Dec. 14, 1937. P. W. HANICKE 2,102,069

CERVICAL SPLINT

Filed June 17, 1936

Fig. 3.

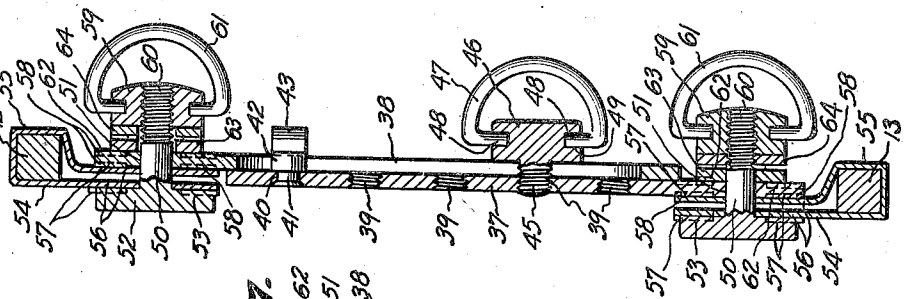


Fig. 7.

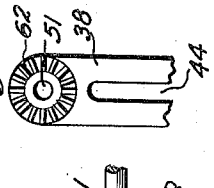


Fig. 4.

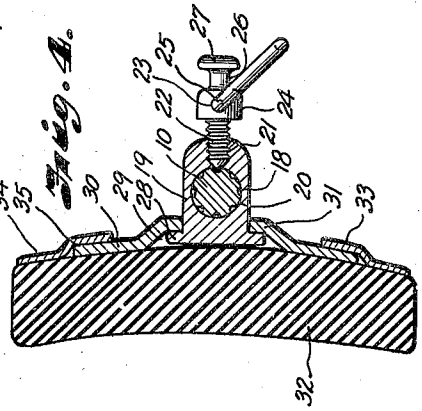


Fig. 2.

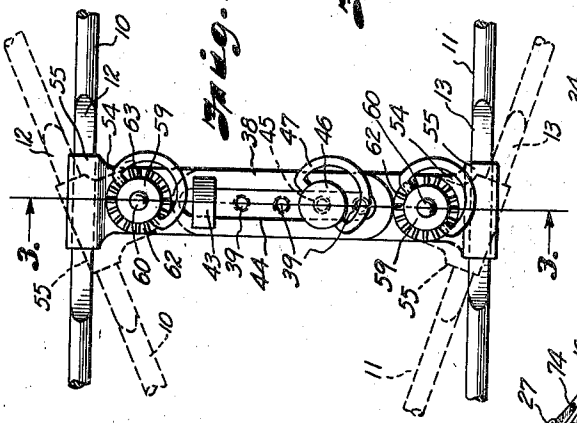


Fig. 5.

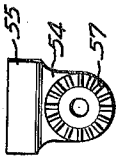
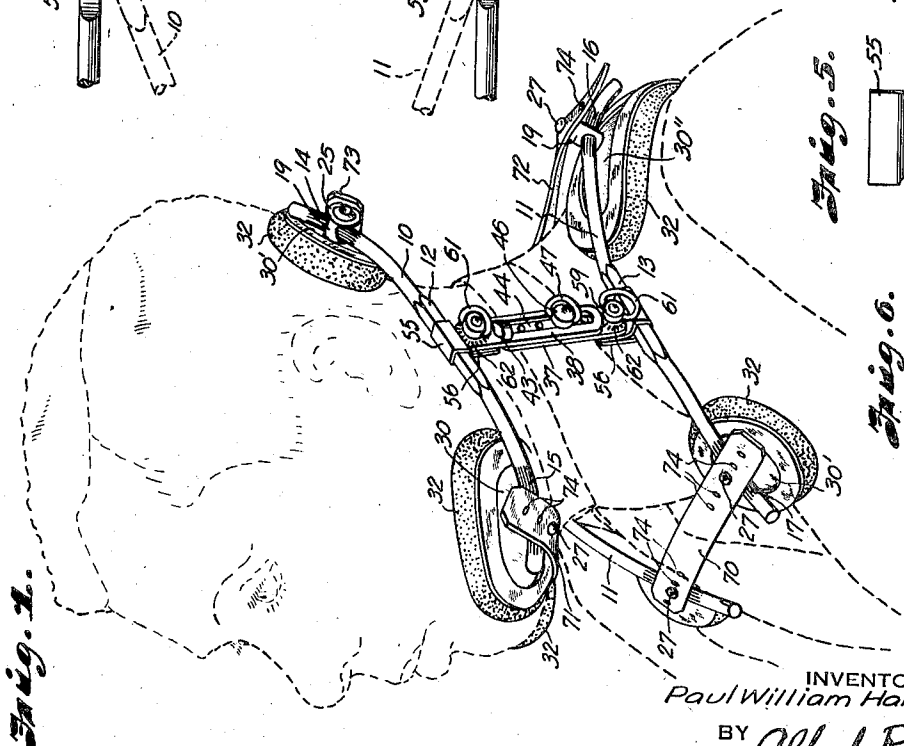


