April 15, 1958 W. E. SCHOBER 2,830,301

ARTIFICIAL LEG

Filed March 15, 1955 3 Sheets-Sheet 1

Fig. 1

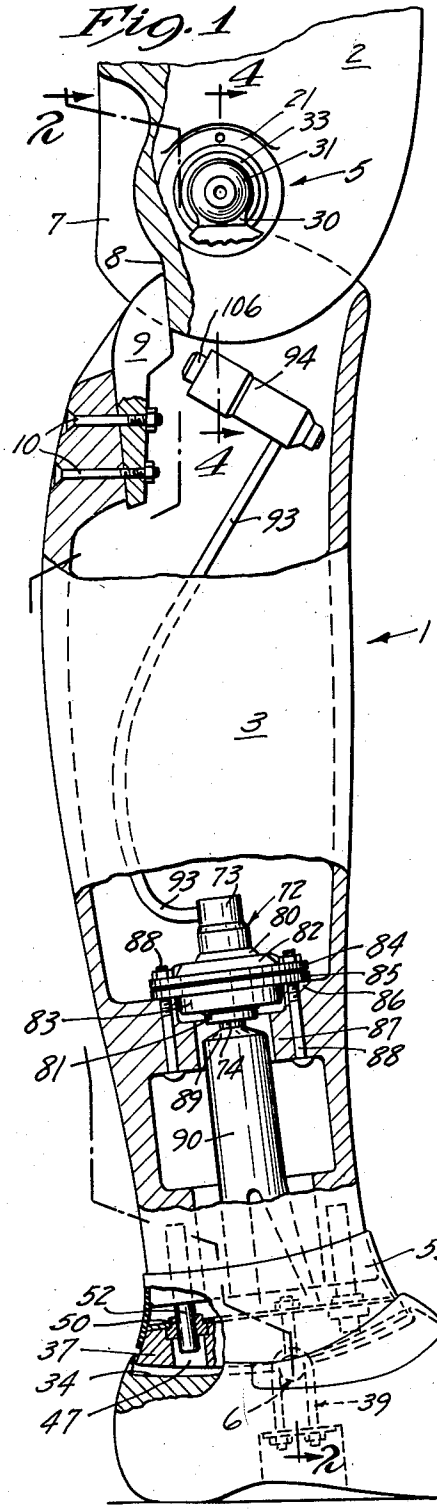
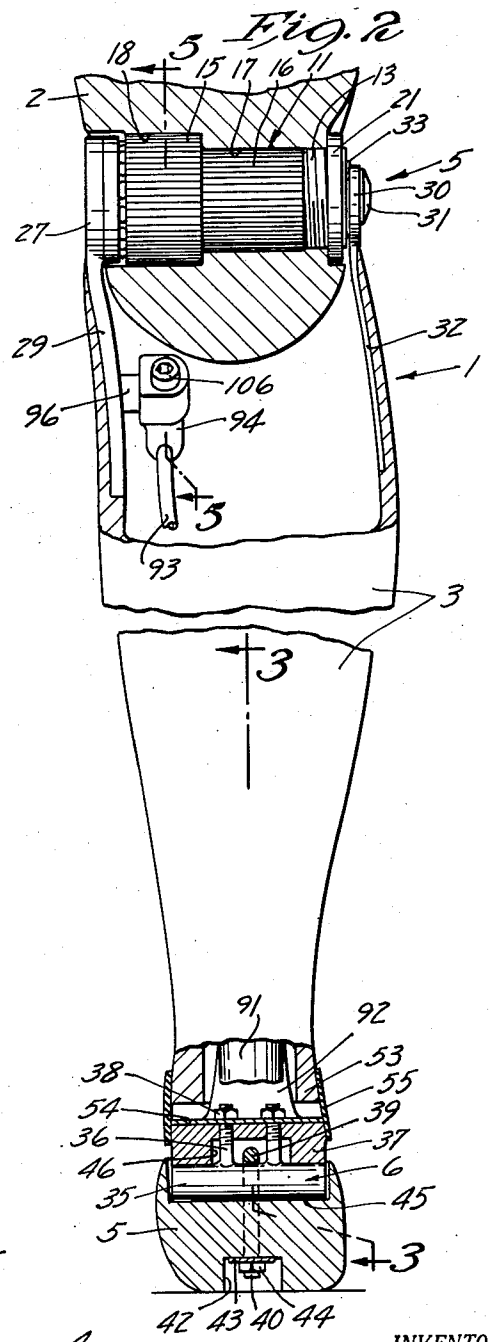


