

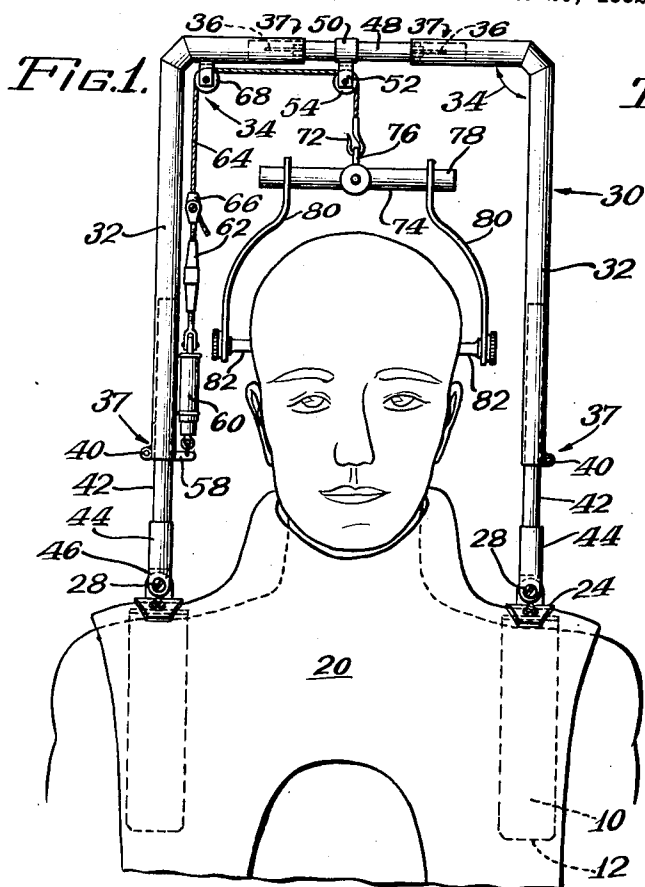
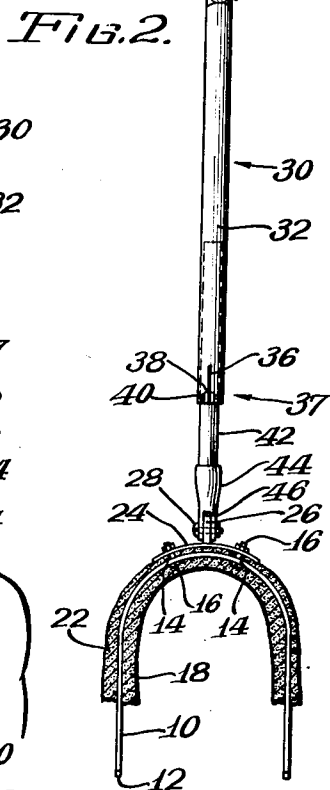
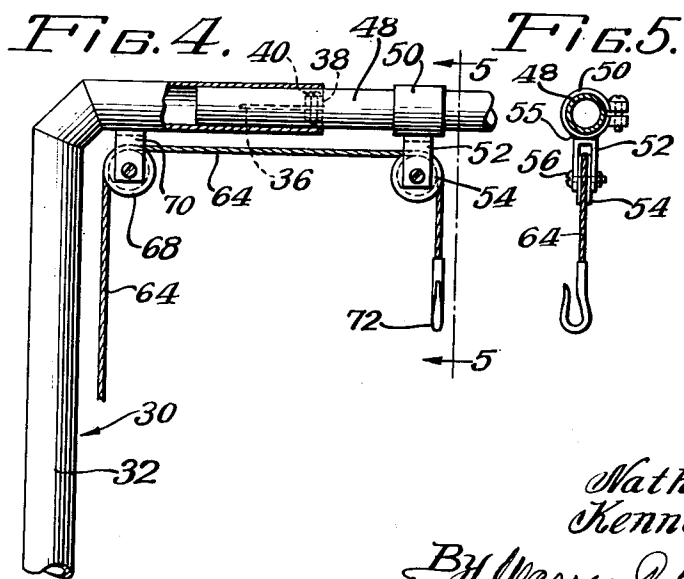
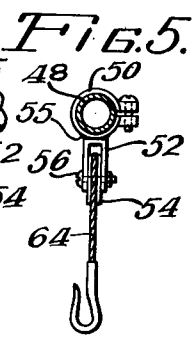
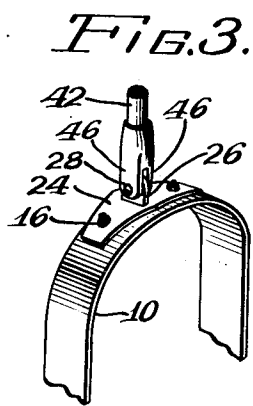
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SURGICAL SPINAL REDUCTION SPLINT

