

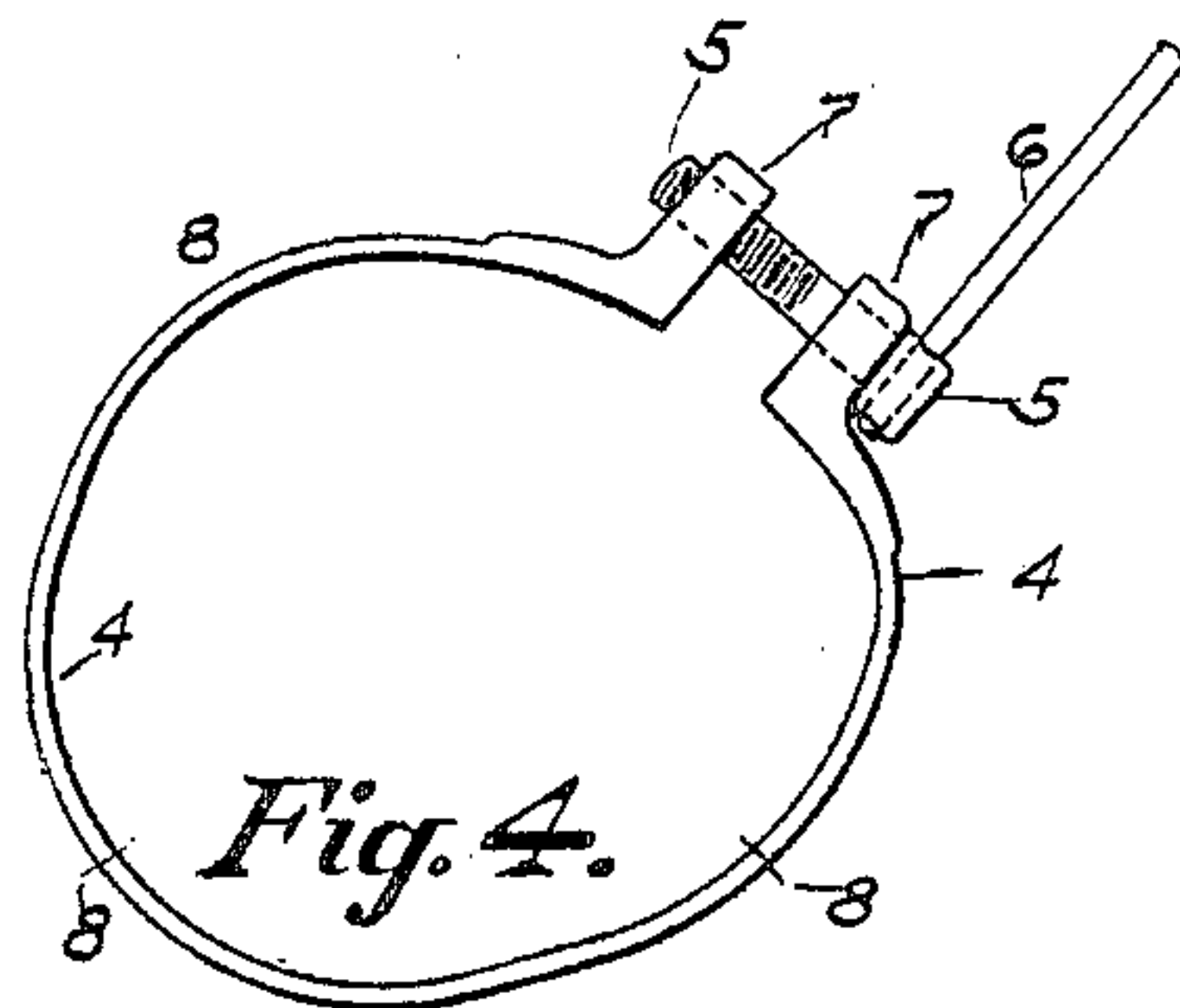
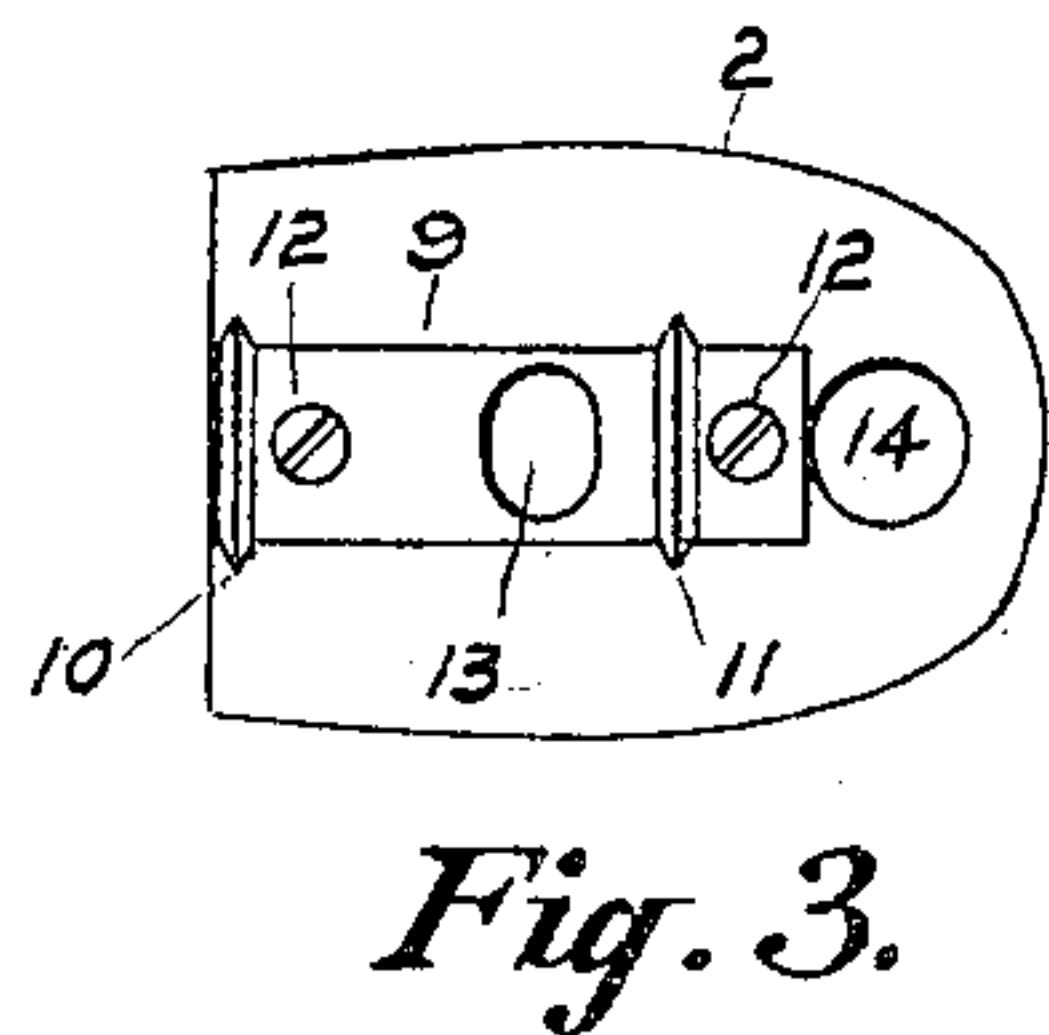
