The present invention relates to a device for effecting cervical traction; in particular, it concerns a novel semi-rigid head gear especially adapted for providing generalized distribution of pressure on the various parts of the head of a patient undergoing cervical traction.

Cervical traction is the application of longitudinal pull on the head of a human being for the purpose of stretching the neck. Cervical traction broadly is a well-known technique, and various methods have been devised to pull apart or stretch the vertebral bodies, lamina, and spinous processes of the neck, more technically known as the cervical spine.

The cervical spine of man is a loosely knit series of bones and ligaments, comprising a central relatively rigid bony support provided with supporting muscle groups both anterior and posterior thereto. Within the central bony structure lies the spinal cord. Obviously, injuries to the bony structure may produce serious injuries to the nerve tissue of the spinal cord.

The cervical spine is located in a vulnerable position at the end of the body, and any type of snap injury, such as a blow on the head while diving, may produce dislocation or fracture of the cervical spine. Such injuries are also often caused due to the shock of a sudden stop, as in an automobile accident.

Such injuries frequently force together in abnormal positions the facets, lamina, or vertebral bodies of the neck, placing pressure on nerve roots emitting from or between the bony and ligamentous structures.

In such cases it is often necessary to utilize traction, that is, longitudinal pull on the head, to restore the various structures of the neck to their normal positions while the process of healing is taking place.

Various sling methods have been utilized in the past, and, in addition, manipulation and stretching of the neck has been carried out manually, longitudinal pull being exerted by means of the hands. Cervical traction has also, in some cases, been accomplished by boring little holes in the patient's skull and engaging the same with tongs. The tongs are then connected to a rope and passed over a pulley, traction being accomplished by hanging weights on the rope. This is an effective method of producing traction, but it has the serious disadvantages of requiring surgery and of occasionally causing local infection of the bone as a result of contamination of the points of the tongs.

The present invention is directed to a novel semi-rigid head gear adapted for administration of cervical traction, permitting distribution of the longitudinal forces on the various parts of the patient's head without application of excessive force to any one part of the head and without necessity for the use of surgery.

It is accordingly the major object of the present invention to provide apparatus for cervical traction which can accomplish, without the use of surgery, the application of cervical traction to desired zones of regions of the skull and permitting also relief of pressure at other points, such as at the point of the chin, where application of pressure causes great discomfort.

Another object of the present invention is to provide a semi-rigid head gear readily adaptable to successive use with various patients whose requirements as to application of pressure differ from one another.

Still another object of the present invention is to provide a cervical-traction apparatus capable of successful application of substantially greater amounts of pulling force than have been practicable with apparatus heretofore available.

A still further object of the invention is to provide a cervical-traction apparatus which is far more effective than prior apparatus in applying, without the aid of surgery, strong longitudinal pull on the occipital and temporal regions of the patient's head.

Other objects and advantages of the invention will be apparent from the detailed specification which follows.

We have illustrated in the accompanying drawing a typical embodiment of our invention.

In the drawing, Figure 1 is a side elevation view, partially in section, showing a typical embodiment of our invention as actually in use in applying longitudinal traction to the neck of a patient. Figure 2 is a perspective view of the embodiment of Figure 1. Figure 3 is a perspective view similar to Figure 2 but showing the hinged metal frame which forms the "skeleton" of the structure. Figure 4 is a rear elevation view of the structure of Figure 2, bringing out in some detail the manner in which the device is adapted to apply traction to the occipital portions of the skull. Figure 5 is a view similar to Figure 4 but showing the head gear opened up on its midline hinge for being fitted in position on a patient's head. Figure 6 is a plan view of the Figure 2 structure, being partly in section to bring out the structural features which particularly adapt the instrument for application to a patient of longitudinal traction along the sides of the skull. Figure 7 is a fragmentary sectional view showing a preferred method of construction by which appropriate padding is built onto the wire skeleton of Figure 3.

Referring now to the drawing, we show in Figure 1 a typical hospital bed 10 on which a patient 11 is reclining, our cervical-traction device 12 being fitted on his head and held in place by means of strap closure 13. As may be noted from Figures 1 and 2, the head gear fits around
the back of the patient's skull and is secured under the patient's chin. The top edge of the head gear is provided with a plurality of eyelets 14 which, as Fig. 3 shows, may be welded to or integrally formed with the metal skeleton or framework of the head gear. Into the eyelets 14 a plurality of cords 15 may be snapped, joining together at their opposite ends on a ring 16. Ring 16 may be secured to a suitable pulley cord 17 which is passed over a pulley 18 and held taut by means of weight 19. Obviously, the amount of pull exerted on the head gear 12 can be controlled by adjusting the magnitude of the weight 19.

