

May 13, 1958

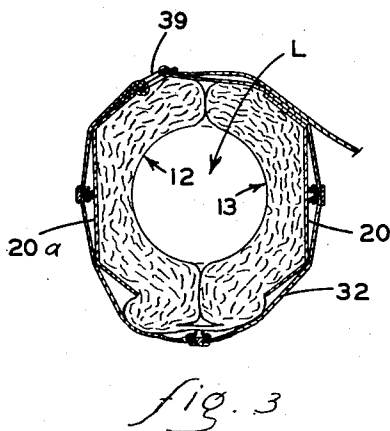
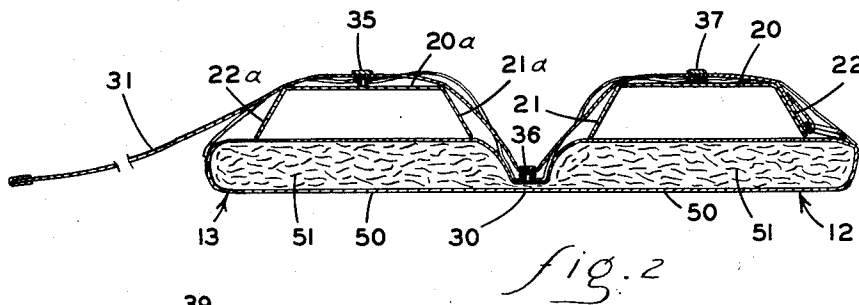
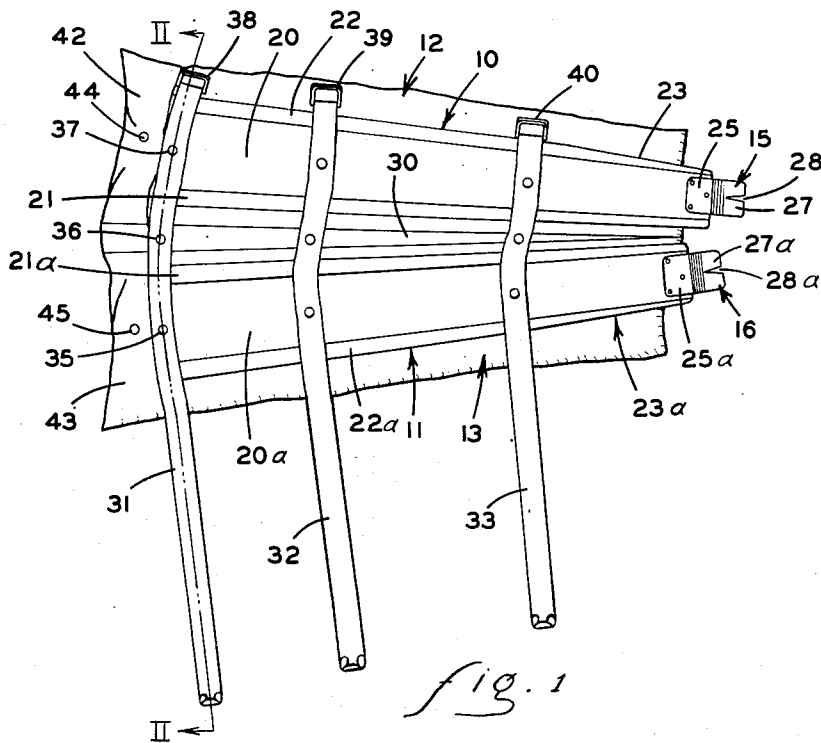
H. H. STRYKER

