited Liability Company with a principal place of business at 6481 Oak Canyon, Irvine, California.

5. Aspen Medical Products, Inc. ("Aspen") is a California corporation with its principal place of business at 6481 Oak Canyon, Irvine, California.

6. On information and belief, Optec USA Inc. ("Optec") is a Georgia corporation, with a principal place of business at 975 Progress Circle, Lawrenceville, Georgia 30043-4644. On information and belief, Optec has made, used, sold and/or offered to sell, including in this judicial district, the products that are alleged to infringe Plaintiffs' patents discussed below. Optec also operates a website at www.optecusa.com at which it advertises the products that are alleged to infringe Plaintiffs' patents, and from which one can order such products.

7. The true names and capacities, whether individual, corporate, associate or otherwise, of defendants DOES 1 through 10, inclusive, are unknown to Plaintiffs, which therefore sues said defendants by such fictitious names. Plaintiffs will seek leave of this Court to amend this Complaint to include their proper names and capacities when they have been ascertained. Plaintiffs are informed and believe, and based thereon allege, that each of the fictitiously named defendants participated in and is in some manner responsible for the acts described in this Complaint and the damage resulting therefrom.

8. Plaintiffs allege on information and belief that each of the defendants

named herein as Does 1 through 10, inclusive, performed, participated in, or abetted in some manner, the acts alleged herein, proximately caused the damages alleged hereinbelow, and are liable to Plaintiffs for the damages and relief sought herein.

9. Plaintiffs allege on information and belief that, in performing the acts and omissions alleged herein, and at all times relevant hereto, each of the defendants was the agent and employee of each of the other defendants and was at all times acting within the course and scope of such agency and employment with the knowledge and approval of each of the other defendants.

ASPEN'S BUSINESS

10. Aspen is a leader in the design, development and marketing of upper and lower spinal orthotics. Aspen's products are sold throughout the United States and abroad. The management team and employees of Aspen have for more than twenty years introduced a continuous flow of pioneering and successful spinal bracing products. As a developer and designer of innovative products, Aspen has a robust intellectual property portfolio that protects its innovations, designs and brands.

THE PATENTS AT ISSUE

11. The patents that are the subject of this action are United States patent no 7,141,031, entitled "Cervical Collar with End-Supported Chin Strap" (the "'031 Patent") and patent no. 7,674,234, entitled "Cervical Collar with Geared Adjustment" (the "'234 Patent"). Plaintiff W. G. Holdings, LLC owns the '031 Patent. Plaintiff Carsar, LLC owns the '234 Patent. Plaintiff Aspen is the exclusive licensee to the '031 and '234 Patents. A true and correct copy of the '031 Patent is attached as **Exhibit "A".** A true and correct copy of the '234 Patent is attached as **Exhibit "B".**

OPTEC 'S INFRINGEMENT

12. Recently, it has come to Plaintiffs' attention that Optec is making, using, offering to sell, selling and/or importing into the United States, including in

this judicial district, a product called the Optec ProGlide Cervical Collar ("the Optec Collar"), which infringes one or more claims of the '031 Patent and the '234 Patent.

FIRST CLAIM FOR RELIEF

(Patent Infringement – '031 Patent)

13. Plaintiffs reallege each and every allegation set forth in paragraphs 1 through 12, inclusive, and incorporate them herein by this reference.

14. Defendants make, use, sell, offer to sale, and/or import into the United States products that meet each and every element of one or more claims of the '031 Patent. As such, Defendants have infringed and are infringing the '031 Patent.

15. On information and belief, Defendants have had actual or constructive knowledge of the '031 Patent before and during their infringement of the '031 Patent. On information and belief, Defendants' infringement of the '031 Patent has been and/or will continue to be willful, wanton and deliberate with full knowledge and awareness of Plaintiffs' patent rights.

16. Plaintiffs have been damaged in an amount to be determined at trial, but which is no less than a reasonable royalty, and irreparably injured by Defendants' infringing activities. Plaintiffs will continue to be so damaged and irreparably injured unless such infringing activities are enjoined by this Court.

17. Moreover, in light of the willful nature of Defendants' conduct, this case should be deemed "exceptional" under the Patent Laws. As a result, in addition to damages, Plaintiffs are entitled to enhanced damages and their attorneys' fees and costs incurred herein.

SECOND CLAIM FOR RELIEF

(Patent Infringement – '234 Patent)

18. Plaintiffs reallege each and every allegation set forth in paragraphs 1 through 12, inclusive, and incorporate them herein by this reference.

19. Defendants make, use, sell, offer to sale, and/or import into the United States products that meet each and every element of one or more claims of the '234

Patent. As such, Defendants have infringed and are infringing the '234 Patent.

20. On information and belief, Defendants have had actual or constructive knowledge of the '234 Patent before and during their infringement of the '234 Patent. On information and belief, Defendants' infringement of the '234 Patent has been and/or will continue to be willful, wanton and deliberate with full knowledge and awareness of Plaintiffs' patent rights.

21. Plaintiffs have been damaged in an amount to be determined at trial, but which is no less than a reasonable royalty, and irreparably injured by Defendants' infringing activities. Plaintiffs will continue to be so damaged and irreparably injured unless such infringing activities are enjoined by this Court.

22. Moreover, in light of the willful nature of Defendants' conduct, this case should be deemed "exceptional" under the Patent Laws. As a result, in addition to damages, Plaintiffs are entitled to enhanced damages and their attorneys' fees and costs incurred herein.

PRAYER FOR RELIEF

WHEREFORE, Plaintiffs pray for judgment against Defendants as follows:

1. That Defendants, their officers, directors, agents, servants, employees, and all persons and entities in active concert or participation with them, or any of them, be preliminarily and permanently enjoined and restrained from further infringement of the '031 Patent and the '234 Patent;

2. A judgment by the Court that Defendants have infringed and are infringing the '031 Patent and the '234 Patent;

3. An award of damages for infringement of the '031 Patent and the '234 Patent, together with prejudgment interest and costs, said damages to be trebled by reason of the intentional and willful nature of Defendants' infringement, as provided by 35 U.S.C. § 284;

4. A determination that this case is "exceptional" under 35 U.S.C. § 285, and an award of Plaintiff's reasonable attorneys' fees;

5. That any monetary award include pre- and post-judgment interest at the highest rate allowed by law;

6. For costs of suit; and

7. For such other and further relief as the Court may deem just and proper.

Dated: July 21, 2014

RUTAN & TUCKER, LLP
RONALD P. OINES
THOMAS C. RICHARDSON

By: _____
Ronald P. Oines
Attorneys for Plaintiffs W. G. HOLDINGS, LLC, CARSAR, LLC and ASPEN MEDICAL PRODUCTS, INC.

DEMAND FOR JURY TRIAL

Pursuant to Local Rule 38-1 of the Local Rules of the United States District Court for the Central District of California, Plaintiffs hereby demand a jury trial in this action.

Dated: July 21, 2014

RUTAN & TUCKER, LLP
RONALD P. OINES
THOMAS C. RICHARDSON

By: _____
Ronald P. Oines
Attorneys for Plaintiffs W. G. HOLDINGS, LLC, CARSAR, LLC and ASPEN MEDICAL PRODUCTS, INC.

US007141031B2

(12) **United States Patent**
Garth et al.

(10) **Patent No.: US 7,141,031 B2**
(45) **Date of Patent: Nov. 28, 2006**

(54) **CERVICAL COLLAR WITH END-SUPPORTED CHIN STRAP**

(75) Inventors: **Geoffrey Garth**, Long Beach, CA (US); **Charles Patterson**, Long Beach, CA (US)

(73) Assignee: **W. G. Holdings, LLC.**, Long Beach, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 189 days.

(21) Appl. No.: **10/444,201**

(22) Filed: **May 23, 2003**

(65) **Prior Publication Data**

US 2004/0176713 A1 Sep. 9, 2004

Related U.S. Application Data

(60) Provisional application No. 60/382,937, filed on May 24, 2002.

(51) **Int. Cl.**
A61F 5/00 (2006.01)

(52) **U.S. Cl.** **602/18**; 128/DIG. 23

(58) **Field of Classification Search** 602/5, 602/18–19, 17; 128/DIG. 23
See application file for complete search history.

(56) **References Cited**

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Primary Examiner—Michael A. Brown
(74) *Attorney, Agent, or Firm*—Rutan&Tucker, LLP

(57) **ABSTRACT**

The cervical collar has three principal pieces: a back panel, a main collar body, and a chin piece. The chin piece is permanently attached to the main collar body and is only attached at its ends to the main collar body so that the center portion of the chin piece can adjust to chin configuration. The back panel engages behind the neck and is tightened with respect to the main collar body to properly support the patient's head and protect the cervical spine. The chin piece adjusts to the patient's chin configuration because it is sufficiently flexible and only supported away from the chin area. Each of the pieces has a foam cushioning layer.

