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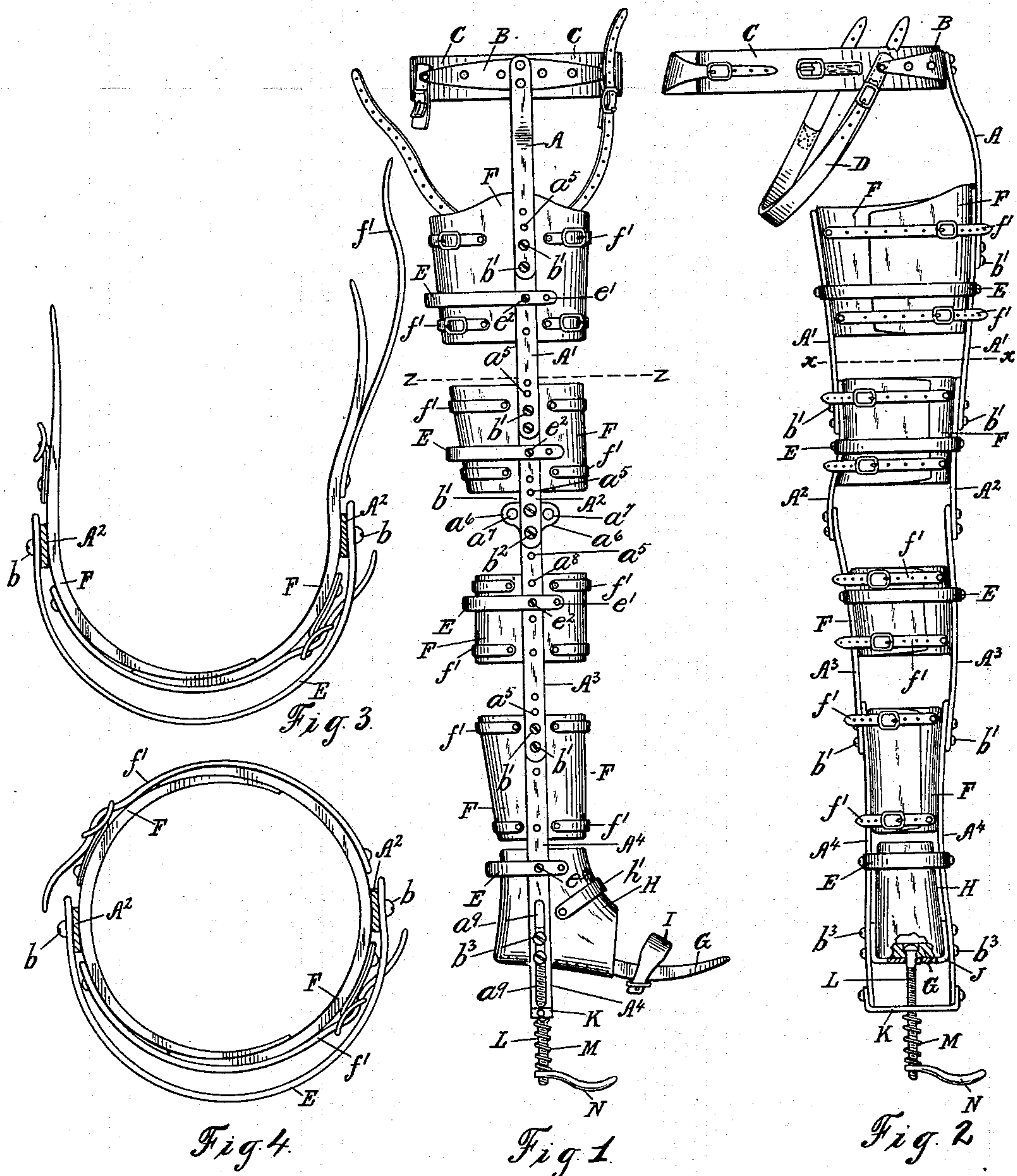
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J. BOYD.

ADJUSTABLE AND REVERSIBLE SPLINT.

(Application filed Apr. 14, 1898.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

JOHN BOYD, OF LUCKNOW, CANADA.

