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Dixon et al.

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[54] **SPLINTS**

[76] Inventors: **Amers Ernest Dixon,** 44 Sutton Street, Walkergate, Newcastle upon Tyne; **Michael Proctor,** 27 Beach Avenue, Whitley Bay, both of England

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[51] **Int. Cl.**.....**A61f 5/04**

[58] **Field of Search**.....128/87, 84, 133, 134, 94; 5/82; 269/328

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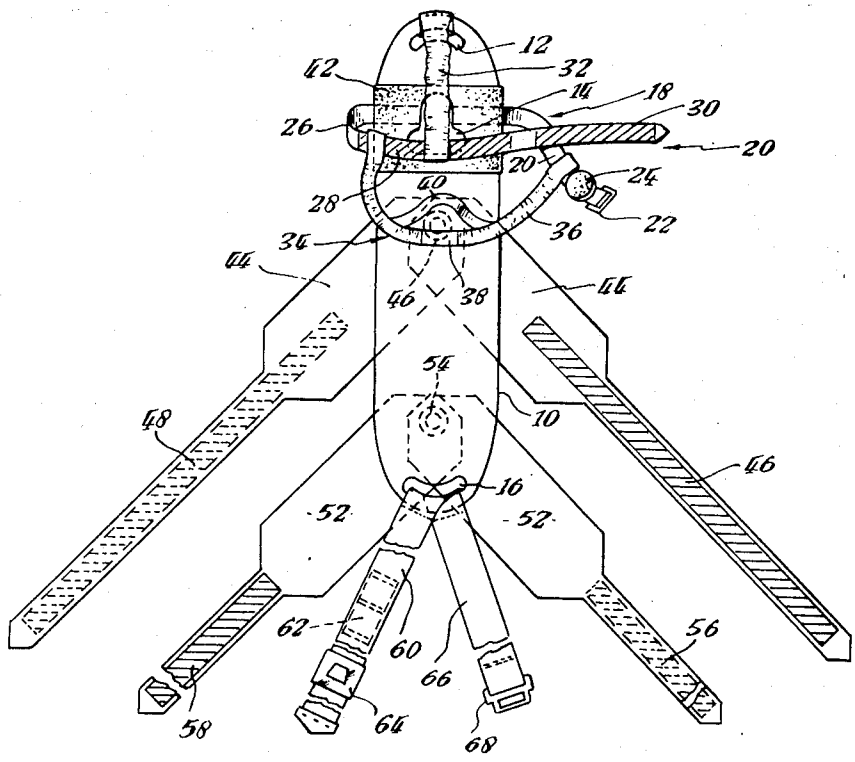
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Primary Examiner—Dalton L. Truluck
Assistant Examiner—J. Yasko
Attorney—Jones and Lockwood

[57] **ABSTRACT**

A splint which is of particular value in extricating persons from vehicle crashes where an injury of the spine or neck is to be feared comprises a solid backing member which is of a length to stretch from adjacent the bottom of the spine to behind the head of an injured person, and which has secured thereto a harness for holding the head in position against the splint and further harness for rigidly securing the torso to the splint (which harness may also hold the arms rigidly).

