

March 29, 1949.

R. H. WEAVER

2,465,771

ARTIFICIAL LIMB

Filed Dec. 8, 1945

Fig. 1

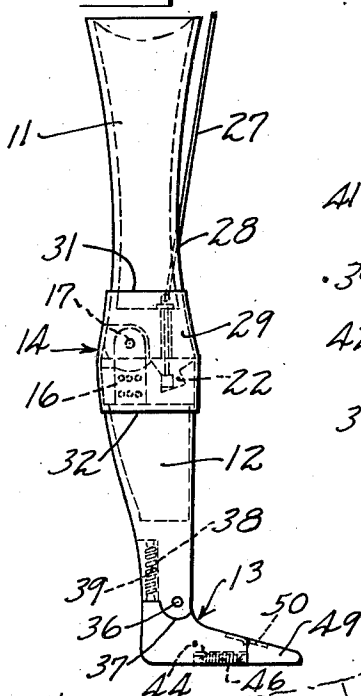


Fig. 4

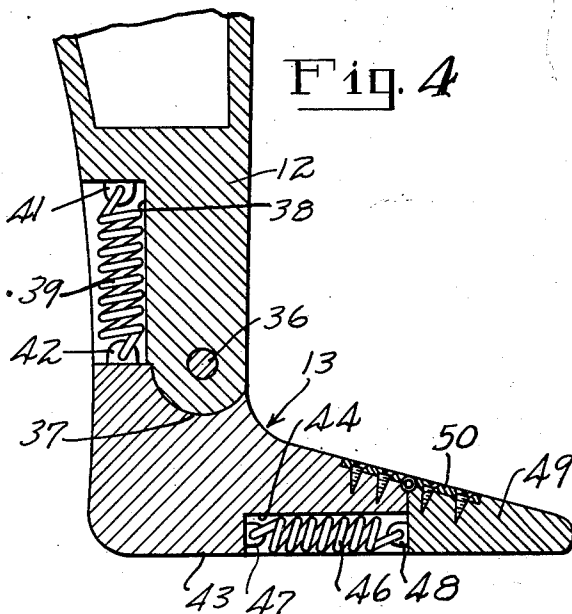


Fig. 2

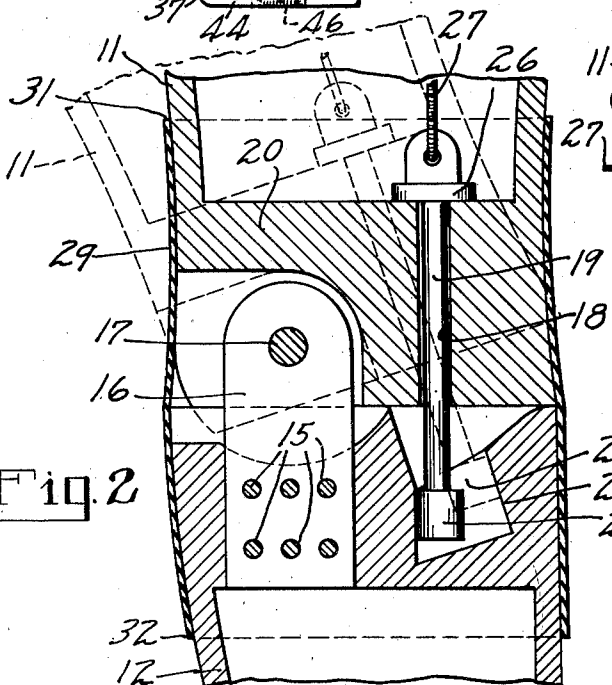
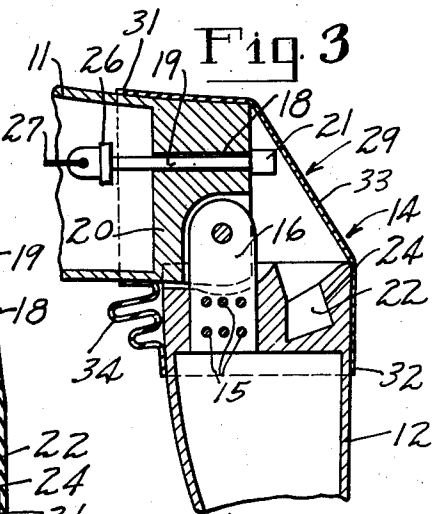


Fig. 3



INVENTOR.

