Oct. 9, 1934. A. B. MORAN 1,976,244

TRACTION SPLINT

Filed June 1, 1932 3 Sheets-Sheet 1

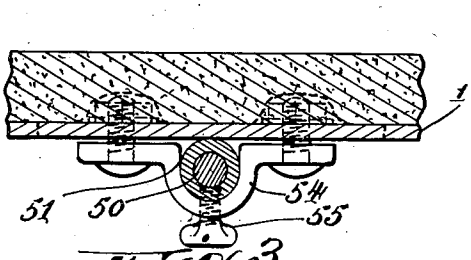


Fig. 3.

Fig. 1.

Fig. 2.

Witness

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TRACTION SPLINT

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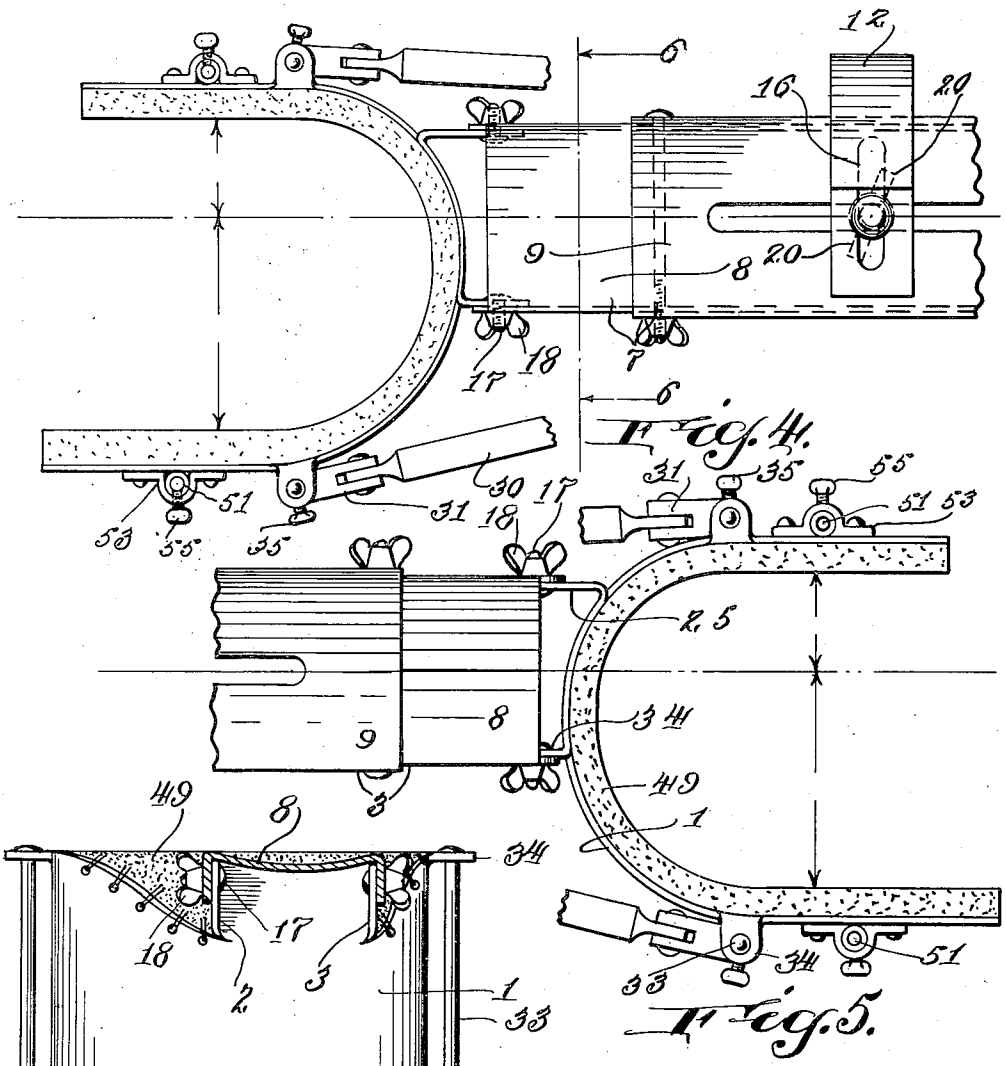


Fig. 4.