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SURGICAL SPINAL REDUCTION SPLINT

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Our invention relates generally to splints and more particularly, to an improved spinal reduction splint.

The splint directed to this purpose in common practice consists of a pair of collars linked usually by four turnbuckles. One of the collars fits under the chin and base of the neck of the patient and the other rests on the patient's shoulders. The turnbuckles are turned to separate the two collars, so to apply expansive force as between the head and shoulders.

This device, while compact and generally effective, has certain defects which make it generally objectionable to the wearer, and limitations which render its use impossible under some circumstances. For instance, other head injuries such as broken jaws, injured skulls, often accompany fractured spines. It is evident that the conventional splint above cannot be used in such cases. Other drawbacks are the high degree of discomfort which accompanies the wearing of these braces and the difficulty of eating, drinking and speaking. Further, there is no way of obtaining precisely even exerted pressure as between the several turnbuckles, nor when a particular pressure is desired is there any way of determining it.

There are spinal reduction techniques which are directed variously to the correction of some of these defects, but they do not meet the prime requisite of being ambulatory, involving most often a procedure for anchoring a patient in a fixed position to a bed while at the same time exerting a pull on the patient's head.

Therefore, it is our primary objective to provide an ambulatory spinal reduction device which overcomes the above described limitations and drawbacks of the conventional ambulatory splint in being suitable for use in a wider range of circumstances, of being more comfortable in the wearing and permitting substantially normal eating and drinking and talking, of being more versatile in the direction and the force of pull and affording greater assurance that the direction of traction will be correct, and in making provision for the application of a constant and measurable tractive force.

Conspicuous advantages of our splint are its structural simplicity and strength, its wide range of adjustment, not only as to tractive direction and force as brought out above, but to its suitability for use on virtually any bodily frame as well, its utility in connection with a wide variety of head grasping procedures, and its firm connection with the shoulders of the patient.

Other objects and advantages of our invention will be apparent from the following description and drawings of a preferred embodiment thereof, of which

Fig. 1 is a front elevation showing our splint as it is employed on a patient,

Fig. 2 is a side elevation showing the manner in which our splint is secured to a cast,

Fig. 3 is an isometric view of that portion of our splint which fits over the shoulder,

Fig. 4 is an enlarged elevation, broken away to a section in part, of the upper left portion of Fig. 1, and

Fig. 5 is a section which may be considered as being taken substantially along the line 5—5 of Fig. 4 looking in the direction of the arrows.

The illustrated embodiment of our invention is preferably made throughout of a stainless steel and consists first of a pair of shoulder straps 10 which are formed of relatively wide steel strips bent into a semicircle with substantially extending ends 12 to give a firm base to the structure generally. The radius of the curvature is somewhat greater than the general curvature of an average

shoulder, but the curvature of the straps may be changed by manual bending to fit the circumstances of differing cases. The straps are perforated at 14 for the reception of bolts 16. In practice, a person suffering, for example, a cracked cervical vertebra will be first encased in an inner portion 18 of a cast 20 which extends over the shoulders. This inner portion 18 should be built up into a relatively smooth curve over the shoulders to ensure the straps 10 fitting flat against it. As was indicated above, the straps 10 may be bent to accommodate different cast shapes occasioned by different shoulder sizes.