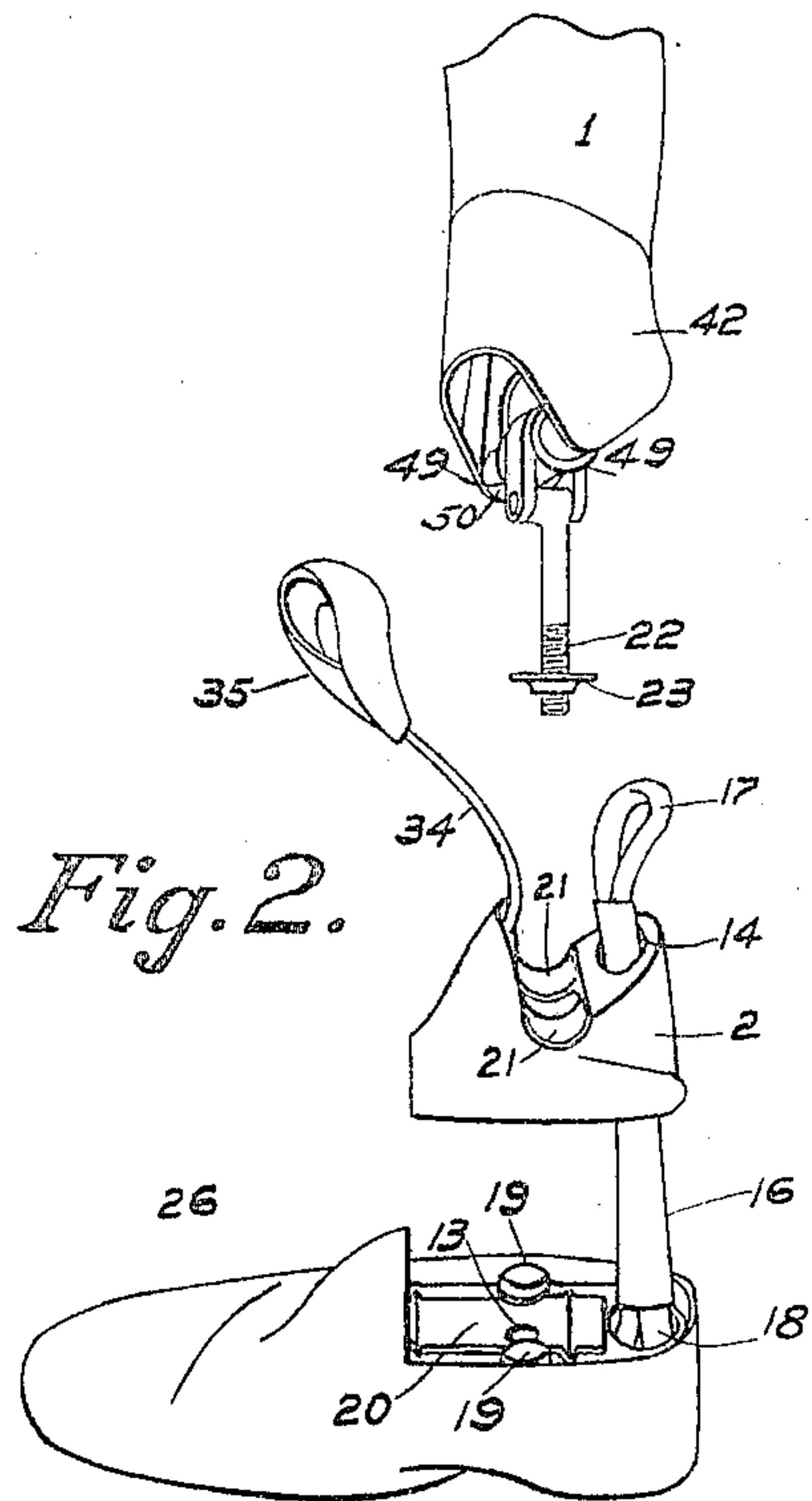