Fig. 6.



Fig. 1.



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UNITED STATES PATENT OFFICE

2,102,069

CERVICAL SPLINT

Paul William Hanicke, Kansas City, Mo.

Application June 17, 1936, Serial No. 85,743

22 Claims. (Cl. 128—87)

My invention relates to apparatus for the immobilization of the cervical vertebrae after a fracture thereof has occurred, to hold the same in such position as to prevent pressure on or injury to the spinal cord. One of the purposes of my invention is to provide an apparatus of the above mentioned character that is simple in construction and which is adjustable in any desired manner to obtain a desired position of the head relative to the body of the person to whom the apparatus is applied so as to hold a fractured vertebra in proper position for unison. The apparatus is so constructed as to contact the head and body of the wearer thereof only at necessary points to thus avoid unnecessary discomfort for the wearer thereof.

Generally, my improved apparatus comprises body-engaging members and head-engaging members, there being a pair of each of said members, and the paired body-engaging and paired head-engaging members being connected together in such a manner as to limit the movement of the same away from each other. The head-engaging and body-engaging members each comprise pads that engage portions of the head and body, respectively, ductile rod-like members connecting the pads mounted on pad holders, and means for connecting the ductile rod-like members so that the same can be moved toward and away from each other to obtain any desired spacing of the body-engaging members from the head-engaging members. Also the apparatus comprises means for adjusting the pad carrying members substantially universally relative to the rod-like members, and the rod-like members relative to each other not only in spacing, but in angular relationship, and in various other ways.

The weight of the head is, of course, transferred from the head to the body through the pads and the framework comprising the rod-like members and connecting means. It is a purpose of my invention to provide a mounting for the pads whereby the same can be shifted on the rod-like members to increase or decrease the spacing of the same on the rod-like members, and to provide means for varying the angular position of said pads around the rod-like members so that the same can be made to fit accurately the contour of the head, chin, shoulder, or other part with which the same may be engaging.

It is a further purpose of my invention to provide a device of the above mentioned character that is provided with means for adjusting the rod-like members, or frame members, relative to each other so as to obtain any desired position either in angular relation, or spacing, of the head engaging portion relative to the body engaging portion that may be desirable, or necessary, as indicated by the nature of the fracture.

It is a further purpose of my invention to provide pads of the above mentioned character, which are made of sponge rubber and which may be replaced when desired.

It is a further purpose of my invention to make the rod-like, or frame, members of ductile material, such as aluminum rod, so that the same can be bent to the contour of the shoulder, or chest, or the shape of the head, to obtain a more proper bearing of the pads on the head, chest and shoulder to fix the head in proper adjusted position relative to the body to obtain the desired position of the fractured portions of the vertebrae for proper setting of the fracture and prevention of injury to the spinal cord.

One of the important advantages of my invention is that all of the parts thereof that are in such relationship to the body of the person to whom the apparatus is applied that the same might interfere with X-ray photography of the fracture, are made of material through which the X-ray will pass, such as aluminum, and sponge rubber, and similar material, the rods and pad holders being both made of aluminum.