20 Claims, 5 Drawing Sheets

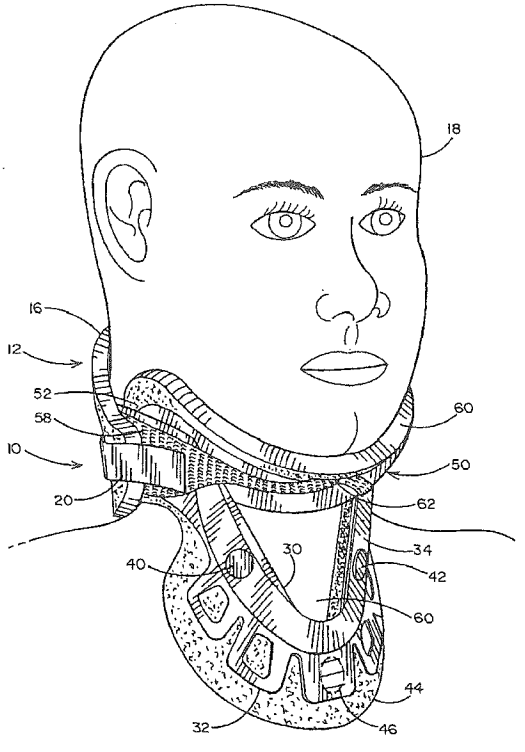

EXHIBIT A, PAGE 8

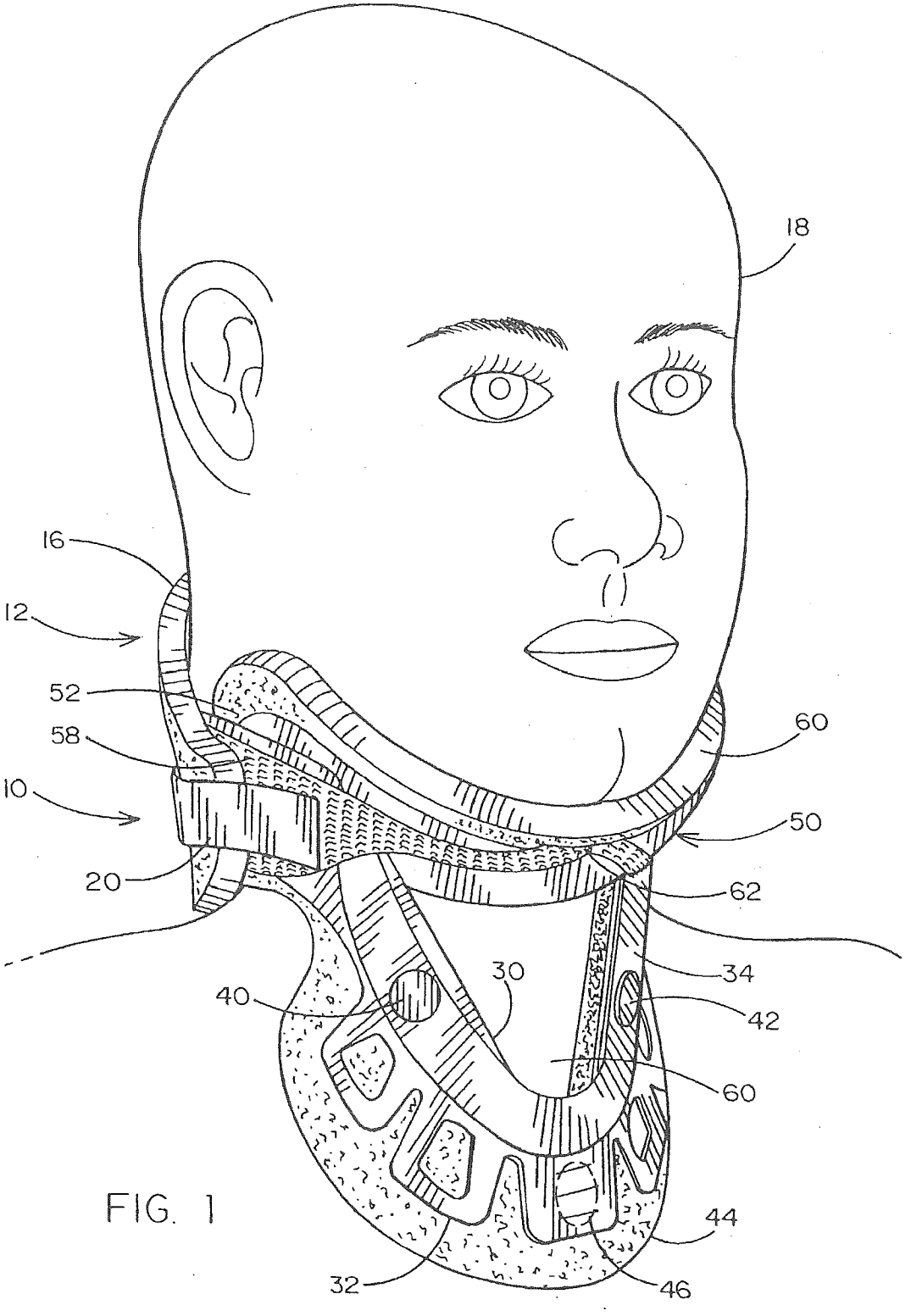

FIG. 1

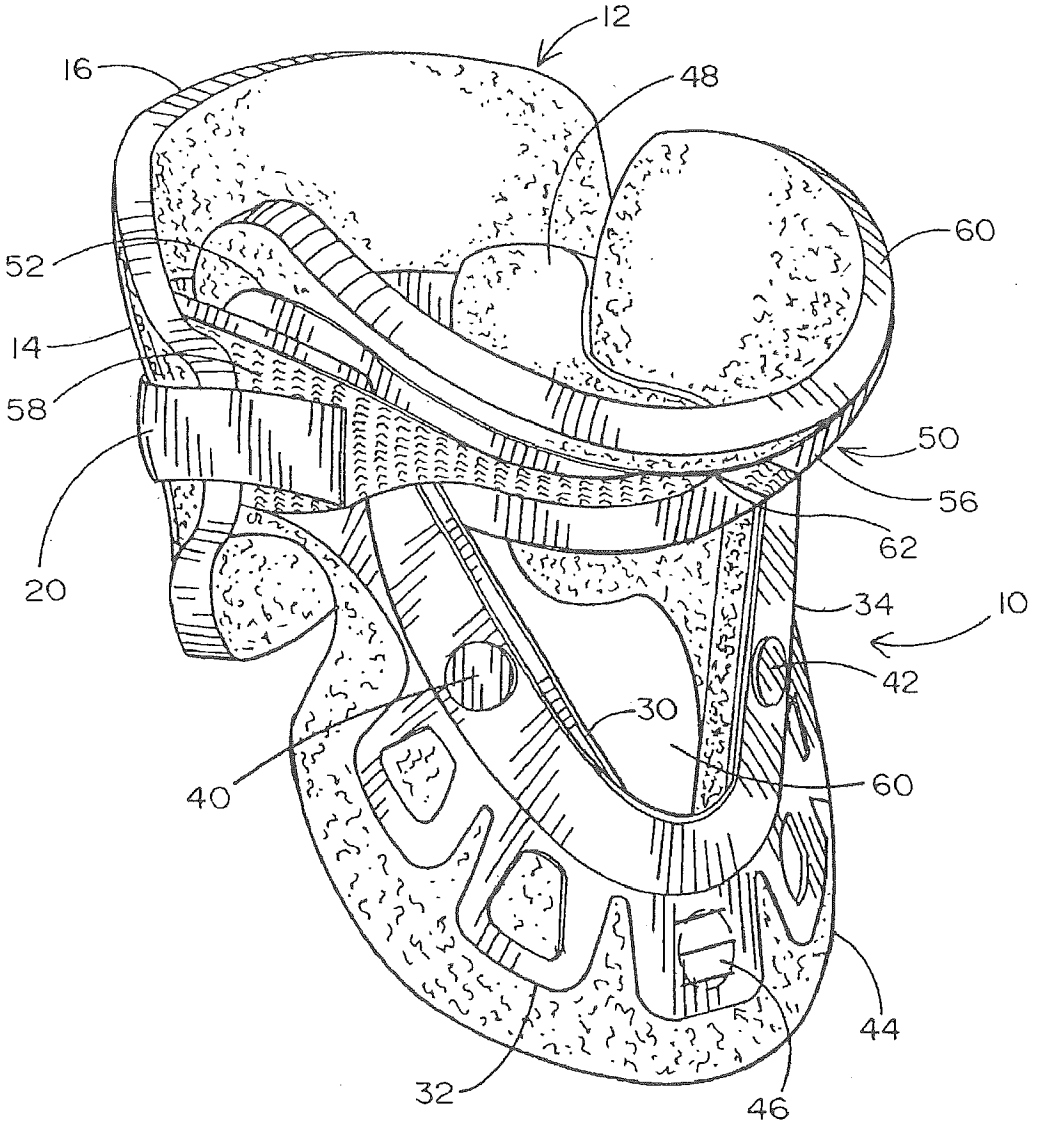

FIG. 2

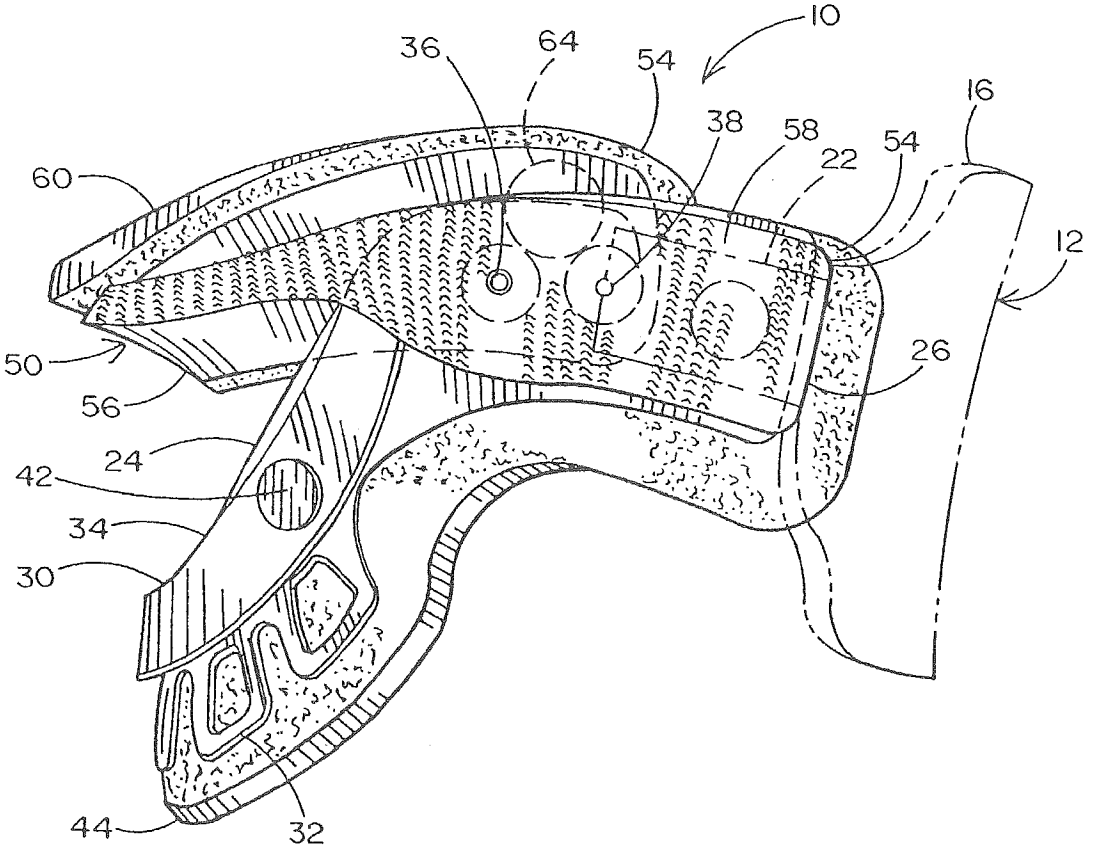

FIG. 3

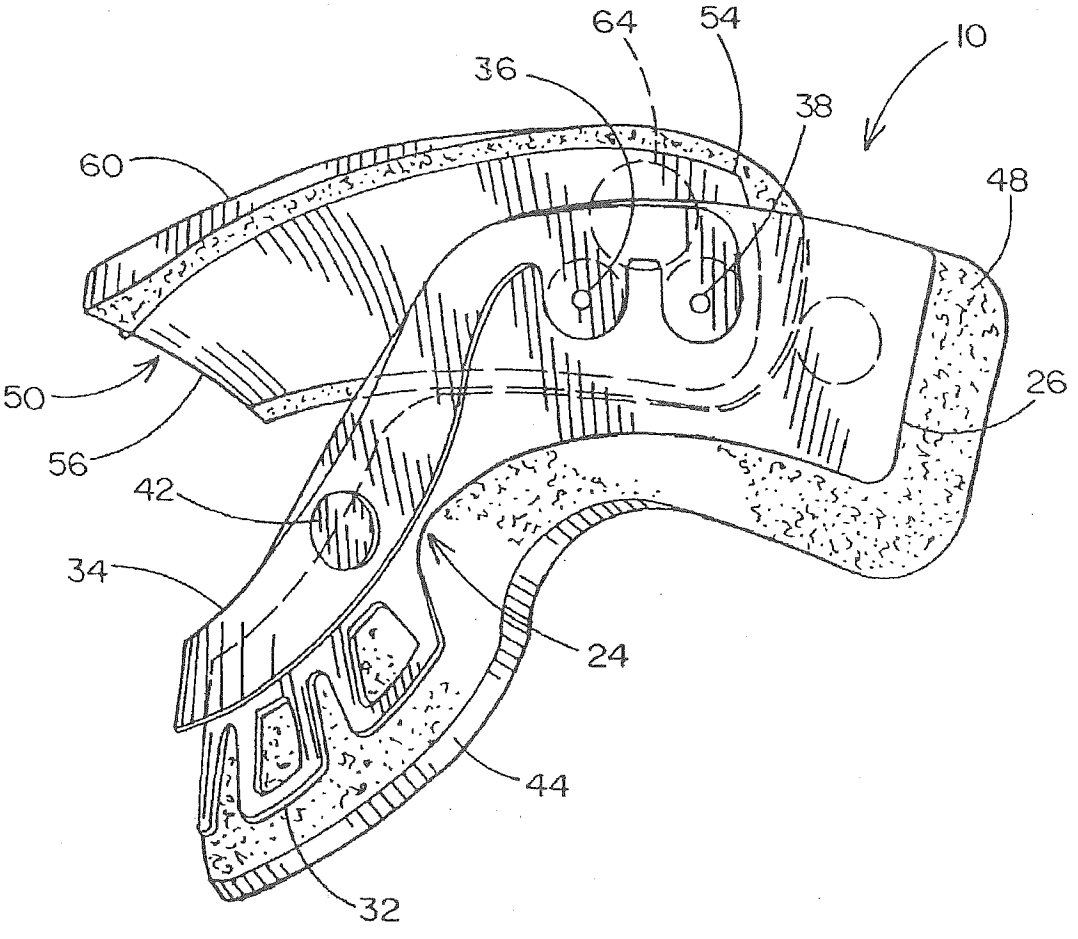

FIG. 4

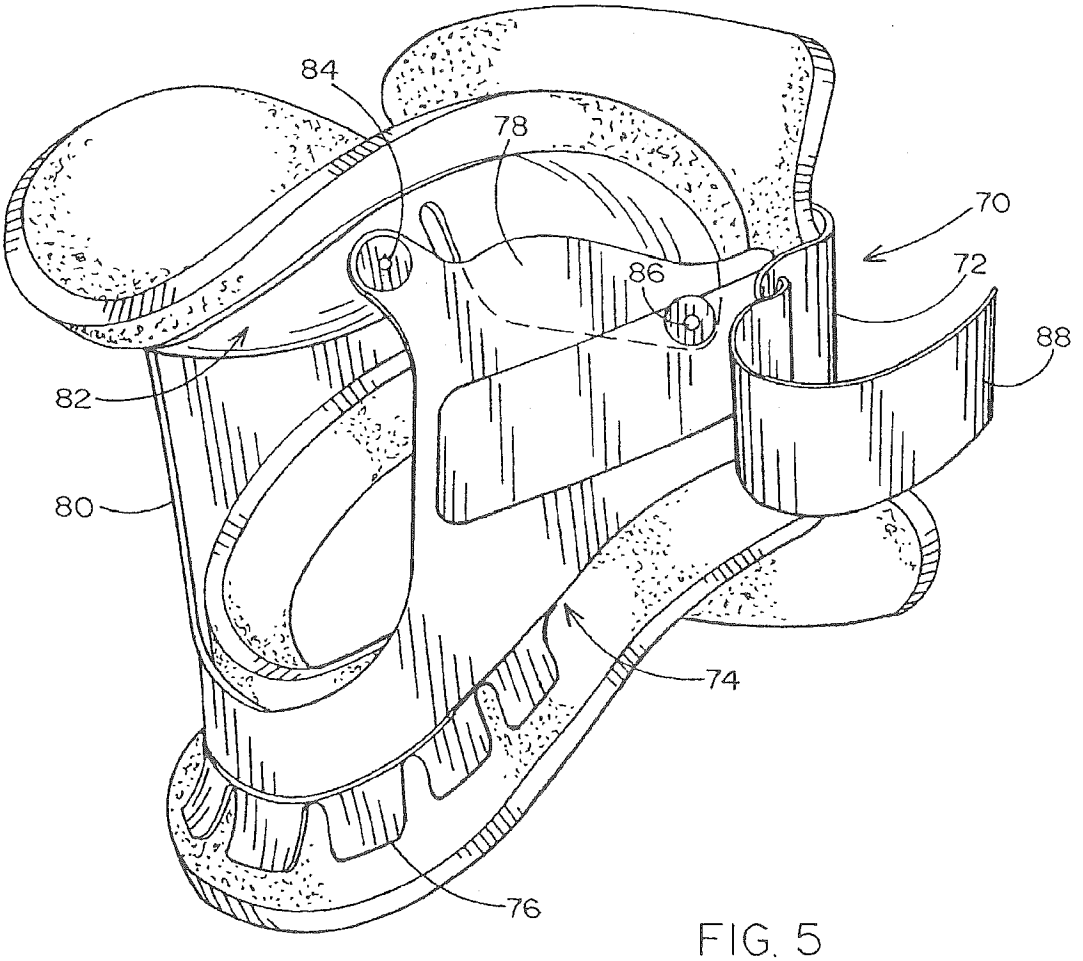

FIG. 5

CERVICAL COLLAR WITH END-SUPPORTED CHIN STRAP

CROSS-REFERENCE

This application relies on U.S. patent application Ser. No. 60/382,937, filed May 24, 2002 for priority.

FIELD OF THE INVENTION

This invention is directed to a cervical collar for supporting the cervical vertebrae, particularly when a person is injured and cervical damage is suspected.

BACKGROUND OF THE INVENTION

When a human body is stressed, such as by injury, various kinds of damage may occur. Stress to the cervical vertebrae may cause nerve damage and, when that high on the spinal cord, nerve damage can lead to significantly debilitating paralysis. The extent of paralysis is related to which particular cervical vertebra is adjacent to the damaged nerve. Therefore, it is essential to provide a cervical collar which properly supports the head and neck of an accident victim until the scope and nature of the damage is determined.

SUMMARY OF THE INVENTION

In order to aid in the understanding of this invention, it can be stated in essentially summary form that it is directed to a cervical collar with end-supported chin piece. The cervical collar is formed of a back piece positioned behind the neck and a main collar body engaged on the upper chest of the patient just below his neck. Each is padded, and they are attached together around the neck. A chin piece is secured to the main collar body at each side thereon. The chin piece is of flexible sheet material and engages under the chin of the patient. It is supported only adjacent its ends so that the center portion under the patient's chin is unsupported allowing it to conform itself to the shape of the patient's chin.

It is, thus, a purpose and advantage of this invention to provide a cervical collar with end-supported chin piece so that the chin piece engages under the chin of the patient and can conform by its flexibility to the shape of the patient's chin.

It is a further purpose and advantage of this invention to provide a cervical collar with end-supported chin piece wherein the chin piece is made of flexible sheet material and is secured to the rest of the collar structure only adjacent its ends so that the center portion thereof may flex to accommodate patients with different chin configuration.

Other purposes and advantages of this invention will become apparent from a study of the following portion of the specification, the claims and the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the cervical collar with end-supported chin piece of this invention shown on a patient for his cervical spine support.

FIG. 2 is a similar view, without the patient.

FIG. 3 is a left side elevational view thereof with the cervical collar in the assembled configuration.

FIG. 4 is an view similar to FIG. 3, but with the upper velcro layer removed.