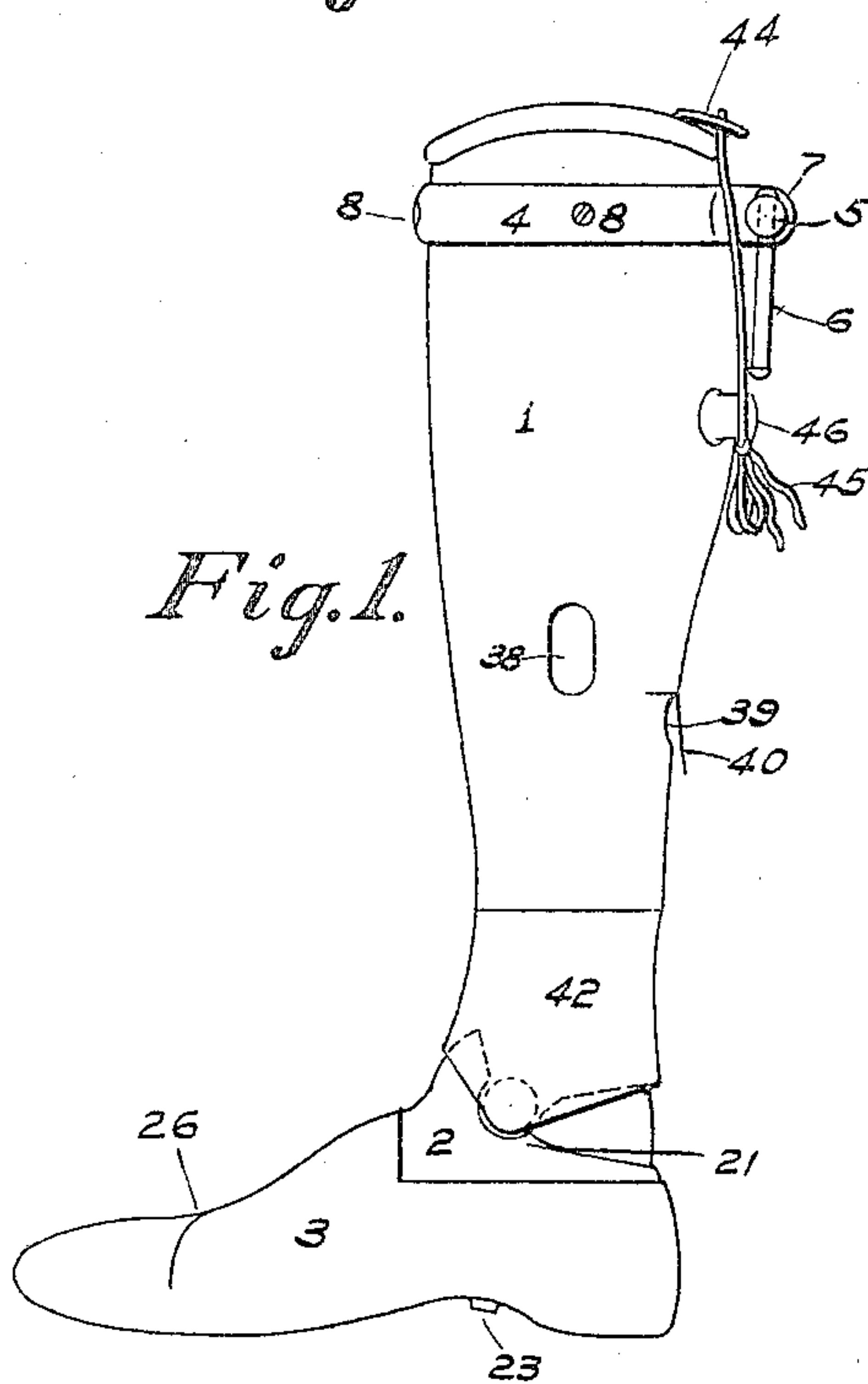
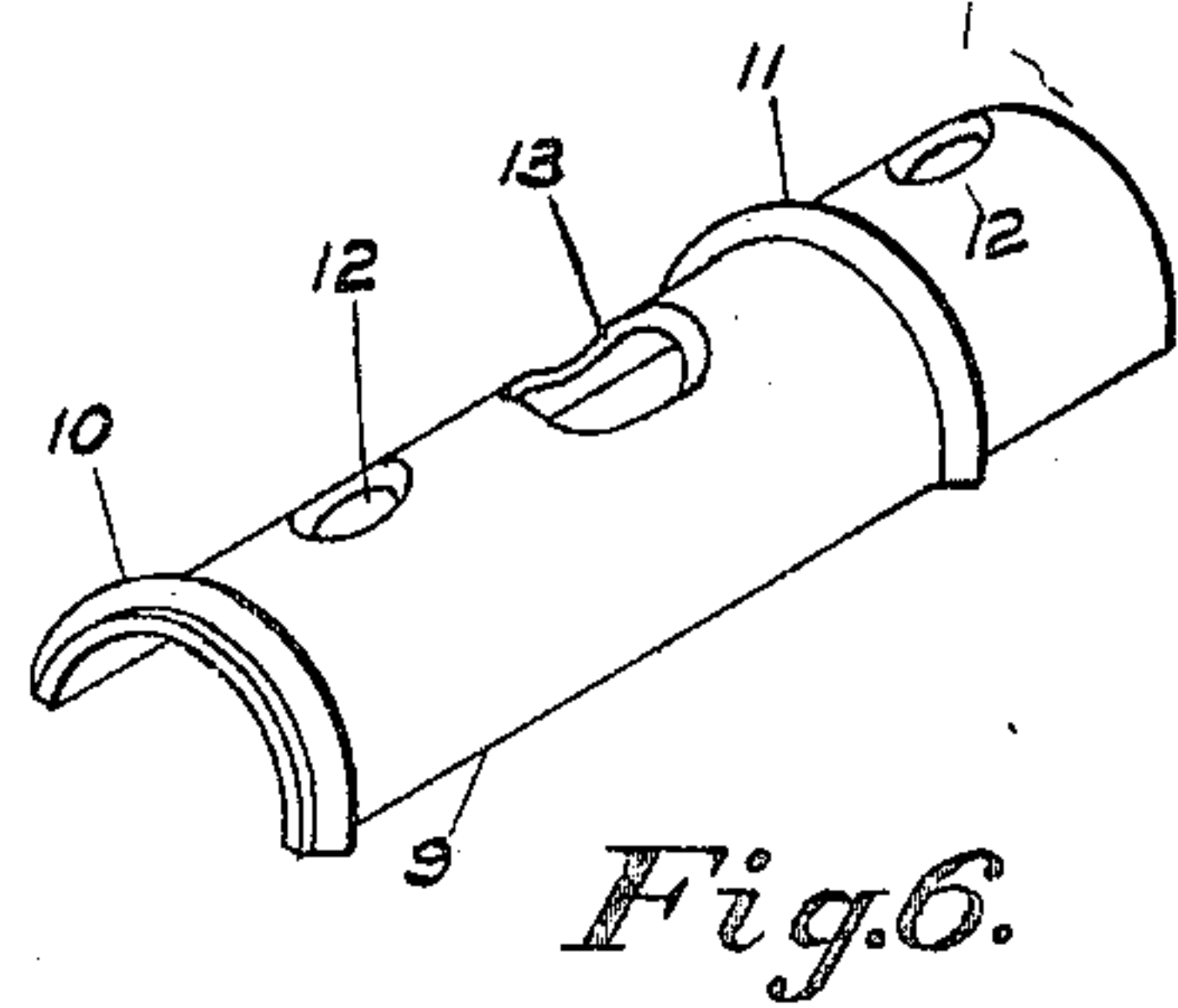
