April 16, 1940. H. C. CAMPBELL 2,197,093

ARTIFICIAL FOOT

Filed Jan. 19, 1939

Fig. 1.

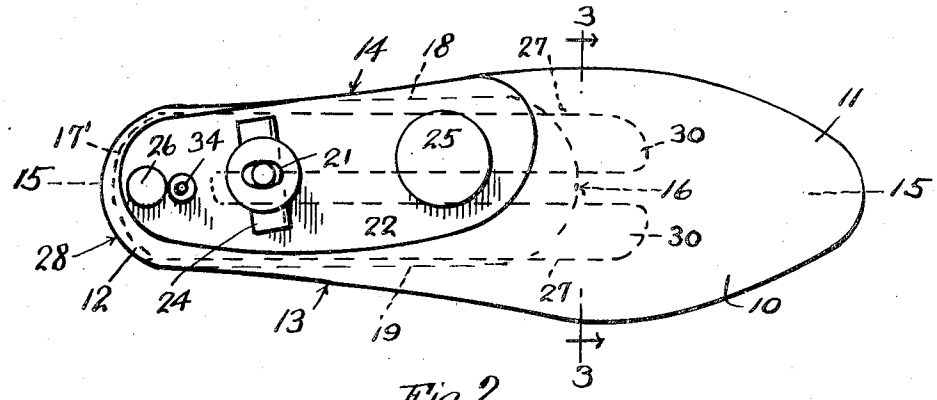


Fig. 2.

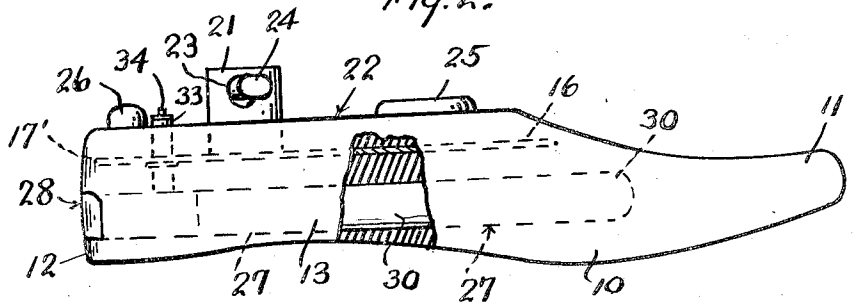


Fig. 4.

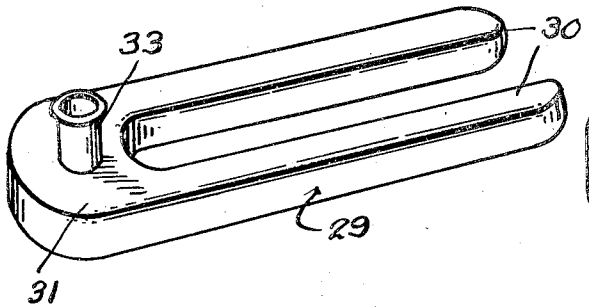


Fig. 3.

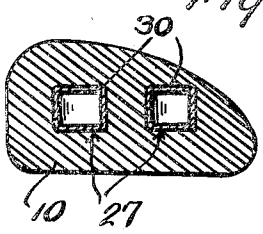
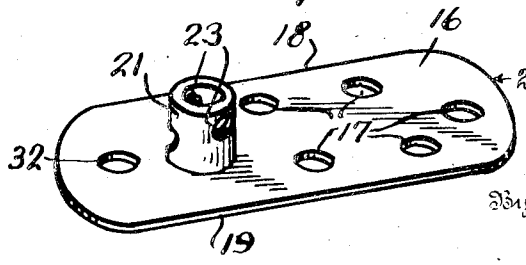


Fig. 5.



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2,197,093

ARTIFICIAL FOOT

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Application January 19, 1939, Serial No. 251,798

7 Claims. (Cl. 3—5)

This invention relates to artificial limbs and has special reference to an elastic foot for such limbs.

One important object of the invention is to improve the general construction of devices of this kind.

A second important object of the invention is to provide a novel pneumatic cushion arrangement for artificial feet.

A third important object of the invention is to provide a novel foot of this character wherein there is embodied novel pneumatic cushioning means so constructed and arranged that the means may be inflated to any desired degree.

With the above and other objects in view as will be hereinafter apparent, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawing and specifically claimed.

In the accompanying drawing like characters of reference indicate like parts in the several views, and:

Fig. 1 is a plan view of a foot constructed in accordance with this invention.

Fig. 2 is a side elevation thereof, the view being partly in section to show certain features of the construction.

Fig. 3 is a detailed section on the line 3—3 of Fig. 1.

Fig. 4 is a perspective view of the pneumatic cushion used herewith as shown when removed from the remainder of the device.

Fig. 5 is a perspective view of a certain metallic plate and associated parts used in connection with this invention for stiffening the foot and preventing excess flexibility.

