No. 710,996. Patented Oct. 14, 1902.

J. A. PEER.

ARTIFICIAL LEG.

(Application filed Dec. 16, 1901.)

(No Model.) 2 Sheets—Sheet 1.

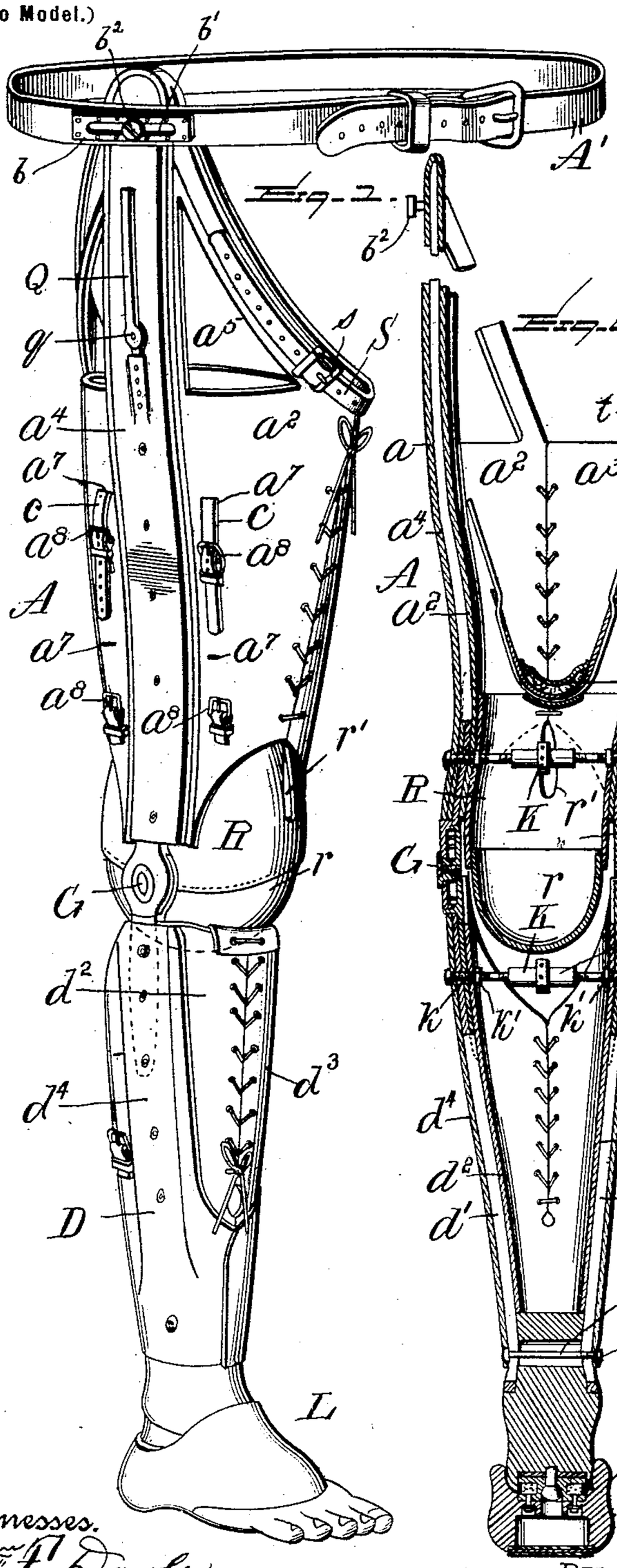

Fig. 2.

Fig. 3.