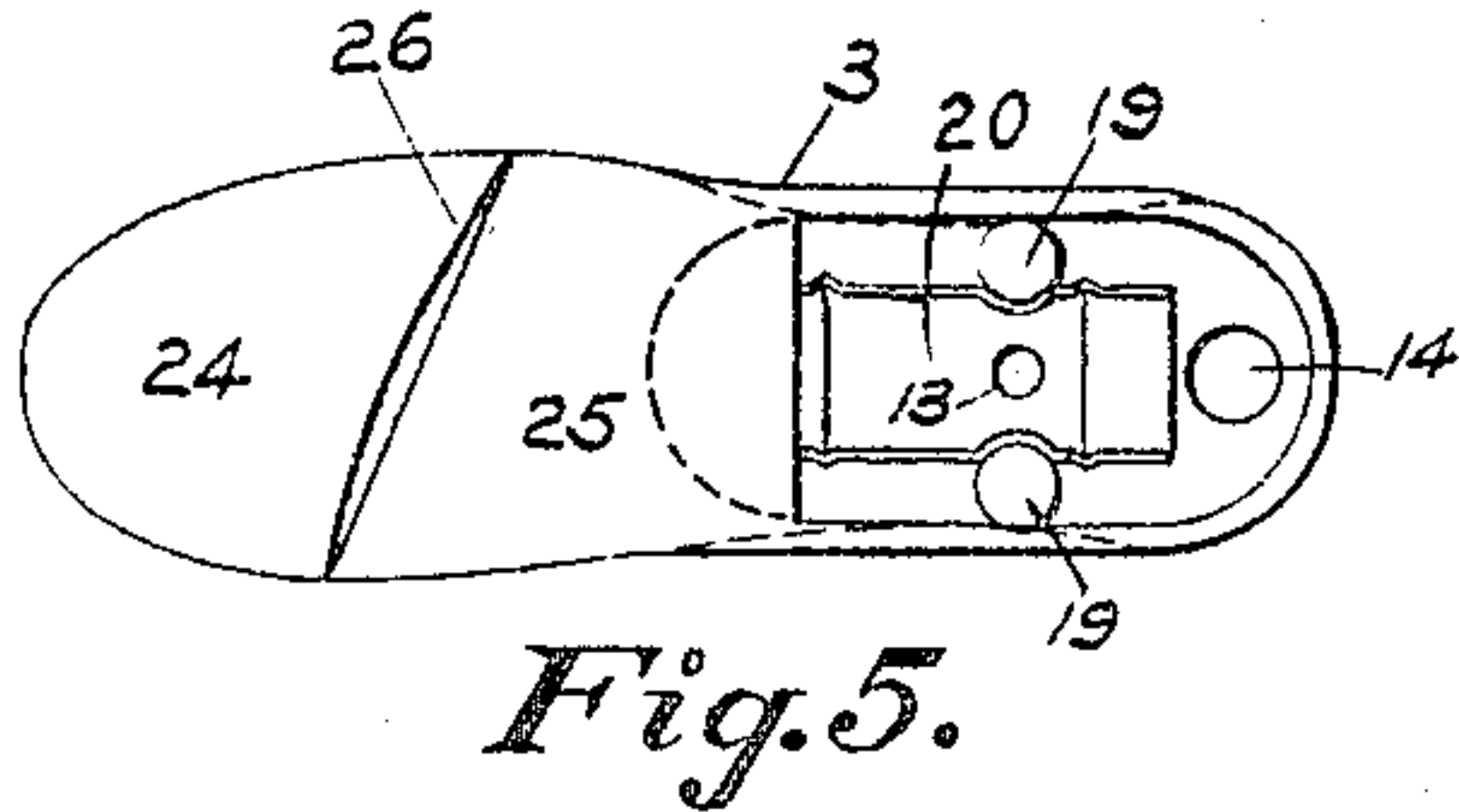
No. 807,427.

