

Feb. 4, 1947.

H. H. JORDAN

2,415,288

ABDUCTION SPLINT

Filed May 27, 1944

2 Sheets-Sheet 1

Fig. 1.

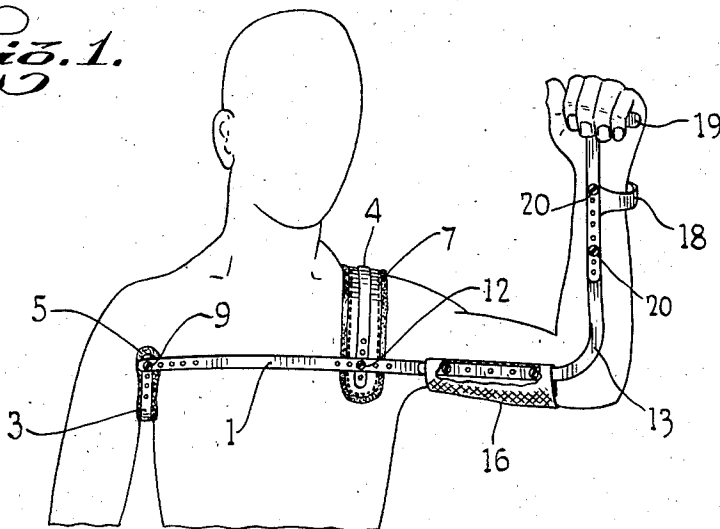
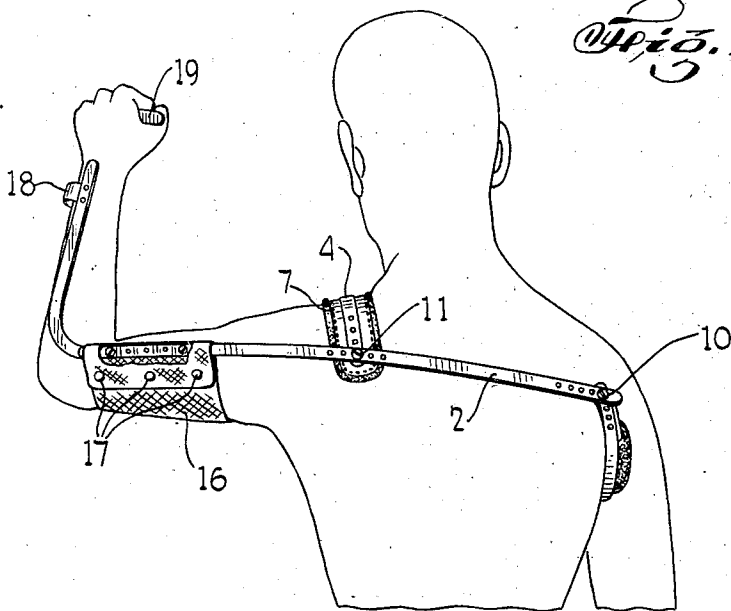


Fig. 2.



INVENTOR:

HENRY H. JORDAN

BY *Hammond Little*
ATTORNEYS

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Fig. 3.