Fig. 2



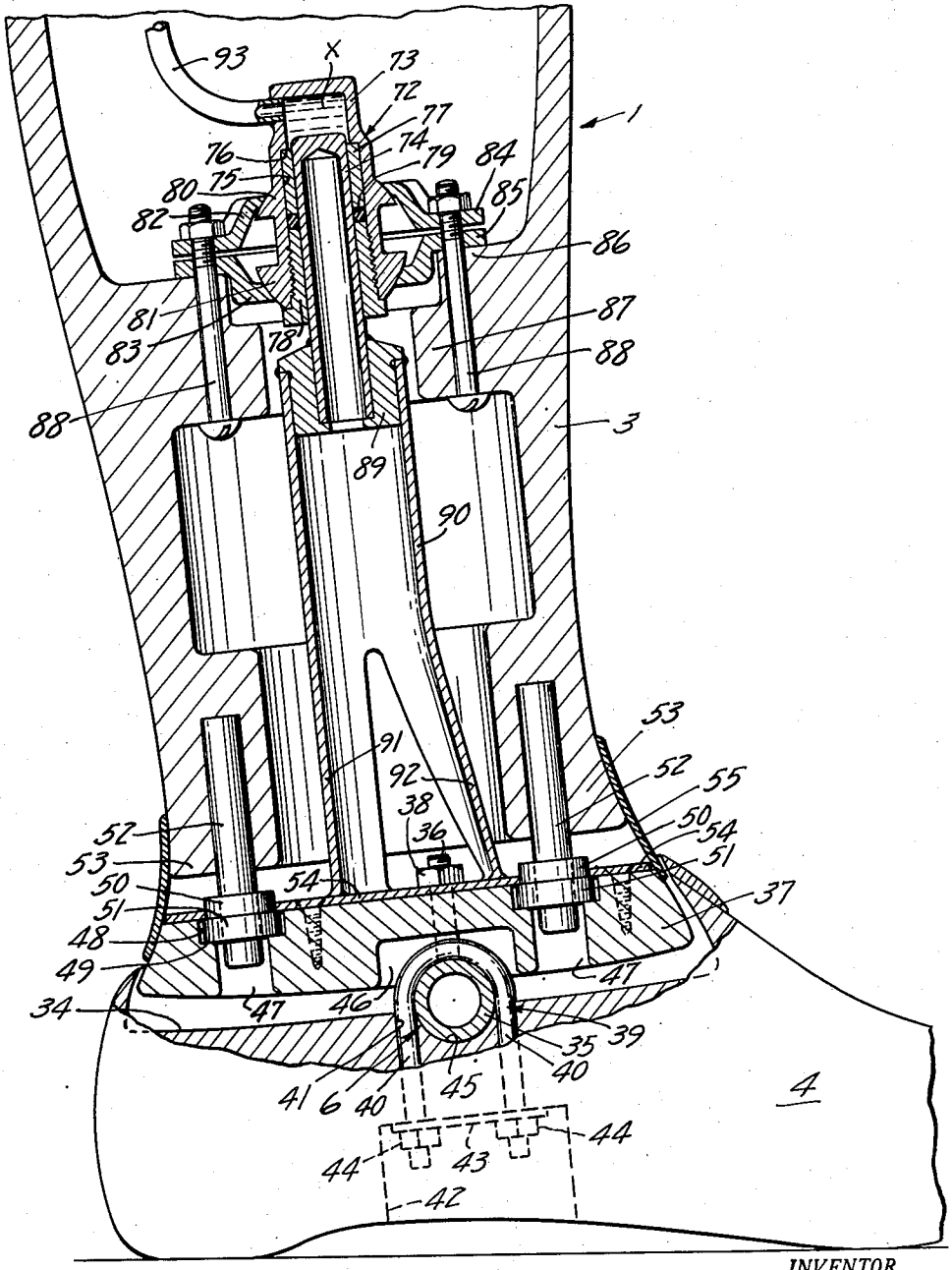
INVENTOR.
Wayne E. Schober
BY
Merchant & Merchant
ATTORNEYS

