Feb. 24, 1953

C. WOODALL

2,629,105

ARTIFICIAL LIMB

Filed Sept. 17, 1948

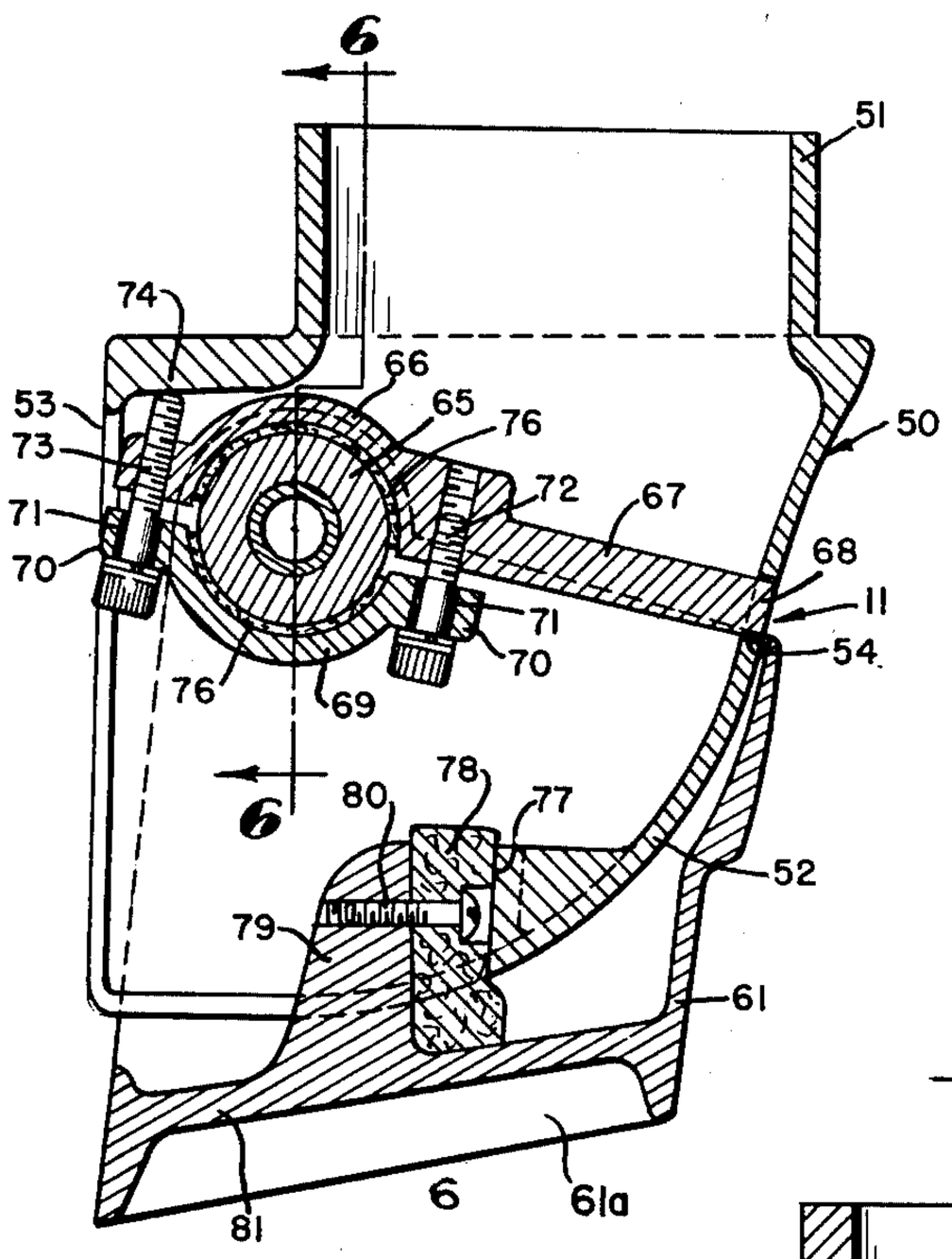


Fig. 2

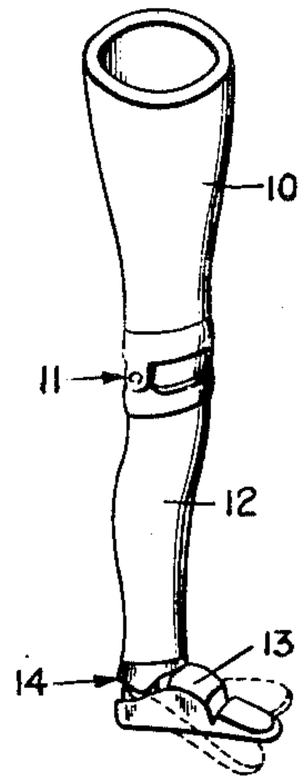
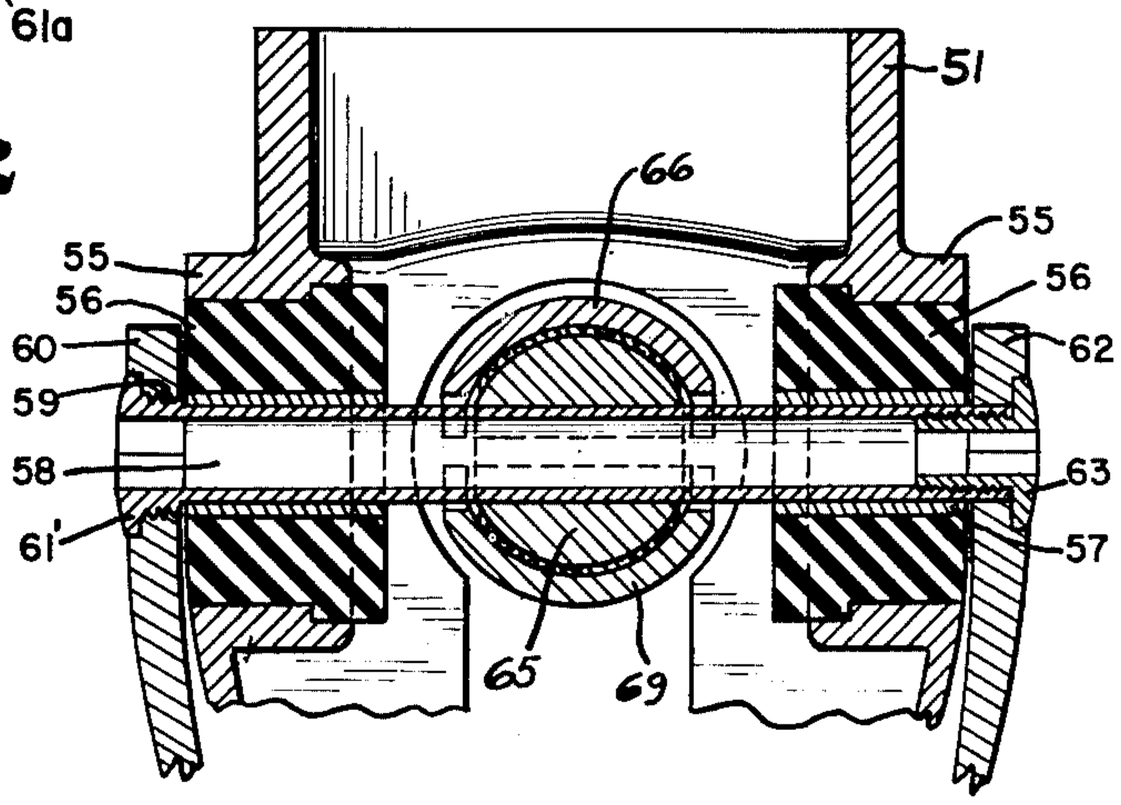


Fig. 1

Fig. 3



INVENTOR
CARL WOODALL
BY
ATTORNEY

Patented Feb. 24, 1953

2,629,105

UNITED STATES PATENT OFFICE

2,629,105

ARTIFICIAL LIMB

Carl Woodall, South Gate, Calif.

Application September 17, 1948, Serial No. 49,719

9 Claims. (Cl. 3—2)

1

This invention relates generally to artificial limbs, and relates more particularly to improvements in the knee joints thereof. The ankle joint is disclosed and claimed in applicant's copending continuation-in-part application for Angle Joints for Artificial Limbs, Serial No. 315,654, filed October 20, 1952.