To obtain the desired adjustment of the pads relative to the frame members of the device, said pads are mounted so that the holders therefor may be rotated about their own axes, about the axes of the rods, and simultaneously clamped in adjusted position to prevent rotation thereof about either of the axes and movement thereof along the rods.

Other objects and advantages of my invention will appear as the description of the accompanying drawing proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawing:

Fig. 1 is a view in perspective, showing my improved apparatus applied, the head and shoulders of the person to whom the apparatus is applied being shown in dotted outline.

Fig. 2 is a fragmentary side elevational view of my improved apparatus, on an enlarged scale.

Fig. 3 is a section thereof taken on the line 3—3 of Fig. 2, on a still larger scale.

Fig. 4 is a transverse sectional view through

one of the pad holders and pads and associated parts on substantially the same scale as Fig. 3.

Fig. 5 is a side view taken substantially on the same scale as Fig. 2 of the clamping bracket connecting the rods with the adjustable connecting bar.

Fig. 6 is an end view of the stud for connecting the bracket and bar, as viewed from the right of Fig. 3, and

Fig. 7 is a fragmentary face view of one end of the connecting bar, as viewed from the left of Fig. 3.

Referring in detail to the drawing, my improved apparatus comprises the rod-like members 10 and 11, there being a pair of the rod-like members 10, one on each side of the head, and a pair of the rod-like members 11, one on each side of the neck of the wearer of the apparatus, each adjacent one of the shoulders of the wearer thereof. Said rod-like members are made of aluminum of such ductility that the same can be readily bent to a desired position. The central portions of the rod-like members 10 and 11 are provided with squared portions 12 and 13, respectively, and with roughened, or serrated, portions 14, 15, 16 and 17. Except for their shape, the rod-like members 10 and 11 are substantially alike, although the same may be of different length, if this is found to be desirable. The serrations are, preferably, formed by cutting shallow grooves 18 in the rod-like members 10 and 11 near their ends. The connection between each rod-like member 10 and each of the pad members, and the connection between each rod-like member 11 and each of the pad members, is the same, so the same reference numerals will be applied to the various parts of the connecting means for each of the pad members.

The rod-like members 10 have sleeve-like members 19 mounted thereon, through the openings 20 of which the rod-like members 10 and 11, respectively, extend. A threaded opening 21 is provided in each sleeve-like member 19, which intersects the opening 20 and in which is threaded a clamping screw 22. Pivotally mounted in an opening 23 in the head portion 24 of said clamping screw, is a ring 25, which ring is utilized for turning the clamping screw. A button having a shank portion 26 and a head portion 27 is also provided on the head of the clamping screw. The opposite end of the sleeve-like member 19 to that having the screw threaded opening 21 is provided with a round flange forming a flat head 28 thereon, which is mounted in a circular socket 29 formed in the pad carrying member 30 by pressing out a portion 31 thereof. The member 30 is thus rotatable on the member 19, or swivelled thereon.

However, it will be obvious, that the clamping screw 22, when tightened up, will not only clamp the sleeve-like member 19 to the rod-like member 10, or 11, as the case may be, but will also draw the head 28 toward the rod-like member 10, or 11, so as to clamp the head 28 on the socket 29 and prevent rotation of the pad carrier 30 relative to the sleeve-like member 19. Thus, while each of the pad holders comprising the sleeve-like members 19 and the carrier members 30 are adjustable by longitudinal sliding movement on the rod-like members 10 and 11, and by rotation about the rod-like members 10 and 11 so as to obtain any desired spacing of said holders on said rod-like members, and any desired angular relationship of said holders to said rod-like members, and to each other, and any desired position of the pads carried by the carriers 30 relative to the axis of the sleeve-like members 19, tightening of the clamping screw 22 will hold said members simultaneously from all such movements and clamp the same in whatever adjusted position these may be placed.