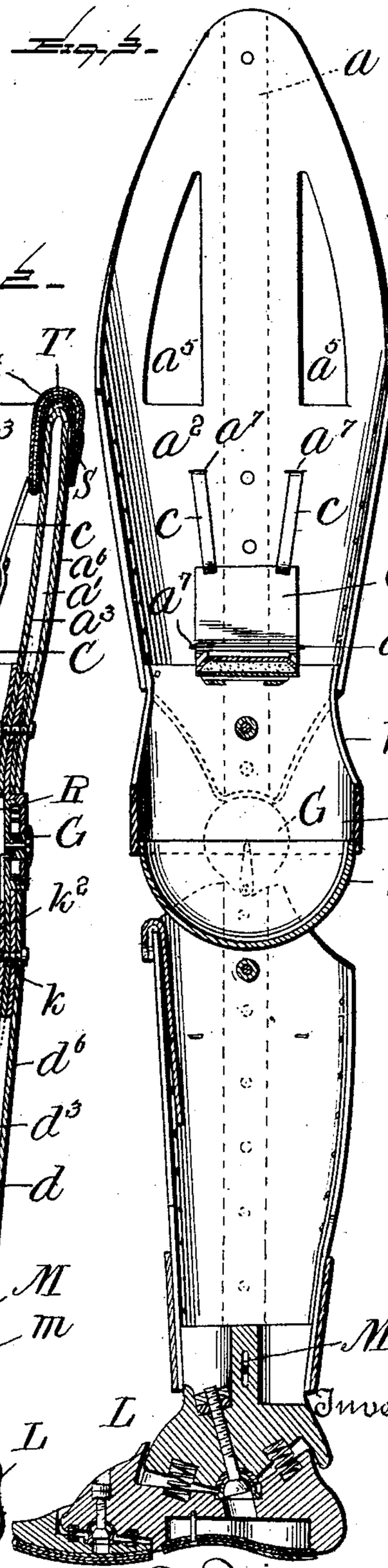

Fig. 4.

Witnesses.
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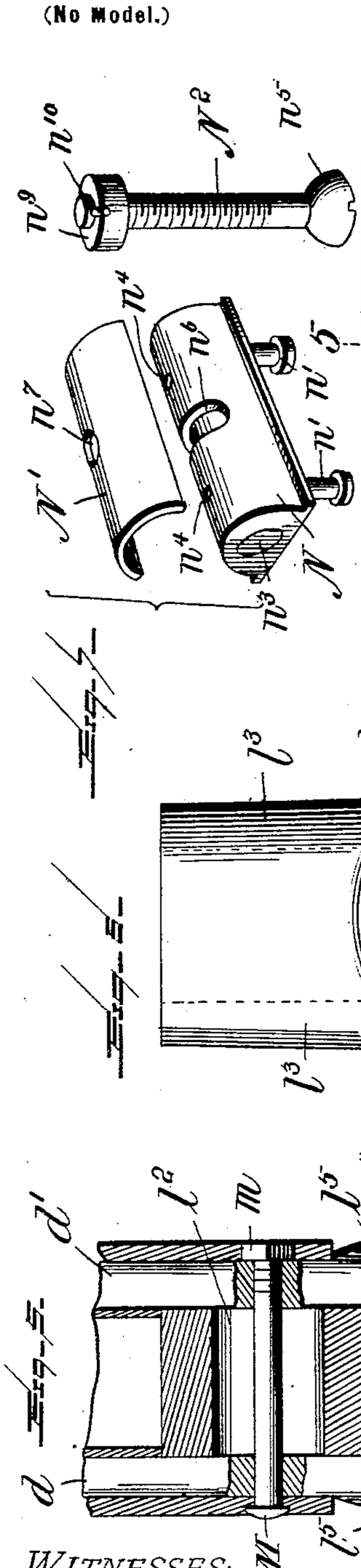

Fig. 1.