2,834,341

SPLINT

Filed Sept. 20, 1955

2 Sheets-Sheet 1



INVENTOR.
HOMER H. STRYKER
BY *R. M. Stryker*
ATTORNEY

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2 Sheets-Sheet 2

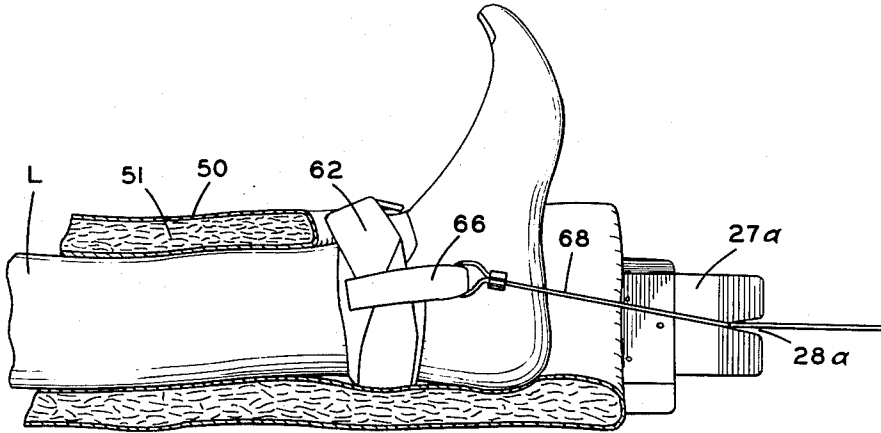


fig. 6

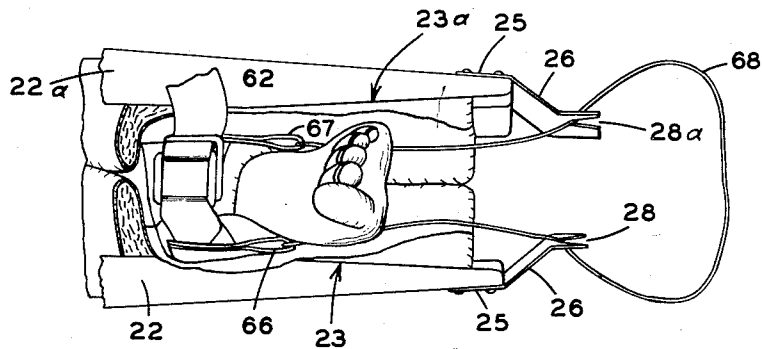


fig. 5

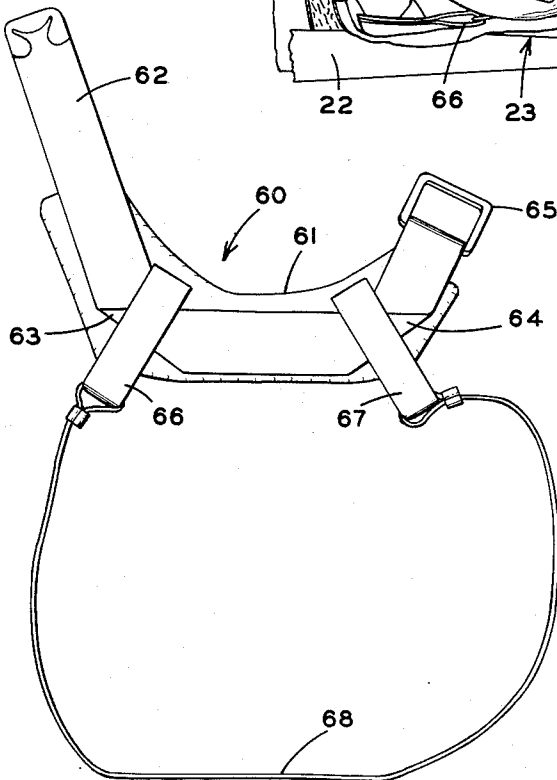


fig. 4

INVENTOR.
HOMER H. STRYKER
BY *R. M. E. [Signature]*
ATTORNEY

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2,834,341

SPLINT

Homer H. Stryker, Kalamazoo, Mich., assignor to Orthopedic Frame Company, Kalamazoo, Mich., a corporation of Michigan

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9 Claims. (Cl. 128—87)

This invention relates to an improved structure for use as a temporary splint and, more particularly, relates to a temporary splint structure provided with means for imposing a substantially uniform pressure on substantially the entire surface of the injured member when the splint is assembled about the injured member.

It has long been recognized that one primary purpose of splint structures is to immobilize the injured member to prevent further injury thereto. However, with many types of injuries, it is also desirable to minimize swelling and/or bleeding of the injured member in order to maintain the injured member in condition suitable for inspection and treatment by the physician. For this purpose, it is desirable to apply a uniform pressure onto the entire surface of the injured part in contrast to the uneven pressure applied by conventional splint structures.

Further, in some surgical procedures it is desirable to minimize the quantity of blood present in a member, as a leg, prior to the commencement of an operation thereon. This can be carried out by first applying a uniform pressure onto the entire surface of the member concerned for sufficient time to drive out therefrom as much blood as possible, second, applying a tourniquet to the upper end of the member to minimize the return of blood into the member, and, third, removing the pressure applying device to expose the member for the desired surgery. The device of the invention can be used to apply the pressure mentioned above and thus function as a surgical aid.