The general structure of the head gear may best be understood by reference to Figs. 3 and 8. The configuration of the head gear is determined by the shape of the relatively rigid wire framework shown in Fig. 3, consisting of a pair of main outer ribs 21 and 21a, each extending around the outer periphery of one-half the instrument and forming a symmetrical pair of head pieces which are hinged together along their midline hinges 22. Each of the symmetrical sections thus formed is provided with a plurality of longitudinal ribs 23, spaced so as to define a pair of relatively large ear apertures 24. The ribs 23 are reinforced by a group of transverse ribs 25, disposed to define the upper and lower limits of the ear apertures and also disposed along the forward portion of the head gear to add rigidity to the skeletal portion which passes alongside the cheeks of the patient and which meets under the patient's chin.

The skeletal structure of the head gear is preferably formed of stiff steel wire; the main ribs 21 and 21a may be made from heavy wire of, for example, No. 8 or No. 10 gauge, while the longitudinal and transverse ribs may be made from smaller wire, such, for example, as No. 12 or No. 14. It will be understood, of course, that the particular wire sizes employed in any given embodiment of our invention will depend to some extent on the forces to which it is put, and we do not limit ourselves to any particular size or types of material for forming the skeletal structure of our head gear. Indeed, it may be desirable in some cases to use strip material rather than wire for some or all of the ribs.

The various ribs and other skeletal parts of our head gear may be joined together by brazing or welding. Any desired means of construction may be used, provided it is sufficiently strong to withstand a substantial amount of bending and shaping without fracture.

The assembled skeletal structure, as shown in Fig. 3, is then covered by a suitable padding 30, preferably of sponge rubber or other suitable, relatively soft resilient material. If desired, a nylon or other cloth outer covering may be sewed over padding 30 and also over the outer surface of the ribbed skeleton, so as to provide a finished product free from exposed metal surfaces.

Strap 13 and its corresponding buckle 13a may be suitably secured in any desired manner to the appropriate portions 32 and 32a of the skeletal assembly shown in Fig. 3. It should be noted, as shown particularly in Figs. 4, 5, and 6, that the wire framework turns inwardly on each side of the head gear below the ear apertures 24 and also at the lower portion of the back of the head gear, to provide a zone 33 shaped to engage and exert force upon the occipital portion of the skull and upon the sides of the skull and jaws.

Our invention is preferably constructed of wire or other skeletal material sufficiently rigid to resist without deformation the maximum forces applied to it during actual use in cervical traction but having sufficient malleability to permit changes in the shape of the head gear in response to forceful manipulation by the attending physician. Thus our invention permits the attending physician, by appropriate shaping of the skeletal structure of Fig. 3, to apply the cervical traction to the particular desired portions of the skull and with forces apportioned in accordance with the needs of the patient.

Further, additional control over the distribution of forces on the patient's skull may be obtained by adjustment of the locking strap 13, since by tightening that strap the attending physician can cause the major portion of the force to be applied to the chin, if desired, and, on the other hand, by loosening the strap, he can relieve the chin almost entirely and cause the stretching forces to be applied against the sides of the jaws and, particularly, on the occipital portion of the skull.

While we have, in the present invention, described at some length a particular embodiment of our invention, it is to be understood that such description is illustrative only, and that the scope of the invention is to be determined primarily with reference to the appended claims.

We claim:

1. A cervical traction device comprising a pair of curved members shaped generally to conform to the human skull, said members being generally symmetrical, hinged together, and being provided with converging zones adapted to engage the sides and occipital regions of the skull, said device having also means for applying thereto pulling force on the end shaped to conform to the upper portion of the human skull.

2. Apparatus according to claim 1 formed from resilient pad material and a framework of semi-rigid metal, said padded material being secured to the inner face of said framework, whereby the distribution of pressures on the padded material against the skull of a patient is controlled by the configuration of said framework.

3. Apparatus according to claim 1 wherein adjustable locking means are provided for controlling the degree of maximum separation of said curved members, the distribution of force exerted by said device between the chin, the sides of the skull, and the occipital region of the skull being affected by the position of said adjustable locking means.

4. A device for cervical traction comprising a skeleton formed from relatively rigid elongated metal elements rigidly secured together, said skeleton being rigid under such forces as are normally applied to the skull of a patient in administering cervical traction but being yieldable in response to strong manipulative forces applied to change its shape, force-coupling means carried by said skeleton adapted for application to said device of external longitudinal forces, and padding means carried at least partially within said skeleton adapted to cushion the transmission of forces between said skeleton and the skull of a patient, said skeleton having a converging zone near its lower extremity adapted to press against and transmit force to the mandibles and the occipital region of the skull.

No references cited.