

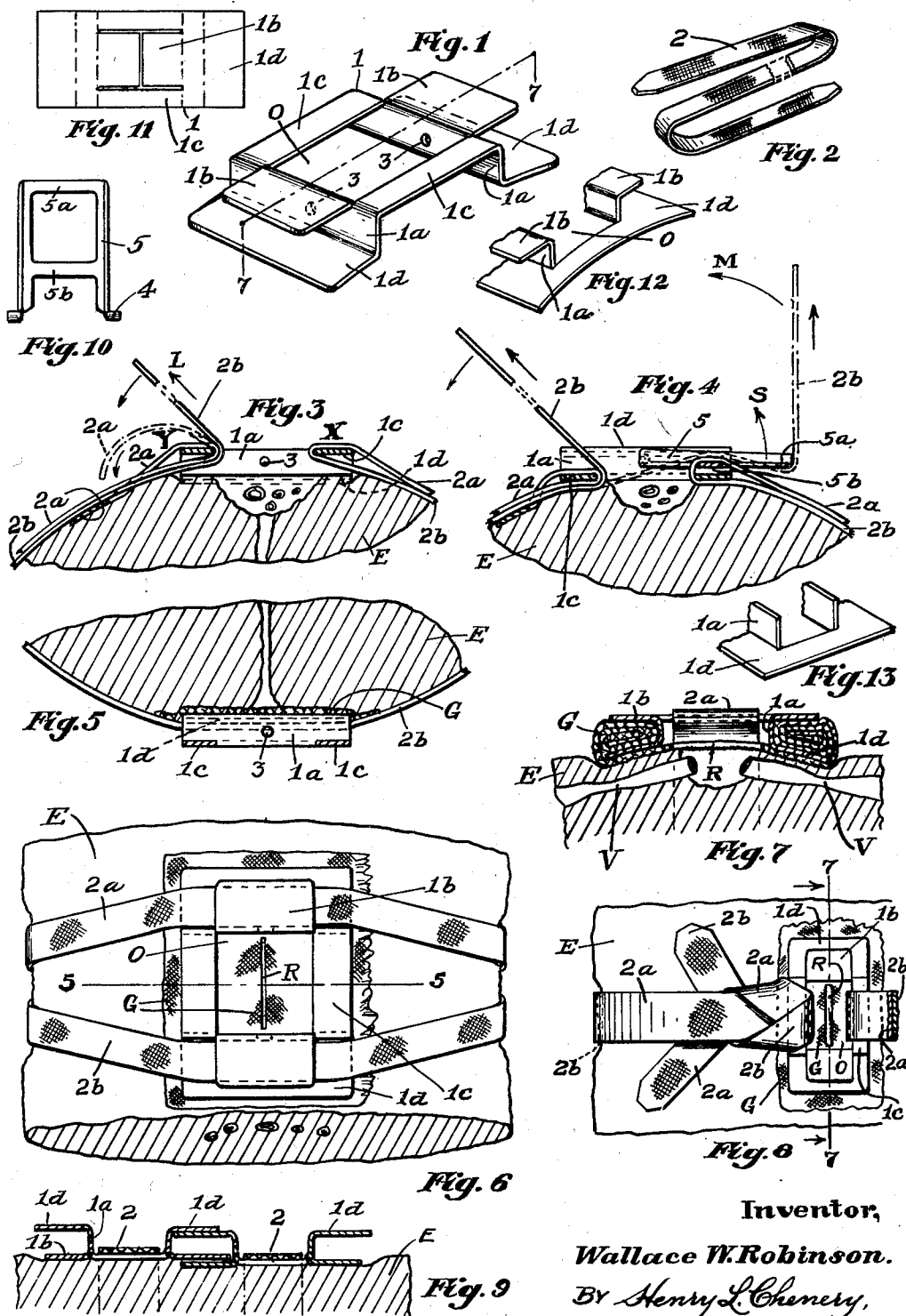
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ZONAL HEMORRHAGE-CHECKING COMPRESSION PLATE

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ZONAL HEMORRHAGE-CHECKING COMPRESSION PLATE

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The invention to be hereinafter described relates, in general terms, to surgical appliances, but deals more specifically with a field, or first-aid device employed primarily to stop the flow of blood from the wound of an injured person, but further incorporating in its structure the means whereby dressing and inspection of the wound, and improvisation of fracture splints previously to hospitalization of the patient, may be undertaken and accomplished in the field with facility and despatch.