The straps 10 with bolts 16 in place, heads inward, are then placed on the still wet and plastic cast, and the outer cast portion 22 added so as to embed the straps 10 firmly in the cast. The ends of the bolts 16 will protrude out of the finished cast.

A pair of base plates 24 which are slightly curved and perforated with holes to align with the outstanding bolt 16 ends comprise the next elements of our device. These members are adapted to be seated on the completed, but not fully set, cast and to be bolted thereagainst and to the straps 10 by bolts 16. The base plates 24 have outstanding transverse ears 26 perforated for the reception of another bolt or pin 28 formed centrally thereon.

The remainder of the structure includes an arch-like frame 30 amounting in general to three sides of a rectangle. It comprises a pair of tubular frame members 32 which are formed to have a right angle 34 therein by bending, welding, appropriate pipe fittings, etc. such that the members of one side of the angle constitute a part of the sides of the frame and on the other side of the angle, part of the top of the frame. These members are slit at their ends as at 36, and perforated ears 38 adapted to have passed therethrough bolts 40 are welded or otherwise secured to the extremities of the members 32 on either side of the slits 36 to adapt the ends 37 of the members for clamping purposes. The sides of the frame also include tubular legs 42 which are adapted to fit closely inside the members 32 so as to be telescopically slidable therein when the bolts 40 are loosened, and seized tightly by the clamping ends 37 when the bolts are tightened. The tubular legs incorporate, in addition to the tubular portion proper, fittings 44 secured to the lower end thereof by welding or other appropriate means which provide at their lower extremity spaced perforated ears 46 which, with the ears 26 and bolts 28, provide the means for attaching the frame to the base plates 24.

A cross-piece 48 constitutes the remainder of the frame, this member likewise being telescopically slidable in the opposing other ends of the frame members 32 or alternatively capable of being clamped by the clamping ends 37 thereof.

Generally centrally of the cross-piece 48 a clamp 50 is situated which carries a hanger 52 for a pulley 54. The hanger is a simple U-shaped member welded at its base 55 to the clamp 50 and having its arms perforated for the reception of a bolt 56 on which the pulley is mounted.

One of the frame members 32 has secured thereto an outstanding horizontal arm 58 adjacent the lower end thereof. To this may be fastened one end of a spring scale 60 of the general type of a common fishing scale which may be graduated to read in any desired units, pounds probably being as suitable as any. The other end is connected to one end of a turnbuckle 62 and the other end of the cable 64 to the turnbuckle is accomplished by a clamp 66 such that the cable may be grasped at any point to achieve any desired effective cable length.

That frame member 32 which carries the arm 58 has also welded thereto a pulley 68 in a hanger 70 adjacent the bend or corner 34 similar to the pulley 54 and hanger 52. The cable, extending from the clamp 66, is entrained over the pulley 68 and the pulley 54 and has at its free end a hook 72. The hook then is connected to the device which is secured to the head and through which the desired traction is exerted. The particular device illustrated is a head clamp 74 which is in common use in the medical profession and includes a ring 76, to which

the hook 72 is secured, centrally located on a bar 78. Two arms 80 are adjustably mounted at one end on the bar, and at the other end carry opposite attachment pins 82 which are imbedded directly in the skull bone. It will be evident, however, that a variety of head clamps or slings may be employed depending on the nature of the injury and the preferences of the physician.