4 Claims, 4 Drawing Figures



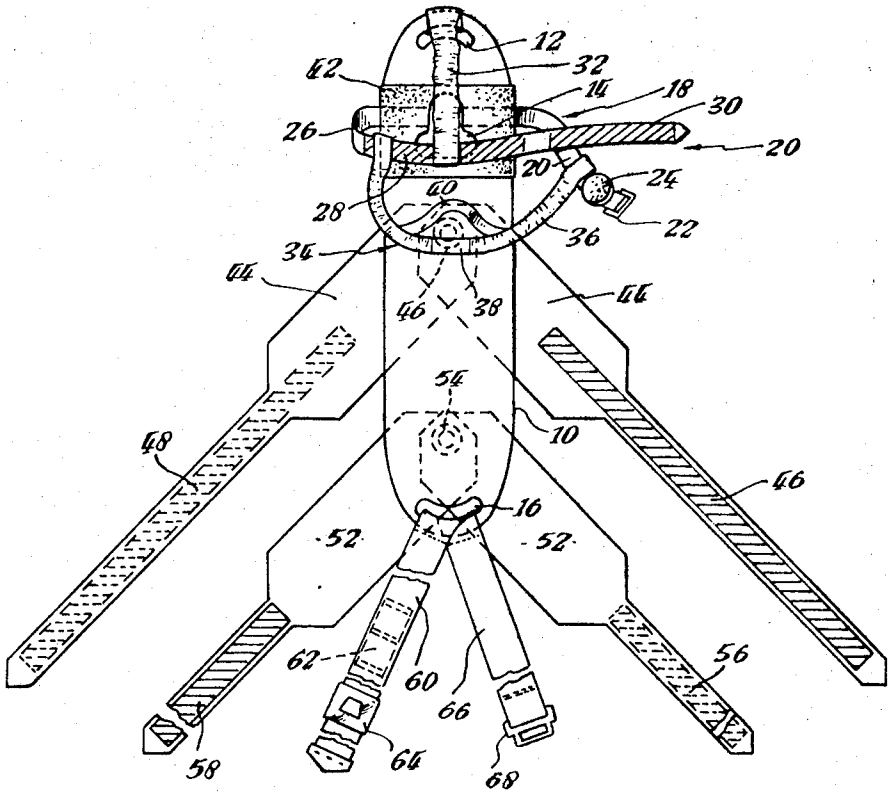

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Fig. 1.

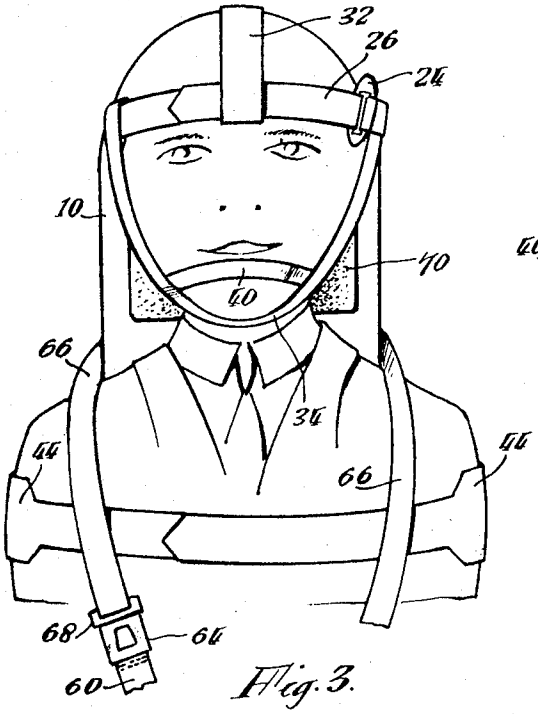


Fig. 3.

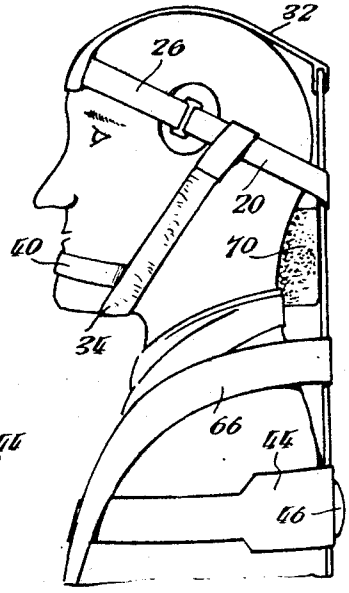


Fig. 4.

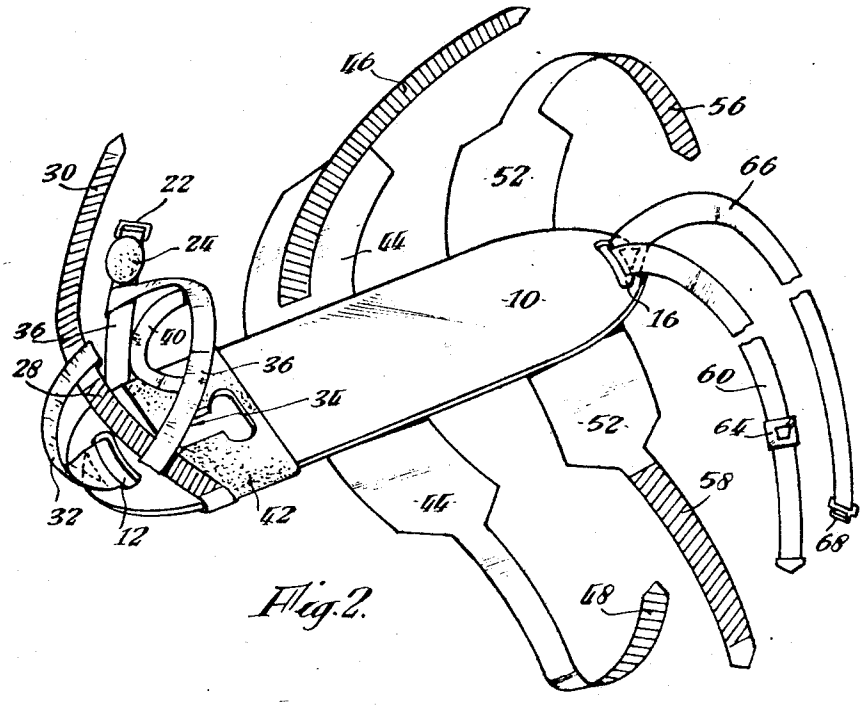


Fig. 2.