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ARTIFICIAL LEG

Filed March 15, 1955 3 Sheets-Sheet 2

Fig. 3



INVENTOR.
Wayne E. Schober
BY
Merchant & Merchant
ATTORNEYS

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Fig. 4

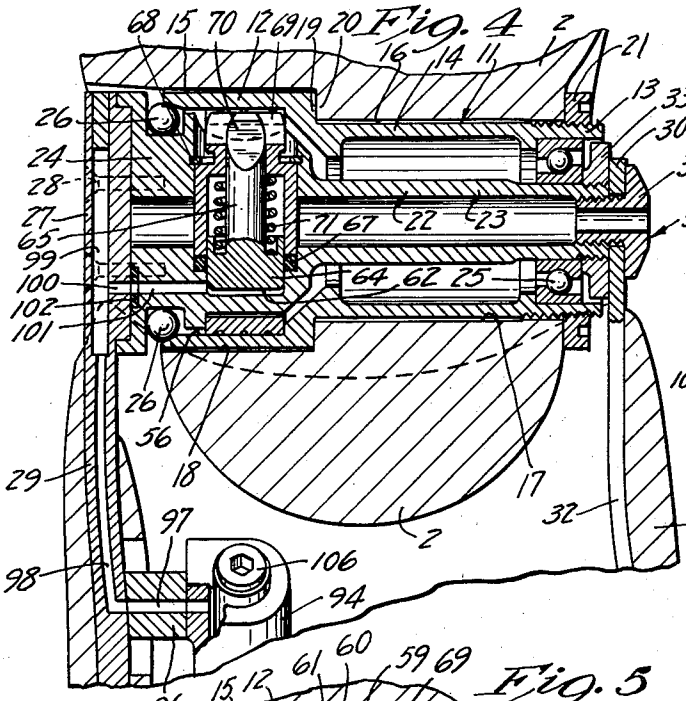


Fig. 6

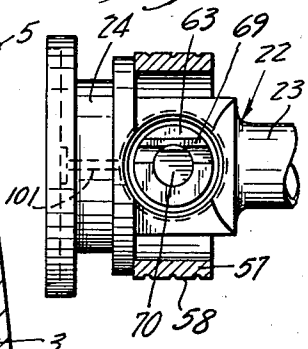


Fig. 5

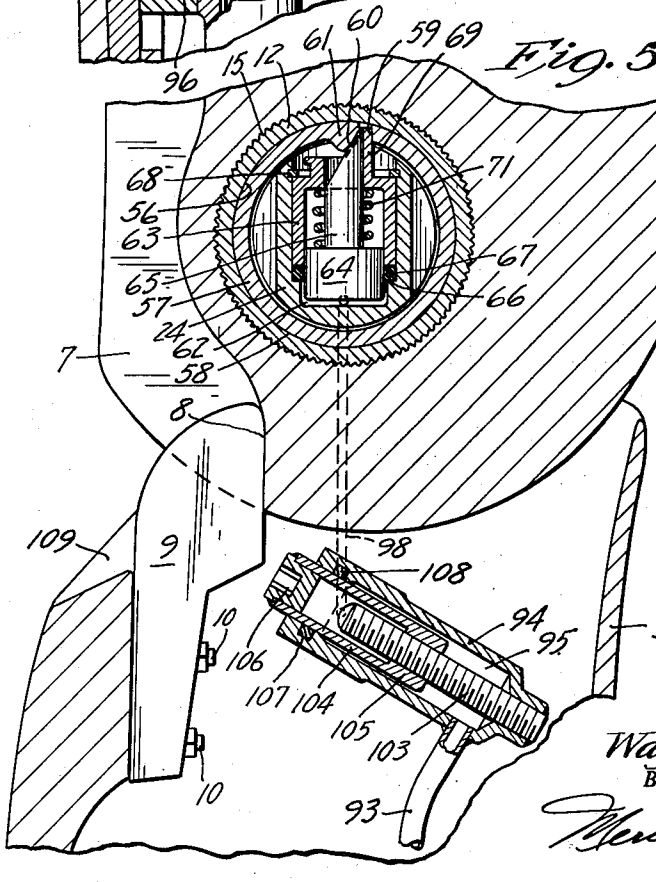
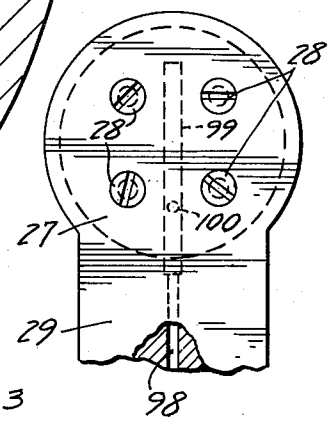


Fig. 7



INVENTOR.
Wayne E. Schober
BY
Merchant & Merchant
ATTORNEYS

United States Patent Office

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ARTIFICIAL LEG

Wayne E. Schober, Minneapolis, Minn., assignor to Peter A. Rasmussen, doing business as Viking Tool and Die Company, Minneapolis, Minn.

Application March 15, 1955, Serial No. 494,311

8 Claims. (Cl. 3—27)

My invention relates generally to improvements in artificial limbs and more particularly to mechanism for controlling the pivotal movement between cooperating portions of artificial limbs, such as at the knee joint thereof.

The primary object of my invention is the provision of an artificial leg having a knee joint which will permit relatively free swinging movements of the leg below the knee joint when the weight of the wearer is removed from the leg but which will automatically frictionally lock the leg against such swinging movement about the knee joint when the wearer's weight is applied to the leg to prevent buckling of the leg at the knee joint even if the leg is slightly bent at the knee when such weight is applied.

Another important object of my invention is the provision of an artificial leg having a brake-equipped knee joint and in which the upper leg portion, including the knee joint, is connected to the foot portion of the leg for limited movements with respect to the foot portion in opposite directions longitudinally of the leg, and a brake actuator operatively associated with said foot for setting the brake when weight of the wearer is applied to the foot as in walking.

Another object of my invention is the provision of a knee joint for artificial legs as set forth and operating mechanism therefor which is relatively light in weight, which is quiet and smooth in operation, and which requires no special harness for mounting the leg to the wearer.

