Aug. 1, 1950 J. M. HAUSER ET AL 2,516,872

ANKLE BRACE

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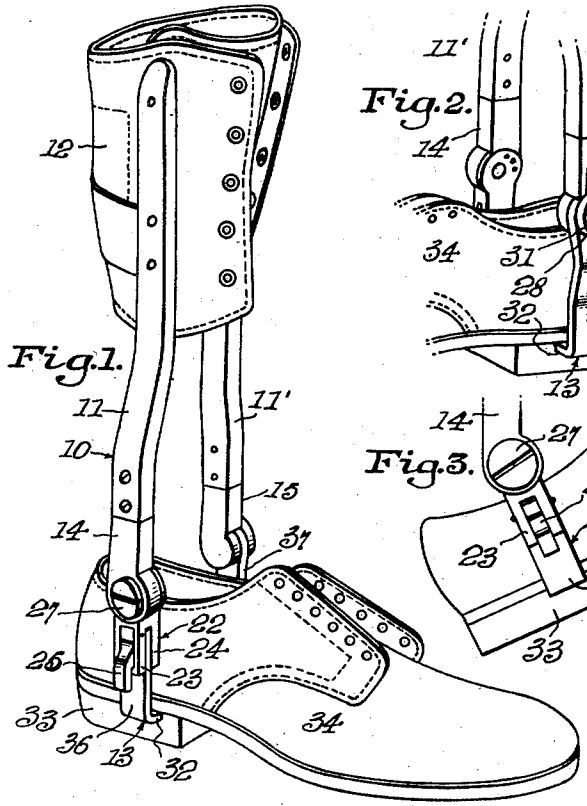


Fig.1.

Fig.2.

Fig.3.

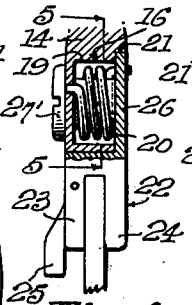


Fig.4.

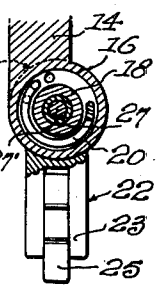


Fig.5.

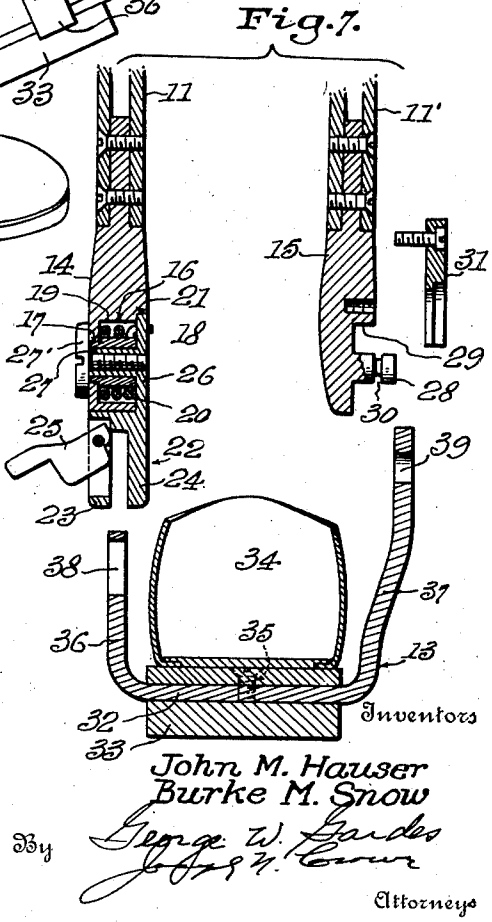


Fig.7.

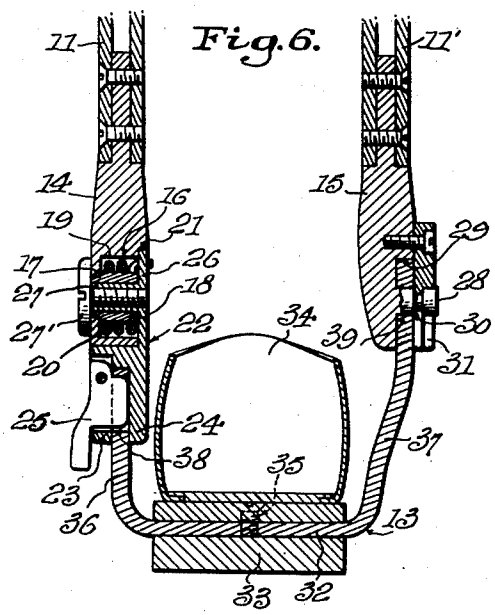


Fig.6.