Each holder is provided with a pad of cushioning material, such as sponge rubber, indicated by the numeral 32, and said pads correspond generally to the shape of the carriers 30, which carriers may be of an oblong shape, as indicated for the carrier 30 in Fig. 1, the same being somewhat curved in cross section so as to fit somewhat to the curvature of the jaw bone adjacent the chin of the wearer, or the same may be made of substantially flat disk-like character, such as the members 30', indicated in Fig. 1 as engaging the back of the head and the chest of the wearer of the device, or the same may be elongated and somewhat curved in cross section in a longitudinal direction, as indicated by the numeral 30'' for the shoulder-engaging pad in Fig. 1. The only difference in the construction of the various pad carriers, however, is in the shape and size of the body portions thereof. The mounting of the same and the engagement of the pads therewith is identical in all cases.

Said pads are provided with flexible pocket forming members 33 thereon, which extend around the edges of said pad members on the rear faces thereof, being secured to said rear faces adjacent the peripheral edges of the same at 34 by any suitable adhesive and forming annular, or uninterrupted, curved, flexible flanges on said members 32, which are adapted to receive the peripheral edge portions 35 of the carrier 30, 30' or 30'', the pad-like members 32 being made of sponge rubber for such deformability and elasticity that the pockets formed by the flexible flanges 33, of leather, or similar material, can be readily engaged with the members 30, 30' or 30'', as the case may be, and will be held in position thereon against accidental removal, but can be removed, when desired, for replacement of pads that may have become soiled with new pads. Thus the apparatus can be supplied with an entirely new set of pads for every wearer thereof if this is desired. The rod-like members 10 and 11 on each side of the device are adjustably connected together by the vertically extending, or substantially vertically extending connecting member having the overlapping flat members 37 and 38.

The member 37 is provided with a plurality of screw threaded openings 39 and with an opening 40, in which is riveted a shank portion 41 of a headed stud 42 having a transversely extending head portion 43, which is considerably wider than a slot 44 provided in the member 38. The slot 44 aligns with the threaded openings 39 and a threaded clamping screw 45 is engaged with any desired one of the threaded openings 39 and has a head 46 thereon that engages the face of the member 38 adjacent the slot 44. A split ring-like member 47 is provided with end portions 48 that are pivotally mounted in openings 49 in the head 46 to provide means for readily turning the clamping screw. It will be seen that by means of the clamping screw 45 and the headed member 42 the two flat bar-like members 37 and 38 can be held in a fixed adjusted position to obtain any desired length for the connecting member formed of the members 37 and 38. Each of the members 37 and 38 is provided with

means for connecting the same with the rod-like member 10 or 11, as the case may be. Said adjustable connecting means are all substantially alike so the description of one thereof will suffice for all.

Said adjustable connecting means comprises a headed clamping screw 50, which extends through an opening 51 provided in either the member 37 or the member 38, the head 52 of said clamping screw being radially grooved, or serrated, on the inner face 53 thereof. Cooperating with each headed clamping member 50 is a sheet metal clamping member 54, which is provided with a rectangular sleeve portion 55 that fits around the squared portion 12 of the rod-like member 10, or the rod-like member 11, as the case may be. The clamping member 54 is somewhat resilient and has a pair of ears 56 thereon that are perforated to receive the shank portion of the clamping screw 50. Said ears are provided with corrugations 57 radiating from the openings through which the headed elements 50 extend, said radially extending corrugations corresponding to the radial grooves, or serrations, in the rear face of the head 52 at 53 and being adapted to be received therein. The members 37 and 38 are each also provided with serrated portions, or radiating grooves, 58 extending around the opening 51, with which a set of radiating corrugations 57 on each member 54 is adapted to engage.

It will be obvious that after the nut 59 on the clamping member is tightened down on the screw threaded portion 60 thereof by means of the split ring-like member 61, the ears 56 will be drawn toward each other and the corrugations 57 will engage with the serrations 53 and 58 so as to hold the clamp-like bracket members 54 in fixed position relative to the members 37 and 38, respectively, but that said members 54 can be adjusted to any angular position on said members before the clamping action of the clamping member is brought into play. Each of the members 37 and 38 is also provided with radiating serrations, or grooves 62 therein, on the opposite face thereof from the serrations 58 and a radially corrugated washer 63 is mounted on the threaded stem 60 adjacent the member 37 or 38, as the case may be, and acts as a lock washer to further clamp the parts against relative movement, a plain washer 64 being provided between the washer 63 and the nut 59 on the headed clamping member 50. It will be obvious that after the nut 59 is screwed down on the clamping member 50 and the ears 56 on the bracket member 54 are drawn toward each other the rectangular sleeve portion 55 will be fixedly clamped on the squared portion 12 of the rod-like member 10, or 11, as the case may be, but that the squared sleeve portion 55 can be slid on the squared portion 12 when the clamping member is released, thus providing a longitudinal adjustment of the connecting member, made up of the parts 37 and 38 and the bracket members 54, on the rod-like member 10, or 11, as the case may be.