FIG. 5 is a front left perspective view of a second preferred embodiment of the cervical collar with end-supported chin piece of this invention, similar to the view of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The first preferred embodiment of the cervical collar with end-supported chin piece is generally indicated at **10** in FIGS. **1**, **2**, **3** and **4**. The cervical collar **10** is comprised of three principal structural parts. The back panel **12** is seen in FIGS. **1**, **2** and **3**. The back panel **12** comprises a sheet **14** of flexible polymer composition material which carries a padding layer **16** thereon. The padding layer **16** is preferably a foam polymer layer. The back panel **12** is configured to extend around the back of the neck of the patient **18**. Extending forward from the back panel on each side is a flexible attachment band for securing the back panel to the main collar body **24**. The attachment band **20** is seen in FIGS. **1** and **2**. A similar band **22** is attached to the left side of the back panel and is seen in dashed lines in FIG. **3**. These bands are preferably half of a hook and loop fastener system.

Main collar body **24** is formed of a sheet of flexible synthetic polymer composition material. It engages from the sides of the neck of the patient down over his chest. The back edge **26** on the left side is seen in FIGS. **3** and **4**. The back edge on the right side is obscured in FIGS. **1** and **2**, because it is inside the near edge of the back panel. The back edges of the main collar body about lie in the plane of the cervical spine. From the back edge, the main collar body extends forward and sweeps down to form an upper edge **30**, which is sufficiently far down on the chest to define a tracheotomy access opening at the front of the patient's neck. The lower edge of the main collar body has tabs **32** thereon. The tabs have notches between and openings therein to provide a progressively smaller cross section from the free lower edge of the solid portion of the main collar body. The tabs provide an easier transition between the constraining effect of the collar **10** and the unsupported surface adjacent thereto. As seen in FIGS. **1–4**, the sides of the main collar body sweep forward off the sides of the neck and then downward to engage over the patient's clavicle to obtain firm support of the cervical collar from the patients skeletal structure.

In order to strengthen the main collar body **24**, strengthener **34** is a generally U-shaped structure of sheet synthetic polymer composition material cut into U-shape. At its upper end, it is attached to the main collar body **24** by means of rivets **36** and **38**, see FIGS. **3** and **4**. At its U-shaped lower portion, which generally follows the U-shaped center portion of the main collar body **24**, is attached by rivets **40** and **42**, see FIGS. **1** and **2**. Rivet **42** is also seen in FIGS. **3** and **4**. The back end of the strengthener band **34** is also attached to the main collar body **24** at rivets **36** and **38**. Similar attachment is provided at the opposite side.

Padding layer **44** underlies the main collar body **24** and is preferably a layer of synthetic foam material having fabric attached to each side. The inside fabric layer is suitable for engagement against the patient, while the outside fabric layer on the foam padding layer is suitable to be engaged by the hook portion of a hook-and-loop fastener. The padding layer **16** is similar. Padding layer **44** is attached to the inside of the main collar body **24** by the hook portion of a hook-and-loop fastener. A disc **46** of hook fastener is attached to the inside of the lower front of the main collar body **24**, see FIG. **1**. Other such discs are preferably fastened