Still another object of my invention is the provision of an artificial leg as set forth having novel means whereby the brake mechanism may be quickly and easily adjusted without the necessity of removing the leg from the wearer's body.

A still further object of my invention is the provision of an artificial leg as set forth having novel coupling means whereby the leg portion below the knee joint is coupled to the foot for limited swinging movements with respect thereto whereby to provide an ankle joint, and for limited reciprocatory movements with respect thereto in directions longitudinally of the leg whereby to set and release the brake mechanism for the knee joint.

In accordance with the present invention, I provide a knee joint having a pair of cooperating brake elements therein, one of which is operatively connected to the thigh or upper leg section, and the other of which is operatively connected to the calf or lower leg section below the knee joint; and an actuator for the brake mechanism, said actuator being operatively coupled to the foot for common movements therewith longitudinally of said lower leg section, and means extending from said actuator to said brake, whereby movements of the foot toward said lower leg section will cause the brake to be set, movement of the foot away from the lower leg section causing release of the brake.

The above and still further highly important objects

and advantages of my invention will become apparent from the following detailed specification, appended claims and attached drawings.

Referring to the drawings, which illustrate the invention, and in which like characters indicate like parts throughout the several views:

Fig. 1 is a fragmentary view in side elevation of an artificial leg built in accordance with my invention, some parts being broken away and some parts shown in section;

Fig. 2 is a fragmentary view partly in rear elevation and partly in section taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary view partly in side elevation and partly in section taken substantially on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary section taken substantially on the line 4—4 of Fig. 1;

Fig. 5 is an enlarged vertical section taken substantially on the line 5—5 of Fig. 2;

Fig. 6 is a fragmentary detail partly in plan and partly in horizontal section of one of the brake elements, brake operating mechanism and a knee joint element of my invention; and

Fig. 7 is a fragmentary view in side elevation as seen from the left to the right with respect to Fig. 4, some parts being removed and some parts shown in section.

Referring with greater detail to the drawings, an artificial leg, indicated in its entirety by the numeral 1, is shown as comprising an upper leg or thigh section 2, a lower leg or calf section 3 and a foot 4. The upper and lower leg sections, 2 and 3 respectively, have their adjacent ends connected for pivotal movement about the axis of a knee joint 5, and the lower leg section 3 and foot 4 are coupled together for limited pivotal movement about the axis of an ankle joint 6 which is generally parallel to the axis of the knee joint 5. Both upper and lower leg sections are preferably of hollow construction, the upper section 2 having a socket, not shown, which is adapted to receive an amputation stub in the well known manner, and being adapted to be secured to the body of the wearer by conventional means, not shown. As shown in Figs. 1 and 5, the lower rear end portion of the upper leg section 2 is provided with a recess 7 one wall 8 of which is adapted to abut a buffer element 9 whereby to limit forward swinging movement of the lower leg section 3 with respect to the upper section 2. The buffer 9 is preferably held in place by a pair of nut-equipped anchoring screws 10.

The knee joint 5 involves a generally cylindrical casing 11 having a diametrically enlarged portion 12 at one end thereof and a threaded portion 13 at its other end, the intermediate portion thereof being indicated at 14. Both the enlarged end portion 12 and intermediate portion 14 are knurled to provide circumferentially spaced axially extending teeth 15 and 16 respectively. The lower end portion of the upper leg section 2 is provided with a transverse bore 17 and a cooperating counterbore 18 for the reception of the intermediate portion 14 and enlarged end portion 12 respectively of the cylindrical casing 11. Preferably, the bore 17 and counterbore 18 are of a size to receive their respective portions of the cylindrical casing 11 with a so-called drive or press fit, whereby the teeth 15 and 16 become more or less imbedded in the material of the upper leg section and prevent relative rotation between the upper leg section 2 and the casing 11. The cylindrical casing 11 provides an annular shoulder 19 which abuts a cooperating annular shoulder 20 in the lower leg section to limit axial movement of the casing 11 with respect to the upper leg section 2. An annular threaded lock nut 21 screw threaded on the threaded end portion 13 of the casing 11, engages the adjacent side of the leg section 2 whereby

to prevent axial movement of the cylindrical casing 11 in the opposite direction. Thus the knee joint casing 11 is locked against axial movement in both directions with respect to the upper leg section 2. The knee joint 5 further involves a spindle 22 which comprises a diametrically reduced portion 23 which extends axially through and is concentric with the intermediate portion 14 of the casing 11, and an enlarged head 24 which is concentric with the diametrically enlarged portion 12 above the casing 11. An antifriction bearing 25 is mounted in the threaded end portion 13 of the casing 11 and supports the diametrically reduced end portion 23, and antifriction bearing means 26 is interposed between the diametrically enlarged head 24 and the adjacent end of the diametrically enlarged portion 12. A bracket element 27 is rigidly secured to the head 24 by means of screws or the like 28, and is formed to provide a strap-like member 29 which extends generally longitudinally of the leg 1 and which is secured to the adjacent inner surface of the lower leg section 3 by suitable means, not shown. A second bracket element 30 is secured to the outer end of the diametrically reduced spindle portion 23 by means of a mounting screw 31, and like the bracket element 27, is provided with a depending strap-like member 32 which is rigidly secured to the adjacent inner wall surface portion of the lower leg section 3 by suitable means, not shown. With reference particularly to Fig. 4 it will be seen that the antifriction bearing 25 is held against axially outward movement by a retaining ring or nut 33 that is screw threaded on the outer end of the diametrically reduced spindle portion 23.