Flexible members, such as the straps 70, 71, 72 and 73, are provided for connecting the apparatus on one side of the head and neck of the wearer thereof, with the apparatus on the other side of the head and neck of the wearer thereof, the straps 71 and 73 connecting the two rod-like members 10 and the straps 70 and 72 connecting the two rod-like members 11. The transverse spacing of the rod-like members 10 and 11 is obtained by means of said flexible members, or straps, 70, 71, 72 and 73, which are provided with rows of openings 74 therein, with any one of which the headed buttons 27 of the pad carriers, or pad holders, may be engaged, to obtain the desired spacing of the rod-like members 11 and rod-like members 10 from each other transversely of the device. Thus the apparatus is readily adjustable in any desired manner and readily placed in proper position on the head, chest and shoulders of the person to whom the same is to be applied, and also readily removed when this is desirable. One side of the apparatus comprising the rod-like members 10 and 11 and the pads carried thereby can be removed from supporting position without disturbing the other side thereof by unbuttoning the flexible straps 70, 71, 72 and 73. The members 10, 11, 19, 30, 30', 30'' and 52 are all made of aluminum. It will thus be seen that there will be no parts made of such a metal as would interfere with the taking of X-ray photographs in such a position as to interfere with the taking of such photographs of the fractured vertebrae when the supporting apparatus is in position to support the fractured vertebrae.

What I claim is:—

1. An apparatus of the character described, comprising an elongated head-engaging member, an elongated body-engaging member and a single spacing member connecting said head-engaging member with said body-engaging member, said head-engaging member being angularly adjustable relative to said spacing member.

2. An apparatus of the character described, comprising an elongated head-engaging member, an elongated body-engaging member and a single spacing member connecting said head-engaging member with said body-engaging member, said body-engaging member being angularly adjustable relative to said spacing member.

3. An apparatus of the character described, comprising an elongated head-engaging member, a body-engaging member and a spacing member connecting said head-engaging member with said body-engaging member, said spacing member being adjustable longitudinally of said head-engaging member.

4. An apparatus of the character described, comprising a head-engaging member, a body-engaging member and a spacing member connecting said head-engaging member with said body-engaging member, said spacing member being adjustabble longitudinally of said body engaging member.

5. An apparatus of the character described, comprising a head-engaging member, a body engaging member, spaced body-engaging pads on said body-engaging member, means for adjusting the position of said pads on said body-engaging member and a spacing member connecting said head-engaging member with said body-engaging member.

6. An apparatus of the character described, comprising an elongated head-engaging member, a body-engaging member, head-engaging pads on said head-engaging member, means for adjusting the position of said pads longitudinally on said member and a single spacing member connecting said head-engaging member with said body-engaging member.

7. An apparatus of the character described, comprising a head-engaging member, a body engaging member, spaced body-engaging pads on said body-engaging member, means for adjusting the position of said pads on said member in a

plurality of different directions and a spacing member connecting said head-engaging member with said body-engaging member.

8. An apparatus of the character described, comprising an elongated head-engaging member, a body-engaging member, spaced head-engaging pads on said head-engaging member, means for adjusting the position of said pads relative to said member in a plurality of different directions and a spacing member connecting said head-engaging member with said body-engaging member.

9. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members, each comprising a frame member, pad holders, pads on said holders, and means for longitudinally adjustably mounting said pad holders on said frame member, and a spacing member connecting said head-engaging member with said body-engaging member.

10. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members, each comprising a frame member, pad holders, pads on said holders, and means for mounting said pad holders on said frame member for relative angular adjustment, and a spacing member connecting said head-engaging member with said body-engaging member.

11. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising a frame member, pad holders and means for mounting each pad holder on its frame member for rotational adjustment about an axis transverse to said frame member, and a spacing member connecting said head-engaging member with said body-engaging member.

12. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising a frame member, pad holders and means for mounting each pad holder on its frame member for longitudinal adjustment on said frame member, and rotational adjustment about an axis transverse to said frame member, and the pad holders on each frame angularly relative to each other, comprising a single clamping means for holding each pad holder in adjusted position, and a spacing member connecting said head-engaging member with said body-engaging member.

13. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising an elongated ductile rod-like frame member having polygonal portions between the ends thereof, and means connecting said rod-like frame members comprising a pair of overlapping adjustably connected members having polygonal sleeve-like brackets on the ends thereof, slidably mounted on the polygonal portions of said rod-like members and means for clamping said brackets in fixed position on said rod-like members.

14. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising an elongated rod-like frame member having polygonal portions between the ends thereof, and means connecting said rod-like frame members comprising a pair of overlapping adjustably connected members having polygonal sleeve-like brackets swingably mounted on the ends thereof and slidably mounted on the polygonal portions of said rod-like members, and means for simultaneously clamping said brackets in fixed position on said rod-like members and said brackets in fixed position on said overlapping adjustably connected members.

15. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising an elongated rod-like frame member having serrated portions near the ends thereof, means connecting said rod-like members between the ends thereof, and pad holders comprising sleeve portions mounted for sliding and turning adjustment on said serrated portions of said rod-like members, and means for simultaneously clamping said sleeve portions against sliding and turning movement on said rod-like members.

16. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising an elongated, ductile, rod-like frame member, means connecting said rod-like members between the ends thereof, said rod-like members being otherwise entirely free of each other, pad holders adjustably mounted on said rod-like members near the ends thereof and pads on said pad holders.

17. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising an elongated, rod-like frame member, sleeve portions mounted for sliding and turning adjustment on said rod-like members, pad carriers swivelled on said sleeve portions, and means for clamping said pad carriers in fixed position on said sleeve portions.

18. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body-engaging members each comprising an elongated rod-like frame member having serrated portions near the ends thereof, means connecting said rod-like members between the ends thereof, and pad holders comprising sleeve portions mounted for sliding and turning adjustment on said serrated portions of said rod-like members, pad carriers swivelled on said sleeve portions, and means for simultaneously clamping said sleeve portions against sliding and turning movement on said rod-like members and said pad carriers in fixed position on said sleeve portions.

19. An apparatus of the character described, comprising a head-engaging member, a body-engaging member, said head-engaging and body engaging members each comprising an elongated rod-like frame member, means connecting said rod-like members between the ends thereof, and pad holders comprising sleeve portions mounted for sliding and turning adjustment on said rod-like members, pad carriers mounted on said sleeve portions comprising disk-like members, and pads of compressible material having flexible marginal means thereon engaging around the edges of said disk-like members to detachably mount said pads on said holders.

20. An apparatus of the character described, comprising a pair of unconnected head-engaging members, a pair of body-engaging members, a pair of spacing members, each spacing member connecting a head-engaging member and a body-

engaging member, and flexible means connecting said body-engaging members.

21. An apparatus of the character described, comprising a pair of unconnected head-engaging members, a pair of body-engaging members, a pair of spacing members, each spacing member connecting a head-engaging member and a body-engaging member, said body-engaging members being each independently adjustable relative to said spacing members and said head-engaging members being each independently adjustable relative to said spacing members, and flexible means connecting said body-engaging members, said flexible means being adjustable.

22. An apparatus of the character described, comprising a pair of elongated members having head-engaging means thereon, said elongated members having the corresponding ends thereof spaced from each other and unconnected, a pair of elongated members having body-engaging means thereon, said last mentioned elongated members having the corresponding ends thereof spaced from each other, a pair of spacing members, each spacing member connecting an intermediate portion of an elongated member having head-engaging means thereon with an intermediate portion of an elongated member having body-engaging means thereon, and transversely extending adjustable flexible members connecting the corresponding ends of the elongated members having said body-engaging means thereon.

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