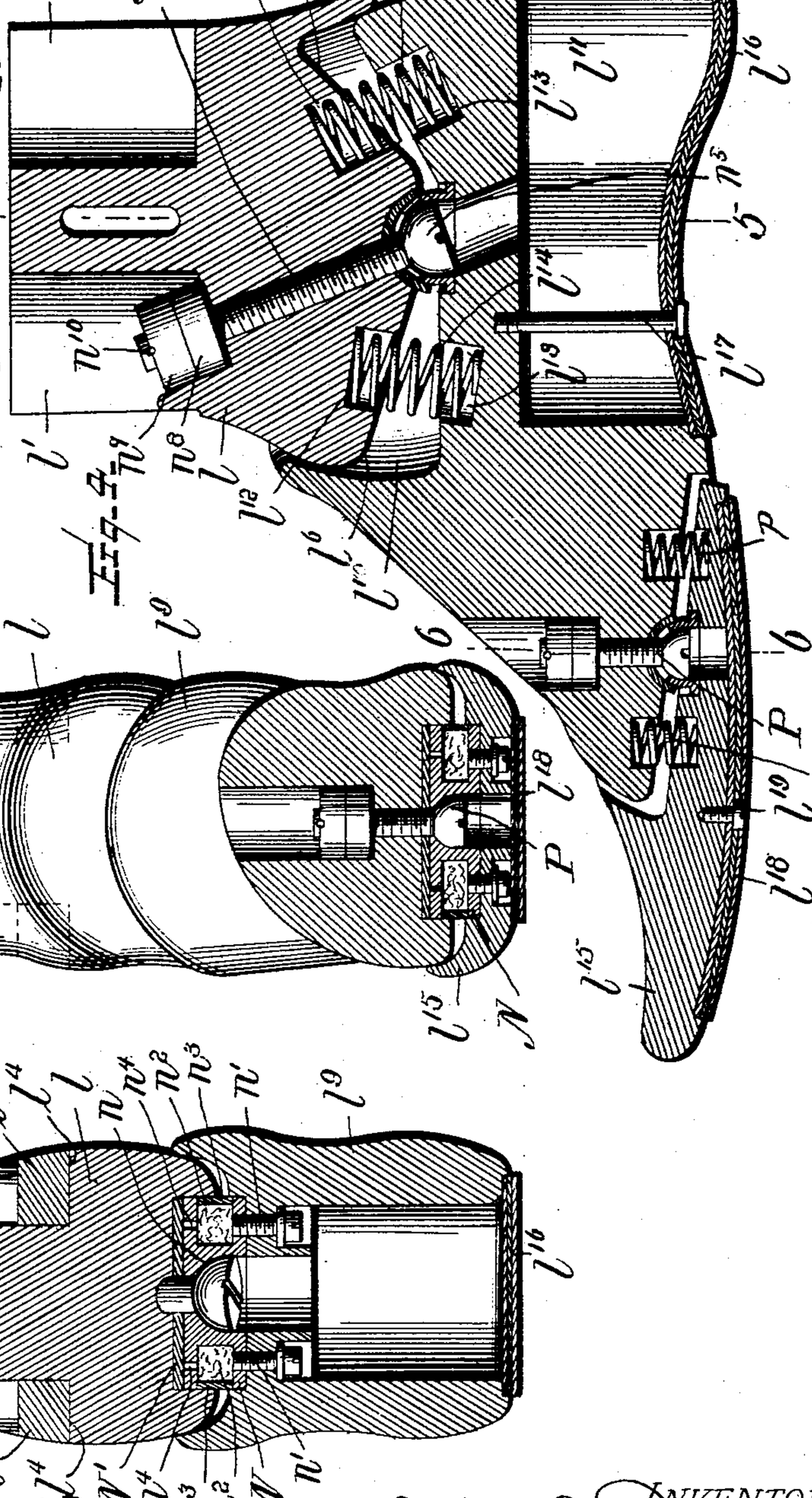

Fig. 2.

Fig. 3.

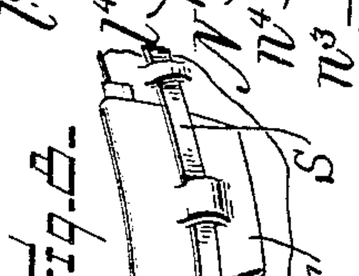

Fig. 4.

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UNITED STATES PATENT OFFICE.

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ARTIFICIAL LEG.

SPECIFICATION forming part of Letters Patent No. 710,996, dated October 14, 1902.

Application filed December 16, 1901. Serial No. 86,138. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. PEER, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Artificial Legs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention is an improvement in the artificial leg covered by my former patent, No. 694,325, dated February 25, 1902; and it consists in the novel features hereinafter described, reference being had to the accompanying drawings, which illustrate one form in which I have contemplated embodying my invention, and the said invention is fully disclosed in the following description and claims.

