United States Patent

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[54] **FRAME STRUCTURE**
7 Claims, 9 Drawing Figs.

[52] **U.S. Cl.** **248/229,** 5/317, 287/51
[51] **Int. Cl.** **A47b 96/06**
[50] **Field of Search** ..... 248/228, 229, 226, 316, 316.2, 226.2; 5/74, 84, 92, 317; 287/51, 54 (B), 49

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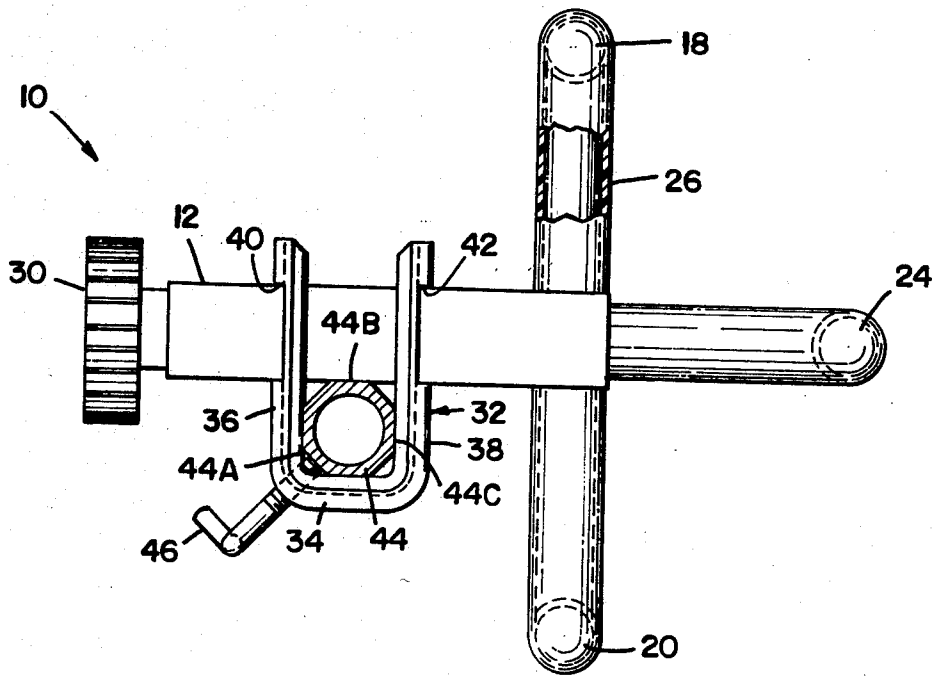
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ABSTRACT: A frame structure including an elongated bar having clamping legs adapted to clamp between them an elongated member perpendicular to the bar. A second bar is positioned in generally perpendicular relation to both the first mentioned bar and the member, and means are included for forcing the bars together in such a way that they are firmly positioned relative to each other with no movement therebetween when either bar is under load.