RALPH H. WEAVER

BY

Henry G. Jennings
ATTORNEY

UNITED STATES PATENT OFFICE

2,465,771

ARTIFICIAL LIMB

Ralph H. Weaver, Fayetteville, Ark.

Application December 8, 1945, Serial No. 633,649

2 Claims. (Cl. 3—2)

1

My present invention relates to an improvement in artificial limbs, and has for an object the provision of an artificial leg embodying an improved locking means for the knee joint which comprises a single, gravity actuated member associated with the upper and lower portions of the leg, and which may be readily disengaged by the wearer to permit full bending of the knee.

Another object of my invention is to provide an artificial leg, which, in association with the above enumerated feature, comprises a foot portion pivotally secured to the lower leg and having associated therewith a spring adapted to bias the foot portion toward the normal or rest position.

A further object is to provide an artificial leg in which the toe section is hinged to the foot, and in which a spring associated with the foot and toe portions biases the toe to rest position.

Further objects are to provide an artificial leg which is simple of construction, light in weight and yet strong enough to withstand the strains imposed by walking, and to arrange the knee and spring biased ankle and foot joints so that the functioning of the leg corresponds as nearly as possible to the action of the natural limb.

The above and other features of my invention are illustrated in the accompanying drawing, forming a part of this application, in which

Fig. 1 is an elevational view of my improved artificial leg;

Fig. 2 is a sectional view taken through the knee joint and illustrating the locking means therefor;

Fig. 3 is a detail view of the knee joint drawn to a somewhat smaller scale than Fig. 2 and showing the leg in full bended position; and

Fig. 4 is a detail sectional view through the ankle and foot portions of the leg.

Referring now to the drawing for a better understanding of my invention, my improved artificial leg comprises an upper portion 11, a lower portion 12, both of which may be partially hollow for the sake of lightness, and a foot portion indicated generally by the numeral 13. The upper portion 11 is pivotally secured to the lower portion 12 to form a knee joint 14 by means of a plate 16, made fast on the lower portion 12 by pins 15; and a pivot pin 17 which passes through the plate and leg portion 12. It will be noted that the hinge arrangement thus formed is located toward the rear side of the leg leaving space toward the front to accommodate the lock mechanism now to be described.

Referring now more particularly to Figs. 2 and 3 of the drawing, it will be seen that the lower

2

end of the upper portion 11 is hollow with a solid end portion 20 having hole 18 extending there-through within which is slidably mounted a pin 19. The lower end 21 of the pin 19 projects from the upper leg portion 11 into a recess 22 provided in the top of the lower leg portion 12. It will be noted that the recess 22 is elongated from front to rear of the leg thus permitting the lower leg portion to have a limited pivotal movement when the pin is in its lowermost position as indicated in Fig. 2. Therefore, when walking, the lower leg portion 12 is free to bend backward about the pin 17, the extent of this bending action being limited by the pin striking the front wall 24 of slot 22. The front wall 24 is inclined rearwardly of the leg so that as the upper portion 11 pivots, the lower end 21 of pin 19 lies flat against the wall, thus affording a better bearing contact.

At its upper end, pin 19 is provided with a head 26 which limits its downward movement in the hole 18. The head is adapted to receive a flexible member 27, such for instance as a strong cord, which passes through the upper leg portions 11 and emerges as at 28, thence upward beneath the trouser leg where its end may be secured to any suitable portion of the wearer's clothing.

When the wearer desires to sit down he pulls upwardly on member 27, thus raising the pin 19 and its lower end 21 from the slot 22, whereupon the knee joint is unlocked and the leg is free to bend substantially 90° as shown in Fig. 3. It will be noted that the pin 19 is gravity actuated and that no springs or other devices are employed to cause it to enter or be disengaged from the slot 22. Therefore, when the wearer desires to lock the joint he stands up, straightening the leg, and pin 19 drops by gravity into the recess 22.

In order to prevent the accumulation of foreign matter within the joint and to round off the knee joint when the leg is bent, I provide a flexible shield 29 therefor, which may be made of rubber or other elastic material, and which is secured along its upper edge 31 and lower edge 32 to the respective upper and lower leg portions 11 and 12. When the leg is bent as shown in Fig. 3, the front portion 33 of the shield 29 stretches, whereas the rear portion thereof is compressed as indicated by the folds 34, Fig. 3.