on the underside of the main collar body **24**, for example, near the rivets **40** and **42**. The padding layer extends up and back along the interior of the main collar body **24** and terminates in an ear, which extends back beyond the back ends of the main collar body. One of the ears is indicated at **48** in FIG. **2**. The other side is similar.

The third principal structural part of the cervical collar **20** is the chin piece, generally indicated at **50** in FIGS. **1**, **2**, **3** and **4**. The chin piece **50** is formed of flexible sheet synthetic polymer material and is configured so that, when the ends **52** and **54** are substantially vertical where they lie inside the ends of the main collar body, the forward chin-supporting section **56** lies forward at an angle between 30 and 45 degrees to the horizontal, as seen in FIGS. **3** and **4**. The chin piece is attached to the main collar body by two rivets at each side. The two rivets on the left side are indicated at **36** and **38** in FIGS. **3** and **4**. There are similar rivets on the right side. These rivets are hidden under the hook fastener band **58**, which is seen in FIGS. **1**, **2** and **3**. The view of FIG. **4** is shown with this hook fastener band removed to show the positioning of the rivets. As seen in FIGS. **3** and **4**, the rivets are close to the back end of both the main collar body and the chin piece.

The entire center section of the chin piece in the forward direction beyond the forward rivet **36** and its companion rivet on the other side is unsupported. The forward rivet is no further forward than halfway from the patient's mandibular joint to the center of his chin. Support for the chin at the center of the chin piece is provided by the stiffness of the chin piece. The chin piece is sufficiently stiff to provide adequate support, but it is flexible enough to be able to bend substantially to the patient's chin contours. The entire width of the front of the chin piece over the entire tracheotomy opening **60** is not engaged or supported by any other structure. The only structural support for the chin piece is at its rivets near its back ends, as previously stated.

Padding layer **60** covers the inside of the chin piece **50**. It is a polymer foam padding layer with a suitable fabric on the inside surface for skin contact. The outside of the padding layer is covered with a fabric which can be engaged by the hook portion of a hook-and-loop fastener system. Band **58** of the hook portion of the hook-and-loop fastener is wrapped round the back end **26** for a short way. The ear **48** engages thereon and is releasibly retained by the portion of the band **58**. The band **58** extends forward and is folded over the top edge of the chin piece at its front center. This folded-over portion is indicated at **62** in FIGS. **1** and **2**. At that location, it lies on the inside of the chin piece at its top edge. It is at this location that the padding layer is attached at its front center to the hook fastener band. The padding layer is secured to the inside of chin piece **60** adjacent its back end by attachment disc **64**, as shown in FIGS. **3** and **4**.