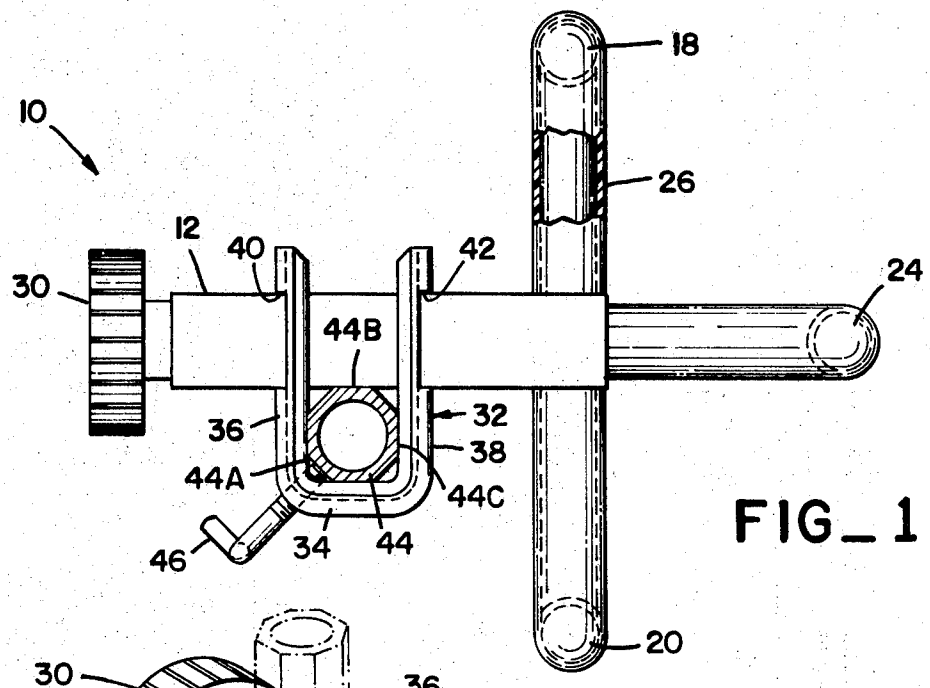


FIG_1

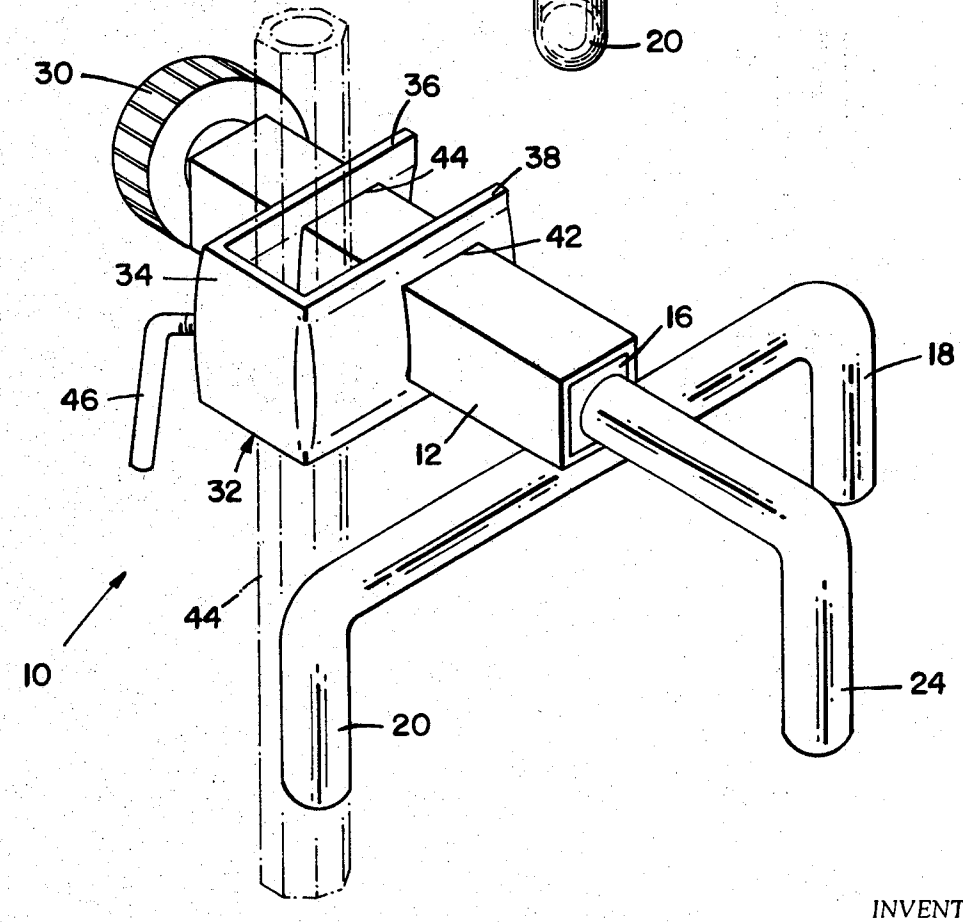


FIG_2

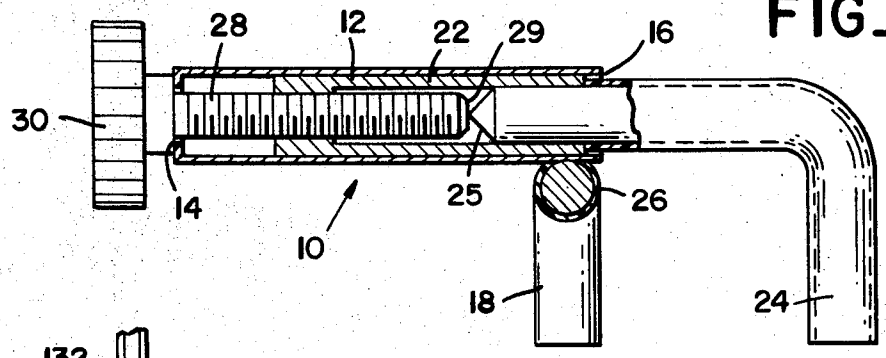
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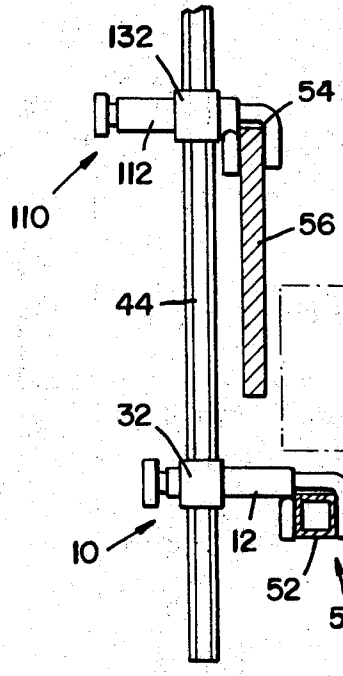
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FIG_3





