Nov. 14, 1944. C. B. ULRICH 2,362,866

UNIVERSAL SPLINT

Filed Oct. 8, 1942 2 Sheets-Sheet 1

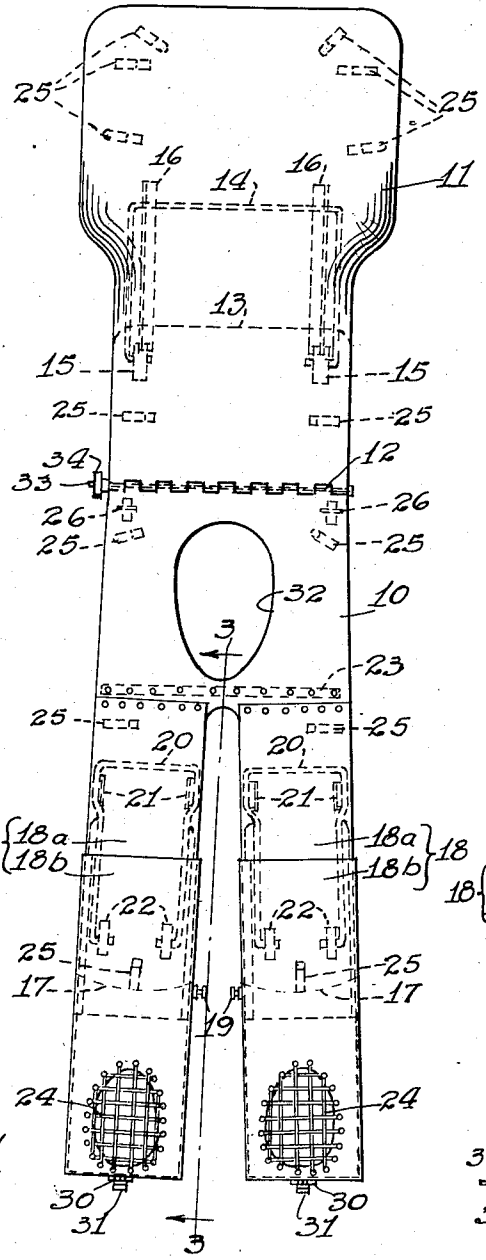


Fig. 1.

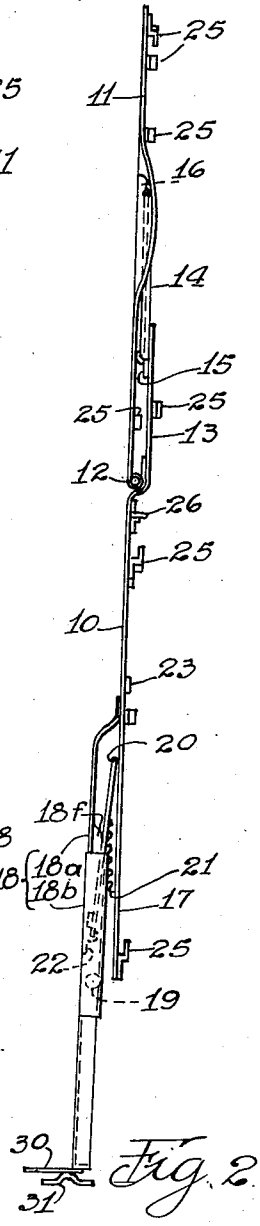


Fig. 2.

INVENTOR.
CHARLES B. ULRICH
BY Albert C. Bell
ATTORNEY.

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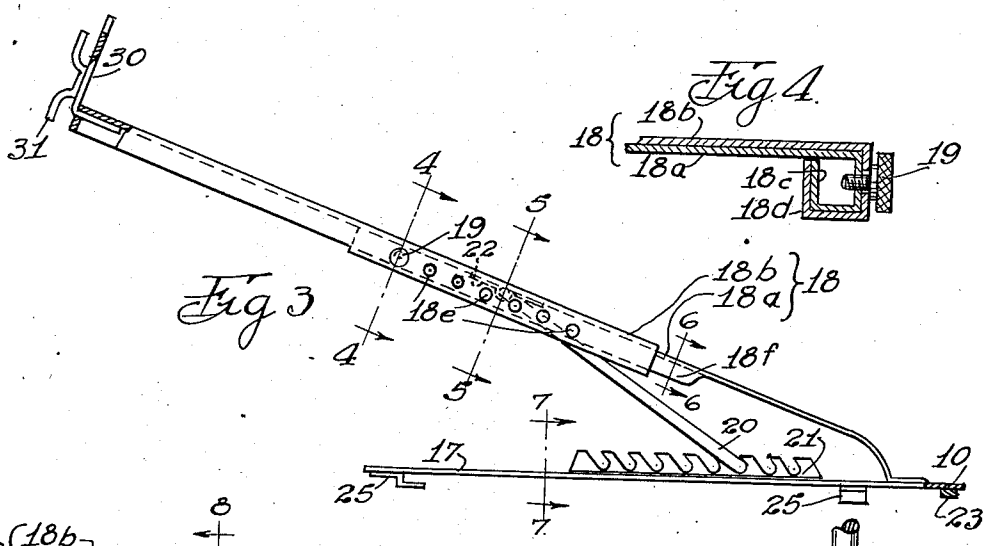