When it is required for the support of his head and neck, the cervical collar **10** is placed on the patient **18**. The main collar body and chin piece are a permanently attached structure, and the respective padding layers are in position. The main collar body **24** is placed against the chest with the chin piece **50** under the chin of the patient. The back panel **12** is placed behind the neck of the patient and overlaps the outside of the main collar body on both sides, as seen in FIGS. **1** and **2**. The main collar body and chin piece are thrust back at the same time the back panel is thrust forward. Attachment bands **20** and **22** on the back panel are pulled forward and attached to the band **58** on both sides. The application of the collar **10** on the patient should be sufficiently firm so that the tabs on the main collar body and the tabs on the back panel are resiliently bent. This applies resilient stabilization to the cervical spine and head of the patient.

Another preferred embodiment of the cervical collar with end-supported chin piece is seen in FIG. **5** and is generally indicated at **70**. The cervical collar **70** is comprised of three principal parts. It has a back panel **72**, which is the same as back panel **12** except that it is taller. Main collar body **74** extends forward and downward and rests upon the chest of the patient. It has tabs **76** to provide a transition which is more gradual than a hard edge. The tabs may have configuration which changes their resiliency as a function of the distance from the principal part of the main collar body. As compared to the main collar body of the cervical collar **10**, the main collar body **74** has an arm **78** which extends upward, with one arm on each side of the tracheotomy opening **80**. Both the back panel and main collar body have a suitably configured padding layer thereunder. The padding layer is of polymer foam material with its inside suitable for body contact and its outside suitable for attachment by hook-type fasteners. The inside of the back panel and inside of the main collar body are each provided with portions of hook-type fasteners so that the padding material is removably attached thereto.

Chin piece **82** is permanently attached to the main collar body by means of two rivets on each side. Rivets **84** and **86** are shown on the near side of FIG. **5**. The forward rivet **84** is no closer to the center of the chin strap than half the distance from the patient's mandibular joint to the center of the chin strap. There are similar rivets on the far side. This structure is very similar to the structure of cervical collar **10**, except that the rivet mountings are farther apart. The chin piece also has a padding layer of the nature described above. The flexibility of the chin piece between the front two rivets, of which rivet **84** is one, and the distance between the front rivets is sufficient so that the chin piece can adjust to the configuration of the patient's chin. The chin piece is unsupported between its rivets and relies upon its own stiffness to provide support, together with the necessary flexibility to achieve the proper chin support configuration. Hook-and-loop fastener strap **88** is attached to the main collar body, extends through a slot in the back panel and extends forward to attach onto itself. A similar fastener strap is provided on the opposite side so that the collar **70** can be tightened to the appropriate firmness to properly support the patient's head and stabilize his cervical spine.

This invention has been described in its presently preferred embodiment, and it is clear that it is susceptible to numerous modifications, modes and embodiments within the ability of those skilled in the art and without the exercise of the inventive faculty. Accordingly, the scope of this invention is defined by the scope of the following claims.

What is claimed is:

1. A cervical collar comprising:
   - a main collar body configured to overlie the upper chest of at patient and extend over his shoulders substantially to the spinal plane;
   - a flexible chin supporting piece, having no midline support and being secured to the main collar body only adjacent to its ends; and
   - a back panel coupled to the main collar body, and configured to engage the hack of the neck of the patient.

2. The cervical collar of claim 1 wherein at least one of said chin supporting piece, main collar body and said back panel have padding attached thereto.

3. The cervical collar of claim 2 wherein said padding comprises a foam polymer.

EXHIBIT A , PAGE 15

4. The cervical collar of claim 1 wherein at least one of said main collar body and said back panel has flex tabs along the edge thereof.

5. The cervical collar of claim 4 wherein at least some of said tabs have a base and a tip, with the base being wider than the tip.

6. The cervical collar of claim 1, further comprising a hook-and-loop fastener that couples said main collar body and said back panel.

7. The cervical collar of claim 6 having right and left lateral portions, each of which operates as a continuous extension of the main collar body.

8. The cervical collar of claim 7 wherein the right and left lateral portions are riveted to the main collar.

9. The cervical collar of claim 1 wherein the chin piece has left and right rivets lateral to the midline.

10. A cervical collar comprising:

a main collar body having a padded chest portion and a portion that extends over a patient's shoulder;

a chin piece having two lateral arms coupled to the main collar body, and a mid-section that is supported entirely by the lateral arms;

an adjustment mechanism thtu adjusts the chin piece relative to the main collar body; and

a back panel removably coupled to the main collar body.

11. The cervical collar of claim 10 wherein said back panel carries a padding.

12. The cervical collar of claim 10 wherein said back panel has flexible tabs.

13. The cervical collar of claim 12 wherein said flexible tabs are of increasing cross section from their tips to the brace where they are integral with said main collar body.

14. The cervical collar of claim 10 wherein there is an opening in said main collar body to provide access for tracheotomy, and there is a strengthening layer adjacent said opening to provide adequate strength around said opening for said main collar body.

15. The cervical collar of claim 11 wherein said padding layer is attached to said cervical collar by hook fasteners.

16. The cervical collar of claim 10 wherein said back panel is attached to said main collar body by means of hook-and-loop fasteners.

17. The cervical collar of claim 16 wherein a portion of said book-and-loop fasteners for attachment of said back panel also serves as attachment structure for attaching said main collar body padding thereto said main collar body.

18. The cervical collar of claim 10 wherein said chin piece is attached to said back panel through the main body.

19. The cervical collar of claim 18 wherein said chin piece is attached to said back panel through the main body by at least one river.

20. The cervical collar of claim 19 wherein the chin piece has right and left rivet attachments.

* * * * *

US007674234B2

(12) **United States Patent**
Calco et al.

(10) **Patent No.: US 7,674,234 B2**
(45) **Date of Patent: Mar. 9, 2010**

(54) **CERVICAL COLLAR WITH GEARED ADJUSTMENT**

(75) Inventors: **Wayne A. Calco**, Laguna Hills, CA (US); **David Laurence Moeller**, Tustin, CA (US); **Jozsef Horvath**, Fullerton, CA (US); **Geoffrey Garth**, Long Beach, CA (US)

(73) Assignee: **Carsar, LLC**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1258 days.

(21) Appl. No.: **11/194,006**

(22) Filed: **Jul. 28, 2005**

(65) **Prior Publication Data**

US 2007/0027418 A1 Feb. 1, 2007

(51) **Int. Cl.**
A61F 5/00 (2006.01)

(52) **U.S. Cl.** **602/18**; 128/DIG. 23

(58) **Field of Classification Search** 602/17–19; 128/DIG. 23

See application file for complete search history.

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(57) **ABSTRACT**

The present invention provides a cervical collar with a rack and pinion adjustment mechanism. The rack moves a chin support member, which raises and lowers a chin piece. Independently, the present invention provides methods and mechanisms in which the chin support can angulate independently of the collar body. Such angulation is preferably accomplish by pivotally supporting the chin piece on the racks, or on the left and right chin support pieces. Thus, in a preferred class of embodiments, the collar has a pivot for the chin support pieces relative to the collar body, and an other pivot for the chin piece relative to the chin support pieces.