Fig. 5.

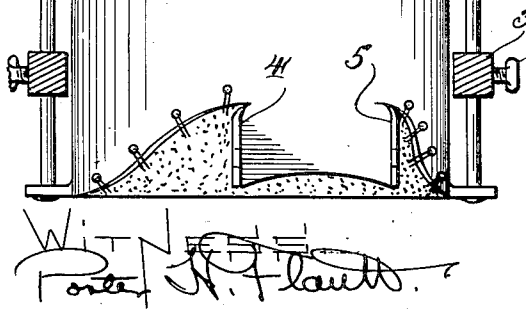


Fig. 6.

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TRACTION SPLINT

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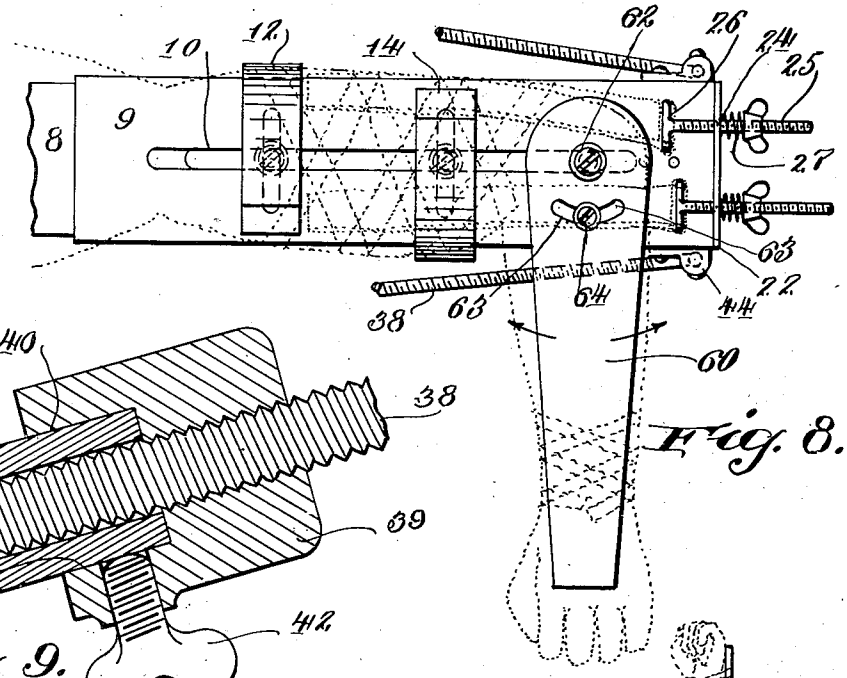


Fig. 8.

Fig. 9.

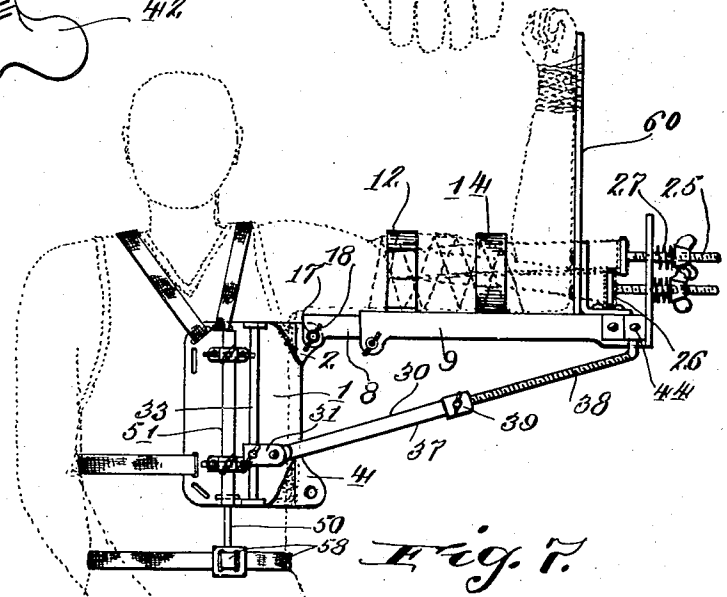


Fig. 7.