Fig. 3

Fig. 4

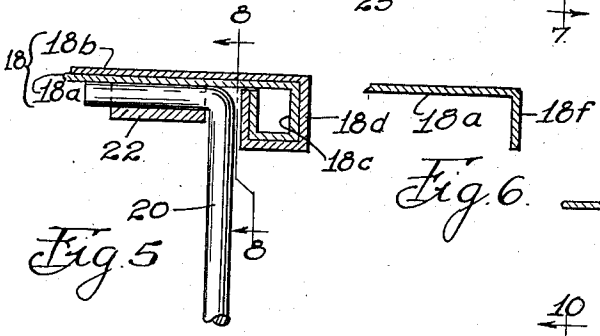


Fig. 5

Fig. 6

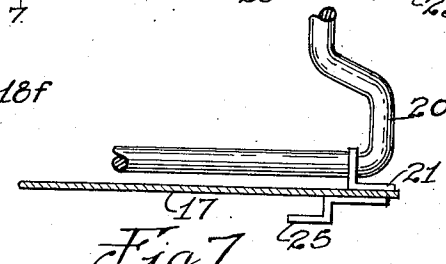


Fig. 7

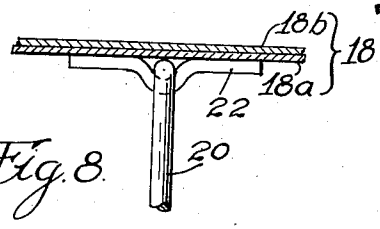


Fig. 8

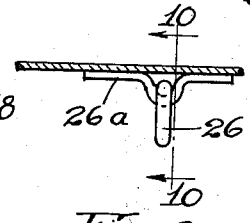


Fig. 9

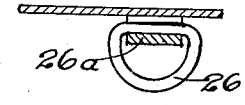


Fig. 10

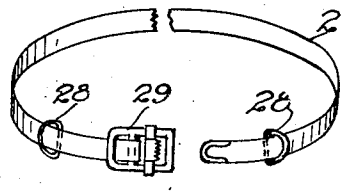


Fig. 11

INVENTOR.
CHARLES B. ULRICH.

BY Albert C. Bell

ATTORNEY.

Patented Nov. 14, 1944 2,362,866

UNITED STATES PATENT OFFICE

2,362,866

UNIVERSAL SPLINT

Charles B. Ulrich, Jamestown, N. Y.

Application October 8, 1942, Serial No. 461,284

5 Claims. (Cl. 128—85)

My invention pertains to a structure adapted to hold fractured bones in proper position for knitting and healing, and also to hold the parts of dislocations in place for healing, including fractures and dislocations involves the vertebrae, ribs, shoulder blades, collar bones, pelvic bones and leg bones.

The structure of my invention includes a base plate or frame adapted to rest in horizontal position on a suitable support such as a bed, to which base plate a back portion is hinged to support the back of a patient at a desired inclination, and to which two separate leg supports are flexibly secured, so that either leg support may be given a desired inclination upwardly from the base plate, independently of the other leg support, according to the requirements of any particular case.

To secure adjustability of the back supporting portion, and to maintain any desired inclination thereof, the base plate or frame is provided with a back extension which projects under the back supporting portion a substantial distance, and an adjustable strut is pivoted to one of said parts, for example, the back extension, for engagement with desired teeth of adjustment racks secured to the other of said parts, for example, to the lower surface of the back supporting portion.

To secure independent adjustability of the leg supports, and to hold either leg support at a desired inclination to the base plate or frame independently of the other leg support, the base plate or frame is provided with a leg extension projecting a substantial distance under each leg support, and each leg support is held at a desired inclination to its leg extension by an adjustable strut pivotally secured to one of said parts, for example, to the lower surface of the leg support, for engagement with desired teeth of adjustment racks secured to the other of said parts, for example, to the upper surface of the leg extension.