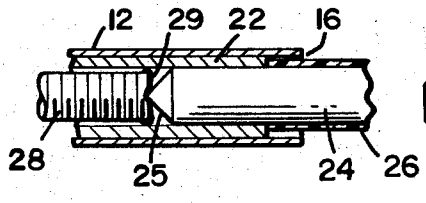


FIG_4

FIG_5

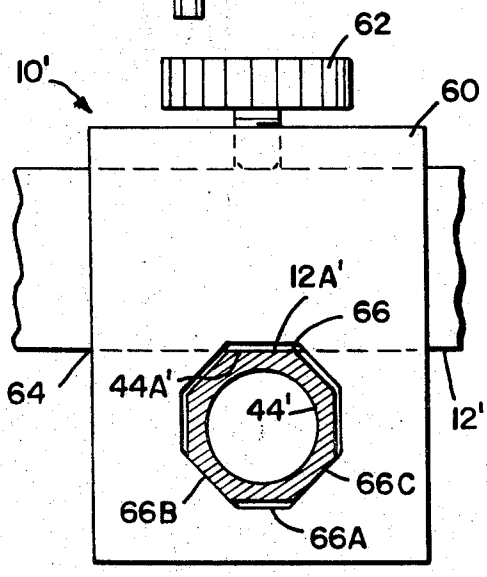


FIG_6

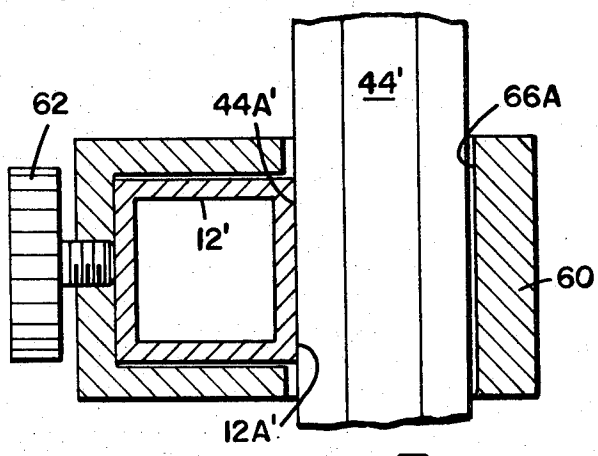


FIG_7

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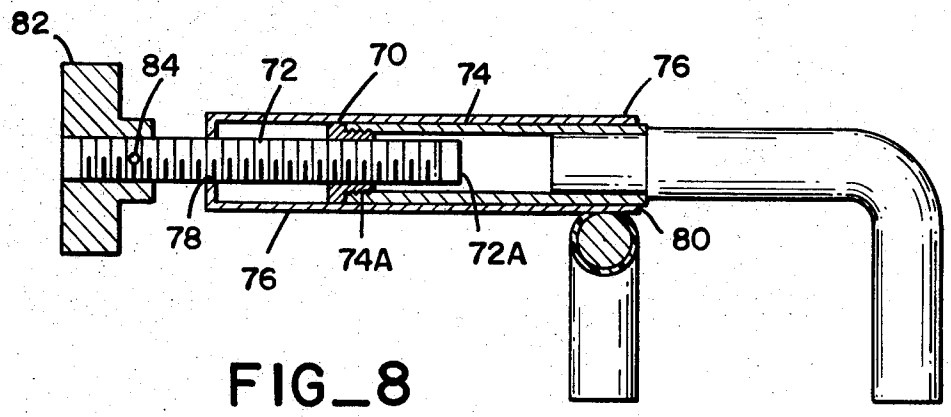


