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SPINAL CLAMP OR SPLINT

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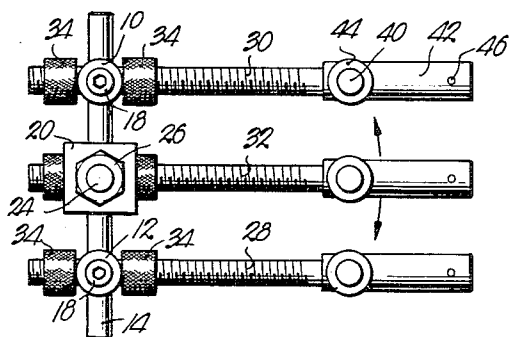


Fig. 1.

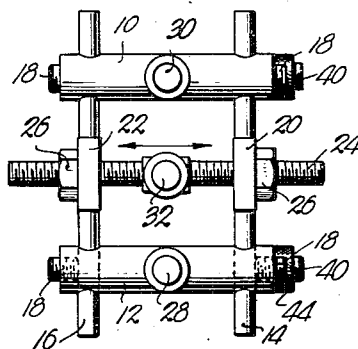


Fig. 3.

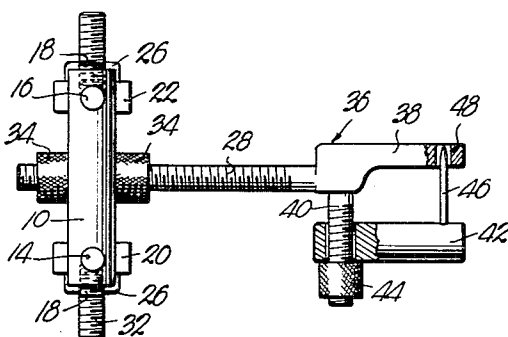


Fig. 2.

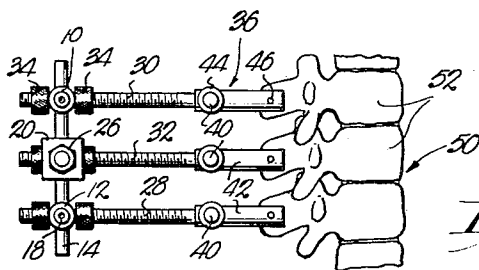


Fig. 4.

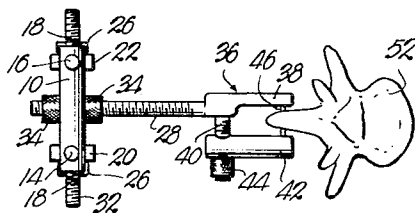


Fig. 5.

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SPINAL CLAMP OR SPLINT

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4 Claims. (Cl. 128—92)

This invention relates to the treatment of the spinal column, and includes a novel clamp or splint having means for attachment directly to the vertebrae for realigning and holding the same in proper position during healing, presenting therefore, one form of structure for carrying out the method of spinal therapy hereof.

The medical profession has heretofore universally accepted the principle that misaligned vertebrae could not be successfully corrected, overlooking the fact that the ligaments of the spine, serving as the primary support for the vertebrae, are attenuable in the same manner as the ligaments of the arm, leg or jaw. I have discovered however, that the misplaced vertebra can be gradually and progressively returned to proper position and, after being held in place for a period of time, it will thereafter normally remain corrected when released.

During treatment in accordance with the principles hereof, one of the opposed spinal ligaments is held taut while the tension on the other ligament is relaxed. After such stretching has continued for a time, the attenuated ligament will retain its new, normal condition and both ligaments will thereafter function in the proper manner to hold the vertebrae in alignment.

It is the primary object of this invention therefore, to provide a method of treatment that includes pulling misplaced vertebrae into place relative to adjacent vertebrae, and holding the same in such aligned position a sufficient period of time to readjust the tension on the opposed ligaments so that the latter will thereafter function alone in the normal manner to hold the previously misaligned vertebrae against misplacement.

The most important object of this invention is to provide a method wherein the realignment step is gradual and progressive, depending on the case, so that the ligament being attenuated will resume its normal tension as the result of the steady, continued pull thereon, and therefore, be less likely to retract and again draw one or more of the vertebrae out of place after release.

Another important object hereof is the provision of a method that employs the use of the vertebrae themselves, i. e. the proper interconnection of the misplaced vertebrae with a pair of adjacent vertebrae as a means of readjustment in the manner above set forth.