The leg supports are extensible to accommodate patients of different heights, by making each leg support in two sections having parts in longitudinal, telescopic engagement with each other, and by providing the sections with a clamping screw or screws. Thus the leg supports may be independently lengthened or shortened, and each may be held in its desired length independently of the other leg support.

The parts described, and particularly the base plate or frame and its extensions, are provided, preferably on their lower surfaces and near their edges, with mooring devices in the form of spaced hooks or rings as desired, having the following major uses; first, said mooring devices afford a convenient means for holding in place against displacement and with desired pressure, flexible bands employed to hold fractured bone parts in proper alignment for knitting and healing; second, said mooring devices afford a convenient means for fastening the ropes or cords of traction devices wholly or in part according to the particular case, where traction is used to prevent fractured bone surfaces or ends from overlapping; and third, said mooring devices afford a convenient means for the attachment of flexible bands by which attendants may move the entire base plate or frame with a patient thereon, without disturbing in any way the adjustment of any part of the splint structure, without movement of any kind of the patient on the splint structure, and without in any way changing the adjustment of any bone parts; in addition, said mooring devices are a convenience for many other purposes incident to treating bone fractures and dislocations.

In addition to the above, the outer ends of the leg supports are preferably provided with short posts and cleats for engagement by the ropes or cords used in certain kinds of traction application involving fractured leg bones.

When the back supporting portion and the leg supports are in their lowermost positions, the entire splint structure is flat and of small thickness, and there are no loose parts that can be lost, making the problem of storing the structure when it is not in use, a very simple one and most economical of storage space. The splint structure described is adapted to handle all kinds of bone fractures, whether simple or compound.

My invention will be best understood by reference to the accompanying drawings illustrating a preferred embodiment thereof, in which

Fig. 1 illustrates the invention in plan view,

Fig. 2 is a side elevation of the structure shown in Fig. 1,

Fig. 3 is a longitudinal, vertical, sectional view to an enlarged scale, of a part of the structure shown in Fig. 1 taken along the line 3—3 in the latter figure, with the illustrated leg support in raised position,

Figs. 4 to 7 inclusive are vertical, sectional views to a further enlarged scale of parts of the structure shown in Fig. 3, taken respectively along the lines 4—4, 5—5, 6—6 and 7—7 in the latter figure,

Fig. 8 is a vertical, sectional view of the struc-

ture shown in Fig. 5, taken along the line 8—8 in the latter figure,

Fig. 9 shows in a view similar to Fig. 7, a modified form of mooring means,

Fig. 10 is a vertical, sectional view of the structure shown in Fig. 9, taken along the line 10—10 in the latter figure, and

Fig. 11 is a perspective view of a flexible band adapted for use with the invention.

Similar numerals refer to similar parts throughout the several views.

As shown in Figs. 1 and 2, the invention includes a base plate 10 having a substantially flat upper surface which in use is generally supported in horizontal position or nearly so. The base plate has secured to its head end, a back supporting portion 11 by means of a transverse hinge 12, so that the upper surfaces of the plate 10 and the portion 11 are in substantially the same plane when the portion 11 is in its lowermost position. To accomplish this, the plate 10 is slightly offset downwardly adjacent the hinge 12 and provided with a flat extension 13 under the portion 11 and in a plane parallel to the plane of the plate 10. A U-shaped strut 14 comprising a bent metal rod, is pivotally connected with the extension 13 by clips 15 secured to said extension, to engage toothed rack bars 16 in any adjustment, when it is desired to support the portion 11 at a desired inclination to the plate 10, said rack bars 16 being secured to the lower surface of the portion 11 and extending longitudinally thereof.

The plate 10 is also provided with two slightly spaced leg extensions 17, substantially in the plane of the plate 10, above which leg extensions leg supports 18 are respectively disposed, each of said leg supports comprising two sections 18*a* and 18*b*. The sections 18*a* and 18*b* of each leg support, are provided along each of their longitudinal edges with tubular portions 18*c* and 18*d* respectively, which telescope each other with sliding engagement (Fig. 4), so that each section 18*b* may be drawn out or extended from the corresponding section 18*a*, and may be similarly moved or telescoped into said section 18*a*, independently of the other leg support 18, to accommodate different lengths of legs, and to facilitate the use of the invention with different kinds of fractures and dislocations.

As more clearly shown in Fig. 3, the inner tubular portion 18*d* on each of the sections 18*b*, is provided with a plurality of clearance holes 18*e*, to receive a clamping screw 19 threaded into the adjacent tubular portion 18*c*, (Fig. 4), by which the sections 18*a* and 18*b* may be secured and held in any desired longitudinal adjustment.