Referring to the said drawings, Figure 1 represents a perspective view of my improved artificial leg arranged for use with a member amputated above the knee. Fig. 2 is a vertical transverse sectional view of the same. Fig. 3 is a vertical longitudinal section of the same. Fig. 4 is an enlarged vertical longitudinal section of the foot. Fig. 5 is a transverse section of the same on line 5 5 of Fig. 4. Fig. 6 represents a section on line 6 6 of Fig. 4. Fig. 7 is a view showing detached the parts of the joint used for the ankle and toe portions of the foot. Fig. 8 is a detail showing the manner of attaching the crotch-pad.

The object of my invention is to improve upon the artificial leg shown, described, and claimed in my former patent, No. 694,325, dated February 25, 1902, said improvements consisting in an improved foot construction, a removable knee-piece, an improved connection between the thigh-section and the waist-belt, and certain other details of construction hereinafter described, and specifically pointed out in the claims.

The leg consists of three parts—to wit, the upper or thigh section, the calf or lower section, and the foot-section.

In the drawings, A represents the thigh-section, which comprises an outer vertical stiffening-bar a, an inner stiffening-bar a', said bars being composed of wood or light metal, and the flexible side portions a^2 a^3, which are secured together along vertical edges at front and rear. The outer stiffening-bar a extends from the knee-joint to a point somewhat above the hip-joint and is secured to the outside of one of the side portions a^2, preferably by riveting in such manner as to leave the inner face of said side portion (which is preferably formed of leather or other flexible material) perfectly smooth. The bar a is also preferably incased by means of a strip a^4, sewed or otherwise secured to the side piece a^2, and the rivets which secure the bar a to the side piece may or may not extend through the strip a^4, as preferred. The side piece a^2 will be cut away from points adjacent to the top of the bar a down to the front and rear edges of said side piece, as shown, and it may also be provided with cut-out portions a^5 at the upper part to make it cooler, as shown in the drawings. The inner stiffening-bar a' is secured to its adjacent side piece a^3, of leather or other suitable flexible material, by riveting or otherwise and is covered by a strip a^6, like the other stiffening-bar. The inner bar a' is shorter than the outer bar as it extends up along the inner surface of the thigh of the wearer. The front and rear edges of the flexible side portions a^2 a^3 are adjustably united in any suitable manner, as by lacing, as shown in the drawings, although I do not limit myself to the use of lacing as I may employ any equivalent construction. The upper part of the thigh-section is provided with a strap S, which extends from the rear and outer side around the inner portion and is secured to a buckle s, provided on the front of the thigh-section, this strap being for the purpose of tightening the thigh-section at its upper end and to carry a portion of the weight supported thereby to the upper end of the outer side stiffening-bar, as will be readily seen. In order to prevent the upper and inner edge of the thigh-section from producing chafing and soreness, I prefer to pad it, as shown at t, (see Figs. 2 and 8,) and to further provide a detachable crotch-pad T, which extends over the padded portion t and has its outer end slit to receive the strap S, (see Fig. 8,) thereby holding said pad in position.

The outer stiffening-bar a is provided at its

upper end with a belt A′, to be secured around the waist of the wearer. This belt is provided with a metal plate *b*, provided with a horizontal slot *b′*, which pivotally and slidingly engages a stud b^2, secured to the outer stiffening-bar *a*, and is provided with a head. This construction allows of pivotal and sliding movements between the stiffening-bar and the belt and facilitates the use of the leg in sitting, bending, &c.

Each of the flexible side pieces a^2 a^3 is provided with two or more pairs of slots a^7 at different heights to receive the straps *c c* of a sling C, provided with a cushion or pad upon which the stump of the leg (if a thigh amputation) can rest gently. The ends of straps *c c* are passed through one pair of slots a^7 in each side piece and secured by any desired means, such as buckles a^8, secured to the side pieces, one adjacent to each of said slots, as shown in the drawings.

