

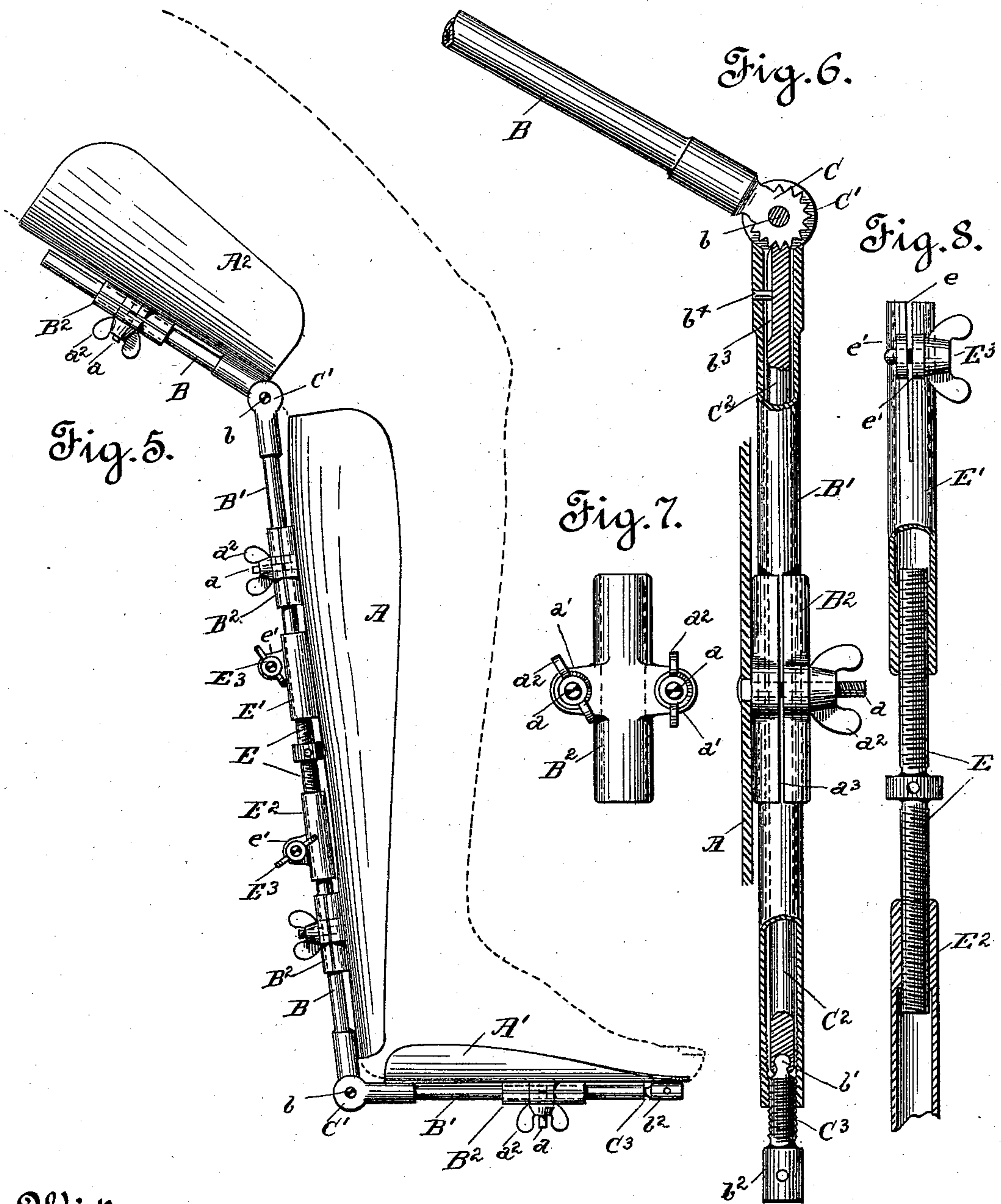
(No Model.)

2 Sheets—Sheet 2.

R. HOPPE.
SURGICAL SPLINT.

No. 532,461.

Patented Jan. 15, 1895.



Witnesses.