It is an object of the invention to provide an artificial limb of this character wherein the articulated parts faithfully simulate the movements and actions of the corresponding natural limb elements.

Another object of the invention is to provide a knee joint having a limited universal action.

Another object of the invention is to provide a device of this character wherein jack-knifing of the knee is prevented.

Still another object of the invention is to provide a device of this character having the parts so arranged that friction in the knee joint is increased as the weight of the user is applied so that said jack-knifing is prevented.

A further object of the invention is to provide a knee joint of this character wherein there will be a limited torque action and a limited lateral action of the parts relative to each other.

A still further object of the device is to provide an artificial limb of this character that is simple in construction, smooth in action, and easy to assemble.

Other objects and advantages of the invention will be brought out in the following part of the specification.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is a perspective view showing an artificial limb embodying the invention;

Fig. 2 is a sectional view through the knee joint; and

Fig. 3 is a partial section taken on line 3—3 of Fig. 2.

Referring to Fig. 1, there is shown an artificial limb having a thigh member 10 connected by a knee unit, indicated generally at 11, to the upper end of a shank member 12, which in turn is connected to a foot 13 by an ankle unit, indicated generally at 14.

Referring to Figs. 2 and 3, there is shown a knee comprising a hollow casing indicated generally at 50, having a tubular wall or flange 51 for attachment to the thigh 10 in the well known manner. The casing includes a knee shell 52 having a flattened back wall 53 and a rounded front wall which has an opening 54 therein. The knee shell includes oppositely disposed axially aligned bearing members 55 for reception of bearing supporting plugs 56 which have axially aligned openings therein. The bearing plugs 56 are of resilient material, such as rubber or the like, and the openings therein are provided with metal bearings 57 pivotally receiving a shaft 58.

2

One end of the shaft 58 is provided with threads 59 for threadable connection with an ear 60 of a lower or second hollow knee member 61 having a flange 61*a* for attachment of the shank or shin member 12. The shaft 58 is provided with a head 61′ for limiting inward movement thereof in said ear 60. The opposite end of the shaft extends into an opening in an ear 62 and is secured by a screw 63. A ball 65 is secured to the shaft 58 by any suitable means such as a pin, not shown. An upper socket member, including a cup-shaped member 66, receives the upper portion of the ball 65. The member 66 is provided with an arm 67 having its outer end 68 loosely received in the opening 54. A second cup-shaped member 69 is provided for the opposite side of the ball, and includes outwardly extending lugs 70 on opposite sides thereof. The lugs 70 are provided with openings 71 therethrough, for reception of screws 72 and 73 respectively. These screws are received in threaded openings provided therefor in the member 66, and secure the members 66 and 69 together. It is to be noted that the screw 73 extends through the portion of the member 66, and the free end of said screw 73 engages a wall 74 of the upper knee member. Each of the cup-shaped members 66 and 69 is provided with a friction lining 76 of suitable material such as is used in brake linings.

In use, the weight of the user is transmitted through the upper knee member and the upper socket member 66 which bears on the upper surface or portion of the ball 65. The bearing plugs 56, which are of resilient material, yield sufficiently so that an increase in the frictional engagement of the socket member 66 with the ball 65 is increased. When the weight is removed, as when the user takes a step, the frictional engagement of these parts is reduced and the lower leg will easily straighten out, being limited in this movement by engagement of a wall 77 of the knee shell with a pad 78 which is attached to a boss 79 by means of a screw 80. The boss 79 is shown as being formed integral with a cross piece 81 of the lower knee member 61.

I claim:

1. In a knee joint: a pair of knee members one of which includes a knee shell and a wall oppo-

site said shell; a shaft having its ends secured to one of said knee members; resilient means for pivotally mounting said shaft to the other knee member; a ball secured to said shaft intermediate the ends thereof; socket means for said ball, said socket means including an upper socket member and a lower socket member, an arm for the upper socket member, said arm having its outer end movably attached to the shell of said one knee member; and abutment means for said socket means on the side thereof opposite the arm, said abutment means being engageable with the wall of said one knee member.

2. The invention defined by claim 1, wherein the socket means includes friction material within the respective parts of the socket.