SPLINTS

This invention relates to a splint which is of particular value in enabling persons to be easily and safely moved under conditions where an injury to the spine or neck is to be feared.

This kind of injury is not uncommon as a result of vehicle crashes. In these situations the occupants of the vehicle often have to be removed from very constricted and difficult situations; on the other hand, if there is an injury to the spine or neck any twisting or extension of the body can be very dangerous and cause permanent injury or death.

An object of the present invention is the provision of a splint to which an injured person can be attached so that the person can thereafter be removed with the minimum of ill effect even if there is an injury to the spine or neck.

According to our invention a splint comprises a solid backing member which is of a length to stretch from adjacent the bottom of the spine to behind the head of an injured person, and which has secured thereto a harness for holding the head in position against the splint and further harness for rigidly securing the torso to the splint (which harness may also hold the arms rigidly). In a preferred form of the invention separate harnesses are used for the upper part of the torso and the lower part of the torso and there are preferably also straps which can be passed under the crutch (or round the hips or thighs) and behind the shoulders of the injured person to hold him securely against longitudinal movement in the event of his having to be raised vertically out of difficult positions.

Preferably too there is a face hole which enables the splint to be secured in front of the body with at least a hole opposite the nose so that there is no interference with breathing.

One form of the invention will now be described with reference to the accompanying drawings, wherein:

FIG. **1** is a view of the front of the device;

FIG. **2** is a perspective view of the front of the device;

FIG. **3** shows a front view of the upper part of a person with the splint attached; and

FIG. **4** is a side view of FIG. **3**.

The splint comprises a solid backing member **10** which may be suitably moulded from a plastics material with glass fiber reinforcement, this backing member being approximately **2**ft **8**ins long and **8**ins. wide with three apertures **12**, **14** and **16**. All three apertures are used to secure various attachments to the backing member; additionally the apertures **12** and **16** are useful as hand grips whilst the aperture **14** gives access to the nose and mouth if the splint is used in front of an injured person instead of behind.

Attached to the apertures **12** and **16** is a head harness **18**. In detail, this consists of a strap **20** which is secured to the backing member **10** by being looped round one side of the backing member between the aperture **14** and the edge of the member. This strap **20** terminates in a metal loop **22**, and a pad **24** is attached to the strap **20** so that the metal loop does not come into contact with the injured person when the head harness is in position. Another strap **26** of greater length is attached in a similar way to the other side of the backing member **10**, the strap **26** having attached to one side thereof a strip **28** of hook-like nylon pile fabric

and, separated slightly therefrom, a strip **30** of nylon pile material. The two strips are such that they will adhere together if they are pressed against each other, and are available under the trade mark VELCRO. If now the strap **26** is passed through the metal loop **22** and bent back on itself so that the strip **30** is pressed against the strip **28**, the two straps **20** and **26** make a loop which is large enough to go round the head of an injured person.

A further strap **32**, which is stretchable so that it can be increased in length, is secured at one end round the top of the splint through the aperture **12**, and at the other end has a loop which can be passed over the strap **26**. A further strap **34**, which has a loop at each end, one for passing over the strap **20** and one for passing over the strap **26**, has two stretchable portions **36**, one near each end, and a substantially non-stretchable portion **38** at the center. A short strap **40** of rather thinner material has its ends attached to the strap **34** at the ends of the non-stretchable portion **38** of that strap.

All the above straps, if not required to be substantially stretchable, can be made of nylon-reinforced polyvinyl chloride or, if required to be stretchable, may be of elastic material covered with a puckered casing of nylon-reinforced polyvinyl chloride. The upper end of the splint is completed by a soft pad **42** of felt material stuck to the front of the backing member **10** round the aperture **14**.

The upper arm straps **44** are pivotally mounted to the back of the backing member **10** through a nylon swivel bush **46**. Each strap **44** consists of a broad portion extending outwardly about 1 foot from the bush **46** and a further narrower portion about 2½ inches wide and some 2 feet in length. One of the straps **44** has a strip **46** of nylon pile material running along its front face, whilst the other has a strip **48** of hook-like nylon pile fabric along the back. These straps may also be made of nylon-reinforced polyvinyl chloride.