The lower or calf section D of the leg is also provided with inner and outer stiffening-bars *d d′*, secured to flexible side pieces d^2 d^3 and covered by strips d^4 d^6, like those of the thigh-section, and the edges of the flexible side sections are adjustably secured at front and rear by lacings or otherwise. The flexible side portions of the thigh and calf sections are cut away at front and rear adjacent to the knee-joint (hereinafter described) to facilitate the action of the knee-joint and also to allow a portion of the leg of the wearer below the knee-joint to project rearwardly if the leg is to be used in such manner.

The thigh and calf sections of the leg are connected by two spring joint or hinge connections G, the construction of which is shown in detail and claimed in my former application above referred to and need not be particularly described herein.

I also provide the thigh and calf portions of the leg adjacent to the knee-joints with removable and adjustable cross-bars K for holding the stiffening-bars at the required distance apart. These devices are exactly alike and a description of one will apply to the other. The cross-bar K comprises two threaded bolts *k k*, passing through the opposite side stiffening-bars and rigidly secured thereto by nuts *k′ k′* on the inner sides thereof, and a central sleeve k^2, provided with right and left hand interior threads, and a central flange k^3, which is constructed to enable the sleeve to be rotated. These devices are also covered by my said former application.

I also provide a hollow knee-section R, composed, preferably, of leather, having its lower end *r* hemispherical in form and united to the upper tubular portion, which is preferably slit vertically at front and rear, as shown at *r′*, to facilitate fitting it into the lower part of the thigh-section. The cylindrical portion of the knee-section may be held in place in any desired manner; but I find it convenient to lace it to the thigh-section by means of the same lacings which are used to lace the front and rear parts of the side portions together. This knee-section will obviously only be used where the amputation is above the knee and will in such case give a natural appearance by distending the clothing properly above the knee.

The foot-section L of my improved artificial leg is shown in detail in Figs. 4, 5, 6, and 7 and is constructed as follows: *l* represents the ankle portion of the foot-section, which is preferably hollowed out at its upper end, as shown at *l′*, and is provided with a vertical slot l^2 and with lateral recesses l^3 l^3, extending from the top down to horizontal shoulders l^4 l^4. (See Figs. 1, 2, and 5.) The lower ends of the stiffening side bars *d d′* of the calf-section fit into said recesses and are secured to the foot-section by a bolt M, which passes through the slot l^2 and is provided with a suitable nut *m*. By this means the length of the leg can be adjusted a distance equal to the length of the slot l^2, and the necessity of having so many sizes of legs in stock is avoided, as a few sizes can be made to accommodate persons of all the varying heights. When the stiffening-bars are adjusted above the shoulders l^4 l^4, blocks l^5 l^5 will preferably be inserted between the ends of said bars and the shoulders, as shown in Fig. 5. The bottom part of the ankle-section *l* is provided with the front and rear beveled faces l^6 l^7 and a rear flange l^8. l^9 represents the main foot-section, provided with a recess l^{10} at the top to receive the ankle-section and a recess l^{11} on the under side. The rear part of the upper portion is made to fit within the flange l^8. The two parts are connected by an improved ankle-joint of peculiar construction, the parts of which are shown in detail in Fig. 7. The joint comprises two plates N N′, the lower one, N, being provided on its lower side with a central hemispherical recess *n* and threaded apertures to receive retaining-screws *n′ n′* and having oil-receiving recesses n^2 n^2 in its ends closed by suitable plugs n^3 n^3 of cork or wood. The upper surface of the plate N is rounded to receive the semicylindrical upper plate N′, which directly engages it, and the plate N is further provided with oil-holes n^4 n^4, extending from the recesses n^2 n^2 to the upper face of the plate to supply oil between the plates N and N′. The oil-recesses n^2 n^2 are filled with heavy oil, which may be absorbed in waste or other absorbent material, if desired, and this joint is thus kept lubricated at all times. N^2 represents the connecting-bolt, which has a hemispherical head n^5, fitting recess *n* in plate N, and extends through a transverse slot n^6 in plate N and a hole n^7 in plate N′. The slot n^6 permits the required movement of the joint, the plate N′ sliding upon the plate N. At its upper end bolt N^2 is provided with a rubber or other elastic washer n^8 and a suitable nut n^9, which may be locked, if desired, by a pin or cotter n^{10}, passing through a hole in the bolt and engaging a groove in the nut n^9. The ankle-