PATENTED DEC. 19, 1905.

J. T. APGAR.
ARTIFICIAL LEG.

APPLICATION FILED OCT. 3, 1903.

2 SHEETS—SHEET 1.



Witnesses
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2 SHEETS—SHEET 2.

Fig. 8.

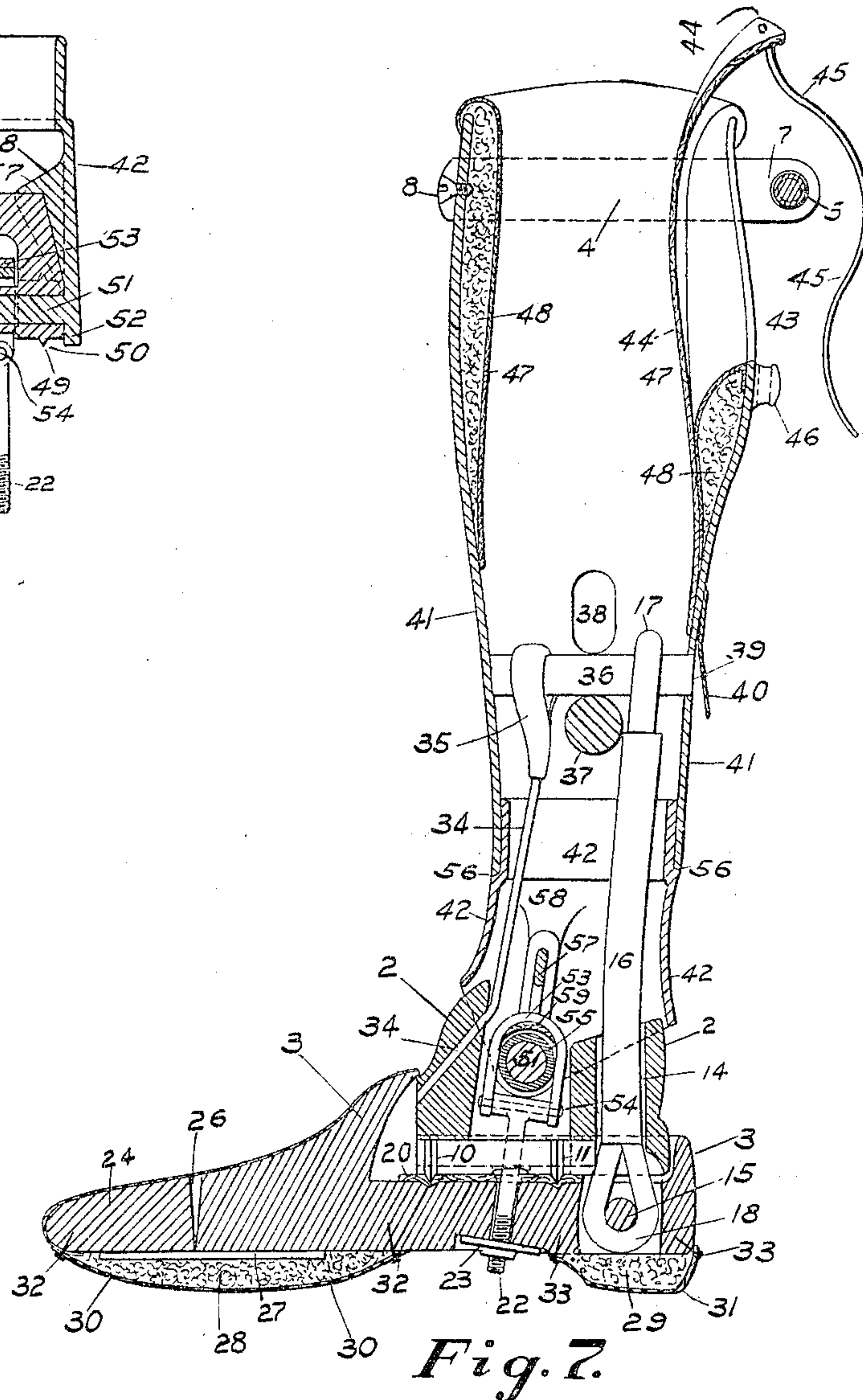
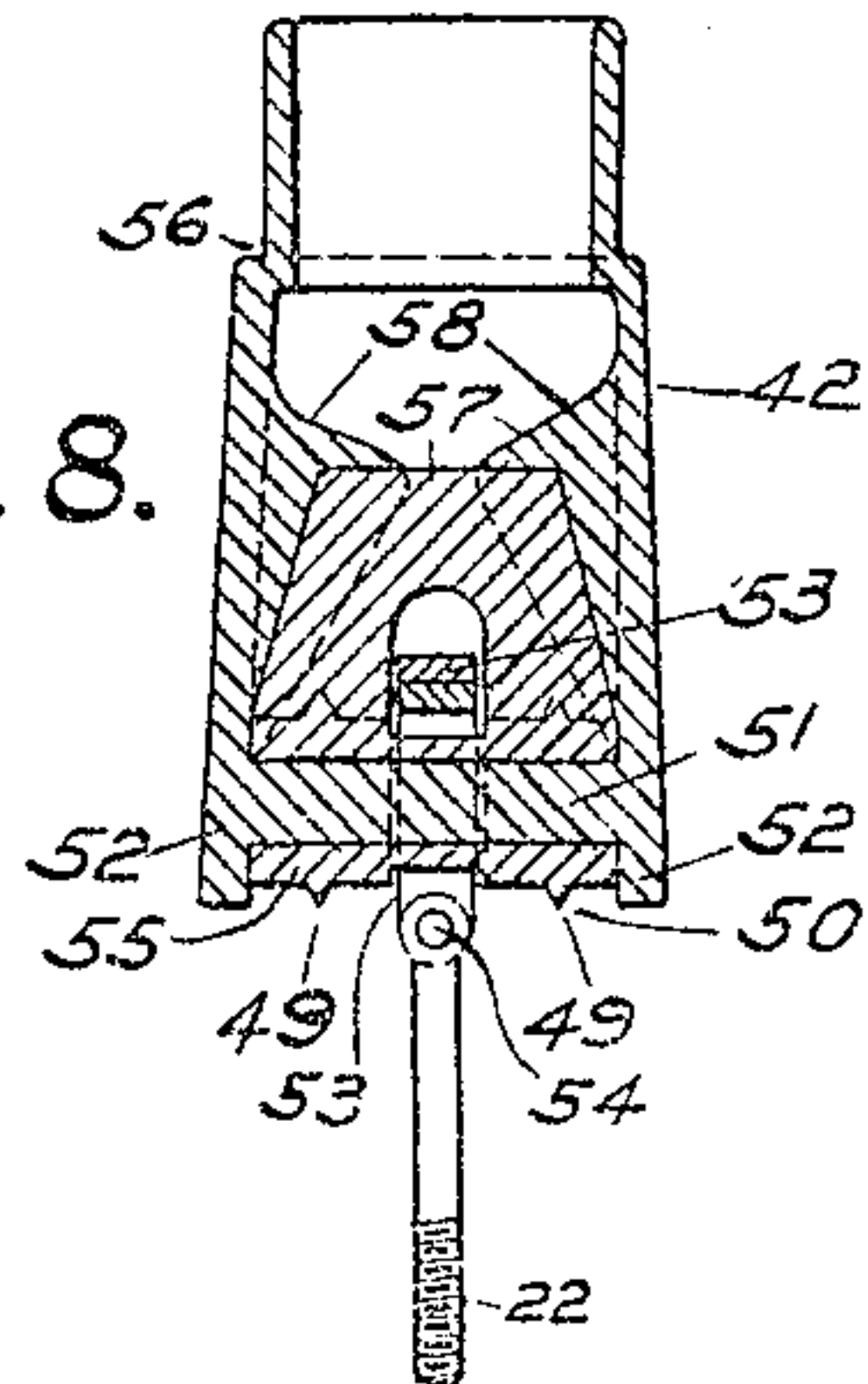


Fig. 7.

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JOHN T. APGAR, OF NEW YORK, N. Y.

ARTIFICIAL LEG.

No. 807,427.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed October 3, 1903. Serial No. 175,644.

To all whom it may concern:

Be it known that I, JOHN T. APGAR, a citizen of the United States, residing in the borough of Manhattan, in the county, city, and State of New York, have invented a certain new and useful Improvement in Artificial Legs and other Human Members, of which the following is a specification, such as will enable others skilled in the art to which it appertains to make and use the same.

While relating more specifically to artificial legs, my invention may be applied also to artificial arms, hands, and feet; and the objects of such invention are to furnish an artificial human member at a minimum cost of construction so made as to be of the greatest possible lightness and yet of the greatest strength and durability and of such material that variations in temperature will have little or no effect thereon and in which the operation thereof when in use upon the person will be absolutely noiseless and so like that of the natural human leg or member as not to be detected upon ordinary and casual observation.

My invention consists in the arrangements of certain devices and parts, and in the construction of certain devices and parts, and in the construction, combination, and arrangement of certain devices and parts, all as hereinafter more specifically set forth in the description, and pointed out in the claims.