With many types of injuries, e. g. fractures, it is further desirable to use traction and the injured member. Prior splint constructions having traction means thereon have not always been completely satisfactory in use either because of their inability to maintain traction in a completely safe and effective manner or because an undesirable amount of manipulation of the injured member has been required in order to properly place the traction device in position on the injured member.

Accordingly, it is an object of this invention to provide a device for imposing a substantially uniform pressure on substantially the entire surface of the injured member.

It is a further object of the invention to provide a device, as aforesaid, which will simultaneously immobilize the member.

It is a further object of this invention to provide a device, as aforesaid, which has a compressor mounted thereon for contacting the surface of the injured member, which compressor is adapted to adjust to the contours of the injured member and to impose a substantially uniform pressure thereabout.

It is a further object of this invention to provide a device, as aforesaid, in which the compressor comprises a flexible casing filled with a material which is capable of transmitting pressure substantially equally in all directions.

It is further object of this invention to provide a de-

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vice, as aforesaid, in which the compressor is filled with a stiffly resilient material.

It is a further object of this invention to provide a device, as aforesaid, in which the compressor is filled with a material which is capable of transmitting pressure substantially equally in all directions, and wherein either the casing or the filling material is of resilient character.

It is a further object of this invention to provide a device, as aforesaid, in which the compressor is adapted to exert pressure on the injured member to diminish the flow of blood thereto.

It is a further object of this invention to provide an improved temporary splint construction having an improved and simplified means for obtaining traction on the injured member.

It is a further object of this invention to provide an improved temporary splint construction and traction means thereon which traction means cooperates with a harness secured about the injured member to maintain a pressure on the injured member.

It is a further object of this invention to provide an improved temporary splint construction and traction means thereon wherein the traction means includes anchor devices, as plates, secured to the splint, each anchor device having a suitable cord engaging device, as a notch provided therein, by which cords attached to the harness are capable of being gripped and held in an adjusted position.

Other objects and advantages of this invention will become apparent to those acquainted with equipment of this type upon reading the following description and inspecting the accompanying drawings.

Since the device of the invention finds a great degree of utility as a temporary splint, the following description has utilized a temporary splint as a convenient means of illustrating the invention. Nevertheless, it will be understood that other uses are possible, and contemplated, such as the use as a surgical aid mentioned above.

In the drawings:

Figure 1 is a plan view of a splint construction embodying the invention in its open, or non-use condition said view being taken from the other side thereof.

Figure 2 is a sectional view taken along the line II—II of Figure 1.

Figure 3 is a sectional view taken along a line through the middle securing strap with the splint construction secured about an injured member.

Figure 4 is a plan view of an ankle harness usable with the traction device of the temporary splint construction.

Figure 5 is a front view of the splint construction secured about a leg with parts thereof being partially broken away to show the ankle harness about the leg and secured to the traction device on the splint.

Figure 6 is a central sectional view of the splint construction and harness as shown in Figure 5.

General description

In general, the splint construction here used to illustrate the present invention includes a pair of rigid, channel-shaped frame members 10 and 11. A pair of compressors 12 and 13 are mounted in the frame members 10 and 11, respectively, and are adapted to surround and exert a substantially uniform pressure on the injured member. A pair of cord gripping devices in the form of plates 15 and 16 are secured to one longitudinal end of the frame members 10 and 11, respectively, and are adapted to receive cords therethrough, which cords are attached to a suitable harness for exerting traction on the injured member.

While the detailed description given hereinbelow relates to a splint construction for an injured leg, it is to be equally applicable to arm splints and other types

of splints used to keep a selected body member immobilized.

The terms "upward" and derivatives thereof, and "downward" and derivatives thereof, are employed for convenience in description and refer to directions corresponding to upward or downward portions of the leg with which the device is to be used, downward referring to directions toward the foot and upward referring to directions toward the hip.

Detailed description

The channel-shaped frame members are mirror images of each other, and accordingly only the frame member 10 will be described herein. Corresponding parts on frame member 11 will be indicated by the same reference numeral with the suffix "a" applied thereto.

The frame member 10 includes a downwardly tapering central panel 20 and a pair of outer flanges 21 and 22. Flanges 21 and 21a are of substantially the same depth through their length and are adapted to lie adjacent the back portion of a leg. Flanges 22 and 22a have cut-away portions 23 and 23a (Figure 5) adjacent their lower ends to provide space for the foot to pass therebetween. The frame members are made of any suitable material, such as aluminum.