FIG_8

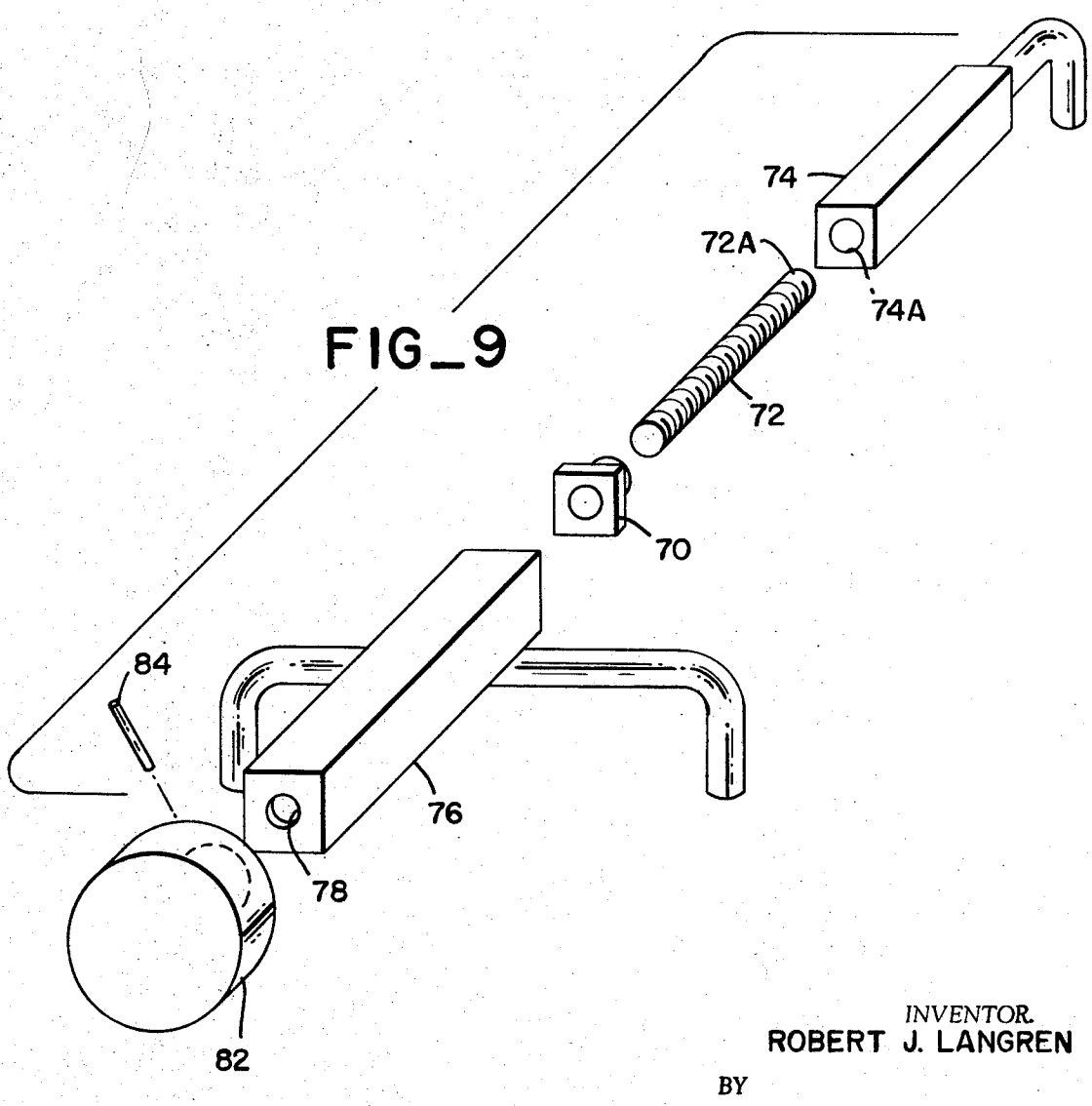


FIG_9

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FRAME STRUCTURE

BACKGROUND OF THE INVENTION

This invention relates to orthopedic frame structures, and more particularly, to a frame structure which is adapted to clamp onto an elongated member, such as the top edge of a headboard or a frame member of a bed.