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UNITED STATES PATENT OFFICE.

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SURGICAL SPLINT.

SPECIFICATION forming part of Letters Patent No. 532,461, dated January 15, 1895.

Application filed August 24, 1894. Serial No. 521,154. (No model.)

To all whom it may concern:

Be it known that I, REINHOLD HOPPE, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Surgical Splints; and I do hereby declare the following to be a full, clear, and exact description of said invention, such as will enable others skilled in the art to which it most nearly appertains to make, use, and practice the same.

This invention relates to a certain new and useful surgical splint, which is more especially designed as an improvement upon the Letters Patent No. 504,218, granted me on the 29th day of August, 1893, for an improvement in the same class of devices.

This device is so constructed that the supporting plates may be fitted upon the outside or inside of a joint, the plates having longitudinal and rotatable movement upon jointed supporting rods, whereby the distance between the plates may be readily shortened or lengthened and freely turned upon the supporting rods, so as to assume any desired position, in order to adapt the supporting plates to fit any form, shape or position, and for any desired pronation.

The object of my invention is to provide a simple and effective splint, which may be readily adjusted to any angle desired and held locked in such position or angle, the plates being allowed unlimited pronation after the supporting rods have been locked; and permit the supporting rods to be locked or unlocked after being covered by the the bandages, thus overcoming the necessity of extreme care being exercised in wrapping of bandages so as not to cover the adjusting mechanism.

Referring to the drawings forming a part of this application, wherein similar letters of reference denote corresponding parts—Figure 1 is a view showing the splint applied to the outside of a joint. Fig. 2 shows the splint in position to be used upon the inside joint, showing the extensible rod connected thereto for breaking an ankylose. Fig. 3 is a detail partly broken view of the extensible rod. Fig. 4 is a top plan detail view showing end portion of the extensible rod and plate connected thereto for securing the

rod to one of the clamp sleeves. Fig. 5 shows the splint as applied to the leg. Fig. 6 is an enlarged detail view of the supporting rods, one of the rods being partly broken away so as to show the position of the lock rod for holding the supporting rods in any desired angle, showing one of the clamp sleeves in position and connected to its supporting plate. Fig. 7 is a top plan view of the clamp sleeve, and Fig. 8 is an enlarged detail view of the coupling connection, partly in section, for the device when used as a leg splint.

The letters A, A' indicate the support or splint plates, which may be manufactured of wood or metal as desired, aluminum being preferred, by reason of its lightness and the easiness of manipulation. These plates are secured to the supporting rods B, B' by means of split clamps B², through the medium of the small set screws a, which pass through the plates and ears a' of the clamps B², being held in place by thumb nuts a². By loosening these thumb nuts the plates may be moved in or out upon the supporting rods, so as to shorten or lengthen the splint, or be rotated thereon, so as to secure any desired pronation, each independent of the other. In order to hold the plates at any desired pronation it is only necessary to screw-up or tighten the thumb screws, which causes the spring clamps to tightly embrace the supporting rods, thereby setting the plates and holding same in position. By reference to the drawings it will be noticed that the spring clamps have quite a long bearing. Consequently, the supporting rods are not cut into or marred by the tightening of the spring clamp. These clamps consist of metallic tubing having an internal diameter slightly greater than the external diameter of the supporting rod, which is to fit therein, and spring or elasticity is given this clamp by cutting a longitudinal slot a³ in one side thereof the entire length of the tube. By thus slotting the tube I provide a split clamp having sufficient elasticity or spring to permit of the same moving in or out with the tightening or loosening of the thumb screws a².