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Fig. 8.

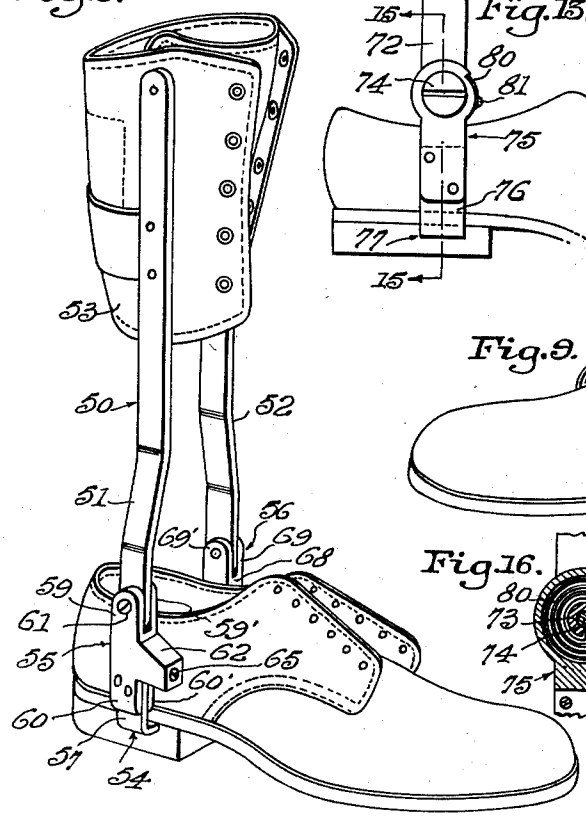


Fig. 15.

Fig. 14.

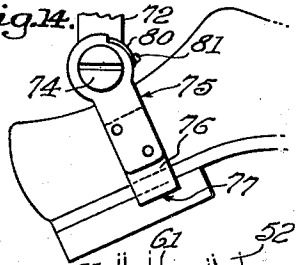


Fig. 9.

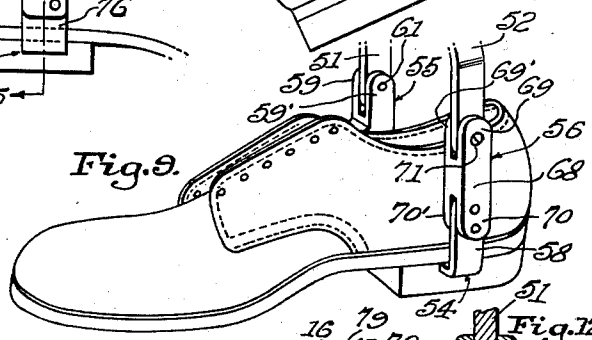


Fig. 16.

Fig. 12.

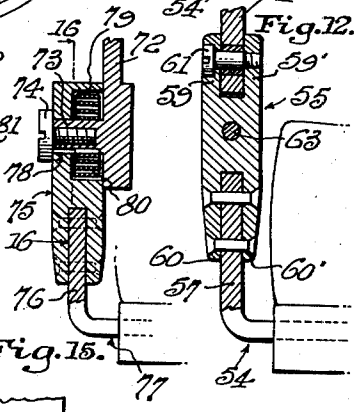


Fig. 10.

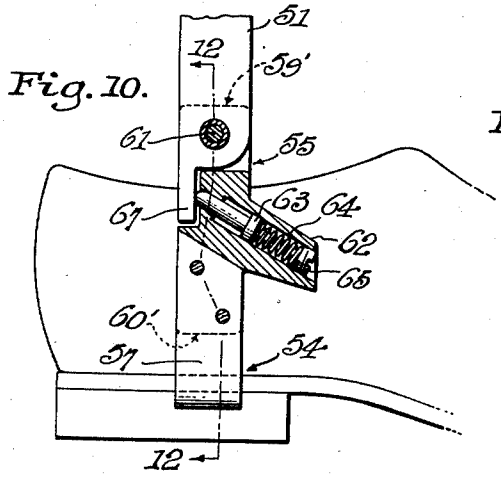
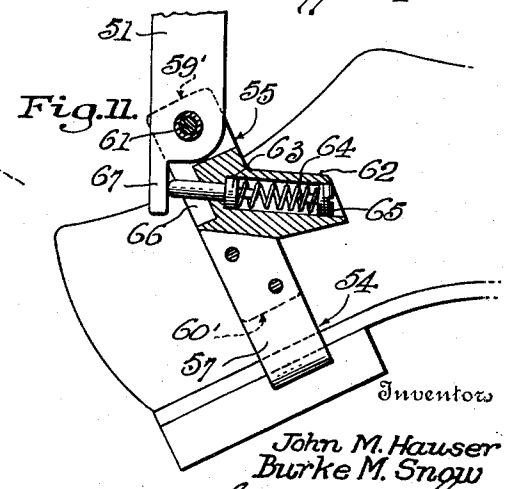


Fig. 11.