The foot 4 is of a type commonly used in the manufacture of artificial limbs, and at its upper rear portion is formed to provide a recess 34 in which the ankle joint 6 is contained. Said ankle joint 6 comprises a tubular element 35 having a pair of laterally spaced parallel upstanding studs 36 which pass through suitable apertures in a coupling section 37 normally contained in the recess 34, and held in place by nuts or burrs 38 screw threaded on the upper ends of the studs 36. A U-bolt 39 embraces the intermediate portion of the tubular element 35 between the studs 36, and has its opposite legs 40 passing downwardly through spaced apertures 41 in the foot 4. The legs 40 of the U-bolt 39 terminate within a recess 42 in the bottom of the foot 4, passing through a reinforcing plate 43. Anchoring nuts 44 are screw threaded on the threaded ends of the legs 40, and may be tightened or loosened to increase or decrease the frictional contact between the intermediate portion of the U-bolt 39 and the tubular element 35. It will be noted with reference to Fig. 3 that the tubular element 35 is seated in a concave channel 45 in the bottom of the recess 34, and that adjustment of the nuts 44 will also vary the frictional contact between the tubular element 35 and the channel or seat 45 whereby to vary the freedom of pivotal movement between the coupling section 37 and the foot 4. It will be further noted with reference to Figs. 2 and 4 that the intermediate portion of the U-bolt 39 is contained within a downwardly opening recess 46 in the central portion of the coupling section 37.

The coupling section 37 is provided with a pair of laterally spaced generally vertically extending openings 47 therethrough, said openings having diametrically enlarged upper end portions 48 which define annular shoulders 49. Guide bushings 50 have enlarged heads 51 that are seated on the shoulders 49, the guide bushings 50 each receiving the lower end of one of a pair of guide rods or pins 52, the upper ends of which are anchored in the lower end portion 53 of the lower leg section 3. The guide bushings 50 are held against axial movement with respect to the coupling section 37 by an anchoring plate 54 that is screwed or otherwise rigidly secured to the top surface of the coupling section 37. It will be noted that the upper end portions of the studs 36 also extend through the plate 54, and that the nuts 38 bear against the top surface of the plate 54. A relatively thin flexible sleeve 55, preferably made from leather or the like, limits downward movement of the coupling section 31 with respect to the lower leg section 3 but permits relatively free movement of the coupling section 37 and foot 4 in opposite directions longitudinally of the leg between the limits of movement thereof. The guide rods or pins 52 prevent lateral rotation of the foot 4 and coupling section 37 with respect to the leg sections 2 and 3 but permit relatively free longitudinal movement as above described, engagement of the upper ends of the bushings 50 with the bottom surface of the lower leg section 3 limiting upward movement of the foot 4 and coupling section 37 with respect to the lower leg section 3.

For the purpose of rigidly holding the leg sections 2 and 3 against buckling at the knee joint when the wearer's weight is placed upon the leg in the process of walking, I provide automatically operating brake mechanism now to be described. The diametrically enlarged portion 12 of the cylindrical casing 11 provides a relatively stationary brake element and defines an internal cylindrical brake surface 56. A relatively movable brake element or shoe in the nature of an axially split generally cylindrical band 57 is contained within the enlarged portion 12, the outer cylindrical surface 58 of the band being adapted to make frictional locking contact with the inner braking surface 56. The adjacent ends of the band 57 are indicated at 59 and 60, see Fig. 5 which converge in a direction generally radially outwardly of the band 57, the end surface 60 defining one side of an enlarged head 61 at the adjacent end of the band 57.