Plates 15 and 16 are identical and, accordingly, only plate 15 will be described in detail. Corresponding parts on plate 16 will be identified by the same reference numeral with the suffix "a" added thereto. Plate 15 includes a mounting flange 25, an inwardly directed connecting web 26 and an offset, planar gripping portion 27. A notch 28, defined by downwardly diverging edges, is provided in the gripping portion 27. The gripping portion 27 preferably is inwardly offset sufficiently that it is substantially aligned with a line along the outside surface of the portion of the leg immediately above the ankle thereof.

The compressors 12 and 13 are disposed on the inner surface of the frame members 10 and 11, respectively, and are each provided with portions which extend beyond the side edges of the frame members. A central web 30 connects the compressors 12 and 13. A plurality of straps 31, 32 and 33 are secured to the frame members 10 and 11 and to the central web 30 in suitable fashion. In the disclosed embodiment snap fasteners 35, 36 and 37 (Figure 1) secure the straps to the frame members and to the central web. Similar snap fasteners are provided for the other straps. The straps have buckles 38, 39 and 40 at one end thereof through which the other ends of the straps pass when the splint is being mounted on an injured member. The compressors 12 and 13 have panels 42 and 43, respectively, which define envelopes for the reception of the upper ends of frame members 10 and 11, respectively. Snap fasteners 44 and 45 secure the panels 42 and 43 to the frame members. The structure just described operatively connects the frame members to each other and to the compressors so that they may be secured about the injured member.

The compressors 12 and 13 are in this embodiment formed with an external casing 50 of any suitable deformable material. Preferably this casing is waterproof and, for example, may be composed of a rubberized fabric or of Koroseal. A suitable filler 51 is provided within the casing to resist deformation thereof with a substantially uniform pressure. The material may be any material capable of transmitting a pressure applied thereto equally, or substantially equally, in all directions. In the disclosed embodiment, a particulate solid such as rubberized hair (hair, often swine hair, covered and partially bonded together by latex) is utilized as the filler. One acceptable type of rubberized hair is made by Armour and Company, Chicago, Illinois, under the trademark "Hairflex." Alternatively, a fluid such as compressed air or water can be used. Thus, when the compressors are placed around a body member and the frame mem-

bers 10 and 11 urged towards each other, the casing will be deformed and a uniform pressure will be exerted on substantially the entire surface of the member by the filler. It will be understood that whenever a non-elastic filler, such as water, is used, then the casing is preferably made from a stretchable material.

With injuries where it is desirable to apply traction to the injured body member, a harness is generally employed which harness may be wrapped around the injured member and then locked to the splint construction so as to apply pressure to the member. In the description that follows one suitable harness is described but it is to be understood that this harness is described for illustrative purposes only and that other harnesses can be used in conjunction with the splint construction of this invention.

The harness 60 includes a pad 61 cut in a substantially semi-circular pattern. A strap 62 is stitched to the pad 61 and is folded over at 63 and 64 so that it follows the shape thereof. A buckle 65 is provided at one end of the strap for the usual purpose. Loops 66 and 67 are secured to the folded over portions 63 and 64 and extend away therefrom. A cord 68 is secured to the loops.

In use the pad 61 is placed around the ankle and the strap is tightened with the buckle lying slightly above and forwardly of the ankle. In this position of the harness, the loops 66 and 67 lie on either side of the ankle.

Operation

In use, as a splint construction, the device of the invention is applied to an injured body member, as a leg L, by placing the compressors on either side of the leg and urging the frame members 10 and 11 toward each other to hold the compressors firmly in place. Such urging is in this embodiment effected by pulling on the straps 31, 32 and 33 with considerable pressure and then securing the splint in such position by use of buckles 38, 39 and 40. During the mounting of the splint, the strap 32 is positioned so that it bears against the knee cap while the straps 31 and 33 are mounted in any desired and satisfactory position about the leg on either side of the knee. The mounting of the splint about the leg causes the compressors 12 and 13 to deform and assume the contour of the leg L and also causes the compressors to impose a substantially uniform pressure on that portion of the leg which is surrounded thereby. In particular, it is pointed out that the portion of the compressors 12 and 13 which extend beyond the side edges of the frame members 10 and 11 are forced to fill the space between the frame members by the straps so that the pressure from the compressors is exerted about substantially the entire periphery of the injured leg.

With the device mounted about the leg and the harness secured to the ankle, the person applying the treatment may pull on the cord 68 to exert traction on the leg if desired. The respective portions of the cord depending from loops 66 and 67 will then be passed through notches 28 and 28a, respectively, which cord will be locked thereby because of the inwardly converging shape of the notches.