It is an object of the present invention to provide a spinal brace having a plurality of vertebra clamps adjustable in a plurality of directions relative to each other, to the end that the misplaced vertebra or vertebrae may be drawn into place and held in a proper position with respect to adjacent vertebrae throughout the time that mending takes place.

Another object hereof is to provide a brace for the spine that includes a plurality of elongated members, each of which is in turn provided with a clamp for one of the spinous processes, which clamping means includes a pair of relatively movable fingers, one of which in turn has an element adapted to pierce said processes.

Other objects of this invention include the way in which

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the elongated members are shiftable along their longitudinal axes; the way in which one of the members is rendered swingable toward and away from adjacent members; the manner of adjusting the members and therefore, the fingers thereon toward and away from each other; and many additional objects including novel details of construction, all of which will be made clear or become apparent as the following specification progresses.

In the drawing:

Figure 1 is a side elevational view of a preferred form of spinal clamp or splint on an enlarged scale for carrying out the method of the present invention.

Fig. 2 is a top plan view thereof.

Fig. 3 is an end elevational view thereof.

Fig. 4 is a side elevational view similar to Fig. 1 on a reduced scale showing the same operably mounted on the vertebrae; and

Fig. 5 is a top plan view illustrating the manner of attachment as in Fig. 4.

The spinal clamp illustrated in the drawing, includes a pair of spaced, elongated, parallel supports or guide rods 14 and 16 for slidably receiving a pair of spaced, parallel crossheads 10 and 12 through the medium of openings provided in the latter, as is clear in Fig. 3. Releasable means for holding the crossheads 10 and 12 against reciprocable movement toward and away from each other with respect to the guide rods 14 and 16, consists of a setscrew 18 at each end of each crosshead 10 and 12 respectively, which normally bears against the corresponding guide rod 14 or 16 as the case may be.

The guide rods 14 and 16 are each provided with a perforated boss intermediate the ends thereof and rigid thereto, said bosses being designated by the numerals 20 and 22 respectively. Bosses 20 and 22 loosely receive a third crosshead 24, for rotation on the longitudinal axis of the crosshead 24 and reciprocation on said axis with respect to the bosses 20 and 22. The crosshead 24 is in the nature of a screw and receives a pair of nuts 26 that bear against the bosses 20 and 22 to releasably hold the crosshead 24 against rotation and reciprocation in the manner aforementioned.

Crossheads 10, 12 and 24 carry elongated bolt members 28, 30 and 32 respectively for reciprocation on their longitudinal axes with respect to the corresponding crossheads. Each crosshead 10, 12 and 24 is provided with an opening for receiving the bolt members 28, 30, and 32 respectively, and each of the last mentioned members is in turn provided with a pair of opposed nuts 34 for releasably and adjustably holding the members 28, 30 and 32 in place with respect to their crossheads. Each member 28, 30 and 32 is provided with clamping means broadly designated by the numeral 36 on one end thereof remote from the nuts 34. Since the three clamping means 36 are identical, only one will be described.

A finger 38 rigid to the member 28, 30 or 32, as the case may be, has a laterally extending, externally threaded projection 40 parallel with the corresponding crosshead 10, 12 and 24 for receiving a second finger 42 that is reciprocable on the extension 40 toward and away from the finger 38. Finger 42 is perforated as shown in Fig. 2 for slidable mounting on the extension 40, and a nut 44 on the extension 40 holds the finger 42 against outward movement away from the finger 38. An elongated piercing element or pin 46 on the finger 42, is aligned with an opening 48 in the finger 38.

The spinal brace is used in the manner illustrated by Figs. 4 and 5 of the drawing, wherein is shown a spinal column 50 having a plurality of vertebrae 52. The fingers 38 and 42 are designed to clamp directly on the spinous processes 54 of each of three vertebrae 52. It is but necessary to manipulate the nut 44 to cause the element 46

to pierce the said spinous process 54 of each vertebra 52 respectively, whereupon the element 46 enters opening 48 as shown in Figs. 2 and 5.