The head 24 of the spindle 22 is formed with a transverse bore defining a fluid chamber 62, and is counterbored to receive a cylinder element 63 in which is mounted for axial sliding movements a piston 64 and a cooperating piston plunger 65. The upper end of the chamber 62 and the aforementioned counterbore define an annular shoulder 66, between which and the inner end of the cylinder element 63 is interposed an annular sealing member in the nature of an O-ring 67. With reference to Figs. 4 and 5 it will be seen that the piston 64 is slightly smaller in diameter than that of the chamber 62, and is more closely fitted to the interior of the cylinder element 63. The O-ring 67 effectively seals the chamber 62 against leakage of fluid outwardly therefrom between the piston 64 and the cylinder element 63 as well as between the cylinder 63 and the head 24. Adjacent the upper end of the cylinder element 63, the head 24 is provided with an annular recess in which is mounted a conventional snap ring 68 which engages the upper end of the cylinder element 63 to anchor the same in place. At its upper end, the cylinder element 63 is provided with an axially extended outwardly tapering guide member 69 for the plunger 65. One side of the guide member 69 forms an abutment which extends between the opposite end surfaces 59 and 60 of the brake band 57, and which forms an abutment which engages the end surface 59 of the band 57. The upper or outer end of the plunger rod 65 is formed to provide a flat surface 70 which is disposed at an oblique angle to the axis of the plunger rod 65, which surface 70 is adapted to engage the end surface 60 of the brake band 57 upon outward movement of the piston 64 and plunger rod 65, whereby to cause the brake band 57 to expand into frictional locking engagement with the cylindrical brake surface 56. In other words, the outer end of the plunger rod 65 defines a wedge element which cooperates with the guide member 69 to spread the ends of the brake band 57 whereby to cause braking expansion thereof. A coil compression spring 71 encompasses the plunger rod 65 between the piston 64 and the upper end of the cylinder element 63, and exerts yielding bias against the piston 64 to move the piston 64 and plunger rod 65 out of braking engagement of the angular surface 70 with the adjacent end surface 60 of the brake band 57, whereby to permit the

brake band 57 to contract to its normal condition out of braking engagement with the brake surface 56. From the above, it should be obvious that, when the piston 64 and plunger rod 65 are retracted by the spring 71, the lower leg section 3 is free for swinging movements with respect to the upper leg section 2 about the axis of the knee joint 5, and that when the piston 64 and plunger rod 65 are moved outwardly to cause setting of the brake, the leg sections 2 and 3 are locked against such relative swinging movements.

For the purpose of operating the brake mechanism in the knee joint 5 to lock the same against pivotal movement I provide an actuator 72 contained within the hollow lower leg section 3. The actuator 72 comprises a cylinder element 73 extending axially in a direction longitudinally of the leg section 3, and a cooperating piston 74 mounted for axial movements with respect to the cylinder 73. The cylinder 73 is formed to provide a counterbore 75 which defines the outer edge of an annular shoulder 76. A sleeve 77 is received in the counterbore portion 75 and has its upper end abutting the shoulder 76, and a tubular threaded packing nut 78 is screw threaded into the lower threaded end of the counterbore 75. Sealing means in the nature of an O-ring 79 encompasses the piston 74, and is located between the adjacent ends of the sleeve 77 and the packing nut 78 whereby to prevent leakage downwardly from the interior of the cylinder 73.

With reference to Fig. 3, it will be seen that the cylinder element 73 is formed to provide a pair of opposed upper and lower ball sections 80 and 81 respectively each of which is engaged by a respective upper and lower socket element 82 and 83. The socket elements 82 and 83 are provided with mounting flanges 84 and 85 respectively, the latter of which rests on an annular shoulder 86 which comprises the upper portion of an annular flange 87 in the lower leg section 3. Nut-equipped bolts 88 extend longitudinally of the leg section 3 through circumferentially spaced portions of the internal flange 87, and serve the dual purpose of clamping the cylinder 73 in desired set position between the socket elements 82 and 83, and anchoring said clamping elements within the lower leg section 3. The lower end of the piston element 74 is provided with a mounting bushing 89 that is welded or otherwise rigidly secured to the upper end of a tubular supporting member 90 which extends generally longitudinally of the leg section 3, and which at its lower end is formed to provide bridge elements 91 and 92 which are welded or otherwise rigidly secured to the anchoring plate 54, whereby relative movements between the lower leg section 3 and the coupling section 37 will cause similar relative movement between the cylinder element 73 and piston element 74. Obviously, the ball and socket connections between the cylinder element 73 and the lower leg section 3 insures accurate alignment between the cylinder element 73 and piston element 74 so that free axial movement therebetween is obtained.

Means for operatively connecting the actuator 72 to the brake mechanism comprises a conduit 93 which is connected at its lower end to the cylinder 73, and at its upper end to one end of a cylindrical housing 94 which defines a generally cylindrical chamber 95. The housing 94 is suitably mounted to the interior of the lower leg section 3, and is provided with a boss 96 which abuts the strap-like member or shank 29. The housing 94 and boss 96 are bored to provide a passage 97 which communicates at one end with the chamber 95 and at its other end with a fluid passage 98 in the strap-like member 29, said passage 98 extending upwardly to the upper end portion of the bracket element 27, terminating in an enlarged portion 99 therein. A transverse passage 100 communicates with the enlarged passage portion 99 and is aligned with a cooperating passage 101 which extends in a direction axially of the head 24 and communicates with the fluid chamber 62. A sealing washer 102 prevents leakage of fluid from the adjacent ends of the passages 100 and 101 outwardly between the head 24 and bracket element 27.