3. In a knee for artificial limbs: a pair of knee members; a shaft for pivotally connecting the knee members together, the ends of said shaft being fixed to one of said knee members; resilient means for mounting the shaft to the other knee member, said resilient means being spaced apart on said shaft; a ball member secured to said shaft; socket means for said ball, said socket means including an upper and a lower socket member, an arm extending from the upper socket member and connected to said other knee member, said connection permitting swinging movement of the arm in a vertical plane; and means for limiting movement of the socket means on the side thereof opposite the arm.

4. In a knee joint for artificial limbs: upper and lower knee members; side walls for the lower knee member, said side walls having openings therein; a shaft received in said openings and held securely therein; bearings for said shaft disposed adjacent the inner sides of said side walls; resilient plug members receiving said bearings and mounted in the upper knee member; a ball member secured to said shaft between said plugs; an upper socket member for said ball, said upper socket member having a forwardly extending arm the free end of which is received in an opening provided therefor in a part of said upper knee member; a lower socket member for said ball member, said socket members being secured together; friction material within the socket members and engageable with the adjacent surfaces of the ball member; and means for limiting movement of the socket members, said means being disposed on the side of the ball opposite the arm.

5. In an artificial knee joint: a pair of knee members one of which includes a knee shell having an opening therein and a wall opposite said shell; pivoting means, including a shaft having its ends secured to one of said knee members; resilient means for pivotally mounting said shaft to the other knee member; friction means, including a pair of members connected together and engageable about said pivoting means; an arm for one of said members, said arm being received in the opening in said shell; and abutment means for said one member opposite the arm thereof, said abutment means being engageable with the wall of said one knee member.

6. In an artificial knee joint: an upper knee member including a knee shell having an opening therein, and a wall opposite said shell; a lower knee member; pivoting means, including a shaft having its ends secured to one of said knee members; resilient means for pivotally mounting said shaft to the other knee member; friction means, including upper and lower friction members connected together and engageable with

said pivoting means; an arm for said upper friction member, said arm being received in the opening in said shell; and abutment means for said upper friction member, said abutment means being opposite the arm and being engageable with the wall of said upper knee member.

7. In an artificial knee joint: an upper knee member including a knee shell having an opening therein, and a wall opposite said shell, said upper knee member having a knee flange for connection with an artificial thigh; a lower knee member including a knee flange for connection with an artificial shin; pivoting means, including a shaft having its ends secured to one of said knee members; resilient means for pivotally mounting said shaft to the other knee member; friction means, including upper and lower friction members connected together and engageable with said pivoting means; an arm for said upper friction member, said arm being received in the opening in said shell; and abutment means for said upper friction member, said abutment means being opposite the arm and being engageable with the wall of said upper knee member.

8. In an artificial knee joint: a pair of knee members one of which includes a knee shell having an opening therein and a wall opposite said shell; pivoting means, including a shaft having its ends secured to one of said knee members; resilient means for pivotally mounting said shaft to the other knee member; friction means, including a pair of members connected together and engageable about said pivoting means; an arm for one of said members, said arm being received in the opening in said shell; and stop means for limiting relative movement of the knee members in one direction so as to prevent forward swinging of said one knee member beyond an aligned position with respect to the other member.

9. In an artificial knee joint: a pair of knee members one of which includes a knee shell; pivoting means, including a shaft having its ends secured to one of said knee members; resilient means for pivotally mounting said shaft to the other knee member; friction means, including a pair of clamped members connected together and engageable about said pivoting means; an arm for one of said clamping members, said arm being so connected with said knee member having the knee shell as to hold said arm against rotation relative to said knee member; and stop means for limiting relative movement of the knee members in one direction so as to prevent forward swinging of said one knee member beyond an aligned position with respect to the other knee member.

CARL WOODALL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
549,889	Allen	Nov. 19, 1895
1,376,292	Sauze	Apr. 26, 1921
2,289,154	Van Cise	July 7, 1942
2,400,032	Talbot	May 7, 1946
2,450,728	Havens	Oct. 5, 1948
2,509,586	Caron	May 30, 1950

FOREIGN PATENTS

Number	Country	Date
421,482	Great Britain	Dec. 21, 1934
656,219	Germany	Jan. 31, 1938