The device is a plate constructed in two planes so that, gauze dressed or bare, when the plate is positioned over a wound, with the long axis of the plate in the direction of the long axis of the body or limb and held there either by the hand, or bound by a bandage, or by strap-securing means, there is simultaneously present when one of the plate planes is applied, a peripheral or marginal zone of high compression of the flesh adjacent the wound, and a decompression locale where there is no pressure of the device directly on the wound itself, and when the plate is inverted and the other plane of the plate is applied then there is a complete circle of wound pressure about a zone of central decompression.

As ordinarily used, the device embodies but two elements, a strap, and a strap-carrying, hemorrhage-checking compression plate, and is devoid of levers, buckles and other paraphernalia which devices of the conventional order employ for securing the free ends of binding structures.

My method, which I believe is peculiar to itself, of adjustably securing the double, free ends of the strap to the strap-carrying member, after an initial strain on the strap has been made, without the intervention of any of the hereinbefore mentioned strap-locking means, has been evolved by taking advantage of friction or strap bind to resist release of the strap once it has been reeved through the strap-carrying member and one end tucked under the portion under tension, a snubbing action taking place which, together with the friction developed, gives ample adjusting and holding means for the free ends of the straps.

A further advantage in the construction of the compression plate resides in locating the bridge-bars—the members which carry the strap, and to one of which the free ends of the strap are locked, perpendicularly outward from the base portion of the plate. This permits of a somewhat more effective pull of the strap, thereby increasing the pressure of the base flanges on the flesh of the member being bound, resulting in a more rapid and complete stoppage of the outflow of blood.

Although under ordinary circumstances I do not contemplate the use of a secondary tensioning device in the form of a lever, which I employ in my tourniquet invention for which U. S. Patent No. 1,712,584, dated May 14, 1929, was granted me, I may, nevertheless, elect to incorporate this element in my present invention and use it whenever it seems advisable to place a greater constriction on the injured parts than could conveniently be gotten by the use of the strap alone. To this end I have made provision in the structure of the compression plate whereby mounting one of these levers may be quickly and easily accomplished.

In the accompanying drawing illustrative of my present invention, and in which like parts are identified by similar reference characters,—

Fig. 1 is a perspective view of the compression plate resting upon its two largest flanges, on which the binding strap may be mounted;

Fig. 2 represents the strap, drawn in perspective view;

Fig. 3 shows the device surmounting a wound, the strap alone, in this instance, being used to apply a circumferential pressure on the bound member;

Fig. 4 is like Fig. 3, except that a tourniquet lever is mounted in the compression plate to augment the tension on the strap; and the compression plate is inverted.

Fig. 5 illustrates a case where the wound passes through the limb, and a duplicate of the compression plate is mounted on the exit end of the wound, the section being taken on 5—5, Fig. 6;

Fig. 6 is an inverted plan view of Fig. 5;

Fig. 7 is a longitudinal sectional view of the gauze dressed plate shown mounted over a wound, the section being taken on line 7—7, Fig. 8; the gauze end having been rolled and punched between flanges 1b and 1d.

Fig. 8 illustrates the application of the device, and strap structure being fully tensioned and the ends of the strap tucked under the tensioned parts;

Fig. 9 illustrates a fracture splint, made of a plurality of the compression plates telescopically arranged;

Fig. 10 shows the secondary tension take-up lever;

Fig. 11 shows the blank from which the compression plate may be subsequently formed, and

Figs. 12 and 13 show alternate forms of compression plates. Fig. 12 is analogous to Fig. 1 and both are preferred forms and invertible in use. Fig. 13 is not for invertible use.

In Fig. 1 of the drawing I illustrate my hemorrhage-checking compression plate 1 which, in some cases may be used alone, or without strap or bandage to stop the flow of blood from a wound, particularly applicable in neck wounds or laceration of the jugular vein, in which instance hand application of the compression plate is solely relied on to provide pressure on the parts until skilled aid arrives on the scene. In this particular instance strap-binding methods would not be practicable, as binding the neck would most likely prevent the patient breathing.

The compression plate 1 is bilaterally symmetrical in shape and comprises, when bent into its ultimate form as shown in Fig. 1, a structure having lateral channel-shape intermediate portions embodying upstanding legs 1a and longitudinal interconnecting web portions 1c, to which latter the strap 2 makes connection in a manner herein-after to be set forth.