13 Claims, 4 Drawing Sheets

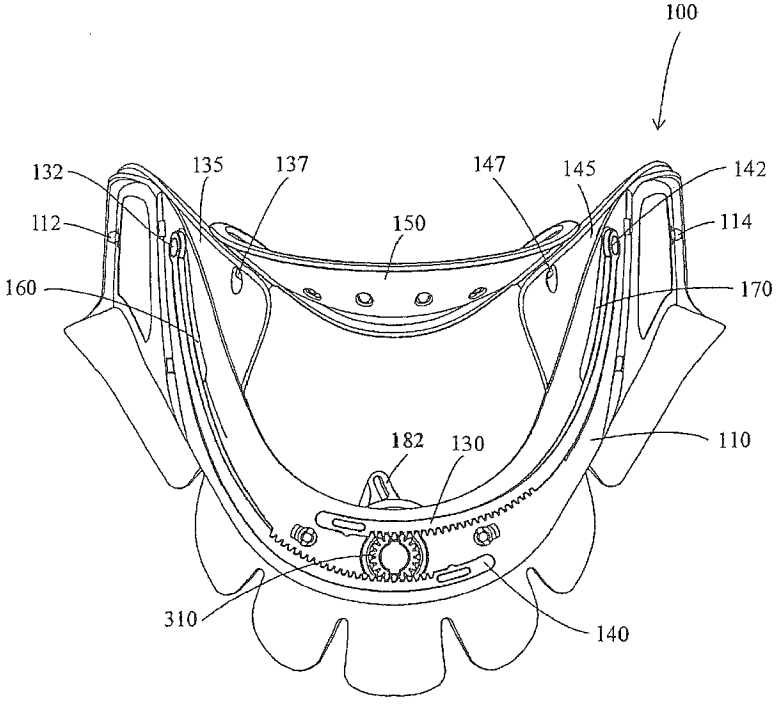

EXHIBIT B, PAGE 17

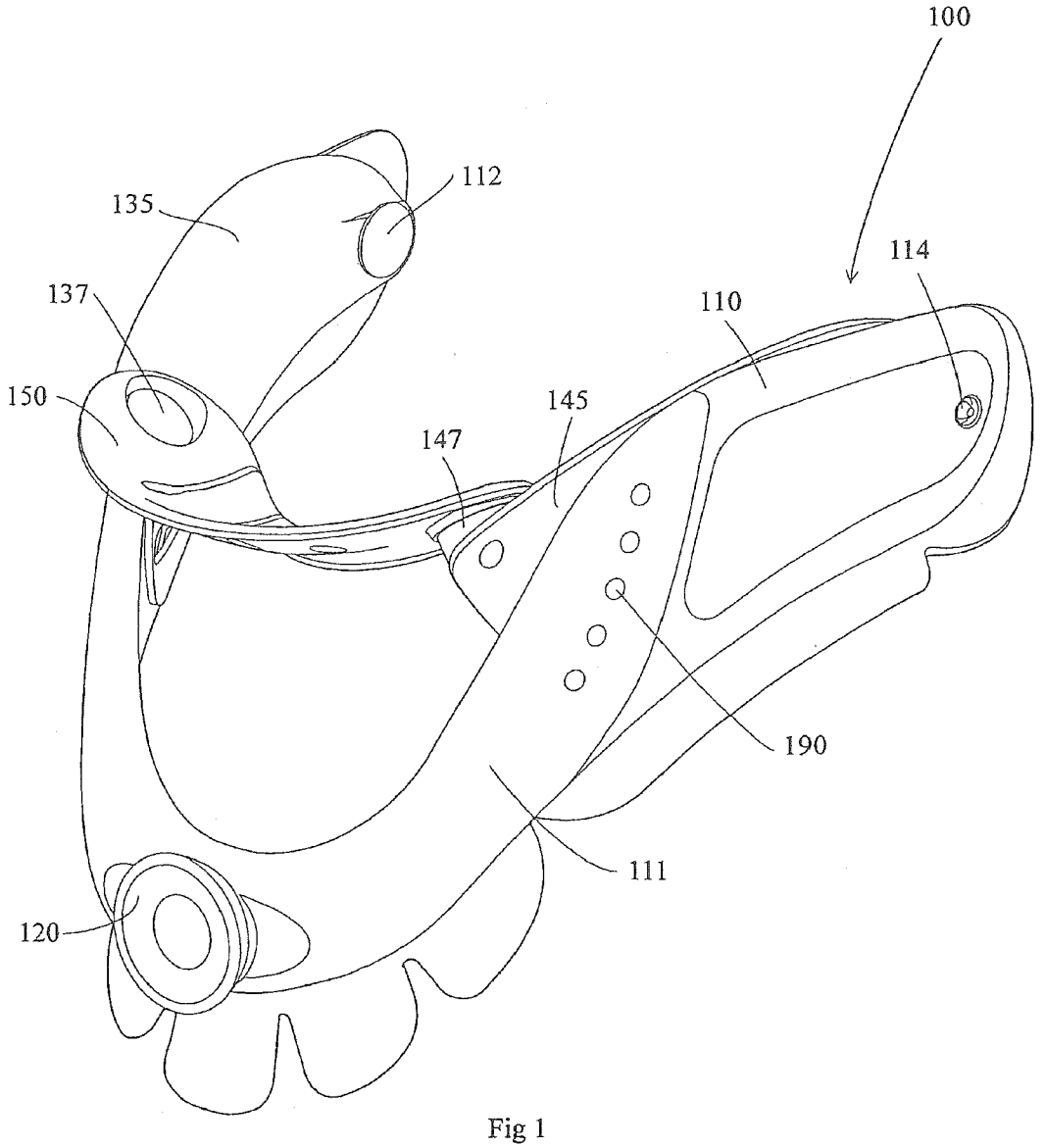

Fig 1

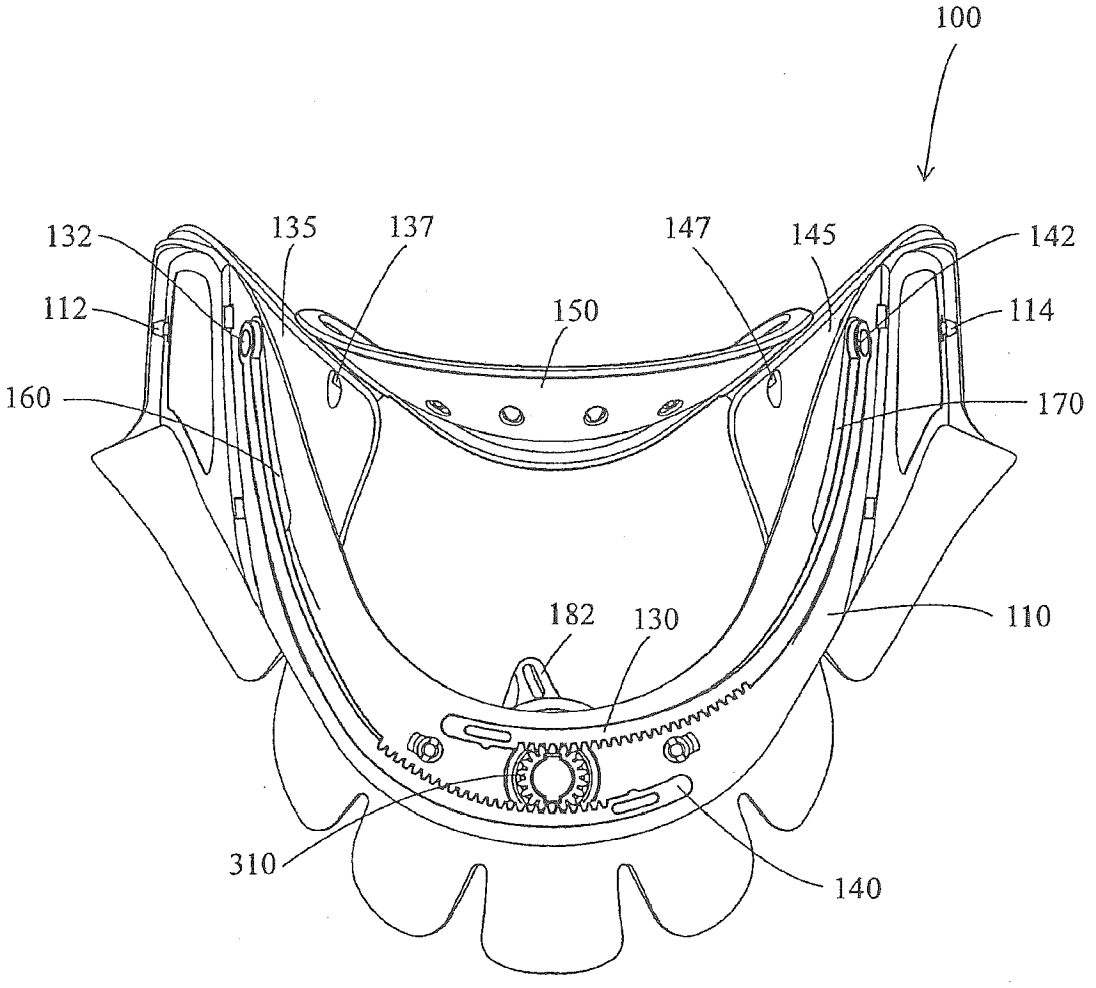
100
132
135
137
147
145
142
112
150
114
160
170
182
130
110
310
140