Witness

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UNITED STATES PATENT OFFICE

1,976,244

TRACTION SPLINT

Arthur B. Moran, Baltimore, Md.

Application June 1, 1932, Serial No. 614,666

6 Claims. (Cl. 128—88)

The invention relates to an improved type of traction splint for use in the treatment of fractures of the bone of the upper arm. The device consists of a body piece or section which conforms to the shape of the chest and an arm support with means for holding it in various positions adapted to maintain the normal anatomical relation of the arm to the body favorable to proper alignment of the bone fragment. An important feature of the invention resides in the construction of the body member or plate in such a way as to make it reversible to fit either side of the chest without addition or subtraction of parts.

The arm support in the preferred form consists of two parts, one sliding over and/or relatively to the other to provide for shortening or lengthening of the arm support to conform to the length of any arm to be treated, affording full and firm support for the entire arm at all times.

The invention also provides a traction or tension abutment shown in the form of a plate attached to the outer end of the arm section and provided with a number of points of attachment to provide a multiplicity of traction or tension points whereby as many lines of traction or tension as may be found desirable, are made available. The invention also includes traction or tension means so designed as to provide any desired increase of traction or tension to be applied to the bone by a simple thumbscrew and/or spring adjustment at any or several of said points. For the screw or spring any equivalent tension means may be substituted.

The construction also includes curved or other suitable bands or abutments placed on or overlying the arm support to engage the arm from either or both sides in various positions of adjustment longitudinally of the arm to correct lateral, i. e., anterior or posterior displacement of the fragments. These bands are so arranged as to be easily adjustable transversely to the length of the arm, and thus arranged they serve a two fold purpose, first to control and overcome lateral, i. e. side to side or anterior, and/or posterior displacement, and second, to hold the arm and the fragments of bone securely after reduction, i. e., relocation or replacement of the fragments in their natural relation has been accomplished.

The construction also includes supporting arms or braces extending from the body portion to the upper or lower end of the arm section so as to provide for full adduction and/or abduction of the arm. These supporting arms or braces may be attached to either end of the body portion providing for reversal of the splint as hereinafter described. Specially arranged members to receive the outer and upper extremities of these supporting arms providing for upward and outward swing resulting from the adjustment of the length of said arms or braces are a feature of the invention. These further provide for elevation and/or depression of the arm section without dispensing with the relation of the supporting arm to either the body or arm section.

The construction also includes reversible sliding extension supports attached to the body portion both at the front and rear, and arranged so as to be placed well toward the mid-line of the body or close to the lateral surface, the upper ends attached to the body section and the lower ends reaching almost to the groin in front and over the sacrum in back. These extension supports are provided at their lower ends with means for the attachment of straps for securing the supports to the body preventing lateral swing of these members, i. e. the extension supports and secondary movement of the splints.

In the accompanying drawings I have illustrated a traction splint embodying the features of the invention in the preferred form.

In the drawings:

Figure 1 is a perspective view of the complete construction.

Figure 2 is a section on the line 2, 2 in Figure 1 looking to the right side.

Figure 3 is a section on the line 3, 3 in Figure 1.

Figure 4 is a top plan view of the splint arranged and adjusted for attachment to the left side of the chest.

Figure 5 is a top plan view of the splint arranged for attachment to the right side of the chest.

Figure 6 is an elevation looking at the body plate from line 6, 6, Figure 4 on which the arm support is sectioned.

Figure 7 is an elevation showing the splint in operation attached to the left side of the body to support the left arm, the upper arm being horizontal and the forearm upright, tension or traction being applied to the bones of the upper arm in accordance with the intended operation of the splint.

Figure 8 is a fragmentary plan showing the splint holding the forearm extending forwardly in a horizontal plane.

Figure 9 is a detail of the inclined brace.