section l is provided on its lower faces l^6 and l^7 with spring-receiving recesses l^{12} l^{12}, and the footpiece l^9 is provided with opposite recesses l^{13} l^{13}. In these recesses, one pair of which are arranged forward of and the other pair in rear of the ankle-joint, I locate compression-springs l^{14} l^{14}, which give the requisite elasticity to the ankle-joint while permitting the easy movement of the parts. The recess l^{11} in the bottom of the foot-section is closed by a leather-covered pad l^{16}, held in place by a screw l^{17}. The front portion of the footpiece l^9 is provided with a toe-piece l^{15}, connected to the footpiece by a joint P, exactly similar to the ankle-joint, previously described, and springs p p are interposed between the two parts in front of and in rear of the joint P to permit the toe-piece to move with respect to the footpiece and to restore it to normal position in walking, thus rendering the use of the artificial leg easy and natural and obviating almost entirely the awkwardness usually accompanying the use of an artificial leg. The bottom of the toe-piece is preferably provided with a leather-covered pad l^{18}, held in place by a screw l^{19}, as shown.

What I claim, and desire to secure by Letters Patent, is—

1. An artificial leg, comprising among its members a foot-section, a calf-section, a thigh-section hinged to the calf-section and provided on its outer side with an upwardly-extending portion adapted to extend above the hip-joint, and a belt, having a pivotal and sliding engagement with said upwardly-extending portion, substantially as described.

2. An artificial leg comprising among its members a thigh-section provided with side stiffening-bars, the outer bar being extended upwardly a greater distance than the inner bar, flexible side portions connected to said stiffening-bars, adjustable devices for connecting said side portions, a stud secured to the upper end of the outer stiffening-bar, and a belt having a longitudinally-slotted portion pivotally and slidingly engaging said stud, substantially as described.

3. An artificial leg, comprising among its members the thigh-section and calf-section each provided with lateral stiffening-bars, and flexible side portions and connections for holding said side portions together, hinge connections between the stiffening-bars of said thigh and calf sections and a detachable hollow knee-piece, secured to one of said sections and having a rounded portion projecting into the other section, substantially as described.

4. In an artificial leg, the combination with the calf-section, of the thigh-section hinged thereto and provided with lateral stiffening-bars, the outer bar being extended upwardly beyond the inner bar, a strap extending around the upper part of the thigh-section from the top of the outer stiffening-bar to the top of the inner stiffening-bar, to transfer a portion of the weight of the wearer to the outer stiffening-bar, substantially as described.

5. In an artificial leg, the combination with the calf-section, of the thigh-section hinged thereto and provided with lateral stiffening-bars, the outer bar being extended upwardly beyond the inner bar, a strap extending around the upper part of the thigh-section from the top of the outer stiffening-bar to the top of the inner stiffening-bar, to transfer some of the weight of the wearer to the outer stiffening-bar, and a crotch-pad, arranged over the inner part of the upper edge of said thigh portion and having a flap or part engaging said strap to hold the pad in position, substantially as described.

6. An artificial leg, comprising among its members, the foot-section provided with parts movable with respect to each other, and a joint connecting said parts, including a plate secured to one of said parts having a rounded upper surface, a hemispherical socket on its under side, and a transverse slot communicating therewith, a semicylindrical part engaging the other part, and fitting over the rounded portion of said first plate and a bolt having a hemispherical head engaging the corresponding recess in the first plate, passing through the slot therein, and through the second plate and provided with a securing-nut, substantially as described.

7. An artificial leg comprising among its members, the foot-section provided with parts movable with respect to each other, and a joint connecting said parts including a plate having a rounded upper face, a hemispherical recess in its lower face, oil-recesses within said plate and oil-holes communicating therefrom to the said rounded face, a second plate curved semicylindrically and engaging the rounded face of the first plate, and a bolt extending through a transverse slot in the first-mentioned plate, and through an aperture in said second plate and having a hemispherical head engaging said hemispherical recess, substantially as described.

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

JOHN A. PEER.

Witnesses:

JOHN E. MCCULLY,

THOMAS G. HAWKES.