Fig. 2

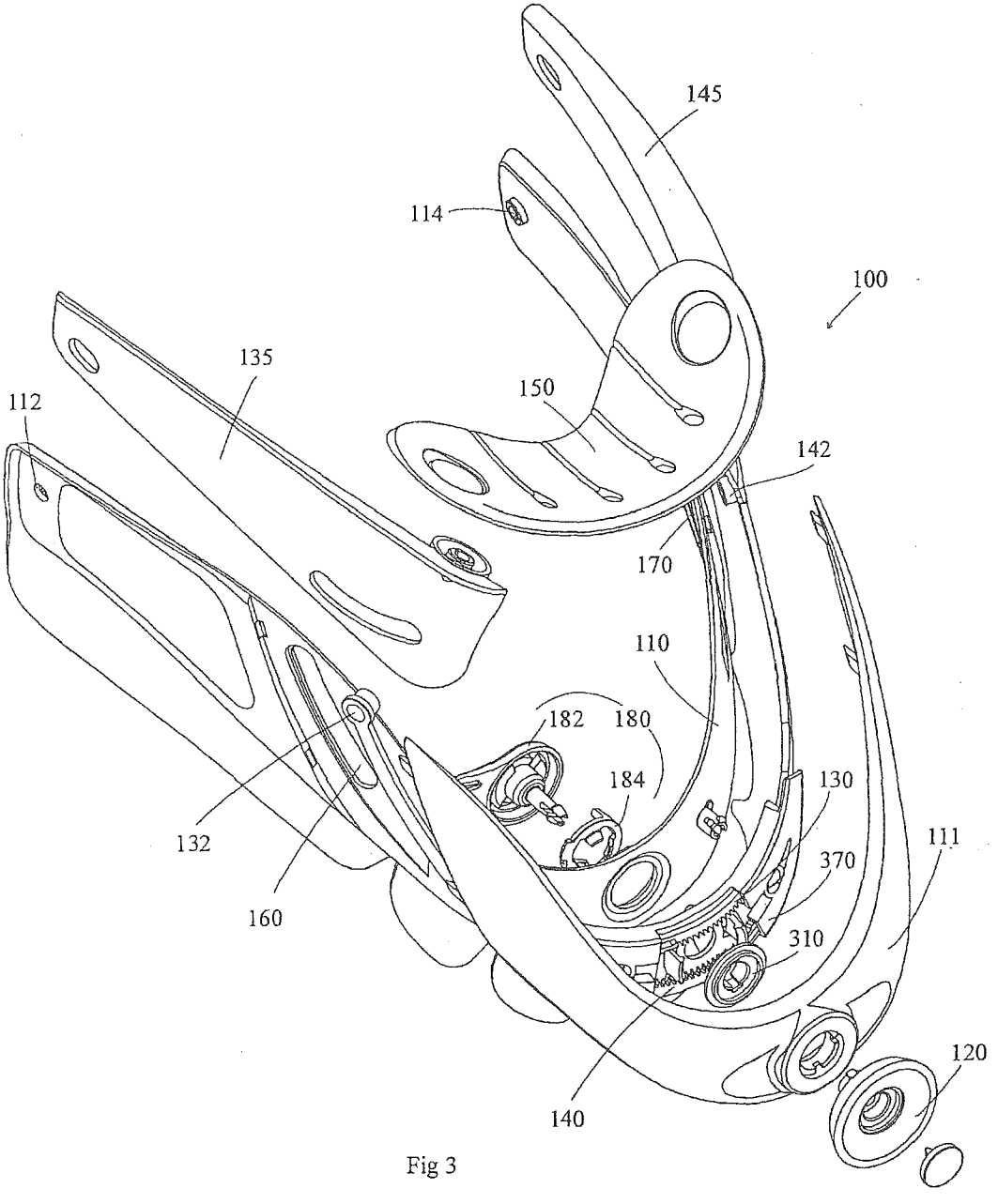
145
114
100
135
150
112
142
170
110
182
180
184
130
132
111
370
160
310
120
140

Fig 3

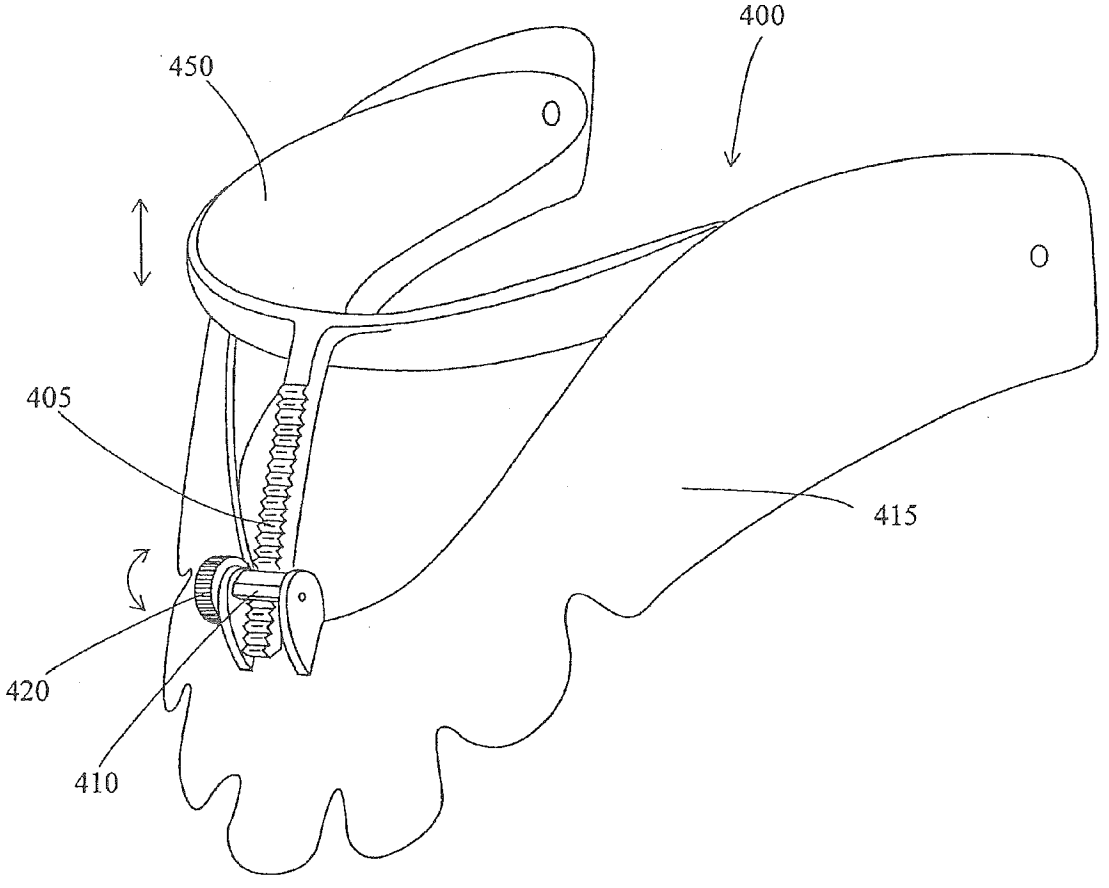

Fig 4

CERVICAL COLLAR WITH GEARED ADJUSTMENT

FIELD OF THE INVENTION

The field of the invention is cervical collars.

BACKGROUND OF THE INVENTION

Cervical collars are generally used to maintain a spine in neutral alignment. In order to maintain neutral alignment, the user's chin must be supported at a particular position. Because of this requirement for neutral alignment, and because users of the collars are proportioned differently, collars are made in various sizes. One of the problems with making collars in various sizes, however, is that medical practitioners have to stock and keep track of a multitude of sizes, which can become quite burdensome.

In order to address the burden caused by the need to stock various sizes, adjustable collars have emerged. One more recent patent, U.S. Pat. No. 6,663,581 to Calabrese, teaches a collar that can be adjusted by manually sliding a mandible into position and then inserting a clip to lock it. While the Calabrese collar may have addressed the adjustability problem with a modicum of success, there are still problems with the way the adjustment is done. One problem is that previously known adjustable collars have independently adjusted left and rights sides, which allows for asymmetric adjustments. Another problem is that making left and right adjustments requires two adjustments rather than one. Still a third problem is that failure of the adjustment on a single side to hold in position may result in a significant torquing of the head and lead to significant misalignment of the cervical spine.

A separate set of problems with respect to prior art cervical braces is that the chin support piece is rigidly coupled to the collar body, and does not sufficiently allow for different shaped chins. The result is that a wearer can experience excessive pressure at localized regions of the chin. This is not so much of a problem for an emergency collar, but it a very significant problem for a collar intended for extended wear.

Thus, there is a need for an adjustable collar where left and rights sides can be adjusted with a single motion, and that provides a chin support that can angulate independently of the collar body.

SUMMARY OF THE INVENTION

The present invention provides methods and mechanisms in which left and rights sides can be adjusted with a single motion. Adjustment of the left and rights sides can be advantageously accomplished using a gear mechanism, and in particular a rack and pinion mechanism. As the pinion is rotated, the chin support member is raised or lowered as a result of movement of the racks.

Independently, the present invention provides methods and mechanisms in which the chin support can angulate independently of the collar body. Such angulation is preferably accomplish by pivotally supporting the chin piece on the racks, or on the left and right chin support pieces. Thus, in a preferred class of embodiments, the collar has a pivot for the chin support pieces relative to the collar body, and an other pivot for the chin piece relative to the chin support pieces.

Various objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of preferred embodiments of the invention, along with the accompanying drawings in which like numerals represent like components.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a front perspective view of a cervical collar.

FIG. **2** is a front view of the cervical collar of FIG. **1**, with the cover removed.