Referring now to Fig. 4 of the drawing, the lower portion of the leg embodies the foot 13 pivotally secured to the lower leg 12 as at 36 to form an ankle joint 37. The lower end of the leg portion 12 is provided with a recess 38 adapted

to receive a spring 39 having one end thereof secured to a lug 41 on the leg portion 12, and the other end secured to a lug 42 fast to the foot 13. The spring is under tension so that the foot 13 is biased always to the rest position, yet is free to bend as does the human foot when the user is walking.

The under portion 43 of the foot 13 is provided with a recess 44 within which is placed a spring 46, having one end thereof secured to a lug 47 fastened to the foot, and its other end secured to a lug 48. The lug 48 is secured to a toe portion 49 which is hinged to the body of the foot 13 by a hinge 50. The spring 46 is under tension so that the toe 49 is biased to the rest position.

From the above the operation of my improved artificial leg will be readily understood. The leg is strapped to the wearer's body, by any suitable means, not shown, and with the upper end of the flexible member 27 secured to a suitable portion of his clothing so that it may be pulled to actuate the pin 19. In normal walking position the lower end 21 of pin 19 is resting within the recess 22 so that the knee joint is free to bend as shown in the dotted lines, Fig. 2. When the wearer desires to sit down, he pulls upwardly on member 27, raising the pin 19 and removing its lower end from the recess 22. As shown in Fig. 3, it will be apparent that the leg portion 11 is then free to bend backwardly with respect to the lower leg portion 12. Upon arising, and when the leg is straightened, the pin 19 drops by gravity into recess 22, thus automatically locking the joint in the walking position.

As the lower leg portion 12 pivots about the ankle joint 37, the springs 39 and 46 tend to return both the foot and toe portions to rest position. However, the tension on the springs is insufficient to hinder free and comfortable action of either of the joints, but is sufficient to return both the joints to the rest position, thus effectively eliminating the undesirable feature of having these portions of the leg loosely hinged.

In actual practice, I have found that an artificial leg made in accordance with my invention is both simple of construction and comfortable to wear. Further, since the flexible member 27 may extend to the upper portion of the wearer's body beneath the trouser leg, I have found that it is most convenient and presents no unsightly appearance as its upper end may be fastened to a part of the under clothing or carried over the shoulder. A knee joint constructed in accordance with my invention is positive of operation, and the spring biased lower foot portions give added walking stability to the wearer.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications, without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. In an artificial leg, an upper portion, a lower portion, hinge means for joining said portions together and disposed toward the rear of the leg, a vertically disposed slot in the lower end of the upper portion, a gravity actuated pin slidably disposed in the slot and projecting from the upper portion, a head on the pin to limit its downward movement within said slot, a recess in the upper end of the lower leg portion elongated from front to rear of the leg and within which the lower end of said pin fits to permit limited pivotal action between the upper and lower leg portions, a flexible member connected to the head of said pin and extending upwardly through the leg and accessible to the wearer thereof to disengage the pin from said recess, a foot pivotally connected to the lower leg portion, a spring disposed internally of the lower portion and associated with the foot to bias it to rest position, a toe section hinged to the top of the foot section, and a spring disposed internally of the foot and associated with the toe portion to bias it to rest position.

2. In an artificial leg, upper, lower and foot portions pivotally connected to form knee and ankle joints, the pivot between said upper and lower portions being disposed toward the rear side of the knee joint, there being a vertically disposed slot through the lower end of the upper portion located toward the front side of the knee joint, a gravity actuated pin slidably disposed in said slot with one end projecting into said lower portion, there being a recess in the lower portion for receiving the projecting end of said pin, said recess being elongated from front to rear of the knee joint, a rearwardly inclined wall forming the front of said recess against which the projecting portion of said pin is adapted to strike thus to limit bending action of the knee joint, a head on the opposite end of said pin, a flexible member connected to the head extending externally of the leg and accessible to the wearer thereof to withdraw said pin from said recess, a coil spring longitudinally disposed within the confines of the lower leg portion adjacent the ankle joint and connected to the foot to bias it toward rest position, a toe section hinged to the top of the foot, and a coil spring longitudinally disposed within the confines of the foot to bias the toe section toward rest position.

RALPH H. WEAVER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,343,298	Worman	June 15, 1920
2,127,566	Malloy-Brehumoff	Aug. 23, 1938

FOREIGN PATENTS

Number	Country	Date
35,808	Germany	June 12, 1886