It is well-known to provide a framework for use with a hospital bed, such framework generally being used to place a patient in traction. Such a framework generally includes overhead bar means for supporting the part of the body in traction, and clamp means which clamp onto the headboard, footboard, or frame of the bed for supporting such overhead bar means.

Such a framework to be effective in this use, it must fulfill certain basic requirements, First, it must be capable of clamping onto a appropriate part of the bed in such a manner as to take the load put on it by the traction. Second, it should be effectively capable of clamping onto a variety of constructions beds. Third, it should be simple and convenient to use as possible, and consist of the fewest possible parts.

Generally, the clamp means of the prior art use a pair of jaws joined by a screw or jack connection. These jaws are disposed over the top edge and under the bottom edge of the headboard, respectively, and are drawn together by the jack means to grip onto the headboard. While such clamp means have been found capable of satisfactorily supporting a load, they are quite inconvenient and time consuming to use, particularly when they need to be adjusted for use with differently constructed beds. Moreover, such clamp means, it has been found, cannot be used at all with certain types of beds, because there is no place for the bottom jaw to effectively clamp onto the headboard, or part of the bed frame.

It is an object of this invention to provide a clamp adapted to cooperate with a hospital bed for properly supporting traction framework or the like, and supporting the loads thereon, effectively.

It is a further object of this invention to provide a clamp which, while fulfilling the above object, is capable of effectively being used with a variety of construction of hospital beds.

It is a still further object of this invention to provide a clamp which, while fulfilling the above objects, is of small size and is extremely convenient and simple to use.

SUMMARY OF THE INVENTION

Broadly stated, the inventive frame structure is adapted to clamp to an elongated member and comprises a first elongated bar, and first, second and third legs extending therefrom. The first and second legs are fixed relative to the bar and, in use, are disposed on one side of the elongated member. The third leg is movable toward and away from a point between the first and second legs and, in use, is disposed on the other side of the elongated member. Means are associated with the first bar of moving the third leg toward the point between the first and second legs so as to grip the elongated member, or moving the third leg away from the point between the first and second legs to release the clamping grip. A second elongated bar is positioned to lie perpendicularly against the first bar. Means are included for selectively forcing the first and second bars together.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects of the invention will become apparent from a study of the following description and drawings, in which:

FIG. 1 is a plan view of a first embodiment of the clamp;

FIG. 2 is a perspective view of the clamp of FIG. 1;

FIG. 3 is a side elevation, partially in section, of the clamp of FIGS. 1 and 2;

FIG. 4 is a side elevation, partially in section, of a portion of the structure shown in FIG. 3;

FIG. 5 is a side elevation of a pair of clamps of the type shown in FIGS. 1—4, as used in conjunction with a hospital bed;

FIG. 6 is a plan view of a portion of a second embodiment of the clamp;

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 6.

FIG. 8 is a view similar to that of FIG. 3, but showing a variation of internal structure of the first embodiment of the clamp; and

FIG. 9 is an exploded perspective view of the structure shown in FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Shown generally in FIGS. 1—4 is the first clamp embodiment 10. The clamp 10 includes a generally hollow elongated bar 12 of square cross section having openings 14, 16 at either end thereof. Fixed to the bar 12 adjacent the opening 16 are first and second legs 18, 20, which extend outwardly and downwardly from bar 12. A sliding member 22 of generally square cross section, and also hollow, is disposed within the bar 12 and has fixed to one end a third leg 24 which extends from the end of bar 12 through opening 16, outwardly and then downwardly therefrom. The legs 18, 20, 24 are covered with a jacket 26 of resilient material, e.g., vinyl. It will be seen that, by sliding the sliding member 22 back and forth within the bar 12, the leg 24 is movable toward and away from a point midway between the legs 18, 20.

A threaded member 28 extends from the other end of bar 12 through opening 14 and is threadably engaged with the other end of the sliding member 22. The threaded member 28 has a knob 30 on its extended end; and it will be seen that the threaded member 28 and sliding member 26 together act as a jack upon turning of knob 30 to extend and retract the leg 24.