From the above it should be obvious that, when the weight of the wearer is applied to the leg, upward movement of the foot 4 and coupling section 37 with respect to the lower leg section 3 will cause corresponding movement to be imparted to the piston element 74 upwardly with respect to the cylinder element 73, whereby to displace fluid, indicated by the reference character X, from the cylinder 73 to the cylinder chamber 62 through the conduit 93, chamber 95 and the aforementioned passages in the boss 96, bracket element 27 and head 24. Thus, fluid under pressure entering the chamber 62 will impart outward movement of the piston 64 and plunger rod 65 against yielding bias of the spring 71 to cause expansion of the brake shoe or band 57 against the brake surface 56 to frictionally lock the knee joint against relative pivotal movement between the parts thereof. When the leg is relieved of the wearer's weight, the spring 71 will move the piston 64 and plunger rod 65 downwardly or inwardly with respect to the chamber 62 causing a reverse flow of the fluid X toward the actuator 72 and release of the brake. This reverse flow of the fluid X is enhanced by relative downward movement of the foot 4 and coupling section 37 from the lower leg section 3 when the foot 4 is lifted out of engagement with the floor or ground in the act of walking by the operator.

With reference particularly to Figs. 4 and 5, it will be seen that the chamber 95 of the housing element 94 is provided with an axially extending threaded stud 103 which is welded or otherwise rigidly secured to the lower end portion of the housing element 94 and which extends axially toward the opposite end of the chamber 95. A plug element 104 extends axially with respect to the housing element 94 and has its lower end portion 105 in screw threaded engagement with the stud 103. At its opposite end, the plug element 104 is provided with a socket head 106, the socket of which is polygonal in cross section whereby a wrench or key of the so-called "Allen" type may be inserted to rotate the plug 104 in either direction to impart movements thereto inwardly or outwardly with respect to the chamber 95. An O-ring 107 is contained within an annular groove 108 in the upper end portion of the housing element 94, and has sealing engagement with the upper end portion of the plug 104.

With reference to Figs. 1, 2, 4 and 5, it will be seen that the socket head 106 is easily accessible from the rear of the leg through an opening 109 between the upper and lower leg sections 2 and 3, and at one side of the buffer element 9. Adjustment of the plug 104 inwardly or outwardly with respect to the chamber 95 causes a variation in the volumetric capacity of the chamber 95 and of the entire fluid system. From the above it will be seen that, when the plug 104 is moved in a direction outwardly with respect to the chamber 95, the piston 64 in the knee joint will be moved inwardly by its spring 71, and a greater relative movement between the leg section 3 and coupling section 37 will be necessary to set the brake. Conversely, the plug element 104 may be moved inwardly with respect to the chamber 95 to the extent that the piston 64 is forced upwardly by fluid displaced from the chamber 95 to an extent that a slight braking pressure is exerted by the brake band 57 against the brake surface 56 at the time when the wearer's weight is removed from the leg. In such event, the relative longitudinal movement of the foot 4 and coupling section 37 relative to the leg 3, necessary to set the brake, is barely perceptible. Also, the slight restriction of swinging movement between the leg elements 2 and 3 caused by the above-mentioned adjustment of the plug element 104 causes the leg to assume a more natural action when the operator is in the process of walking.

While I have shown the coupling section 37 as being partly contained within the foot 4, my novel leg structure

will operate equally well in the event that the actuator 72 were moved upwardly toward the knee joint, and if the lower leg section 3 were considerably shorter and the coupling section 37 were considerably longer. Thus the coupling section 37 may, if desired, form almost any desired portion of the lower leg section. However, I have found that excellent results have been obtained by producing the coupling section 37 as a relatively short element and joining the same to the lower leg section 3 in the ankle region of the leg.

My invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the objectives set forth; and while I have shown and described a commercial embodiment of my artificial leg structure, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention as defined in the claims.

What I claim is:

1. In an artificial leg, cooperating upper and lower leg sections pivotally connected together to provide a knee joint, a foot, means coupling said foot to the lower end of said lower leg section for limited movements generally longitudinally with respect to said lower leg section, normally released brake mechanism comprising a pair of cooperating relatively rotatable brake elements each operatively connected to a different one of said leg sections, a brake actuator comprising a pair of cooperating actuator elements one of which is fixedly mounted in the lower leg section and the other of which is coupled to said foot for common movements therewith longitudinally of the lower leg section, and means for transferring relative movement of one of said actuator elements to the brake mechanism to set the same and lock said knee joint when the wearer's weight is applied to the leg, and to cause release of the brake mechanism to unlock said knee joint when the leg is relieved of said weight.