Bent outwardly and oppositely from the original web structure are two finger-hold flanges or shelves 1b, leaving an opening O in the central, raised part of the compression plate.

Projecting outwardly from each end of the device and made integral with the rising portions 1a, is a base flange 1d which, in one method of applying the device, contacts the flesh, or else an interposed compress, on opposite sides of a wound.

The legs 1a are provided with holes 3 which are engaged by the gudgeons 4 of the take-up lever 5 when this member forms a part of the strap-tightening structure (see Figs. 4 and 10).

By raising the web portions, or as I designate them, the bridge-bars 1c, above the base flanges, the pull on the strap is made more effective, due to the decrease in the angle of tension, thereby causing the base portions to become more deeply imbedded in the flesh or the interposed gauze compress G.

But other reasons have impelled me to adopt the foregoing construction, one being that it provides a clear space across the full width of the compression plate, leaving a decompression zone over the wound at which locality there is no direct pressure of the plate on the wound. In other words, the pressure is localized and is applied on opposite sides of the wound which may be examined and dressed, without disturbing any part of the device, through the opening O, and underneath the elevated bridge-bars 1c.

Furthermore, the strap is more conveniently reeved under these bridge-bars when positioned as shown in Fig. 1 or in Fig. 12 when inverted than would be the case were the end flanges extended in one continuous flesh contacting curve or straight line throughout the length of the device.

Fig. 3 illustrates a transverse, part section of a wounded limb and Fig. 7 a longitudinal part section of the same, both views showing my device mounted on the limb with the larger base flanges contacting the injured member in the longitudinal axis of the limb.

It will be observed that the strap 2 loops around one of the bridge-bars at X, then passes doubly around the limb and under and around the opposite bridge-bar at Y. It will further be noted that the strand or single portion of the strap designated as 2b is disposed nearest the part being bound.

In creating a tension on the strap structure the two portions of the strap, 2a and 2b, are at the start, drawn as a unit more or less tautly

around the limb. Now by pulling on the strap end 2b in the direction of the arrow L the outer strap end 2a, shown in dotted lines, will be drawn along by frictional contact with the strap end 2b, over the bridge-bar 1c, at Y. But before too much tension has been placed on the strap 2b, the other end of the strap, 2a, is tucked under the two portions which are at this time under light tension. Thus a slack loop is formed in 2a at Y.

Alternate pulling on strap end 2b and then on 2a, taking away the slack-loop in strap end 2a will finally bring the two ends into the proper locking tension, the outer strap 2a now being as shown in full lines, Fig. 3. At this point the strap end 2b may also be tucked under the two thicknesses of strap and pulled taut, as shown in Fig. 8. This frictional snub locking of the strap insures against any possible release of the tension around the bound body, accidentally.

Should it be desired to use the take-up lever 5, which is now mounted in inverted Fig. 1, as in Fig. 4 for the purpose of applying a greater tension on the strap 2, the strap end 2b instead of being tucked under the two thicknesses of strap as shown in Fig. 3, is reeved through the space between bars 5a and 5b in the lever 5, which has been mounted in the compression plate, and when pulled taut, swung over in the direction of arrow M until the lever, swinging in the direction of arrow S, arrives at the opposite end of the compression plate, and the lever is locked by strap tension at which time, if so desired the strap end 2b may be tucked under the strap portion under tension.

Often times a wound extends clear through a limb or body injured, particularly in the case of ballistic accidents. In this instance the exit end of the wound needs treatment similarly to that applied at the entrance end of the wound.

In Figs. 5 and 6, taken together with Fig. 3, I illustrate the method of protecting both ends of the wound with two of the compression plates and one strap. It will be observed that on the exit end of the wound, as illustrated in Fig. 5, the straps separate, the two portions bearing on the base flanges and straddling, respectively, the two walls 1a.

Gauze protecting material G may or may not be employed beneath the compression plate member, directly on the wound, Fig. 3 showing it without and Fig. 5 with it interposed.

Frequently it is required to treat a fracture by binding a splint to the injured member. Fig. 9 illustrates how this may be accomplished by the use of my compression plate, a plurality thereof being telescopically assembled along the injured limb and secured thereto by the straps 2 in the manner hereinbefore set forth.