Referring to the drawings by numerals, each of which is used to indicate the same or similar

parts in the different figures, the body piece or plate 1 is U shaped in horizontal cross section, being curved to conform to the natural contour of the body on either side of the vertical axis from a point immediately below the shoulder and in the vicinity of the armpit to a point just above the waistline. This body piece or plate is provided at the top and bottom with ears or lugs 2, 3 at the top and 4, 5 at the bottom for which any suitable means for the purpose hereinafter described may be substituted. The lugs 2, 3 at the top are spaced apart by a convenient distance which may be about 4", the lugs at the bottom being directly beneath them and correspondingly spaced. These lugs 2, 3, 4, 5 are preferably somewhat nearer the back than the front, see Figures 4 and 5, the front portion of the plate being somewhat fuller in its curvature than is the rear portion to conform to the normal relative curvature of the back and front of the human trunk. These lugs 2, 3, 4, 5 are suitably apertured at 6 for the hinged attachment thereto of the arm support 7 which consists of two parts 8 and 9, both being preferably of channel shaped cross section, and one, i. e. section 9, being arranged to enclose section 8 upon which it is mounted and relatively to which it is adapted to slide for purposes of adjustment of the length of the arm support. The two sections are slotted in alignment at 10, the slots being partially in registration and are connected together for longitudinal adjustment by screw bolts 11 which also serve to support the curved arm bands 12 and 14. These members 12 and 14 as shown, have rectilinear base portions 15 which are slotted in the direction of their length at 16 to receive the screw bolts 11 by which they are secured to the arm sections for adjustment longitudinally of the arm sections and laterally relatively thereto and in the direction of the length of the bands 12, 14. These bands may also be referred to for convenience in a general way as adjustable abutments, being provided in any suitable form. As aforesaid, the inner part 8 of the arm support 7 is hingedly connected to the lugs 2, 3, or the lugs 4, 5 by means of hinge pins which may be in the form of screw bolts 17. These bolts may be provided with butterfly nuts 18 or any convenient type of head and the screws 11 may also be provided with butterfly nuts 20, or, if desired, with spring or other suitable type of washers 21. The arms 7 or more particularly, the outer section 9 thereof, is provided at its outer end with a suitable tension means shown in the form of an upright traction plate 22 secured thereto and preferably perforated, the holes being arranged throughout the area of the plate as indicated at 24, providing a multiplicity of points of attachment or traction or tension points for the establishment in this way or in any suitable manner of as many lines of traction as may be found necessary or advisable. In the form of the invention shown, this is accomplished by means of tension pins or bolts 25 which are preferably provided with T heads 26 for the convenient attachment of tape, adhesive or other tension means which may, if desired, be provided with a spring or other resilient means 27 between the T plate 22 and the takeup means or nuts 28.

The construction also shows as an important feature of the invention the supporting arms or braces 30. These in the form of the invention shown are connected to the body plate by means of sliding blocks 31 which are perforated at 32 or otherwise adapted to slide on vertical rods 33 which are mounted on the body plate in any suitable manner as by means of horizontal ears 34 at the top and bottom. These sliding blocks 31 are held in adjusted position by means of clamping screws 35 and the braces 30 are hingedly connected thereto as indicated at 36 or they may be connected in any suitable or convenient manner. These supporting arms or braces 30 are shown as each composed of two members 37 and 38, respectively, the member 37 being hollow to receive the member 38 which telescopes therewith, being threaded as indicated for engagement by a nut 39 which is chambered at 40 to receive the end of the tubular member 37. Screw 42 passes through the chamber 40 into engagement with tube 37. This provides for adjustment of the nut 39 along the screw 38 after which the tubular member 37 may be inserted in the chamber 40 and clamped by means of the screw 42 holding members 37 and 38 in adjusted relation.

The outer end of the supporting arms 30, i. e., the outer end of the member 38 is turned upwardly and clamped or otherwise secured in a sleeve 44 forming part of a bracket 45 secured to the outer end of the outer member 9 of the arm support 7. It will be noted there is one member 30 on each side of the arm section, i. e. at the front end and at the rear of the body plate, said members being arranged in diverging relation inclined inwardly and downwardly from the outer end of the arm support to the body section or support.

The arrangement of these supporting arms 30 provides for upward swing, inward and outward adjustment and elevation and lowering of the arm supports 7 without causing any disturbance of the relation of the supporting arm to either the body plate or arm support.

In accordance with the construction shown the body portion or plate 1 is lined with a soft felt pad 49 which in the construction shown is approximately three quarters of an inch thick. While this is regarded as a necessary adjunct, the details are not essential to the invention.