To assemble the structure thus far described, sliding member 22, with leg 24 fixed thereto is slide onto bar 12 through opening 16. Threaded member 28 is disposed through opening 14 and is threadably engaged with sliding member 22 by turning knob 30. Upon continued turning of knob 30, the end 29 of threaded member 28 contacts the inner end 25 of leg 24, which, as shown in FIG. 3, is pointed. Upon further tightening of knob 30, the pointed end 25 of leg 24 spreads the end 29 of threaded member 28 as shown in FIG. 4. The spread end 29 can no longer be removed from sliding member 22, since the spread end 29 will not pass through the threaded portion of sliding member 22. The structure thus far described, once assembled, is therefore nondisassemblable. Such a unit can thus be easily and conveniently handled, since it cannot fall apart due to excessive loosening of the knob 30, or for any other reason. The unit is therefore always ready for easy and convenient use.

As shown in FIGS. 1 and 2, a generally U-shaped member 32 cooperates with bar 12. The U-shaped member 32 is composed of a bottom portion 34 and generally parallel sides 36, 38. The sides 36, 38 define square apertures 40, 42 through which bar 12 is slidably disposed in perpendicular relation to sides 36, 38. An elongated bar 44, preferably of generally equilaterally octagonal cross section, is disposed between the sides 36, 38 of the U-shaped member 32, and between the bottom portion 34 and the bar 12, so that one surface thereof contacts one surface of the bar 12. The bars 12, 44, when so positioned, are in generally perpendicular relation to each other.

A bolt 46 is threaded through the U-shaped member 32 perpendicular to the longitudinal axis of bar 44 and at an angle of about 45° from the longitudinal axis of the bar 12. The bolt 46, when tightened, bears on the surface 44A of bar 44 and forces the surface 44B of bar 44 against bar 12, and surface 44C against side 38 of the U-shaped member 32. This arrangement results in the bars 12 and 44 being held quite rigidly relative to one another and insures that one bar cannot skew relative to the other. A strong joint between bars 12 and 44 is thus achieved.

It will be understood that the bolt 46 need not be threaded through at an angle 45° from the longitudinal axis of bar 12. It is important only that force be applied to the bar 12 so that

surface 44B thereof is forced against bar 12, and surface 44C is forced against side 38 of the U-shaped member 32. To achieve such forcing or wedging, the bolt 46 may be threaded through the member 32 at any angle between 0° and 90° from the longitudinal axis of bar 12, as the cross section of the bars used may dictate.

FIG. 5 shows a pair of clamps 10, 110 as described, used with a bed 50 to support a traction framework (not shown). Bottom clamp 10 is positioned with two legs on one side of a frame member 52 of bed 50, and with the third leg 24 extending over the frame member 52 and one the other side thereof. Tightening of the knob 30 of bottom clamp 10 draws leg 24 so that frame member 52 is gripped by the legs. The legs of clamp 110 are positioned similarly relative to the top edge 54 of headboard 56. A single octagonal bar 44 passes through U-shaped members 32, 132 of clamps 10, 110. This octagonal bar 44 is forced against the bars 12, 112 by the means previously described. The bar 44 may be disposed vertically by sliding the U-shaped members 32, 132 along the bars 10, 110 to an appropriate position before bar 44 is tightened against bars 12, 112. A traction framework may then be fixed to the bar 44.

It should be noted that because of the three-legged construction of each clamp 10, 110, it does not matter if the headboard 56 is warped. Such three-legged construction insures that proper gripping of the frame member or headboard is achieved. It should be noted also that each clamp, as shown in FIG. 5, straddles over the member to which it clamps. Thus, each clamp 10, 110 acts as a support structure which bears part of the weight transmitted thereto by bar 44.

The clamp as described may, be a single adjustment (through knob 30) be loosened so that it can be moved or removed, or tightened to provide an effective grip on its associated elongated member.

It will be understood, of course, that one clamp as described herein may be used alone, as for light loads, or in conjunction with other clamps in various combinations, and with and without bars interconnecting them.

FIGS. 6 and 7 show a variation made to the clamp previously described. In this clamp 10', elongated bar 12', and its associated structure, are identical to that in the previously described clamp 10. Furthermore, the bar 44' is positioned to bear against the bar 12'. However, the means for forcing the bars 12', 44' together are quite different.