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ANKLE BRACE

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Application January 27, 1948, Serial No. 4,608

6 Claims. (Cl. 128—80)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without payment to us of any royalty thereon.

This invention relates generally to an ankle brace but more particularly to a brace of the type which may be interchangeably connected to any one of a plurality of shoes.

One object of the invention is to provide an ankle brace having stirrup and leg sections which are pivotally connected and adapted to flex at the ankle joint.

Another object of the invention is to provide an ankle brace with which the wearer may change his shoes without removing the brace from his leg.

Another object is to provide an ankle brace formed with pivotally connected leg and stirrup sections which may be easily and quickly detachably connected to each other.

Another object of the invention is to provide an ankle brace having a leg section and a stirrup which raises the toe portion of the shoe of the wearer to facilitate walking.

Referring to the drawings in which like parts are indicated by similar reference characters:

Fig. 1 is a perspective view showing the ankle brace attached to a shoe, and showing the shoe attaching mechanism on one side of the brace;

Fig. 2 is a perspective view showing a portion of the brace, the shoe and attaching mechanism on the opposite side of the brace to that shown in Fig. 1;

Fig. 3 is a side elevation showing a portion of the brace and the shoe, with the brace in flexed position;

Fig. 4 is a sectionized view taken along the longitudinal axis of the lateral stay which is equipped with a spring-operated flexing mechanism;

Fig. 5 is a sectionized view of a portion of a lateral stay, the section being taken on the line 5—5 of Fig. 4;

Fig. 6 is a sectionized view of the shoe and a portion of the ankle brace, the section being taken along the center line of the brace and showing the same attached to the stirrup of the shoe, in latched position;

Fig. 7 is a sectionized view of the shoe and a portion of the ankle brace, similar to that shown in Fig. 6, showing the stays of the brace unlatched and separated from the shoe and the stirrup.

Fig. 8 is a perspective view showing another form of the improved ankle brace attached to a shoe and illustrating the shoe attaching mechanism and one side of the brace;

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Fig. 9 is a perspective view showing a portion of the brace and a shoe and attaching mechanism on the opposite side of the brace to that shown in Fig. 8;

Fig. 10 is a partially sectionized side elevation showing a portion of the brace attached to a shoe and illustrating the toe elevating mechanism;

Fig. 11 is a partially sectionized side elevation similar to Fig. 10, showing the shoe tilted with the toe in elevated position;

Fig. 12 is a vertical section taken on the line 12—12 of Fig. 10;

Fig. 13 is a side elevation of a modified form of the improved brace;

Fig. 14 is a similar view showing the shoe in flexed position;

Fig. 15 is a vertical sectional view taken on line 15—15 of Fig. 13; and

Fig. 16 is a sectional view taken on the line 16—16 of Fig. 15.

Briefly stated, the invention relates to an ankle brace which is formed in two sections, an upper section which comprises longitudinal stays which are attached to a corset for enclosing the lower portion of the leg of the wearer, and a stirrup which is attached to the wearer's shoe.

Referring to Fig. 1, the numeral 10 indicates the ankle brace, 11 and 11' the stays which are attached to a corset 12, the latter being adapted to encircle the lower portion of the leg of the wearer. The numeral 13 indicates the stirrup which is rigidly connected to the shoe of the wearer. To the stays are attached end members 14 and 15, the latter being provided with pivotal means as will be described. The end member 14 is provided with a combined circular bearing receptacle and spring housing 16 of increasing diameters, the smallest of which is indicated by the numeral 17 and which is provided for the reception of a sleeve 18, the next larger diameter is indicated by the numeral 19, and provides a circular space for the reception of the spring 20. A portion of the circular bearing receptacle, which is of largest diameter, is indicated by the numeral 21, and is arcuate in form, and adapted to provide a bearing surface for the intermediate pivotally connected bearing member 22, to which one side of the stirrup is attached.

The bearing member 22 which is shown in section in Figs. 4, 5, 6 and 7 comprises a lower portion having two downwardly projecting parallel walls 23 and 24 which are spaced to receive one side of the stirrup 13, the wall 23 being provided with a slot therein in which is pivotally mounted a latching member 25, and an upper portion

which comprises a single upwardly projecting wall 26 provided with an outwardly projecting sleeve-shaped bearing 27, which is held within the end member 14 by the screw 27'.