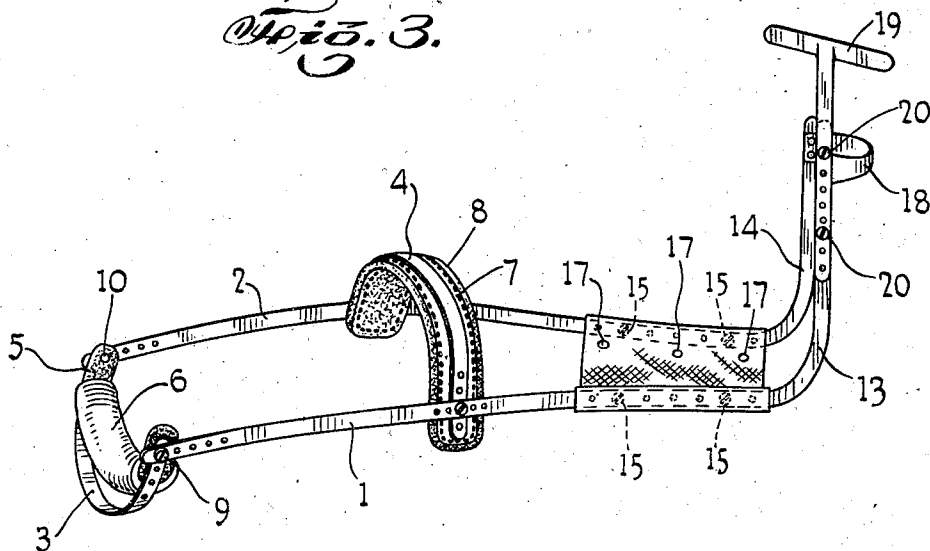
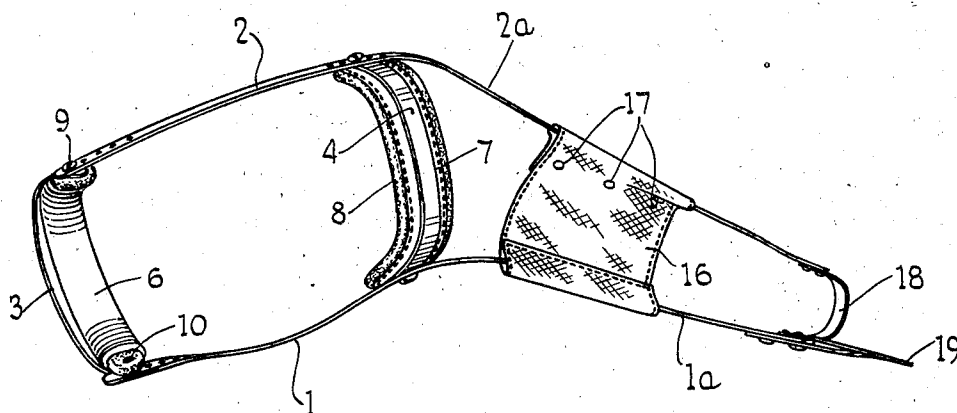


Fig. 4.



INVENTOR.
HENRY H. JORDAN
BY
Hammond & Co.
ATTORNEYS

UNITED STATES PATENT OFFICE

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ABDUCTION SPLINT

Henry H. Jordan, New York, N. Y.

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11 Claims. (Cl. 128-88)

1

This invention relates to an improvement in abduction or aeroplane splints for supporting the arm at an angle of substantially 90 degrees to the vertical plane of the body during periods of treatment which necessitate such support.

In injuries or infections involving the bones of the shoulder or the arm and in some cases of injury or strain to the shoulder and arm muscles, it is often desirable to immobilize the shoulder joint or to fix the position of the arm temporarily so that the broken bones, injured muscles or the infection may heal properly, and this immobilization or fixation of the arm should be done in such a way as to put the minimum of strain upon the shoulder and arm muscles and to avoid discomfort to the patient as much as possible.

Numerous forms of abduction or aeroplane splints to hold the arm at an angle of 90 degrees to the vertical plane of the body have been used in the past, but none of these prior splints has proven satisfactory from the standpoint of cost and convenience and comfort for the wearer or certainty of the results obtained thereby.

Splints of this type have varied from simple wooden construction to elaborate and complicated devices which allow the fixation of the arm in any desired degree of flexation, extension, abduction or internal and external rotation of the joints of the arm.

Most of these appliances, particularly those made of wood or wire, do not afford adequate fixation of the arm without bulky bandages and strappings which are a great discomfort to the patient while the previous abductions splints made from metal require special fitting to the individual's body, special straps and the like, and are hence difficult to make and apply and uncomfortable to wear.

The best practice in this respect is described in my book, "Orthopedic Appliances," published by the Oxford University Press, 1939 edition, at pages 345-352, inclusive.

The abduction splint according to the present invention is a substantial improvement over the devices therein described.

The object of my invention is to provide an abduction splint of simple construction which can be readily manufactured from a minimum number of parts and can be adjusted to persons of different size without necessitating individual manufacture for each different person.

Another object of my invention is to provide an abduction splint of simple construction which can be worn by the patient undergoing treatment

2

without material discomfort, and which can be worn in cases where the patient is not confined to the bed with the minimum of alteration of ordinary clothing.

Another object of the invention is to provide an abduction splint which can be readily made for either right-hand or left-hand use and readily adjusted to patients of different sizes without separate manufacture for each different size patient.

Another object of my invention is to provide an abduction splint which can be made of a minimum number of light weight parts and can be shipped in disassembled condition and readily assembled at the point of use.

Another object of the invention is to provide an abduction splint which is adjustable for size and which can be made in a large number of units and individually adjusted to the different patients, thereby securing the economy of mass production and bringing about a reduction in cost of splints of this type.