The supporting rods B, B' are hinged together. The inner end of rod B terminates in a ratchet wheel C, which fits between ears C', projecting from inner end of rod B', being

secured therebetween by pin *b*. Supporting rod *B'* is a tubular one, and within same is fitted the lock rod *C*², the inner end of which is shaped so as to fit between the teeth of the ratchet wheel *C*. When this rod is moved inward its full distance, the end thereof engages within the teeth of the ratchet wheel and holds the rods locked together at whatever angle they may be when the lock rod engages the teeth of the ratchet wheel. By simply moving the lock rod outward sufficiently far to take the inner end from between the teeth of the ratchet wheel, the supporting rods are unlocked and may be moved in or out to any angle desired. This lock rod is carried in or out by means of the screw rod *C*³, which is connected to the outer end of the said rod by a socket joint, as shown at *b'*. The threads of the screw rod *C*³ engage with the inner threads of the tubular supporting rod, the outer end of which screw rod is enlarged, in order to provide a handle or knob *b*², by which the said rod may be screwed in and out. By securing the screw rod to the lock rod by means of a socket joint, the screw rod is free to turn without rotating the lock rod.

For the purpose of preventing any possibility of the lock rod being rotated, I cut in the inner end portion thereof the guide groove or slot *b*³, within which fits the guide pin or stud *b*⁴, said pin or stud projecting through the inner end portion of the tubular supporting rod, Fig. 6. By means of this pin or stud the lock rod is held in true line with the teeth of the ratchet wheel *C*, so that when the lock rod is moved inward the end thereof will enter between the teeth of the ratchet wheel. If this guide pin or equivalent be not provided, the lock rod might possibly become displaced, which would consume time to place the end of the said rod in line with the teeth of the ratchet wheel. When thus constructed I provide a device similar to that illustrated by Fig. 1, whereby the supporting rods are free to move in and out to any desired angle, and the splint plates free to be turned to any desired position of pronation, each independent of the other. As thus constructed the splint device, after proper pronation of the splint plates is secured, may be entirely covered by bandages, and the supporting rods locked or unlocked without removing the same. This feature of my invention will be greatly appreciated by users of the splint, inasmuch as the same may be secured to the limb and the limb then bent until a comfortable angle or position is secured, when the supporting rods may be locked at such angle. Again, the rods may be unlocked and the movement of the limb tried without removing the bandages, hence preventing displacement of the splint plates. By permitting a free, unlimited rotation to be given the splint plates, the same may be so adjusted as not to bear upon such muscles of the limb as to necessitate the patient holding the limb in an unnatural position, so as to avoid pain. As shown by the

construction illustrated in Fig. 1, I may flex the device in either direction.

It oftentimes is required that the surgeon break an ankylose, and in order to accomplish this successfully, where the splint is used, I make employment of what I term a break rod, which consists of the screw rod *D* and tubular rod *D'*, within which the screw rod fits, the screw rod *D* passing through the screw nut *D*², which nut is movably secured to inner end of the tubular rod *D'*. As this screw nut is turned to the right or left the screw rod is forced in or out of the tubular rod. When moved outward the pressure thereof forces the supporting rods apart or away from each other, which, if sufficient pressure be applied, will readily cause the breaking of an ankylose. The outer end of the screw rod *D* and tubular rod *D'* is slotted, so as to receive the end of ear *d*, which is swiveled to plate *D*³. Ear *d* is secured within the slotted ends by means of pin *d'*. Consequently, the tubular rod and screw rod may be said to be secured to plate *D*³ by a universal joint.

Plates *D*³ are provided with openings *d*², through which the screws *a* extend, the thumb nuts *a*² holding the plates in position, Fig. 2. In this manner the break device is connected to the splint or supporting plates. By providing a universal connection between the tubular rod *D'*, screw rod *D* and securing plates *D*³, the break device may be readily attached to the splint plates, as before described, although the splint plates may be placed at different angles of pronation, as illustrated by Fig. 2.

The screw nut *D*² is prevented from moving out of the tubular rod by means of the pin *c*, which extends through said rod and fits within the annular groove *c'*, cut within the stem of the screw nut.

In cases of joint fractures where it is a necessity that the joint be moved each day so as to prevent stiffness, this attachment to my splint will be found of the utmost importance, inasmuch as by giving a slight turn to the screw nut each day, so as to move the screw rod in and out, the joint will be moved correspondingly, while the splint or supporting plates will hold the splintered bone sufficiently rigid to cause the same to knit properly.