## ADJUSTABLE AND REVERSIBLE SPLINT.

SPECIFICATION forming part of Letters Patent No. 612,087, dated October 11, 1898.

Application filed April 14, 1898. Serial No. 677,632. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN BOYD, a subject of Her Majesty the Queen of Great Britain, and a resident of Lucknow, in the county of Bruce, in the Province of Ontario, Canada, have invented a new and useful Adjustable and Reversible Splint, (for which I have obtained a patent in Canada, No. 60,201, bearing date June 2, 1898,) of which the following specification, taken in connection with the accompanying drawings, forms a full, clear, and exact description.

This invention relates to a device for holding a dislocation in place or a broken bone when set; and the object of this invention is to provide a simple, durable, and efficient device for this purpose—one which may be adjusted to fit the leg of any size or length of an adult, male or female; one which is reversible, so that it may be used for either leg; one which is adapted to draw overlapping bones or parts of bones apart and hold them in place; one which may be adapted to be bent at the knee, and one by the use of which all crookedness or shortness of the limb, as well as eversion or turning of the foot, will be avoided and completely prevented.

To this end my invention consists of the novel features of construction and the combination of parts, as will be hereinafter first fully set forth and described and then pointed out in the claims.

Reference being had to the accompanying drawings, Figure 1 is a side elevation of a splint embodying my invention. Fig. 2 is a rear view of same. Fig. 3 is an enlarged detail plan view on the line  $xx$  of Fig. 2, showing the position of the leather bands when open at one side to receive the limb. Fig. 4 is an enlarged detail plan view on the line  $zz$  of Fig. 1, showing the position of the leather bands when closed on the limb.

$A^1$ ,  $A^2$ ,  $A^3$ , and  $A^4$  designate adjustable splint-sections, which are preferably formed of steel; but they may be formed of any suitable material, and in the accompanying drawings a splint composed of four sections is shown, and this I have found by experiment to give the best results. At the same time this splint may be solid at the knee and composed of a less or greater number of sections,

as found most suitable, according to the circumstances in connection with which it may be used. In the adjacent ends of each of these splint-sections a series of three, four, or more holes  $a^5$  are formed, and  $b^1$   $b^1$  are set-screws, two of which are used to secure the adjacent ends of the splint-sections together. These set-screws extend through plain holes  $a^5$  in the outer section and into and engage with screw-threaded holes in the inner section, so that by screwing up the set-screws the adjacent ends of the splint-sections are secured together. This forms a convenient means for securely fastening and holding the adjacent ends of the splint-sections together against accidental lateral adjustment.

As shown in the accompanying drawings, the splint-sections  $A^2$  and  $A^3$  are secured together at a point about the knee-joint, and the end of one of these sections is formed with a lateral extension  $a^6$ , in which screw-threaded holes  $a^7$  are formed. When so constructed, if one of the set-screws  $b^1$  were removed sections  $A^2$  and  $A^3$  would be pivoted on the screw  $b^2$ , so that these sections, as well as the portion of the limb above and below the knee-joint, could be adjusted at an angle to one another, and when properly adjusted could be securely fastened in this position by projecting the set-screw  $b^1$  into one of the holes  $a^5$  in the outer section and into one of the screw-threaded holes  $a^7$  of the lateral extension  $a^6$  of the inner section, and by forming a series of three, four, or more holes  $a^5$  in both of the adjacent ends of each splint-section the said ends of the splint-sections could be adjusted to lap more or less over on one another and be secured together, as before described, in order to adjust the splint-sections lengthwise to adapt the splint to legs of different lengths, and by adjusting each section slightly it would be sufficient in the aggregate to adapt the splint to the leg of any adult, male or female, and at the same time retain the normal shape and relation of the splint-sections to one another.

$A$  designates an extension which extends upward and at one side of the splint, which is preferably formed of the same material, and its end, as well as the adjacent end of the splint-section  $A^1$ , provided with a series



of holes  $a^5$  and secured together by two set-screws  $b' b'$  and adjustable on one another the same as the other splint-sections.