The bearing member 15 on the opposite stay 11' consists of a trunnion 28 which projects from an arcuately cutaway portion, the upper surface 29 of which functions as a bearing for the round end of a stirrup arm. The trunnion is provided with an annular groove 30 for the engagement of a locking member 31 which is adapted to slide over the end of the trunnion 28 and which engages the groove 30 to lock the arm of the stirrup in pivotal engagement with the trunnion as will be described further.

The stirrup 13 comprises a metallic bar of rectangular cross-section having a central straight portion 32 which is embedded within the heel 33 of a shoe 34 and held rigidly in place by a screw 35. The straight portion 32 of the stirrup 13 is bent upwardly at either end thereof to form support members 36 and 37 which connect with the bearing member 22 and the end member 15 of the stay 11'.

The upwardly extending portion 36 is provided with an opening 38 which is engaged by the pivotally mounted latching member 25 when the member 36 is moved up into the space between the downwardly projecting ends of the bearing member 22.

The upwardly extending portion 37 of the stirrup is drilled with a circular bearing opening 39 which fits over trunnion 28 and is held in engagement therewith by the locking member 31 which slides over the end of the trunnion 28 and engages the groove to lock the upwardly extending arm 37 in pivotal engagement with the trunnion as will be described.

The spring 20 surrounds the sleeve member 18 and one end thereof is connected to the end member 14 and the other end to the bearing member 22 as shown in Figs. 4, 5 and 6.

Referring to the modified form of the device shown in Figs. 8, 9, 10, 11 and 12, the numeral 50 indicates the brace, 51 and 52 the stays which are attached to a corset 53, which is adapted to encircle the lower portion of the leg of the wearer as explained above. The numeral 54 indicates the stirrup which is rigidly connected to the shoe of the wearer. The stays 51 and 52 are pivotally connected to bearing members 55 and 56 which are riveted to upwardly extending side members 57 and 58 of the stirrup 54.

The bearing member 55, which is pivotally connected to the stay 51, consists of a central base provided with upper parallelly extending, pivotal connecting members 59 and 59' and parallelly extending clamping members 60 and 60'. The bearing member 55 is pivotally connected to the brace 51 by means of a screw 61 adapted to pass through a hole in connecting member 59 and is threaded to fit a tapped hole in the connecting member 59' to thus form a pivot joint between the brace 51 and the bearing member 55. The lower clamping members 60 and 60' are riveted to the vertical arc 57 of the stirrup 54.

The bearing member 55 is formed with a plunger housing 62 which projects forwardly and downwardly from the main body thereof. This plunger housing is drilled to provide a passage having a larger and a smaller diameter for the reception of the plunger 63 and spring 64, and is tapped for the reception of the retaining screw 65.

The upper part of the central body portion of the bearing member 55 is provided with a cutaway portion 66 for the reception of a stop member 67 which projects downwardly from the brace 51. This stop member 67 not only functions to prevent the stirrup from turning about its pivot in a backward direction, after it is in longitudinal alignment with the brace, but also functions as an abutment for the plunger which presses against the stop member in order to move the toe of the shoe upwardly and thus assist the wearer in walking.

The bearing member 56 contains no spring operated plunger and is formed merely with a central body portion 68 provided with two upper parallelly projecting pivotal connecting members 69 and 69' and two lower parallelly extending clamping members 70 and 70'. The bearing member 56 is pivotally connected to the brace 52 by means of the screw 71. The clamping members 70 and 70' of the bearing member 56 are riveted to the upwardly projecting arm 58 of the stirrup 54.

Another form of spring-operated ankle joint is shown in Figs. 13, 14, 15 and 16, in which a spiral spring is used instead of a helical spring as illustrated in Figs. 8, 9 and 10. In this type of pivotal joint the stay 72 is provided at one end with an outwardly projecting trunnion 73, which is drilled centrally for the reception of a screw 74. The bearing member 75, which is rigidly riveted to an upwardly projecting arm 76 of the stirrup 77, is provided with a bearing opening 78 which is fitted rotatably upon the trunnion 73. The upper portion of the bearing member 75 is cut away to form a circular spring housing 79 which is concentric with the bearing opening 78. Within this spring housing is mounted the coil spring 80, the one end of which is attached to the side of the housing 78 by means of the screw 81 and to the trunnion 73. The coil spring 80 functions in the same manner as the helical spring 64, that is, it moves the stirrup so as to elevate the toe of the shoe and thus assists the wearer in walking.