In Fig. 5 my device is shown when converted to a leg splint. For this purpose I make employment of a third splint or supporting plate *A*², the supporting rods being connected to the splint plates as heretofore described. When thus used it is necessary to make use of two sets of supporting rods and connect same by a coupling device, which consists of a right and left handed screw threaded rod *E*, which works within the screw threaded coupling sleeves *E'*, *E*². The outer end portion of these sleeves at one side I slot for a distance, as shown at *e*, and provide with ears *e'*. Through these ears works the thumb screw *E*³. By slotting the ends of the sleeves

E', E², I give a spring thereto. Within the slotted portion of the sleeves fits the free end of supporting rods B, said rods being held in place by screwing down of thumb screws E³.

5 When the supporting rods have been coupled, the same may be moved toward or from each other by merely turning the screw rod E to the right or left. The hinged joints of the splint are locked in any position in the same
10 manner as when used as an arm splint.

While I make employment of the coupling device for moving the inner supporting rods toward or from each other, so as to gain the proper distance, such is not the primary ob-
15 ject thereof, for this may be obtained by simply loosening one of the clamps B² and moving the rod up or down. The main purpose of the coupling device is to enable me to stretch the limb when contracted by a frac-
20 ture. This is accomplished by simply loosening one of the clamps B² and turning the coupling rod so as to force the bandaged plates away from each other by increasing the distance between the ends of the inner rods, thus
25 gaining proper extension of the bone.

The fact that my splint plates are removably secured to the spring clamps enables me to utilize different sized or shaped plates without requiring separate fastening devices, for
30 by merely puncturing the plates, in order to permit the screws *a* to pass therethrough, the same clamps may be used. This is an important feature in the manufacture of these devices, as it materially reduces the cost of
35 the article.

Of course it will readily be understood that my device may be used to straighten and strengthen a curvature of the back and for various other injuries or malformations to the
40 human body.

Having thus described my invention, what I claim as new, and desire to secure protection in by Letters Patent, is—

1. In a surgical splint, the combination with
45 the hinged supporting rods, a locking device adapted to be moved into locked engagement with the hinged joint of the supporting rods, whereby the rods may be readily locked at any angle or unlocked at will, and the splint
50 or supporting plates secured to the supporting rods, said plates having a slidable and rotatable movement upon the said rods.

2. In a surgical splint, the combination with the hinged supporting rods, a locking device
55 for said rods, which holds the rods locked at

any desired angle, the splint or supporting plates, spring clamps fitted upon the supporting rods, and the set screws for removably securing the plates to the spring clamp and locking the clamps to the said rods.

3. In a surgical splint, the combination with the supporting rods hinged together, one of said rods being tubular and terminating in ears, the others terminating in a ratchet wheel, which fits between the ears of the tubu-
60 lar rod, a longitudinally movable lock rod fitted within the tubular rod, which moves in or out of engagement with the ratchet wheel so as to lock or unlock the supporting rods, a screw rod movably connected to the lock
65 rod for forcing the said rod in or out of engagement with the ratchet wheel, and the splint or supporting plates connected to the supporting rods so as to have a longitudinal or a rotatable movement upon the supporting
70 rods. 75

4. In a surgical splint, the combination with the hinged supporting rods, a lock mechanism carried by said rods in order that the same may be locked at any desired angle, 80 spring clamps secured upon the rods, supporting plates removably connected to the clamps, a device connected to the clamps for forcing the supporting rods apart in order to break an ankylose or give movement to a joint, 85 said device consisting of a screw threaded rod and a tubular rod within which the screw threaded rod works, a screw nut movably secured to the tubular rod for forcing the screw rod in or out, the outer end of the rods be-
90 ing hinged to an ear swiveled to a plate which is connected to the clamps.

5. In a surgical splint, the combination with the hinged supporting rods, a locking device carried thereby for securing the rods at any
95 desired angle, the supporting plates removably secured to the supporting rods, and a device for forcing the supporting rods apart in order to break an ankylose, said device being fastened to the rods by swivel connec-
100 tions, whereby the rods may be forced apart with the supporting plates at any position of pronation.

In testimony whereof I affix my signature in presence of two witnesses.

REINHOLD HOPPE.

Witnesses:

N. A. ACKER,
LEE D. CRAIG.