In this embodiment, block 60 and bolt 62 are substituted for U-shaped member 32 and bolt 46. Block 60 has aperture 64 of generally square configuration through which bar 12' is disposed, and aperture 66 of generally equilateral octagonal cross section, through which bar 44' is disposed, the cross-sectional octagon of the aperture 66 being slightly larger than the cross-sectional octagon of bar 44', to allow the bar' therethrough. When the bars 12', 44' are so positioned, bolt 62 is tightened to force surface 12A of bar 12' against surface 44A' of bar 44'. The inner surface 66A of aperture 66, opposite the contacting surfaces 44A', 12A', is recessed to an extent so that it is not contacted by the bar 44'. In fact, since the cross section of the aperture 66 is slightly larger than the cross section of the bar 44', only the surfaces 66B, 66C, adjoining the recessed surface 66A, are contacted by bar 44'. The bar 44' thus incurs force from three directions, similar to the previous embodiment, and, because of such three-part force, the bars 12', 44' are held quite rigidly relative to each other.

Block 60, it should be pointed out, lends itself quite conveniently to simple die-casting. Aperture 66 need not be machined in any way. Aperture 66 will increase slightly in size as the casting cools, allowing bar 44' to be easily placed therein. As long as surface 66A is recessed sufficiently in casting to ensure that bar 44' bears only against surfaces 66B, 66C when block 60 cools, the slight oversize of aperture 66 does not affect holding of the bar 44', since the bar 44' is in effect "wedged into" surfaces 66B, 66C.

The advantages of the embodiment previously described, of course, apply equally to this embodiment.

In the device shown in FIGS. 8 and 9, which is a variation of the clamp 10, a square bushing 70 is screwed onto a threaded member 72, one end of which 72A is left unthreaded. Bushing 70, by means of external threads thereon, is screwed into a tapped end 74A of a sliding member 74. This assembly is positioned in a body 76 having openings 78, 80 at either end thereof. With the sliding member 74, body 76, and bushing 70 being of square cross section as shown, bushing 70 cannot be unscrewed from sliding member 74 while they are within body 76.

An end of threaded member 72 extends from opening 78, and a knob 82 is screwed thereon and held in place by means of a removable spring pin 84. With such parts assembled as described, it will be seen that the threaded member 72 and sliding member 74 together act as a jack upon turning of knob 82, similar to the embodiment of FIGS. 1—3. However, it will be seen that end 72A of threaded member 72 cannot pass through the internally threaded portion of square bushing 70. The assembly can therefore not be disassembled merely by rotating knob 82. The only way to disassemble it is to remove spring pin 84, remove knob 82, and slide threaded member 72, square bushing 70, and sliding member 74 out together through opening 80.

Similar to the previous unit, this unit can be easily and conveniently handled, since it cannot fall apart due to excessive loosening of the knob 82, or for any other reason. The unit is therefore always ready for easy and convenient use.

Each embodiment of the inventive clamp, it will be seen, is extremely simple and convenient to use, meanwhile being quite capable of properly supporting relatively great weight. Each embodiment, it will also be seen, is capable of effective use with a variety of constructions of hospital beds or the like.

I claim:

1. A frame structure adapted to be clamped to an elongated member comprising:
   a. a first elongated bar;
   b. a pair of spaced generally straight legs extending first laterally outwardly then generally downwardly from and substantially perpendicular to said bar substantially equidistant therefrom adapted to be disposed on one side of said elongated member and abut against said member;
   c. a third generally straight leg associated with said bar adapted to be disposed on the other side of said elongated member and abut there against, said third leg extending generally downwardly from and substantially perpendicular to said bar and in substantially the same plane as said bar, said third leg including elongated member gripping means associated therewith for selectively drawing said third leg toward said first and second legs to grip the elongated member between said spaced legs and said third leg and to separate said legs to release said elongated member from between said spaced legs and said third leg;
   d. a second elongated bar positioned to contact the first elongated bar; and
   e. forcing means operatively engaging said first an second elongated bars for selectively forcing the first and second elongated bars together and releasing them from contact with each other.

2. A frame structure according to claim 1 wherein the forcing means for selectively forcing the first and second elongated bars together comprise:
   a. a generally U-shaped member defining a bottom portion and a pair of generally parallel sides which define apertures through which the first elongated bar is disposed, the second elongated bar being disposed between the sides of the generally U-shaped member and between the bottom portion thereof and the first elongated bar; and
   b. bolt means threaded through the generally U-shaped member at an angle between 0° and 90° from the longitudinal axis of the first elongated bar to bear on the second elongated bar and force the second elongated bar against the first elongated bar and one side of the generally U-shaped member.