FIG. **3** is an exploded perspective view of a cervical collar of FIG. **1**.

FIG. **4** is a perspective view of an alternative cervical collar utilizing a single rack.

DETAILED DESCRIPTION

Referring first to FIGS. **1-4**, a cervical collar **100** comprises a main collar body **110**, mechanism enclosure **111**, a knob **120**, a first rack **130**, a second rack **140**, a first chin support member **135**, a second chin support member **145**, and a chin piece **150**.

First and second racks **130**, **140** and the pinion gear **310** cooperate to adjust the height of the first and second chin support member **135**. **145**, and thereby the height of the chin piece **150**. These parts are configured to allow use of a single (or relatively small number of collars) to maintain the head and neck in neutral alignment, supports must be consistent with the key dimension of an individual wearer. As used herein, the term "key dimension" means the height of the inferior surface of the chin where the chin piece supports the chin, relative to a horizontal line drawn at the top of the shoulder where the collar body rests upon the trapezius muscles.

As best seen in FIG. **1**, the racks **130**, **140** are guided between the main collar body **110** and mechanism retainer **370** toward the pinion gear **310**. The pins **132** and **142** couple the racks to the chin support members **135** and **145** such that upward movement of a rack causes the associated chin support member to also move upward. Likewise, downward movement of a rack will cause the associated chin support member to move downward. Because the racks **130**, **140** are used to push the chin support members **135**, **145** upward relative to collar body **110** (and of course also relative to the wearer's sternum and shoulders), they are preferably made of a sufficiently stiff material. Contemplated materials include hard thermoplastic, metal, etc.

Pinion gear **310** is preferably constructed from a relatively hard plastic or other suitable material that exhibits relatively little wear over time due to contact with the rack teeth (e.g. acetyl resin). The teeth of the pinion gear must of course mate with the teeth of the racks.

In the embodiment of FIGS. **1-4**, the height adjustment is accomplished by rotating knob **120**, which causes rotation of a pinion gear (see **310** in FIG. **3**), which moves the racks **130**, **140** laterally and vertically, which causes the first and second chin support members **135**, **145** to move up and down. Rotation of the knob **120**, and hence of the gear **310**, is preferably bi-directional with one direction (e.g. clockwise) causing the racks **130**, **140** to move upward and he other (e.g. counter-clockwise) causing the racks to move downward.

Since the pinion gear **310** operates upon both racks **130**, **140** simultaneously, each chin support member **135**, **145** moves up or down at the same time, at the same rate, and for the same distance. Preferred embodiments include some mechanism for limiting the travel of the racks **130**, **140** and support members **135**, **145**. This can be accomplished in several ways. For example, travel of the racks **130**, **140** can be readily limited by limiting rotation of the pinion gear **310**,

through the use of stops, by limiting the number of teeth on one or both of the racks **130**, **140**, and/or limiting the rise of the chin support member **135**, **145** such as through the use of a pin within a slot. FIGS. **1** and **2** show the use of pins **132**, **142** cooperation with slots **160**, **170** for this purpose. Slots **160** and **170** allow the support members **135**, **145** to move from a fully extended configuration in which the pins **132**, **142** are at their highest point to a fully compressed configuration in which the pins **132**, **142** are at their lowest point. The fully extended configuration is intended to adapt to a person with a large key dimension (tall neck), while the most compressed configuration is intended to adapt to a person with an especially small key dimension (short neck).

It should also be appreciated that the extent of pivoting of the chin piece **150** should probably be limited in some manner to prevent excessive angulation that could result in the wearer's chin sliding off the chin piece. Such limitation can be provided by the shapes of the juxtaposing surfaces of the chine piece **150** and the side pieces **135**, **145**.

Preferred embodiments of collar **100** can be readily sized to a wearer by including calibration markings **190** that correspond to key dimensions. For example, a calibration marking for a "short" collar might correspond to a key dimension of 0.75. The calibration can be in a relatively small unit of measure such as a millimeter but is more likely to be in centimeters, inches or some other designation. Placement of the calibration markings **190** should be conspicuous to the person setting the size (generally not the user himself). In FIG. **1**, for example, the calibration markings **190** are shown on the side of the collar body. In other embodiments, the calibration may be on or around the knob or some other place along the path of either rack.

Knob **120** not only rotates, but also move in and out. In the fully inward configuration the knob is locked from rotation, and in the outward configuration the knob **120** is rotatable (unlocked). In the particular embodiments shown, the pinion gear **310** is directly connected to the knob **120**, and the knob **120** is biased to the locked (inward) position.

A safety **180**, comprising lock **182** and spring **184**, can optionally be provided as a secondary means of prohibiting movement of the racks. Safety **180** can operate in any suitable fashion, but in this particular embodiment the safety **180** prevents the knob **120** from moving to the outward (rotatable) position. This may be done by providing a tab on the pinion gear which can be stopped by contact with the safety.

Chin support members **135** and **145** are pivotally mounted to the main collar body **110** at points **112** and **114**. Additionally, chin piece **150** is pivotally mounted to the chin support members **135** and **145** at pivots **137**, **147**. As used herein the term pivot includes mechanisms that provide pivoting motion, even though there is no actual axle or line about which the pivoting motion takes place. Thus, chin piece **150** can be said to be pivotally mounted to the chin support members **135** and **145** at pivots **137**, **147** even in situations where these parts are molded together in a manner that provides sufficient "play" to effectively provide a pivoting type motion.

An alternative embodiment of a cervical collar **400** is shown in FIG. **4**. The collar **400** has a single central rack **405** and a pinion gear **410** attached to main collar body **415**. Rotation of the pinion gear **410** moves rack **405** upward, which therefore raises chin piece **450**. As with the embodiment of FIGS. **1-3**, the height of the chin piece **450** can be adjusted by rotating a knob **420**, which turns the pinion gear **410**. In this embodiment, however, there is no need to pull out the knob.

It should also be appreciated that the terms "rack" and "pinion" are used herein in a broader manner than ordinary usage, and include embodiments with teeth of any size, or indeed no teeth at all. In the latter case, for example, the rack and pinion can each have rubbery surface that together provide sufficient friction to couple the relatively motions of the rack and pinion. Moreover, in common usage one often refers to the rack portion of a rack and pinion as being flat. As used in this application, a rack need not be flat, and indeed in most instances will be curved. The only essential feature of the racks and pinions as used herein is that the rack translates in space as the pinion rotates. Where discussion is limited to a toothed rack and pinion, either the teeth are expressly stated, or the pinion is referred to as a pinion gear.

Thus, specific embodiments and applications of a cervical collar with a geared adjustment have been disclosed. It should be apparent, however, to those skilled in the art that many more modifications besides those already described are possible without departing from the inventive concepts herein. The inventive subject matter, therefore, is not to be restricted except in the spirit of the appended claims. Moreover, in interpreting both the specification and the claims, all terms should be interpreted in the broadest possible manner consistent with the context. In particular, the terms "comprises" and "comprising" should be interpreted as referring to elements, components, or steps in a non-exclusive manner, indicating that the referenced elements, components, or steps may be present, or utilized, or combined with other elements, components, or steps that are not expressly referenced.

What is claimed is:

1. A cervical collar having a chin piece, a collar body, and a chin height adjustment mechanism comprising a first rack that cooperates with a pinion, disposed such that a single adjustment to the adjustment mechanism operates to raise both lateral sides of the chin piece relative to the collar body.

2. The cervical collar of claim **1**, further comprising a second rack that cooperates with the pinion.

3. The cervical collar of claim **2**, wherein at least one of the racks and the pinion has teeth.

4. The cervical collar of claim **1**, wherein the rack is coupled to a lateral chin support member.

5. The cervical collar of claim **4**, wherein rotational movement of the pinion is bi-directional, one direction causing the lateral chin support member to raise and another direction causing the chin support member to lower.

6. The cervical collar of claim **4**, wherein the lateral chin support member is coupled to a chin piece.

7. The cervical collar of claim **1**, wherein the chin piece raises and lowers as a result of movement of the rack.

8. The cervical collar of claim **1**, further comprising a chin support piece, and wherein the chin piece rotates relative to the chin support piece, and the chin support piece rotates relative to the cervical collar body.

9. The cervical collar of claim **1**, further comprising a chin support piece that moves up and down, the chin piece rotating relative to the chin support piece.

10. The cervical collar of claim **1**, further comprising a knob that is effective to raise and lower the chin piece, and is configurable between an inward configuration in which rotation of the pinion is locked and an outward configuration in which rotation of the pinion is unlocked.

11. The cervical collar of claim **1**, further comprising a safety that substantially prohibits rotation of the pinion.

12. The cervical collar of claim **1**, wherein the rack and the pinion have alternating peaks and valleys that cooperate with each other to move the rack.

13. The cervical collar of claim **1**, further comprising a calibration that correlates with a height of the chin piece.

* * * * *