Having thus described our invention, what we claim as new and wish to secure by Letters Patent is:

1. An ankle brace for reinforcing a weakened leg and foot, comprising a frame formed with lateral stays, a corset attached to the stays and adapted to surround the lower portion of the leg of the wearer, and a stirrup connected to a shoe worn on the foot of the wearer, means within the heel of said shoe for securing the stirrup thereto, means pivotally connecting the stirrup to the ends of the stays to form a joint adapted to allow flexing of the brace at the ankle, and spring means mounted in the connecting means for operating on the stirrup to effect elevation of the toe of the shoe to facilitate walking.

2. An ankle brace for reinforcing a weakened leg and foot comprising a frame formed with lateral stays, a corset attached to the stays and adapted to surround the lower portion of the leg of the wearer and a stirrup extending through a channel formed within the heel of the shoe worn on the foot of the wearer, and means within said heel for securing the stirrup thereto, pivotal bearing members connected to the ends of the stays and to said stirrup, and spring means mounted within a bearing member and coacting with a stay to effect an angular movement of the stirrup to raise the toe of the wearer and thus facilitate walking.

3. An ankle brace comprising a frame formed with lateral stays attached to a corset adapted to surround the lower portion of the limb of the

wearer, end members connected to said stays, a stirrup connected to the shoe of the wearer, said stirrup having upwardly extending arms, an intermediate bearing member pivotally connected to one of said end members adjacent its lower end and in horizontal alignment with the ankle joint of the wearer, releasable clamping means in connection with said bearing member adapted to clamp one of the upwardly extending arms of said stirrup, a trunnion projecting from the opposite end member adjacent its lower end and in horizontal alignment with the pivotal connection of said intermediate bearing member, said trunnion being adapted to be connected pivotally to the other arm of said stirrup, and resilient means in connection with said bearing member and said first-mentioned end member adapted to flex the brace at its pivotal connections to thereby tilt the toe of the shoe upwardly to facilitate walking.

4. An ankle brace comprising a frame formed with lateral stays attached to a corset adapted to surround the lower portion of the limb of the wearer, end members connected to said stays, a stirrup connected to the shoe of the wearer, said stirrup having upwardly extending arms, an intermediate bearing member pivotally connected to one of said end members adjacent its lower end and in horizontal alignment with the ankle joint of the wearer, releasable clamping means in connection with said bearing member adapted to clamp one of the upwardly extending arms of said stirrup, a trunnion projecting from the opposite end member adjacent its lower end and in horizontal alignment with the pivotal connection of said intermediate bearing member, said trunnion being adapted to be connected pivotally to the other arm of said stirrup, and a helical spring surrounding the pivotal connection of said bearing member and connected at its ends to said first-mentioned end member and to said intermediate bearing member adapted to flex the brace at its pivotal connections to thereby tilt the toe of the shoe upwardly to facilitate walking.

5. An ankle brace comprising a frame formed with lateral stays attached to a corset adapted to surround the lower portion of the limb of the wearer, one of said stays being provided with a downwardly projecting stop member, a stirrup connected to the shoe of the wearer, said stirrup having upwardly extending arms, intermediate bearing members pivotally and releasably connected to one of said stays adjacent the lower end thereof and in horizontal alignment with the ankle joint of the wearer, clamping means in connection with said bearing members adapted to clamp rigidly the upwardly extending arms of said stirrup, a plunger housing formed integrally with one of said intermediate bearing members and projecting forwardly and downwardly therefrom, a spring pressed plunger slidably mounted within said housing, said plunger being adapted to press against said stop member to flex the brace at its pivotal connections and thereby tilt the toe of the shoe upwardly to facilitate walking.

6. An ankle brace comprising a frame formed with lateral stays attached to a corset adapted to surround the lower portion of the limb of the wearer, a stirrup connected to the shoe of the wearer, said stirrup having upwardly extending arms, intermediate bearing members interconnecting the stirrup and stays and pivotally and releasably connected to said stays adjacent their lower ends and in horizontal alignment with the ankle joint of the wearer, clamping means in connection with said bearing members adapted to clamp rigidly the upwardly extending arms of said stirrup, a circular spring housing concentric with the pivotal mounting and formed within said intermediate bearing members and a coiled spring mounted within said spring housing surrounding said pivotal mounting and connected at its ends to said stay and to said intermediate bearing member adapted to flex the brace at its pivotal connections and thereby tilt the toe of the shoe upwardly to facilitate walking.

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