The construction also includes sliding supports 50 attached to the body portion or plate 1. These sliding supports 50 may be mounted in any suitable manner so that they can be reversed as hereinafter described. In the construction shown tubular guides or sockets 51 are secured in vertical position to the body plate 1 at the front and rear immediately adjacent the front and rear edges 52 and 53 of the body plate where it approaches the axis of the body. As shown, these tubular sockets 51 are held by means of U shaped straps 54 in each of which is seated a clamping screw 55 which may have a wing grip as shown. The sliding supports 50 terminate at their outer ends in bearing plates 56 which are slotted at 57 to receive suitable body straps. In this way the extension supports with their bearing plates 55 are arranged so as to be placed well toward the midline of the body, the upper ends being attached to the body section reaching almost to the groin in front and over the sacrum in the back providing supporting means at both points and securing means in the form of straps 58 which may encircle the body in any suitable manner.

The clamping screws 55 extend through the tubes 51 into contact with the sliding rods 50, as best shown in Figure 3, and the construction thus described contributes to an important function of the invention, i. e. the reversibility of the splint in that the rods 50 with the plates 56 may be withdrawn and inserted from the opposite end

of the body plate 1, providing for its use on the opposite side of the body.

The construction shown also includes in the preferred form a forearm and wrist support 60 which is adapted to be adjustably secured in a variety of positions to conform to various positions of the forearm and upper arm, to the outer section 9 of the arm section or arm support, which latter in accordance with the preferred form of the invention is preferably concave as seen from above and as best shown in section, Figure 2.

The forearm support may have two alternative points of attachment. It may be attached as shown in Figure 1 to an L shaped bracket 61 secured by means of screws or in any suitable manner to the section 9 near its outer end. This bracket provides an upright to the lower portion of which the forearm support 60 is pivotally connected by means of a screw 62. The arm support 60 also has an arcuate slot 63 which is concentric with the screw 62 and which is adapted to receive a screw 64 which passes through a hole in the upper end of bracket 61. This permits the arm 60 to be adjusted about the pivotal screw 62 in a fore and aft vertical plane spaced outwardly from the body plate 1 by a distance varying with the adjusted length of the arm section or support 7.

The forearm support 60 may also be secured in horizontal position in which it extends forwardly from the arm support 7 as best illustrated in Figure 8, the pivotal screw 62 being passed through the horizontal web of the section 9 and secured by a nut or otherwise, and the screw 64 being passed through slot 63 and likewise suitably secured. The forearm support is thus secured to said web on a transverse line extending through the screw 61 and on either side of the same depending upon the attachment of the body plate to either side of the body, it being understood that the forearm support 60 would ordinarily extend forwardly from the arm support.

The construction shown includes in addition to the strap slots described, slots 64, 65 and 66, extending through the body plate 1 and arranged about the four corners of the same as best illustrated in Figure 1 for the accommodation of straps to pass over the patient's shoulders on each side to secure the splint in position in a manner well understood in the surgical art and further illustrated in Figures 7 and 8.

As already brought out, the body plate encloses or fits the chest portion of the trunk on either side, the front curvature being fuller than the curvature at the rear and the arm support being nearer the back than the front. In order to change the apparatus from its adaptation to a position beneath the left arm as shown in Figure 4 to accommodate it to a position beneath the right arm as shown in Figure 5 it is necessary to invert the body plate. To this end the arm support 7, particularly as to the section 8, is disconnected from the hinged lugs 2, 3 which are now at the top and inverted and similarly connected to the corresponding hinged lugs 4, 5 at the bottom. The supporting arms or braces 30 may for this purpose be disconnected at the center by loosening the clamping screw 42 and reconnecting them in the inverted position, the blocks 31 being for this purpose unclamped and moved or slid to the opposite ends of the rods 33 and reclamped. Also, the sliding extension supports 50 are removed from the tubular sockets 51 being released by loosening the screws 55 and inserting at the opposite ends and reclamping. By this operation the splint is converted from a left to a right handed apparatus, or vice versa.