In the embodiment of the invention herein shown there is provided a body 10 which is preferably made of elastic rubber and has a general shape conforming to the lower part of the human foot, the shape in plan being suited as to whether the foot is to be a right or left foot. This body has the usual toe portion 11, heel portion 12, and intermediate portion 13. The inner edge of the intermediate portion is shown at 14 and the outer edge thereof is shown at 13. The normal or medial line of the foot, indicated at 15—15 passes through the center of the heel portion 12 and the center of the forward or toe portion 11 as clearly shown in Fig. 1. Molded into the upper part of the body 10 is a metallic plate 16 preferably of steel and this plate 16 is provided with a number of openings 17 through which the material of the body 10 extends so that the plate is firmly anchored in the body 10. This plate conforms generally to the portions 12 and 13 of the body but the rear end of the plate, indicated at 17, is curved on a smaller radius than the heel portion 12 and thus is forwardly inset with respect to the rear face of such heel portion. Furthermore the plate 16 is provided with an inner edge 18 which conforms closely to the edge 14 of the body and is provided with an outer edge 19 which merges forwardly by a curved end 20 into the edge 13. The edge 19 is inset from the edge 13. The plate 16 has adjacent the rear end thereof an upstanding hollow boss 21 which projects above the upper face 22 of the body 10 and is provided with opposed openings 23 where through extends a pin 24 by means of which the foot is attached flexibly to the upper part of the artificial limb. Projecting upwardly from the surface 22 of the foot is a forward cushioning boss 25 and a rear cushioning boss 26 for engagement against the under surface of the upper section of the limb. The axes of the bosses 25 and 26 are alined with the axis of the hollow boss 21. Formed in the body 10 below the plate 16 is a U-shaped channel 27 opened at the heel and as at 28. In this channel is located a U-shaped pneumatic bag generally indicated at 29 and comprising a pair of legs 30 which extend in parallel at equal distances from the line 15 and are connected at the heel end by an arcuate portion 31. These legs form a relatively thin rubber bag separate from the body 10. The plate 16 has rearwardly of the boss 21 an opening 32 and the bag 29 carries a tube 33 which extends upwardly from the portion 31 through the body 10 and opening 32 to project above the surface 22 at which point it is provided with a valve closure 34 whereby the tube 33 may be connected to any suitable inflating means as desired.

It is to be understood that when the bag 29 is deflated it may be withdrawn through the opening 28 so that in the event of this bag leaking or wearing out a similar bag may be substituted.

With the construction as thus set forth the bag 29 may be inflated to any desired degree and it will be noted that the forward ends of the legs 30 project beyond the forward end of the plate 16 so that the forward ends of these legs lie well toward the foot portion 11 as will be noted from Fig. 2. The forward end of the plate 16 is slightly to the rear of the center of the ball portion of the body 10 while the forward ends of the legs 30 are somewhat forward of the center of such ball. It is also to be noted that when the bag 29 is inflated the rear portion thereof will firmly engage the heel portion of the shoe wherein the de-

vice is placed and thus prevent accidental withdrawal of the artificial foot from the shoe wherein it is placed.

In use it is found that the cushioned bag 29 permits a flexibility of the toe portion of the artificial foot very closely corresponding to that obtained from the natural foot. The cushioned bag 29 absorbs all shocks in walking which would not be accommodated by the natural foot. Thus, when this foot is applied to the lower end of an artificial limb the wearer is enabled to have a walking movement corresponding with great precision to that obtainable in nature.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that minor changes may be made in the form and construction of the invention without departing from the material spirit thereof. It is not, therefore, desired to confine the invention to the exact form herein shown and described, but it is desired to include all such as properly come within the scope claimed.

Having thus described the invention, what is claimed as new, is:

1. An artificial foot including an elastic body having the conformation and dimensions of a human foot below the ankle joint, a rigid plate extending longitudinally of the body at the upper part thereof, and an inflatable cushioning element extending in said body between said plate and the lower surface of the body.

2. An artificial foot including an elastic body having the conformation and dimensions of a human foot below the ankle joint, a rigid plate extending longitudinally of the body at the upper part thereof, and an inflatable cushioning element extending in said body between said plate and the lower surface of the body, said inflatable element being of general U-shape and including a pair of hollow legs.

3. An artificial foot including an elastic body having the conformation and dimensions of a human foot below the ankle joint, a rigid plate extending longitudinally of the body at the upper part thereof, and an inflatable cushioning element extending in said body between said plate and the lower surface of the body, said body having an opening at its rear end through which said inflatable element may be inserted and withdrawn.

4. An artificial foot including an elastic body having the conformation and dimensions of a human foot below the ankle joint, a rigid plate extending longitudinally of the body at the upper part thereof, and an inflatable cushioning element extending in said body between said plate and the lower surface of the body, said inflatable element being of general U-shape and including a pair of hollow legs, said body having an opening at its rear end through which said inflatable element may be inserted and withdrawn.

5. An artificial foot including an elastic body having the conformation and dimensions of a human foot below the ankle joint, a rigid plate extending longitudinally of the body at the upper part thereof, and an inflatable cushioning element extending in said body between said plate and the lower surface of the body, said body having an opening at its rear end through which said inflatable element may be inserted and withdrawn, said inflatable element having a filling tube extending upwardly therefrom above the upper surface of said body.

6. An artificial foot including an elastic body having the conformation and dimensions of a human foot below the ankle joint, a rigid plate extending longitudinally of the body at the upper part thereof, and an inflatable cushioning element extending in said body between said plate and the lower surface of the body, said inflatable element being of general U-shape and including a pair of hollow legs, said body having an opening at its rear end through which said inflatable element may be inserted and withdrawn, said inflatable element having a filling tube extending upwardly therefrom above the upper surface of said body.

7. The combination of a shoe having a portion enclosing the toe part thereof and having a heel portion, with an artificial lower foot portion provided with an inflatable bag having a rearwardly exposed portion engageable with the heel portion of the shoe to press thereagainst upon inflation and thereby hold the artificial foot from withdrawal from the shoe.

HARRY C. CAMPBELL.