Further objects and advantages of my invention will be apparent as this description proceeds.

In the accompanying drawings which illustrate a preferred form of embodiment of my invention:

Figure 1 is a front view, showing my improved abduction splint in position of application on a patient;

Figure 2 is a rear view of the abduction splint on the patient;

Figure 3 is a perspective view of the splint removed from the patient; and

Figure 4 is a top plan view of the splint removed from the patient.

In those injuries to the bones of the shoulder or arm or infections of the bones or joints or muscular strains where immobilization of the shoulder joint or fixation of the arm becomes temporarily necessary, this is usually done by maintaining the arm elevated to an angle of 90 degrees with the vertical plane of the body, with the arm extending also at an angle of 25 to 40 degrees forward from the frontal plane of the body. It is preferable that the elbow be flexed at right angles to the upper arm, and, depending upon the indications in the individual case, the wrist may also require some flexure. The support for the arm in this position should be as easy as possible for the patient, and at the same time the arm should be firmly supported so as to substantially prevent relative movement of the affected parts while the patient is undergoing treatment.

In the form of embodiment of the invention illustrated in the accompanying drawings, the abduction splint consists of a front member 1

3

extending across the chest of the patient and along the mid-portion of the arm, and a rear member 2 extending along the back of the patient and along the rear portion of the arm. The members 1 and 2 are preferably constructed of a strap form of metal of either steel, aluminum, Duraluminum or other suitable light weight, non-corrosive construction. Plastics or wood or plywood may be used, but metal is the preferred construction. A strap 3 extends under the arm or armpit which is opposite to the arm being supported by the splint, and a shoulder strap 4 extends over the shoulder adjacent the arm being supported by the splint. The member 3 is preferably provided with a felt strip 5 extending from one end to the other of the underarm strap, which is covered with sponge rubber, felt, or other padding material 6. The strip 5 may, of course, be of felt, leather, rubber or other suitable construction to give flexibility and softness under the arm of the wearer. The shoulder strap 4 is preferably provided with a leather top member 7, which is lined with felt, sponge rubber, sheep's wool or the like, 8. The underarm strap 3 and the shoulder strap 4 are preferably constructed of the same metal or other material as the members 1 and 2, and the underarm strap 3 may be weighted or may have weights attached thereto to balance the splint and compensate for the weight of the arm to be treated.

The ends of the members 1 and 2 which are opposite the arm to be supported are provided with a plurality of holes and the underarm strap 3 is likewise provided with a plurality of holes so that by means of the adjustment screws 9 and 10 in the front and back, the strap 3 can be adjustably connected to the members 1 and 2 for length as well as shifted to the right or left along the front and back members 1 and 2 to fit the splint to the size of the particular patient. If necessary, the excess projection of the members 1 and 2 may be cut off if they are too long for the patient on which the splint is to be used, although some excess projection of the members 1 and 2 beyond the points of connection to the underarm strap 3 will cause the patient no discomfort.

The strap 4 which goes over the shoulder of the patient adjacent the arm to be supported is also provided with a plurality of holes and the members 1 and 2 may likewise be provided with holes at this point so that with screws 11 and 12 the position of the members 1 and 2 can be raised or lowered to bring about the right degree of elevation of the support for the patient's arm, or the position of the shoulder strap 4 may be shifted from the right to the left.

The member 1 is given a curvature similar to the average curvature of the upper portion of the chest of a man and is then bent forward at 1a to give the desired degree of forward inclination to the portion of the arm between the shoulder and the elbow. The rear member 2 is likewise formed to the shape of the back of the average patient and is provided with a forwardly bent portion 2a, having approximately the same angle as the part 1a of the member 1, to give the right degree of forward slant to the patient's arm. This angle is usually about 25 to 40 degrees to the frontal plane of the body.

When used on patients having round shoulders, if the rear member 2 tends to ride up and cause the front member 1 to cut into the chest, this tendency may be corrected by fastening a metal shield corresponding to the size of the chest between and above the breasts to the front mem-

4

ber 1, suitable padding being used on said shield.

At the end of the portions 1a and 2a, a series of holes are provided by which an adjustable connection can be made between the horizontal portions 1a and 2a of the splint and the vertical arms 13 and 14, which assist in holding that portion of the patient's arm from the elbow to the hand in vertical or elevated position. The ends of the arms 13 and 14 are likewise provided with a plurality of holes by which adjustments may be made, by the use of the screws 15, between the members 1a and 2a, the arms 13 and 14, to accommodate the splint to the length of the arm of the patient between the elbow and the shoulder.