B designates a curved band or brace, preferably formed of steel, which is securely fastened about midway between its ends to the upper end of the extension A, which curved brace extends partly around the pelvic region, and a belt C is secured to said curved brace B and extends completely around the pelvic region of the body, and its ends are buckled or otherwise secured together for the purpose of securing the upper end of the curved steel brace B in place and the splint to the body when required.

D designates a perineal or counter extension-strap the ends of which are secured to the ends of the curved steel brace B.

The upper extension A, together with the connections B, C, and D, is necessary for a short break near and for a dislocation of the hip-joint and for hip disease.

E E designate adjustable semicircular resilient spring-bands, preferably formed of steel; but they may be formed of any suitable material, which bands extend around the rear portion of the leg, their ends being secured by set-screws  $e^2$  to the splint-sections for the purpose of holding said splint-sections firmly and securely in place, and in the ends of said semicircular bands two or more holes  $e'$  are formed, so that by lapping the ends of the semicircular bands E more or less over the splint-sections and securing them thereto by the set-screws  $e^2$  the semicircular bands E may be adjusted and adapted to legs of different size, and by forming two or more holes  $a^8$  in the splint-sections adjacent to said bands E the latter may be adjusted vertically on said splint-sections.

F F designate wide bands of leather or other suitable material which are firmly riveted or otherwise secured to the splint-sections, and said bands F are open and lap over one another at both the back and front, these bands F being for the purpose of firmly securing the splint to the limb. The sides of said bands F lap over one another, as shown in Fig. 4, when the limb is placed therein, and the overlapping bands F are held in place around the limb by straps and buckles  $f'$ , as shown in the accompanying drawings.

G designates a foot-piece, and H a leather counter, and I a wide strap provided with a buckle, both of the latter being secured to the foot-piece for the purpose of securely holding the foot in proper position and to avoid and completely prevent its eversion or turning. The leather counter H is open at the front, and when the foot is placed therein the sides of the leather counter are lapped over one another and held in place by a strap and buckle  $h'$ .

J designates a stirrup to which the foot-piece G is firmly secured, and in the splint-sections  $A^4$ , or those adjacent to the foot-piece, elongated slots  $a^9$  are formed, and  $b^3$

are two set-screws which extend through said elongated slots  $a^9$  into screw-threaded holes in the stirrup J, and the foot-piece G is firmly secured at the desired position or elevation in the splint-sections  $A^4$  by screwing the set-screws  $b^3$  tightly on the splint-sections  $A^4$ .

K designates a cross-brace firmly secured to the lower ends of the splint-sections  $A^4$ , their ends being firmly secured together for the purpose of bracing and holding one another firmly in place.

L designates a screw-bolt the head of which extends through and is firmly engaged with the foot-piece G and stirrup J, and said bolt L also extends through a hole in the cross-brace K.

M designates a coil-spring which encircles the lower end of the bolt L and is interposed between the cross-brace K and a winged nut N, screwed on the lower end of the bolt L.

The adjacent ends of the splint-sections, as well as the adjacent end of the upward extension A, have been described as being secured together by set-screws, and the adjacent ends of the leather bands have been described as being secured together by a strap and buckle; but these parts may be secured together in any manner or by any means found most suitable or convenient.

In adapting this splint to the dislocated or fractured limb it is first regulated in regard to length by adjusting the adjacent ends of the splint-sections to lap more or less over one another and securing them at the position to which they are adjusted, as hereinbefore described. The front of the leather bands F is then opened or spread apart, as shown in Fig. 3, and the counter H opened. After the dislocated or broken parts of the limb are set the splint, adjusted as described, is placed so that the limb will rest in the leather bands F and counter H. The sides of the leather bands F and counter H are then lapped over said limb and held in place, as well as the limb, by the straps and buckles  $f'$  and  $h'$ , respectively. Thus the dislocated or fractured parts of the limb may be easily and instantaneously adjusted and secured in the splint, and said leather bands being secured to the steel splint-sections and the latter being firmly and securely held in place by the curved resilient semicircular steel spring-bands E the accidental displacement of the dislocated or fractured parts of the limb will be avoided and completely prevented and said parts securely held in apposition, and my splint constructed as hereinbefore described will firmly hold and resist any accidental displacement of the dislocation and fracture and in a resilient and flexible manner and not in a rigid manner, as in the case where a plaster-of-paris jacket is used, the torture of which when the circulation is retarded or when removing it from the limb is beyond description, all of which is avoided and completely prevented by using my invention.