The use of the device embodying our invention will be largely self evident from the above description. In the case of a person suffering, for example, a cracked vertebra, the initial step will probably be the attachment of the head clamp 74 of whatever description and the patient will be placed in a stationary traction device for the application of the cast 20 which, it will be noted, fits closely up under the chin and to the sides thereof to inhibit movement of the head, but sufficient clearance is allowed so that there is no pressure or even direct contact between the head and cast. At a time when the cast is only partially completed, however, sufficient to constitute the inner part 18, the straps 10 with the bolts 16 in place are bent to conform to the inner cast portion and placed thereon over the shoulders. The outer portion 22 is then added to complete the cast, the straps being completely and firmly embedded therein and the end of the bolts 16 protruding therefrom. Before the finished cast has set, the base plates 24 are bolted to the protruding bolt ends 16 and drawn down against the cast to form firm seats for the plates in that part of the cast between the straps and plates. The cast is then permitted to set and dry.

After it has properly set, the frame is attached to the base plates 24 by bolts 28, the necessary adjustments being made in the telescoping joints 37 associated with the cross-piece 48 to fit the spacing of the plates 24 and to locate as desired the pulley 54 centrally or elsewhere within the frame 30. Likewise the joints 37 in the sides of the frame are adjusted to bring the cross-piece as close as possible to the patient's head for convenience in wearing while at the same time leaving sufficient space for the clamp, hook and cable under circumstances of maximum desired traction. The telescoping joints are then tightened to make the frame fixed and rigid. To conclude the process, the hook 72 is secured to the head clamp 74, the cable 64 is adjusted in the clamp 66 to remove any excessive slack therein, and the turnbuckle 62 is tightened to effect the desired degree of traction on the head, the tractive force being readable on the spring scale 60.

In this fashion is provided a traction device which possesses all the advantages mentioned above and which is capable of employment in a wide variety of circumstances. It is of course understood that we do not desire to be limited by the specific disclosure herein. Many modifications are possible among which might be mentioned entraining and enclosing the cable, scale, and turnbuckle within the tubular frame members 30, the members having openings to permit adjustment and reading of the device. The limitations of our invention are set forth in the following claims:

We claim:

1. An ambulatory spinal traction device for holding under traction the head of a patient and adapted to be employed with means for seizing the head of said patient, said patient being provided with a cast which extends

over the shoulders of said patient comprising, on each shoulder, a first arched member embedded and wholly enclosed in said cast over the shoulder, a second arched member situated on the exterior of the cast to overlie a substantial portion of said first member, means securing together said members to grasp that portion of said cast between said members, an arch-like frame secured at its free ends to said second members and to extend over the head of the patient, connecting means secured to said seizing means extending from said seizing means to a point on said arch above the head of said patient, and anchored on said arch, and means attached to said connecting means for adjustably shortening said connecting means.

2. An ambulatory spinal traction device for holding under traction the head of a patient and adapted to be employed with means for seizing the head of said patient comprising two members formed to have a right angle therein to define a lower vertical end and an upper horizontal end, legs telescopically connected with said vertical end of each of said members, a crosspiece telescopically connected at both ends with the horizontal ends of said members, clamping means at each of said telescoping connections, means forming a part of said arch for fixing the free ends of said legs to the shoulders of said patient, said members holding said cross-piece to extend over the head of said patient, connecting means adapted to be secured to said seizing means extending from said seizing means to a point on said cross-piece above the head of said patient, and means attached to said connecting means for adjustably shortening said connecting means.

3. An ambulatory spinal traction device for holding under traction the head of a patient and adapted to be employed with means for seizing the head of said patient, comprising an arch-like frame to extend over the head of said patient, means at the free ends of said arch for fixing the free ends of said frame to the shoulders of said patient, and traction means including a cable adapted at one end to be secured to said seizing means, a pulley overhead on said frame over which said cable is entrained to exert upward force, and means including a turnbuckle adjustably securing the other end of said cable to one side of said frame.

4. The combination set forth in claim 3 which includes additionally in said traction means a spring scale to determine and maintain a fixed tractive force.

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