Further down the splint, and mounted in a similar way on a swivel bush **54** are two lower arm straps **52** which are basically similar to the upper arm straps **44**, though slightly shorter in length. One of these has a strip **56** of nylon pile material on the back face while the other has a strip **58** of hook-like nylon pile fabric on the front.

The splint is completed by crutch straps **60**, **66** made of suitable braided or woven material, secured round the bottom end through the aperture **16**. The strap **60** is about 4 feet long and has, secured to the reverse side thereof, a polyvinyl chloride strip **62** sewn to the strap at each end and in the middle to form two loops, the first loop being about 1 foot and the other loop about 1½ feet from the end of the member **10**. Also mounted on the strap **60** is a quick release clasp **64**, which may be of a type used on safety belts in automobiles or in airplanes. The other crutch strap **66** is some 5½ feet long and bears at its end a clip **68** which co-operates with the quick release clasp **64**.

In order to use the splint on, for example, a person trapped in a crashed car, the splint is inserted behind the person. A separate resilient pad **70** supplied with the splint, is inserted between the neck and the splint, and the head harness **18** is then applied to the injured person by forming the straps **20**, **26** into a loop round the forehead with the stretchable strap **32** over the

head, the further strap **34** under the chin, with the thin strap **40** in front of the chin. Now the upper and lower arm straps **44, 52** are applied round the arms and torso, the strips **46, 48** and **56, 58** on the respective arms being pressed firmly together so that the torso is held securely against the splint and the arms are secured to the torso. The injured person is now completely immobilised and may often be moved without further straps being applied.

If, however, the injured person has to be removed vertically, some care must be taken to stop any longitudinal movement of the torso and head on the splint. To stop this the crutch straps are used. These are passed under the crutch and straight up the front of the person, the longer strap being passed around the shoulders behind the splint and downwardly, where the clip **68** is put into the clasp **64** on the other strap. Tension is then applied to the strap **60** so that the two straps **60, 66** are tight and the person is immobilised from longitudinal movement. In cases where the crutch straps cannot easily be passed between the legs of the injured person, for example in the case where the injured person is a woman wearing a long skirt the two crutch straps can be passed around the hips (as low as possible) and the longer straps **66** put through one of the loops formed between the strip **62** and the strap **60** after which the strap **66** is taken up round the shoulders of the injured person and down, the clip **68** and clasp **64** being engaged as before, and the strap **60** is pulled tight.

If it is necessary to immobilise the knees and ankles of the injured person further straps (not shown) supplied with the splint may be used for this purpose. The injured person may now be removed from the vehicle to safety and placed on an orthodox stretcher for transportation to the hospital. On arrival at the hospital the injured person can be examined with the splint in position since the backing member **10** is transparent to X-rays.

The splint can also be used where a person has suffered a fracture of the pelvis or of the femur.

If it is impossible to apply the splint behind the injured person, it may instead be applied in the front of the person, with the nose and mouth opposite aperture **14**.

We claim:

1. A splint comprising a solid backing member which is of a length to stretch from adjacent the bottom of the spine to behind the head of an injured person, a head harness secured to the backing member at the upper end thereof for holding the head in position against the backing member, swivel means on the backing member, an upper torso harness comprising two straps individually mounted on the said swivel means for rigidly holding the upper part of the torso to the backing member, further swivel means on the backing member and a lower torso harness comprising two straps individually mounted on the said further swivel means for rigidly holding the lower part of the torso to the backing member, and a face hole in said backing member at the upper end thereof wherein said face hole is so located in said backing member as to be opposite the nose of an injured person when the splint is applied to the front of the person.

2. A splint according to claim **1**, having also straps secured to the backing member for passing under the crutch or round the hips or thighs and behind the shoulders of an injured person to hold the person securely against longitudinal movement on the splint.

3. A splint according to claim **1**, wherein said head harness comprises a first pair of straps secured to said backing member and adapted to form an adjustable loop for holding the forehead of an injured person, a stretchable strap secured at one end to the top of said backing member and at the other end to said adjustable loop and adapted to pass over the top of the head of an injured person, and a chin strap secured at each end to said adjustable loop and adapted to hold the chin of an injured person.

4. A splint according to claim **2**, wherein said crutch strap means comprises first and second crutch straps secured to said backing member, said first crutch strap carrying first and second loops adapted to receive said second crutch strap, and quick release clasp means connected to the free ends of said crutch straps.

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