Through use of the various means of adjustment of the component parts of the spinal clamp, it is possible to gradually and progressively realign the misplaced vertebra 52 after attaching the clamping means 36 of member 32 thereto. Loosening of the nuts 34 will permit shifting of the three bolt members 28, 30 and 32 on their longitudinal axes with respect to the crossheads 10, 12 and 24. Likewise, loosening of the setscrews 18 permits the surgeon to shift the crossheads 10 and 12 toward or away from each other. The bolt member 32 is not only shiftable with respect to crosshead 24 by manipulation of nuts 34 thereof, but can be shifted with respect to guides 14 and 16 to either reciprocate crosshead 24 relative to the bosses 20 and 22, or to swing the clamping means 36 on the member 32 in the direction of the arrows shown in Fig. 1 of the drawing. The arrow in Fig. 3 of the drawing, indicates the manner of shifting the screw 24 with respect to the supports 14 and 16. It is manifest that once the three vertebrae 52 are relatively aligned as shown in Fig. 4 of the drawing, tightening of all of the nuts 26, 34 and 44, as well as the setscrews 18, renders all of the component parts of the clamp relatively immovable, and the originally misplaced vertebra 52 cannot shift in any direction with respect to the two outermost vertebrae 52 while the patient changes positions.

It is clear from the above that the method hereof includes the step of making an incision to expose the spinous processes of the misplaced vertebrae as well as those of a pair of properly aligned vertebrae. In this connection, although the drawings hereof illustrate a clamp for realigning but one vertebra, it is obvious that the clamp could easily be modified to permit treatment wherein a number of vertebrae needing correction would be replaced simultaneously if desired.

In some cases it may be possible to attach the clamp and immediately draw the misplaced vertebra into place. More often however, the condition will have existed for a rather long period of time, one of the ligaments being stretched or attenuated abnormally and the opposed ligament being relaxed, and therefore, substantially shorter than normal. The word "attenuation" is used herein to indicate either abnormal elongation of a ligament or the stretching of a ligament from an abnormally shortened condition to a normal condition. The shortened ligament must be attenuated gradually, otherwise upon release of the clamp it will tend to resume its shorter condition and pull the vertebra being corrected back toward the incorrect, misaligned position.

In accordance with the method hereof therefore, the clamp is manipulated periodically in the manner above explained, each time drawing the misplaced vertebra nearer the correct position, and each time placing an increased pull or tension on the ligament that became shortened and caused the original misplacement.

After the vertebrae are finally brought into alignment, the clamp is left in place until "healing" is complete, it being understood that throughout the time the clamp is attached, one of the ligaments is under constant tension and the tension on the other, abnormally stretched ligament is relaxed. Both ligaments reassume their normal,

balanced tension on opposite sides of the vertebrae to hold the latter in proper alignment, whereupon the clamp may be removed, and the original incision sutured for healing.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. A spinal brace comprising a pair of spaced, parallel, elongated guide rods; three spaced, parallel, elongated cross-heads having their longitudinal axes in substantially coplanar relationship; means shiftable mounting each of the outermost pair of said cross-heads respectively on the guide rods for reciprocation toward and away from each other along the longitudinal axes of the guide rods with the longitudinal axes of the cross-heads perpendicular to the longitudinal axes of the guide rods; means releasably holding said pair of cross-heads upon the guide rods to maintain a predetermined relative positioning between said pair of cross-heads and to hold the guide rods in spaced parallelism; means rigid to each guide rod respectively, shiftable mounting the remaining cross-head on the guide rods between said pair of cross-heads for reciprocation along and rotation about its longitudinal axis with the longitudinal axis of the remaining cross-head perpendicular to the longitudinal axes of the guide rods; an elongated member for each cross-head respectively; means mounting each member on a corresponding cross-head between said guide rods in perpendicularly extending relationship to its cross-head for reciprocation of the member along and rotation about its longitudinal axis; and structure on each member respectively for releasably holding the spinous process of a vertebra.

2. A spinal brace as set forth in claim 1, wherein each of said structures includes a pair of elongated, spaced, parallel fingers, means mounting the fingers on the member for relative shifting movement toward and away from each other, and an elongated, pointed pin on one of the fingers having a length for piercing and extending through the dorsal process of a vertebra, there being an opening in the other finger for clearing said pin.

3. A spinal brace as set forth in claim 1 wherein each of said structures includes a pair of fingers, each member having a device mounting one of the fingers thereof for movement rectilinearly toward and away from the other finger thereof; and means on each device respectively for holding the fingers attached to a dorsal process of a vertebra.

4. A spinal brace as set forth in claim 3, wherein said one finger of each member is provided with an elongated, pointed pin having a length for piercing and extending through said dorsal process.

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