2. In an artificial leg, cooperating upper and lower leg sections pivotally connected together to provide a knee joint, a foot, means coupling said foot to the lower end of said lower leg section for limited movements generally longitudinally with respect to said lower leg section, said means comprising a coupling section secured to the lower end of the lower leg section for limited movements longitudinally of said lower leg section, said coupling section being pivotally connected to said foot on an axis generally parallel to the axis of the knee joint, normally released brake mechanism comprising a pair of cooperating relatively rotatable brake elements each operatively connected to a different one of the leg sections, fluid pressure operated means in said knee joint for said brake mechanism, brake actuator means comprising a fluid pump cylinder element and a cooperating plunger element movable axially therein, means rigidly mounting one of said elements in said lower leg section, the other of said elements being rigidly mounted to said coupling section for common movements therewith longitudinally of said lower leg section, and a fluid conduit connecting said fluid pump cylinder with said fluid pressure operated means, whereby relative movement of said coupling section toward the lower leg section, responsive to application of the wearer's weight to said leg, will cause setting of the brake mechanism to lock the knee joint, movement of said coupling section away from the lower leg section, when the leg is relieved of said weight, causing release of said brake mechanism.

3. In an artificial leg, cooperating upper and lower leg sections pivotally connected together to provide a knee joint, a foot, means coupling said foot to the lower end of said lower leg section for limited movements generally longitudinally with respect to said lower leg section, said means comprising a coupling section secured to the lower end of the lower leg section for limited movements longitudinally of said lower leg section, said coupling section being pivotally connected to said foot on an axis generally parallel to the axis of the knee joint, normally released brake mechanism comprising a pair of relatively rotatable brake elements each operatively connected to a different one of the leg sections, one of said brake elements defining a cylindrical brake surface, the other of said brake elements comprising a generally cylindrical expansible and contractible band cooperating with the cylindrical brake surface to releasably lock said knee joint, and brake operating mechanism including an actuator, said actuator being rigidly mounted on said coupling section and movable therewith in one direction relative to said lower leg section to cause braking engagement between said band and brake surface and lock said knee joint when the wearer's weight is applied to said leg, and in the opposite direction to cause said band to be released to unlock the knee joint when the leg is relieved of said weight.

4. In an artificial leg, cooperating upper and lower leg sections and a foot, means coupling said foot to said lower leg section for limited movements longitudinally of said lower leg section, knee joint means pivotally connecting said upper and lower leg sections for swinging movements relative to each other, said knee joint means including a pair of coaxial joint elements each anchored to a different one of said leg sections, one of said elements defining a cylindrical brake surface, a brake shoe carried by the other of said elements and comprising a generally cylindrical axially split expansible and contractable band cooperating with the cylindrical brake surface to releasably lock said knee joint, said band providing adjacent end surfaces converging in a direction radially of the band, and brake shoe operating mechanism including a wedge element mounted for movements into and out of operative band expanding engagement with said end surfaces of the band and an actuator operatively coupled to said foot and movable therewith relative to said lower leg section in one direction to move said wedge element into operative band expanding engagement with said end surfaces to cause engagement of said brake surface by said band to lock the knee joint means responsive to application of the wearer's weight to the leg, and in the opposite direction to cause release of said braking engagement when the leg is relieved of said weight.

5. In an artificial leg, cooperating upper and lower leg sections and a foot, means coupling said foot to said lower leg section for limited movements longitudinally of said lower leg section, knee joint means pivotally connecting said upper and lower leg sections for swinging movements relative to each other, said knee joint means including a pair of coaxial joint elements each anchored to a different one of said leg sections, one of said elements defining a cylindrical brake surface, a brake shoe carried by the other of said elements and comprising an axially split generally cylindrical expansible and contractible band the adjacent ends of which define surfaces converging in a direction generally radially of said band, said band cooperating with said cylindrical brake surface to releasably lock the knee joint, and brake shoe operating mechanism comprising a fluid pressure cylinder, a piston plunger mounted in said cylinder for movements longitudinally thereof, said plunger terminating in a wedge element operatively engaging said end surface of the brake band to set the brake upon movement of the plunger in one direction, yielding means biasing said plunger in the opposite direction to release the brake, an actuator comprising a second fluid pressure cylinder and a cooperating plunger one mounted in said lower leg section and the other being operatively coupled to said foot and movable therewith relative to the lower leg section, and fluid conduit means connected at its opposite ends to said cylinders, whereby application of the wearer's weight to the leg will cause fluid under pressure to be delivered to said first-mentioned cylinder to set the brake against bias of said yielding means.

6. The structure defined in claim 5 in which said first-mentioned cylinder includes an abutment element engag-

ing one of the end surfaces of said brake band, said wedge element being interposed between said abutmnt element and the other one of the end surfaces of said brake band.

7. The structure defined in claim 5 in further combination with means for adjusting the frictional contact between said brake band and cylinder brake surface whereby to vary the freedom of swinging movement between the upper and lower leg sections when the brake is released, said last-mentioned means comprising a housing element defining a chamber in communication with said conduit means and a plug element mounted in said housing element for movements into and out of said chamber to vary the volumetric capacity of the chamber.

8. The structure defined in claim 7 in which said housing element and plug element are provided with cooperating screw threaded portions within said chamber, whereby rotation of said plug in one direction will impart axial movement thereof in a direction to reduce the volumetric capacity of the chamber.

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