3. A frame structure according to claim 2 wherein the first elongated bar is square in cross section, the second elongated bar is equilaterally octagonal in cross section, and the bolt means is threaded through the generally U-shaped member at an angle of approximately 45° from the longitudinal axis of the first elongated bar.

4. A frame structure according to claim 1 wherein the second elongated bar is equilaterally octagonal in cross section, and wherein the forcing means for selectively forcing the first and second bars together comprise:

a. a block having a first aperture through which the first elongated bar is disposed, and a second aperture of generally equilaterally octagonal cross section through which the second elongated bar is disposed; and

b. bolt means threaded through the block to bear on the first elongated bar and force it against the second elongated bar, the inner surface of the second aperture opposite the contacting surfaces of the first and second bars being recessed so that the second bar bears only against the surfaces of the second aperture adjoining the recessed surface.

5. A frame structure according to claim 1 wherein the first elongated bar is hollow, and wherein said elongated member gripping means includes a sliding member within the first elongated bar and to which the third leg is fixed, the third leg being movable toward and away from a point between the spaced legs by sliding the sliding member back and forth within the first elongated bar, and a threaded member threadably engaged with the sliding member and having one end extending from the other end of the elongated bar, the other end of the threaded member being disposed in a hollow portion within the sliding member and being limited from passing through the threaded portion of the sliding member.

6. A frame structure adapted to be clamped to an elongated member comprising:

a. a first elongated bar of cross section;

b. first, second and third generally straight legs extending from one end of the first elongated bar, the first and second legs extending first laterally outwardly then generally downwardly from and substantially perpendicular to said bar substantially equidistant therefrom adapted to be disposed on one side of the elongated member, the third leg extending generally downwardly from and substantially perpendicular to said bar and in substantially the same plane as said bar, said third leg being movable toward and away from a point between the first and second legs and adapted to abut against the other side of said elongated member;

c. elongated member gripping means associated with the first elongated bar for selectively moving the third leg toward the point between the first and second legs to grip the elongated member therebetween and moving the third leg away from the point between the first and second legs to release the elongated member from between said legs;

d. a second elongated bar of equilaterally octagonal cross section disposed perpendicular to the first elongated bar and having one surface thereof in contact with one surface of the first elongated bar;

e. a generally U-shaped member defining a bottom portion and a generally parallel pair of sides which define square apertures through which the first elongated bar is disposed in perpendicular relation to the sides, the second elongated bar being disposed between the sides of the generally U-shaped member and between the bottom portion thereof and the first elongated bar; and

f. bolt means threaded through the generally U-shaped member perpendicular to the longitudinal axis of the second elongated bar and at an angle of 45° from the longitudinal axis of the first elongated bar to bear on the second elongated bar and force the second elongated bar against the first elongated bar and one side of the generally U-shaped member.

7. A frame structure adapted to clamp to an elongated member comprising:

a. a first hollow elongated bar;

b. first, second and third legs extending from one end of the first elongated bar, the first and second legs being fixed relative to the bar and disposed to one side of the elongated member, the third leg being movable toward and away from a point between the first and second legs and disposed on the other side of the elongated member;

c. means associated with the first elongated bar for moving the third leg toward the point between the first and second legs to grip the elongated member and moving the third leg away from the point between the first and second legs to no longer grip the elongated member, said means including a sliding member within the first elongated bar and to which the third leg is fixed, the third leg being movable toward and away from the point between the first and second legs by sliding the sliding member back and forth within the first elongated bar, and a threaded member threadably engaged with the sliding member and having one end extending from the other end of the elongated bar, the other end of the threaded member being disposed in a hollow portion within the sliding member and being limited from passing through the threaded portion of the sliding member;

d. a second elongated bar equilaterally octagonal in cross section positioned to contact the first elongated bar; and

e. means for selectively forcing the first and second elongated bars together comprising, a block having a first aperture through which the first elongated bar is disposed, and a second aperture of generally equilaterally octagonal cross section through which the second elongated bar is disposed and bolt means threaded through the block to bear on the first elongated bar and force it against the second elongated bar, the inner surface of the second aperture opposite the contacting surfaces of the first and second bars being recessed so that the second bar bears only against the surfaces of the second aperture adjoining the recessed surface.