Said invention is fully shown and described in the following specification, of which the accompanying drawings form a part, wherein similar numerals of reference designate like or equivalent parts wherever found throughout the several views, and in which—

Figure 1 is a side view of my improved artificial leg. Fig. 2 is a view of the ankle-piece and lower portion of the leg-piece separated from the ankle-block and the ankle-block nearly separated from the foot-block. Fig. 3 is a bottom view of the ankle-block, showing the metallic rocker-plate secured in position thereon. Fig. 4 is a detailed view of the stump-socket socket-clamp by the operation of which the leg is secured to the leg of the wearer. Fig. 5 is a top view of the foot-block and toe-piece before being provided with the covering-leather. Fig. 6 is a bottom or inverted perspective view in detail, on an enlarged scale, of the metallic rocker-plate of the ankle-block. Fig. 7 is a view of the entire leg, taken in central vertical longitudinal section; and Fig. 8 is a detailed view, in central vertical

cross-section, of the aluminium and brass ankle-piece.

Referring to the drawings, the reference-numeral 1 designates the leg-piece, the exterior at least of which is usually formed of a single piece of rawhide shrunk into shape and having its abutting edges joined together in any suitable manner, usually by a thin strip of sheet-brass (not shown) riveted thereto.

2 is the ankle-block, which is usually of wood, as is also the foot-block 3 and the toe-piece 24, which is hinged to the foot-block by a thin sheet or strip of resilient sheet metal, usually brass, secured to the bottom or sole of such foot-block in any desired manner, usually by screws, and my improved foot has the hinge-point or line of junction between the foot-block and toe-piece diagonal to the central longitudinal axis of such foot and nearer to the heel and outer side of the foot than at the inner, as shown in Fig. 5, wherein a right foot is shown with the ankle-block removed and shows the cavity in which the same rests, such ankle-block, foot-block, and toe-piece and front portion being usually covered with thin rawhide shrunk thereon and the entire toe-piece and front portion of the foot-block being covered with tanned leather so flexible as to allow of a natural and free movement of the toe-piece in the act of walking, the sole of the foot being provided with an elastic sole-pad, usually of india-rubber, 28, covered with leather 30, secured to the foot and toe blocks by tacks 32, a similar rubber heel-pad 29 with a leather covering 31 being secured to the foot-block at the heel by tacks 33, all as shown in Fig. 7. Secured firmly to the under side of the ankle-block 2 by means of screws, as at 12 as shown in Fig. 3, is the metallic ankle-block roller-plate 9, which is usually of any suitable hard metal, such as aluminium-bronze, and of the substantially semicylindrical form shown in detail in Fig. 6 and is provided with two or more rocker-ribs 10 and 11, which when the parts are in position rest and rock upon the leather rocker-bed 20, on each side of which are located the ankle-block springs 19, which are usually of elastic rubber and are inserted at the lower ends in suitable holes or sockets in the foot-block cavity, so as to bear upon the under side of the ankle-block on either side of the ankle-block roller-plate 9, such springs 19 when the parts are in position, as shown in Fig. 7, being under such tension that

the side motion or rock motion of the ankle-block even under great strain will be only equivalent to the side rock motion natural to the human ankle.

5 The ankle-piece 42 is composed mostly of aluminium and is provided at the upper end with a chamfer 56, down over which fits the lower end of the rawhide leg-piece 1, the two being firmly secured together at such joint in
10 any suitable manner, and such ankle-piece is provided with the central bottom side wings, located a little to the front of the vertical center, between which wings is located the hollow ankle-pin 55, which is usually of brass
15 and of the form shown, having the upper securing-fin 57, through the central hole of which passes the ankle-block yoke 53, between which and the fin is interposed a shoulder piece or bushing 59, of leather or other
20 suitable material of like qualities. Such ankle-piece 55 is usually provided with the annular ribs 49 about the relative distance from the outer end of such pin shown at 50 in Fig. 8 and also with the interior secur-
25 ing-wings 58, which partially envelop the securing-pin 57, and with a pin-piece 51, which extends from one bottom side wing 52 to the other through the central cavity of the brass ankle-pin, the ankle-piece be-
30 ing formed by first casting the hollow brass ankle-pin 55, then inserting the ankle-pin in a suitable mold and supplying the same with the required quantity of molten aluminium or of any suitably alloy thereof, whereby an an-
35 kle-piece of extreme lightness, but of great strength, will be formed, which by reason of the shrinkage of the aluminium upon the brass ankle-pin fins in cooling and of the pin-piece 51 passing through the ankle-pin 55 is prac-
40 tically of one piece when completed.

To the bottom of the yoke 53 is secured by a swivel-pin 54 the securing-bolt 22, which passes down through the holes 13 and 13, formed through the rocker-plate 9, rocker-bed
45 20, and foot-block 3, and is provided at the outer end with a securing-nut 23, which rests in a socket formed to receive it in the hollow of the foot-block, as shown in Fig. 7, the ribs 49 resting and rocking on the surfaces 21 of
50 the ankle-block and the lower part of the yoke lying in the hole between such surfaces 21.

In order to prevent the softening of the rawhide at the stump-socket through the ac-
55 tion of the bodily heat and moisture, I provide the same with a stiffening or reinforcement 48, of sole-leather or any suitable material which will be less affected either by heat or moisture than is the rawhide of the body, which will be but little, and that not
60 permanently, distorted thereby, and yet which will not have a tendency to heat the stump of the wearer, and for this purpose I have found sole-leather to be an excellent material, and when the same has been cemented
65 firmly in place for additional comfort to the

wearer such leather or reinforcement 48 is usually provided with a soft or buff leather covering or lining 47, while the open slot 43 at the rear of the stump-socket is covered on the interior side with a tongue 44 of soft
70 leather, having the tie-string 45, a loop of which is slipped over the string-stud 46, as shown in Fig. 1.