As shown in Figs. 1 and 2 and as more clearly shown in Fig. 3, each section 18*a* has pivotally secured to its lower surface, a U-shaped strut 20 similar to the strut 14, for engagement with the teeth of rack bars 21 carried by the upper surface of the corresponding leg extension 17 (see Fig. 7), connection clips 22 being employed to effect said pivotal connection (see Figs. 5 and 8).

Excepting at their telescoping portions, the sections 18*a* and 18*b* are preferably provided with reinforcing edge flanges 18*f* to stiffen said sections (Fig. 6), but it will be noted (Figs. 2 and 3) that said flanges are discontinued on the sections 18*a* adjacent the base plate 10, where said sections 18*a* are rigidly secured to the base plate 10, for example, by rivets or spot welding. Adjacent the base plate 10, each section 18*a* is offset upwardly and in a smoothly curved manner, a substantial amount for engagement with the buttocks of a patient, which is found to be an advantage in connection with handling some types of fractures and dislocations.

As shown in Figs. 1, 2 and 3, a laterally extending reinforcing bar 23 is secured to the lower surface of the base plate 10 adjacent its connection with the leg supports 18, to stiffen said base plate.

The described construction of the leg supports 18 and their connection with the base plate 10 and its leg extensions 17, provide a convenient and effective means for elevating either leg of a patient, as desired, where the case calls for such treatment, and without in any way changing the rigidity of lateral relationship between the base plate 10 and the leg supports 18, the material of the sections 18*a* where not reinforced by edge flanges, being sufficiently flexible to permit adjusting the leg supports to any degree of inclination that may be needed.

Each of the sections 18*b* as shown in Fig. 1 is preferably provided near its outer end, with an opening covered by interwoven tapes 24 of fabric, to cushion the heels of a patient.

The base plate 10, its extensions 13 and 17, the back supporting portion 11 and the leg supports 18 are preferably made of suitable sheet metal reinforced as described or by equivalent means, although said parts may be made of other sheet material that will give similar results, the requirement being that the structure shall afford a support for a patient and have sufficient stability and rigidity to maintain in desired adjustment the parts of the patient secured to the structure, even when the entire splint structure is moved with the patient thereon, from one location or position to another.

To facilitate securing the parts of fractures and dislocations to the splint structure in desired adjustment, and to hold the patient and splint structure in applying traction, spaced mooring devices 25, 26 (Figs. 1, 2 and 3), are preferably secured to the lower surfaces of the parts of the structure near their edges, for example, by riveting or spot welding, the devices 25 comprising metal hooks as shown in Fig. 7 and the devices 26 comprising metal rings secured to the splint parts by metal clips 26*a* as shown in Figs. 9 and 10. To hold the parts of the patient in desired adjustment, fabric bands 27 of the kind shown in Fig. 11 may be employed to advantage, having metal rings 28 thereon and provided with buckles as shown at 29. The rings 28 may be readily engaged with the hooks of the devices 25, and where mooring devices 26 are used, the bands 27 may be threaded through the rings of said devices, suitable pads being employed in any case to give desired elevations to the parts of the patient so secured to the splint structure, and at the same time to afford the greatest possible comfort to the patient.

To facilitate certain types of traction, the outer end of each leg support has rigidly secured thereto a short vertical post 30 of metal (Figs. 1, 2 and 3), preferably notched at its upper end to receive and hold in place the traction cord or rope, a cleat 31 being also rigidly secured to the end of the leg support, to which the cord or rope may be fastened.

In using the splint structure, because of the rigidity thereof, additional splints are seldom required, and in many cases where they might otherwise be indicated, casts are not needed. Thus, because of the parts being held positively

in alignment even where the splint structure is moved as a whole with the patient thereon and because of the patient's parts being conveniently accessible for examination and where necessary, for treatment, and because of the necessary pressures and restraint exerted on the patient being reduced to a minimum, recoveries proceed much more rapidly and effectively than with the usual practice involving local splints and casts.

Where for any reason it is desired to move the splint structure as a whole and with a patient held thereon in adjusted position, it may readily be done without discomfort of any kind to the patient and without any change in the adjustment of the patient, by an attendant on either side of the splint structure, each using a band of the kind shown in Fig. 11, passing around the neck and over the shoulders of each attendant if desired, by engaging the rings **28** with suitable ones of the mooring hooks **25** on the base plate **10**. This is of great importance in caring for the needs of the patient, for example, elimination by the patient, to facilitate which the base plate **10** is provided with an opening **32**.