The leather bands F, the splint-sections, and the curved resilient steel spring-bands E are of sufficient firmness to safely hold and resist the accidental displacement of the fractured parts of the limb, and at the same time they are resilient and flexible to a certain limited extent, and as a result the limb will rest easily and naturally in the splint, and the pain and discomfort attending this class of injuries will be reduced to a minimum or practically removed. Consequently a rapid healing and knitting together of the broken bones will take place, as well as a rapid healing of the surrounding parts.

When the splint is complete and full length, as shown in the accompanying drawings, it is adapted to be used for a fracture of the thigh and for a dislocation of the hip-joint and for hip disease. The perineal strap D, secured to the ends of the curved brace B, extends around the perineum and forms a counter extension-strap to draw the hip-joint down into place to adapt the splint for use in the case of a short fracture near or for a dislocation of the hip-joint. Again, the construction of the splint with the lateral extension  $a^6$  at the knee allows the flexion or bending of the latter and permits this splint to be adapted for use in the fracture of the condyles or protuberance on the ends of the bones at the knee or a fracture of the bones near the knee. Again, the splint is provided with a counter H and foot-piece G to prevent the eversion or turning of the foot or to hold the foot in a natural position, and the foot-piece G also projects a little beyond the toes to take off the pressure of the bedclothes, and when the splint has been properly adjusted and secured to the leg the fractured limb is gradually and easily extended as far as the patient can conveniently bear by means of the screw extension L to draw the bones or parts of bones apart and in place and to gradually overcome the contracted muscles and to complete the extension, the spring M making this extension resilient to a limited extent. As a result the fracture will come easily and naturally together. Again, by adjusting the extension A and connections to the opposite side of the splint and reversing the lower splint-section  $A^4$ , to which the foot-piece G and connections are secured, and reversing the curved semi-circular resilient steel spring-bands E the splint is made reversible to be used for the

other leg, the result of all which is that the one splint is reversible, so that it may be used for either leg, it may be lengthened or shortened to adapt it to the limb of any adult male or female, and by its use all crookedness and shortness of the limb, as well as any eversion or turning of the foot, is avoided and completely prevented, and a splint simple, durable, and efficient in practical use is provided and one which may be easily and instantaneously adjusted on the limb and one by which a more rapid healing and knitting together of the fracture will take place.

I have found by experiment that the construction herein shown and described gives the best results. At the same time, while I prefer the same, I do not wish to limit myself to the details thereof, as they may be modified in various ways without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. In a splint, a splint-section,  $A^3$ , provided with a lateral extension,  $a^6$ , in combination with a splint-section,  $A^2$ , and means for securing said splint-sections together at the position to which they are adjusted, by which the angle of flexion is formed at the knee, substantially as and for the purpose set forth.

2. A splint-section,  $A^4$ , provided with elongated slots,  $a^9$ , the foot-piece, G, the counter, H, and stirrup, J, in combination with the screw, L, cross-brace, K, spring, M, and nut, N, substantially as and for the purpose set forth.

3. The adjustable splint-sections,  $A'$ ,  $A^2$ ,  $A^3$ , and,  $A^4$ , the resilient spring-bands, E, and the bands, F, in combination with the foot-piece, G, counter, H, stirrup, J, screw, L, cross-brace, K, spring, M, and nut, N, substantially as and for the purpose set forth.

4. The adjustable splint-sections,  $A'$ ,  $A^2$ ,  $A^3$ , and,  $A^4$ , the resilient spring-bands, E, the bands, F, and the extension, A, curved brace, B, belt, C, and strap, D, in combination with the foot-piece, G, counter, H, stirrup, J, screw, L, cross-brace, K, spring, M, and nut, N, substantially as and for the purpose set forth.

In testimony whereof I have signed in the presence of the two undersigned witnesses.

JOHN BOYD.

Witnesses:

P. J. EDMUNDS,  
S. MCBAIN.