Secured upon the leg-piece 1 slightly below the top of the stump-socket is the socket-clamp
75 4, which is formed of resilient spring metal, such as spring steel or brass, and is usually of the form shown in detail in Fig. 4, having the lugs 7 with the open space between them, through which passes the adjusting-screw 5,
80 through the head of which easily slides the adjusting-lever 6, which is slightly upset at each end after insertion in the screw-head to prevent the same from being removed. Such clamp is secured in place upon the leg-piece
85 1 by suitable screws or rivets or in any other desired manner, and the open side is of course located at the top of the slot 43 of the stump-socket.

It is well known to all wearers of artificial
90 legs that frequently, and especially in hot weather, the stump is likely to heat and swell, so as to render the wearer uncomfortable, especially when sitting down, and with the leg having laced stump-sockets it is impossi-
95 ble to loosen or tighten the lacing without great trouble and such disarrangement of the clothing as is not to be permitted within the public view. By the use of my socket-clamp, however, all these objections are removed, as
100 the actuating-lever 6 may be taken hold of through the cloth of the trouser-leg and manipulated so as to tighten or loosen the socket upon the stump to any desired extent in an
105 instant of time, and this, too, without any unseemly motions or exhibitions.

Formed in the walls of the leg-piece 1 below the stump-socket are the usual ventilating orifices or holes 38, and below these and se-
110 cured at the ends in the side wall, so as to be supported thereby, is the wooden supporting-pin 37, which supports at the center the cord-pin 36, which, like the pin 37, is usually of wood and is supported at the ends in the leg-
115 wall, leather flaps 40 being cemented down or otherwise secured in position over the hole 39, through which the pin 36 is inserted.

The cord-pin 36 passes on the forward side of the pin 37 through the leather-covered supporting-loop 35 of the ankle-block cord
120 34, which is firmly secured at the lower end in the forward upper extension of the ankle-block 2, as shown in Fig. 7, and on the rear side of such pin through the upper and sup-
125 porting loop 17 of my new and improved form of heel-cord 16, which passes down through the hole 14, formed in and through the rear end of the ankle-block 2, and through the lower loop 18 of this heel-cord passes the heel-pin 15, which passes from side to side through the heel of
130

the foot-block 3 and is usually held in place by the rawhide covering of such foot-block, or the same may be secured against accidental misplacement in any other desired manner.

5 When in position the cords 34 and 16 are of course under considerable tension, and my improved heel-cord, like the loop 35 of the ankle-block cord 34, is provided at both end loops and body with a suitable covering of any
10 suitable flexible material, usually buff-leather. Such heel-cord 16 consists of a plurality of rope-strands, usually three in number, each of which rope-strands is composed of a single
15 cord, the two ends of which have been knotted or otherwise firmly secured together, looped, and twisted at the center, so as to form a rope-strand with a loop at each end composed of a considerable number of cord-strands, such
20 cord-strand being usually twenty in number. After being so formed the three rope-strands are laid together at the central twisted body portion, so as to form thereat a three-stranded
25 laid rope, and the three-strand loops at each end are placed together, so as to form a single large loop 17 and 18 at each end, and the main body or laid rope central portion, as well as such end loops, are then covered with buff-leather or some material which possesses similar
30 qualities, which covering is secured in position by sewing the edges together or in any other desired manner.

The cord-strands out of which the heel-cord 16 is composed are of any suitable material having great tensile strength and flexibility,
35 and for this purpose I have found stout paper or flaxen or linen cords of tight twist to be excellent materials, and the cord 34 may also be of like material. I have found by actual experience and use thereof that a heel-cord
40 made as described is of great durability and especially when made of paper cord and is not affected appreciably by atmospheric or thermal changes and will without appreciable

stretching retain its elasticity through a long period of actual use.

45

Some of the parts described may be used with equal advantage in arms as well as in legs—such, for instance, as my improved form of artificial tension-cord, shown herein as a heel-cord, also the sole-leather stump-socket
50 reinforcement, socket-clamp, and the joint or ankle piece formed of a light metal and a heavier metal, which latter with but slight modifications of shape may be used with advantage in knee-joints or in the elbow and wrist joints
55 of arms.

Having now particularly shown and described my said invention, what I claim, and desire to secure by Letters Patent, is—

1. A securing-clamp for artificial human
60 members formed of resilient spring metal adapted to be secured around the stump-socket of such member and to contract the stump-socket by the rotation of a screw-bolt passing through wings thereof at the ends of the
65 band with outwardly-extending abutting ends thereof forming such clamp.

2. An ankle-piece for artificial legs comprising a heavy metal hollow securing-pin secured to an ankle-piece or sleeve proper of lighter
70 metal cast upon the pin so that a core of the soft metal merging at the ends in the walls of the sleeves lies in the hollow of the securing-pin, a fin of the heavy metal having a hole to receive the securing-yoke being formed integral with the hollow securing-pin, the edges
75 of which fin are secured in interior wings of the sleeve cast around same.

In testimony that I claim the foregoing as my invention I have signed my name, in the
80 presence of the subscribing witnesses, this 19th day of September, 1903.

JOHN T. APGAR.

Witnesses:

EDWARD W. SEARING,
DAVID HOAG.