In mounting the take-up lever 5 in the compression plate, the walls 1a are slightly spread apart by flexing the bridge-bar 1c sufficient for the entrance of the gudgeons 4 to the holes 3, and then bent back.

In making use of this lever 5 it will be noted, by observation of Fig. 4, that the compression plate in Fig. 1 is reversed with respect to its disposition on the wound, that is, the flanges or finger gripping shelves 1b and the bridge-bars 1c are now placed nearest the wound, the base flanges being outermost, now function as finger gripping shelves. This arrangement provides for a continuous contact with the flesh completely around the wound, and opening thereto for inspection and dressing still being provided at O.

Fig. 7 graphically illustrates how the arcuate form of the base flanges 1d in conjunction with the elevated bridge-bars 1c over which the strap on both sides of the compression plate is mounted, augments the pressure on the arterial above and venous structure below the wound, constricting them at points V, V, in the longitudinal axis of the limb.

While the description of the compression plate 1 as hereinbefore given constitutes preferred construction, I may elect to construct it as shown in either Fig. 12 or Fig. 13, wherein in both cases the base flange is continued from one end to the other of the compression plate, the bridge-bars being a continuation of the base flanges. In Fig. 13 construction the finger-hold flanges or shelves are omitted, the upright portions 1a serving as finger-holds.

As in most instances a gauze compress is used to cover the wound, it would prevent, unless otherwise provided for, examination of the wound without loosening or detaching the whole appliance. To overcome this objection I slit the compress as at R, this opening being enlarged to obtain access to the wound, thus avoiding the necessity of removing any part of the binding structure.

Fig. 7 illustrates how an extra supply of the gauze may be lockingly housed under compression between the flanges 1b and 1d of the compression plate.

The simplicity of my device is one of its appealing characteristics. The compression plate may be applied, even without the strap, to a bleeding wound and the outflow of blood checked by a tyro unskilled in surgical and anatomical matters. Its form readily lends itself to ease of handling, protects the wound from finger contamination and the holding fingers from wound discharges. Moreover it is easily cleaned and sterilized and is therefore sanitary in practical use.

What I claim is:

1. A wound-encompassing hemorrhage-checking compression plate having a central opening therein, said plate embodying a base flange at each end thereof, a bridge-bar on each side, elevated from and interconnecting said base flanges, and finger-hold elements rising from the inner end of each of said base flanges, and forming, together with said bridge-bars, the longitudinal and transverse bounds, respectively, of said central opening.

2. A device of the class described comprising a plate adapted, after being longitudinally and transversely sheared at its intermediate portion,

to be bent to form a wound encompassing structure embodying two arcuate, longitudinally bent base flanges, an interconnecting, channel-shape portion disposed on each side of said device, and two finger-hold shelves formed by outwardly bending said sheared portions so that they are disposed superjacent, respectively, the two said base flanges, the said shelves and the web portions of said channel-shape elements defining the bounds of a central opening in the upper portion of said device.

3. A device of the class described comprising two arcuate, longitudinally bent base flanges, an interconnecting channel-shape structure disposed on each side of said device, the horizontal, web portions of said channel-shape structure constituting strap-carrying bridge-bars, two angular finger-hold elements disposed above the inner ends, respectively, of said base flanges, leaving a wound-inspecting opening in the top of said device, and a strap adapted to be looped around one of said bridge-bars, thence passing in double layer around the body to be bound and then reeved under the opposite of said bridge-bars, whereby upon placing a moderate strain on both layers of the strap and tucking the outer layer beneath the two layers under tension, consecutive pulls on the inner layer of strap alternating with slack-take-up pulls on the outer layer eventually brings the desired and predetermined tension on the body being bound.

4. A device of the class described having characteristics according to claim 3, and a gauze compress having a central slot therein adapted to be placed under said device with the surplus supply on each end of the gauze element housed within the space between said finger-hold elements and said base flanges.

5. A device of the class described comprising a plate having an opening centrally disposed therein, said plate conformed in two planes overlying each other, both planes interconnected by two portions of the plate to form side boundaries of the opening, the end boundaries of the opening being formed by two bridge-bars of the plate.

6. A device of the class described comprising a plate having an opening centrally disposed therein, said plate conformed into four flat flanges two of said flanges positioned at each side of said opening one set above the other and the inner ends of said flanges interconnected by portions of the plate, and two of said flanges in the same plane and interconnected by bridge-bars of the plate.

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