No attempt is made herein to describe the procedure involved in treating any particular fracture or dislocation by means of the splint structure, because it would be impossible to adequately discuss the many different cases capable of being so treated, and because it is believed that the experienced practitioner will at once from the present description, understand the applicability of the invention to his own practice, and how it is to be used in any particular case.

In some cases it may be desirable to remove the back supporting portion **11** from the base plate **10**, and to do this, the hinge **12** is preferably provided with a readily removable and headed pintle rod **33** held in place in the hinge by a thumb nut **34** threaded on the unheaded end of said rod (Fig. 1), so that by removing the nut **34** and the rod **33**, the portion **11** may readily be separated from the base plate **10**.

While I have shown my invention in the particular embodiment described, I do not limit myself thereto, as I may employ equivalents thereof without departing from the scope of the appended claims.

What I claim is:

1. A splint structure including in combination a substantially flat base plate of sheet material for supporting a patient, said base plate having rigid leg extensions projecting from one of its ends and substantially in the plane of said base plate, leg supports of flat sheet material flexibly connected with said base plate and projecting therefrom over said leg extensions, each of said leg supports being rigid and restricted to substantially a single plane and having a length to support the entire extended leg and foot of a patient, each of said leg extensions being substantially shorter than the corresponding leg support, and means independently supporting each of said leg supports from the corresponding leg extension, each of said leg supports including two interengaging sections of flat sheet material longitudinally movable relatively to each other in substantially the same plane to adjust the length of the leg support, and means holding said sections in desired adjustment.

2. A splint structure including in combination a substantially flat base plate of sheet material for supporting a patient, said base plate having rigid leg extensions projecting from one of its ends and substantially in the plane of said base plate, leg supports of flat sheet material flexibly connected with said base plate and projecting therefrom over said leg extensions, each of said leg supports being rigid and restricted to substantially a single plane and having a length to support the entire extended leg and foot of a patient, each of said leg extensions being substantially shorter than the corresponding leg support, and means independently supporting each of said leg supports from the corresponding leg extension, said supporting means including adjustable devices between each of said leg supports and the corresponding leg extension supporting said leg support at different inclinations relatively to said base plate as desired.

3. A splint structure including in combination a substantially flat base plate of sheet material for supporting a patient, said base plate having rigid leg extensions projecting from one of its ends and substantially in the plane of said base plate, leg supports of flat sheet material flexibly connected with said base plate and projecting theerfrom over said leg extensions, each of said leg supports being rigid and restricted to substantially a single plane and having a length to support the entire extended leg and foot of a patient, each of said leg extensions being substantially shorter than the corresponding leg support, and means independently supporting each of said leg supports from the corresponding leg extension, said supporting means including adjustable devices between each of said leg supports and the corresponding leg extension supporting said leg support at different inclinations relatively to said base plate as desired, said adjustable devices including an adjustable strut and cooperating notched rack bars connected with each of said leg supports and the corresponding leg extension.

4. A splint structure including in combination a substantially flat base plate of sheet material for supporting a patient, said base plate having rigid leg extensions projecting from one of its ends and substantially in the plane of said base plate, leg supports of flat sheet material flexibly connected with said base plate and projecting therefrom over said leg extensions, each of said leg supports being rigid and restricted to substantially a single plane and having a length to support the entire extended leg and foot of a patient, each of said leg extensions being substantially shorter than the corresponding leg support, and means independently supporting each of said leg supports from the corresponding leg extension, said supporting means including adjustable devices between each of said leg supports and the corresponding leg extension supporting said leg support at different inclinations relatively to said base plate as desired, said adjustable devices including an adjustable strut pivotally connected with each of said leg supports and cooperating notched rack bars secured to the corresponding leg extension.

5. A splint structure including in combination a substantially flat base plate of sheet material for supporting a patient, said base plate having rigid leg extensions projecting from one of its ends and substantially in the plane of said base plate, leg supports of flat sheet material flexibly connected with said base plate and projecting therefrom over said leg extensions, each of said leg supports being rigid and restricted to substantially a single plane and having a length to support the entire extended leg and foot of a patient, each of said leg extensions being substantially shorter than the corresponding leg

support, and means independently supporting each of said leg supports from the corresponding leg extension, said supporting means including adjustable devices between each of said leg supports and the corresponding leg extension supporting said leg support at different inclinations relatively to said base plate as desired, said adjustable devices including an adjustable strut pivotally connected with each of said leg supports and cooperating notched rack bars secured to the corresponding leg extension, said struts comprising U-shaped metal rods.

CHARLES B. ULRICH.