The manner of utilizing the curved bands 12 and 14 to encircle the arm to control and correct lateral or anterior and/or posterior displacement of the bone fragments of the upper arm, will be understood by those familiar with the medical art, these bands being capable of sliding adjustment both longitudinally of the arm support and laterally thereof. As already pointed out, they serve a two fold purpose, i. e., both to control lateral or anterior and/or posterior displacement of the bone fragments, and second, to hold the arm fragments securely after reduction or relocation or replacement has been accomplished. It is also understood that suitable traction or tension is applied in variable and in several lines, i. e., at a multiplicity of points by means of the tension or traction pins 25, which may be seated in any of the multiplicity of apertures 24 in the plate 22.

The forearm and the wrist may be strapped to the forearm plate 60 as best shown in Figures 7 and 8, the forearm being turned up as shown in Figure 7 or turned forward in horizontal position at various angles with the lateral plane as best shown in Figure 8.

I have thus described specifically and in detail a traction splint embodying the features of my invention in the preferred form in order that the manner of constructing, applying and using the invention may be fully understood, however, the terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claims.

What I claim as new and desire to secure by Letters Patent is:

1. The combination in a traction splint of a body member formed to fit the contour of the human chest as to one side of the same, an arm support of adjustable length with means for hingedly mounting the same at either end of the body member whereby the body member may be reversed interchanging the top and bottom and causing the body member and arm support to fit either side of the chest and to support either arm, a brace for the arm support, means connecting the same to the outer end of the arm support, and means connecting the same to the body member at the end of the same opposite to the point where the arm support is hingedly mounted as aforesaid, the brace being inclined from the end of the arm support inwardly and downwardly toward the body member.

2. The combination in a traction splint of a body member formed to fit the human chest as to one side of the same, an arm support of adjustable length with means for hingedly mounting the same at either end of the body member whereby the body member and arm support may be reversed to fit either side of the chest and to support either arm, a brace for the arm support, means connecting the same to the outer end of the arm support and means connecting the same to the body member at the end of the same opposite to the point where the arm support is hingedly connected as aforesaid, the brace being inclined from the end of the arm support inwardly and downwardly to the bottom of the body member, the means for securing the inner end of the brace to the body member consisting of a vertical rod and a block to which the inner end of the brace is hingedly connected, the block being slidable up

and down on said rod and having means for clamping it in adjusted position on said rod.

3. The combination in a traction splint of a body member formed to fit the contour of the human chest as to one side of the same, the same having a relatively flat back portion and a fully curved front portion, an arm support of adjustable length with means for hingedly mounting the same at the top or bottom of the body member whereby the body member and arm support may be reversed to fit either side of the chest and to support either arm, a supporting brace for the arm support, means connecting the same to the outer end of the arm support and means connecting the same to the body member at the end of the same opposite to the point where the arm support is hingedly connected as aforesaid, the brace being inclined from the end of the arm support inwardly and downwardly, and means for securing the inner end of the brace to the body member consisting of a vertical rod and a block to which the inner end of the brace is hingedly connected, the block being slidable up and down on said rod and having means for clamping it in position on said rod, the braces being adjustable as to length to conform to the position and the length of the arm.

4. A traction splint having a reversible body member shaped to fit the trunk beneath the arm at either side, an arm support and means for securing the same to the portion of said body member which is uppermost in either position, providing for the reversal of the splint to make it possible to adapt the same to support either arm, the body member also having extension supports with means at their lower ends reaching almost to the groin in front and over the sacrum in back, said extension supports being reversible so that they can be made to project from either end of the body support, the body member being of fuller curvature at the front than at the rear and the arm support being adjacent the rear side of the same.

5. In a traction splint, a curved body member having a front and a rear portion, the front portion of said body member having a greater radius of curvature than the rear portion of said body member whereby the same may be inverted and caused to fit either side of the body with the portion of greater curvature at the front, an arm support and means for securing the same to the portion of said body member which is uppermost.

6. In a traction splint, a U shaped body member, the curve of the U being of relatively small radius at the rear and of a considerably greater radius at the front to conform to the natural contour of the cross section of the human trunk, a support for the upper arm extending laterally from said body member and means for securing the support to the body member at the top, said arm support being located at the top and to the rear of the fore and aft center of the body member, and spaced a relatively great distance from the front, said securing means being removably attached to the body member and adapted to be secured at either end of the body member in the position defined so that the body member can be inverted as to its top and bottom ends to fit either side of the body.

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