When used as a surgical aid in the manner above described, the device will be affixed around the member in the same manner as though it were being used for a splint and the pressure applied, as by tightening the straps 31, 32 or 33 or by, in the case of a device intended for use with a pressure fluid, such as compressed air, supplying a sufficient amount of such fluid under pressure to provide the compression required.

Although the above mentioned drawings and description apply to one preferred embodiment of the invention, it is not my intention, implied or otherwise, to eliminate other variations or modifications which do not depart from the scope of the invention unless specifically stated to the contrary in the hereinafter appended claims.

I claim:

1. A splint construction for an injured bodily member, including in combination: a pair of similar rigid, substan-

tially channel-shaped frame members; deformable compressors, positioned on the interior surface of said frame members and extending beyond the lateral edges thereof, said compressors including a casing and material within said casing resisting deformation thereof with a force which is substantially uniform, said compressors overlapping the edges of said frame members; a web connecting a pair of adjacent compressors each of said adjacent compressors being located respectively on one of said frame members, said web thereby providing an operative connection between a pair of adjacent edges of said frame members so that said frame members may be moved relative to each other into engagement with different portions of the injured member; and means secured to said frame members for securing said frame members and compressors about the injured member.

2. A splint construction including in combination: a pair of similar rigid, substantially channel-shaped frame members, said frame members each having a relatively wide web and having a pair of relatively short arms extending away from said web at an obtuse angle; a pair of deformable compressors, said compressors having adjacent edges joined together by a connecting web, said compressors including a flexible external casing and means within said casing for resisting deformation of the casing, said means being of character capable of transmitting substantially equally in all directions a force applied thereto; means mounting each of said compressors in one of said frame members on the interior surface thereof, said connecting web operatively connecting said frame members together but permitting relative movement thereof, each compressor overlapping the edges of the frame member with which it is associated; securing means mounted on said frame members and adapted to secure said frame members about an injured member, said securing means deforming the overlapping portions of said compressors into engagement with the outer surface of said injured member whereby a substantially uniform pressure is imposed on the outer surface of the injured member.

3. A construction as in claim 2 wherein said material within said casing for resisting deformation thereof is a fluid, one of the fluid and the casing being of elastic character.

4. A construction as in claim 2 wherein said material within said casing for resisting deformation thereof is a mass of particulate solids which are adapted to move within said casing and resist deformation thereof.

5. A construction as in claim 4 wherein said mass of particulate solids includes rubberized hair.

6. A splint construction including in combination: a pair of rigid, substantially channel-shaped, elongated frame members; deformable compressors secured to the interior surface of said frame members, said compressors including means resisting deformation thereof with a force which is substantially uniform at all points on its surface; means on one longitudinal end of each of said frame members for connection to a traction device, said

means including a plate inwardly from the interior surface of each frame member and having a longitudinally extending notch; and securing means for mounting said frame members about an injured member.

7. A splint construction including in combination: a series of rigid, elongated frame members, said frame members being operatively connected so as to be capable of substantially surrounding an injured member; a harness securable about an injured member; cord means secured to said harness on opposite sides thereof; a plate on one longitudinal end of each of a pair of opposed frame members for connection to said cord means, said plates each having a longitudinally extending V-shaped notch in the edge thereof opposite the frame member to which it is attached for reception of a cord therewithin.

8. A splint construction including in combination: an elongated, substantially channel-shaped, rigid frame member, said frame member having a plate secured thereto at one longitudinal end thereof; said plate having a planar portion offset inwardly of the surface of said frame member which is adapted to be closest to an injured member, said planar portion being adapted to align with the outside surface of said injured member, said planar portion having a V-shaped, longitudinally extending notch formed in said planar portion and extending from the end edge thereof which is opposite the frame member to which it is attached.

9. A splint construction, including in combination; a pair of rigid, substantially channel-shaped frame members; a plurality of deformable compressors, said compressors being positioned on the interior surface of said frame member and extending beyond the lateral edges thereof, said compressors including a casing which is urgeable into contact with an injured member under substantially uniform pressure; a web connecting the adjacent lateral edges of a pair of adjacent compressors, said pair of adjacent compressors each being secured, respectively, to one of said frame members, said web thereby connecting adjacent lateral edges of said frame members so that said frame members may be moved relative to each other around an injured member and urge said compressors into contact with substantially the entire periphery of the injured member under substantially uniform pressure; and means for securing said frame members and compressors in position about the injured member.

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