To give support to the patient's arm, a fabric or web 16 extends between the parts 1a and 2a and is preferably secured around the member 1a and is removably attached around the member 2a by means of a series of snap fasteners 17 so that one end of the fabric or web 16 may be removed from around the member 2a to facilitate installation of the splint on the patient and to permit the arm to be raised or lowered in the original application of the splint or in removing the splint in case removal should become necessary during the treatment.

The arms 13 and 14 are preferably connected by a semicircular loop 18 which encloses the wrist of the patient and a handpiece or handgrip 19 is provided at the upper end of the member 13 to be grasped by the hand of the patient. This grip may be of metal or of plastic wood or other construction and may, if desired, be formed in the shape of the patient's hand to facilitate gripping by the patient. The position of the hand grip 19 is made adjustable by the provision of holes in the upper part of the arm 13 and in the lower part of the handgrip 19 and by the use of screws 20 the position of the handgrip 19 may be adjusted to the length of the forearm and hand of the patient.

While the abduction splint has been illustrated for application to the support of the left arm and hand, it will be understood that the same principle of construction will apply on the reverse position, in which the abduction splint extends under the left arm and is used to support the right arm and hand. The members 1a and 2a in that case will be given substantially the same curvature but will be shaped to support the right arm and hand instead of the left arm and hand.

By virtue of the ready adjustability of the underarm strap 3 and shoulder strap 4 to accommodate patients of different chest sizes and of the position of the arms 13 and 14 for the length of the arm between the shoulder and the elbow and of the handgrip 19 for the length of the arm between the elbow and the hand, an abduction splint of almost universal application is provided which, however, has only a limited number of parts. In this way abduction splints can be readily assembled from previously shaped standard parts and applied at the hospital or any other place where they are made to fit the size of any particular patient without the necessity for special construction for each patient.

In addition the splints provide more comfort for the wearer than previous types of abduction splints and more satisfactory support, etc., for the arm during treatment.

Various modifications and changes may be made in addition to those specifically described, without departing from the spirit of my invention or the scope of the claims thereto.

I claim:

1. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member separate from the front member adapted to extend along the back of a patient and having the curvature of the back, an integral portion on each of said members projecting at an angle and adapted to extend along the upper arm, a strap pivotally connected to the front and back members adjacent the ends thereof and opposite said integral projecting portions and adapted to extend under the arm opposite said projecting portions, said strap constituting the only connection between said ends of the front and back member which are opposite said integral projecting portions, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said projecting portions, and means connecting said projecting portions and acting as a support for the arm.

2. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member to extend along the back and having the curvature of the back, a forwardly projecting portion on each of said members adapted to extend along the upper arm, a strap connecting the two members adjacent the ends thereof and adapted to extend under the arm opposite said forwardly projecting portions, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means projecting between the forwardly projecting portions to support an arm of the patient and means connecting said forwardly extending portions including a pair of curved arms extending along the forearm and adapted to support the forearm of a patient.

3. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member adapted to extend along the back and having the curvature of the back, a forwardly projecting portion on each of said members adapted to extend along the upper arm, a strap pivotally connected to the front and back member adjacent the ends thereof opposite said forwardly projecting portion and adapted to extend under the arm opposite said forwardly projecting portions, and constituting the only connection between said ends of the front and back member, a strap connecting the chest and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means connecting said forwardly extending portions including a pair of curved arms connected thereto and extending upwardly along the forearm adapted to support the forearm of the patient, a hand-grip connected to the upper end of one of said curved arms, and web means extending between said forwardly projecting portions adapted to support the upper arm of the patient.

4. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member to extend along the back and having the curvature of the back, an integral forwardly projecting portion on each of said members adapted to extend along the upper arm, a strap movably connected adjacent the ends of the two members and adapted to extend under the arm opposite said forwardly projecting por-

tions, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means extending between the forwardly projecting portions adapted to support an arm of the patient, and means connecting said forwardly projecting portions including a pair of curved arms extending upwardly along the forearm adapted to support the forearm of a patient, and adjustable connections between said straps and said members and between said curved arms and said forwardly projecting portions.

5. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member adapted to extend along the back and having the curvature of the back, a forwardly projecting portion integral with each of said members adapted to extend along the upper arm, a strap connecting the front and back member at the side of the patient's body opposite said forwardly projecting portion and adapted to extend under the arm opposite said forwardly projecting portions and constituting the only connection between said front member and back member at the side of the patient's body opposite said forwardly projecting portion, means to permit adjustment of the position of said strap relative to said members, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means to permit adjustment of the position of said strap relative to said members, means connecting said forwardly projecting portions including a pair of curved arms connected thereto and extending upwardly along the forearm adapted to support the forearm of the patient, a hand-grip connected to the upper end of one of said curved arms, and web means extending between said forwardly projecting portions adapted to support the upper arm of the patient.

6. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member adapted to extend along the back and having the curvature of the back, a forwardly projecting portion on each of said members adapted to extend along the upper arm, a strap connecting the front and back member at the side of the patient's body opposite said forwardly projecting portion and adapted to extend under the arm opposite said forwardly projecting portions and constituting the only connection between said front member and back member at the side of the patient's body opposite said forwardly projecting portion, means to permit adjustment of the position of said strap relative to said members, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means to permit adjustment of the position of said strap relative to said members, means connecting said forwardly projecting portions including a pair of curved arms connected thereto and extending upwardly along the forearm adapted to support the forearm of the patient, means to permit adjustment of the position of said curved arms relative to said forwardly projecting portions, a hand-grip connected to the upper end of one of said curved arms, and web means extending between said forwardly projecting portions to support the upper arm of the patient.

7. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof,

8. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member adapted to extend along the back and having the curvature of the back, a forwardly projecting portion on each of said members adapted to extend along the upper arm, a strap connecting the front and back member adjacent the ends thereof and adapted to extend under the arm opposite said forwardly projecting portions and constituting the only connection between said front member and back member at the side of the patient's body opposite said forwardly projecting portion, means to permit adjustment of the position of said strap relative to said members, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means to permit adjustment of the position of said strap relative to said members, means connecting said forwardly projecting portions including a pair of curved arms connected thereto and extending upwardly along the forearm to support the forearm of the patient, means to permit adjustment of the position of said curved arms relative to said forwardly projecting portions, a handgrip connected to the upper end of one of said curved arms, web means extending between said forwardly projecting portions adapted to support the upper arm of the patient, and means to permit one end of said web means to be readily connected and disconnected to one of said forwardly projecting portions.

8

10. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member adapted to extend along the back and having the curvature of the back, a forwardly projecting portion on each of said members adapted to extend along the upper arm, a strap connecting the front and back member and adapted to extend under the arm opposite said forwardly projecting portions and constituting the only connection between said front member and back member at the side of the patient's body opposite said forwardly projecting portion, means to permit adjustment of the position of said strap relative to said members, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means to permit adjustment of the position of said strap relative to said members, means connecting said forwardly projecting portions including a pair of curved arms connected thereto and extending upwardly along the forearm adapted to support the forearm of the patient, means to permit adjustment of the position of said curved arms relative to said forwardly projecting portions, a handgrip connected to the upper end of one of said curved arms, web means extending between said forwardly projecting portions adapted to support the upper arm of the patient, means to permit one end of said web means to be readily connected and disconnected to one of said forwardly projecting portions, and means to secure said adjustable parts in their adjusted positions.

11. In an abduction splint, a front member adapted to extend along the front of the chest of a patient and having the curvature thereof, a back member adapted to extend along the back and having the curvature of the back, an integral forwardly projecting portion on each of said members adapted to extend along the upper arm, a strap connecting the front and back member adjacent the ends thereof and adapted to extend under the arm opposite said forwardly projecting portions and constituting the only connection between said front member and back member at the side of the patient's body opposite said forwardly projecting portion, means to permit adjustment of the position of said strap relative to said members, a strap connecting the front and back member and adapted to extend over the shoulder adjacent said forwardly projecting portions, means to permit adjustment of the position of said strap

relative to said members, means connecting said forwardly projecting portions including a pair of curved arms connected thereto and extending upwardly along the forearm adapted to support the forearm of the patient, means to permit adjustment of the position of said curved arms relative to said forwardly projecting portions, a handgrip connected to the upper end of one of said curved arms, means to permit adjustment of the position of said handgrip relative to the curved arm to which it is connected, web means extending between said forwardly projecting portions adapted to support the upper arm of the patient, and a semicircular loop rigidly connecting the ends of said curved arms.

HENRY H. JORDAN.

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