May 10, 1949. R. ANDERSON 2,469,361

ORTHOPEDIC FOOT PLATE DEVICE

Filed Oct. 17, 1945

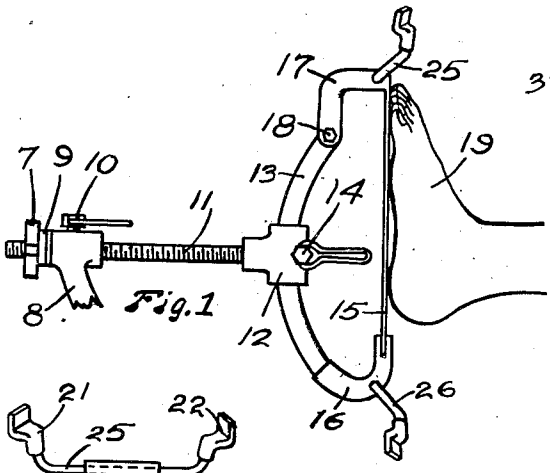


Fig. 1

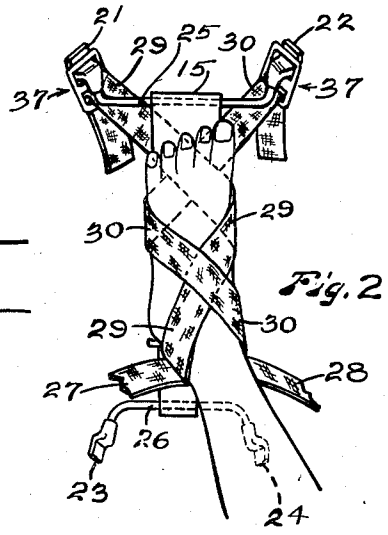


Fig. 2

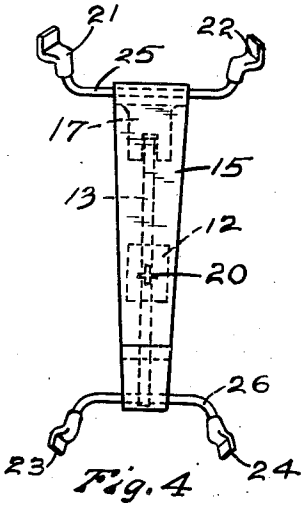


Fig. 4

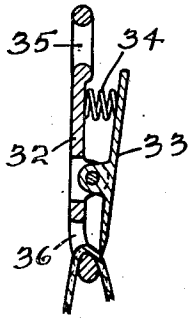


Fig. 6

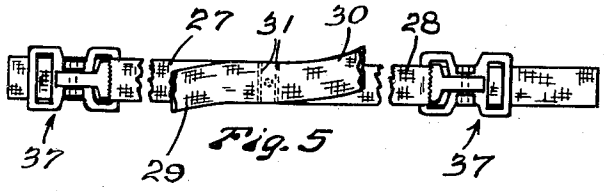


Fig. 5

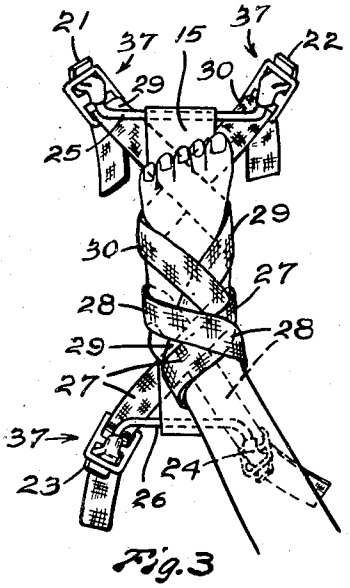


Fig. 3

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ORTHOPEDIC FOOT PLATE DEVICE

Roger Anderson, Seattle, Wash.

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7 Claims. (Cl. 128—84)

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This invention relates to the art of applying a foot to a foot plate and a foot plate device for use in connection with orthopedic operating devices.

In orthopedic surgery a device which is commonly known as a foot plate is used to secure not only a foot but other portions of the anatomy thereto. The devices with which this invention may be used are those as for example, as shown in my copending application "Orthopedic table, fracture reducing apparatus, and methods of reducing fractures," Serial No. 622,786.

Heretofore it was common practice to wrap bandages about a foot and foot plate to secure the foot to the foot plate. In such prior art practice it was common to employ usual surgical bandages as the securing means and the amount of wrapping or the number of layers depended upon the technique of a particular doctor, but in all instances with which I am familiar a great number of layers were employed. Often, when traction and turning forces were applied to the foot plate, the foot became released from the foot plate. Obviously, any previous manipulation of the bone or the bone fragment involved were lost if such were being maintained through the foot plate and the foot secured thereto. Thus the time required for an operation and the anaesthetic period were extended and remanipulation was necessary, all of which would not help the patient and in many instances resulted in complications. Of course the time of the doctor in previous manipulations prior to the release of the foot from the foot plate was wasted.

Another difficulty in the prior art resided in the fact that the application of the bandages was time-consuming and even if a foot did not become released, it became loose and either augmented the difficulties in obtaining proper reduction or prevented proper manipulation to obtain satisfactory reduction. A still further difficulty resided in the fact that the bandages often did not maintain the foot rigid with the foot plate.

It is an object of my invention to provide a foot plate and strap means which can be rapidly and readily applied to the foot of a patient in a time in the order of seconds as distinguished from the previous time required in the prior art which was in the order of minutes.

It is a further object of my invention to provide a foot plate and strap which will provide substantially rigid and certain connection between said parts and with a minimum pressure on the foot of a patient.

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Also, in the prior art gauze bandages tended to roll or wrinkle and provide discomfort to the patient. It is therefore an object of my invention to provide a strap means which will tend to lay flat against the skin of the patient and to provide maximum comfort to the patient considering the circumstances.

It is a further object of my invention to provide means to secure a foot to a foot plate of a nature so that if a cast is applied over the straps, the straps can be removed from the cast to lessen discomfort of the patient.

It is a further object of the invention to provide foot straps, which are preferably secured together to lessen risk of misplacement, which carry buckles of a type to be readily attached to or released from tongs carried by the foot plate.

It is an object of the invention to provide straps where the side and particular portions of the strap which is to be placed against a particular portion of a patient is readily distinguishable so that buckles carried by the strap will be positioned for ready attachment with the foot plate means and for ready manipulation when so attached.

It is a further object of the invention to provide a foot plate which tapers in width from the toe portion towards the heel portion and of a width so that the plate will always be slightly narrower than the foot of the patient which is to be secured to a particular plate. I have found that three sizes of foot plates may be employed which can be generally classified as infant's size, child's size, and adult's size and that such will suffice for practical purposes.

It is a further object of the invention to provide marking means on the foot plate so that feet of various sizes can each be placed on the foot plate with the position of the tibia predetermined as respects the foot plate and any traction means connected with the foot plate.

It is a further object of the invention to provide a shaft or screw secured to the foot plate and at a location so that any traction force will be applied to the foot plate in alignment with an axis of the bone involved, as the anatomical axis of the tibia.

It is a further object of the invention to provide an articulated foot plate wherein the center of angular movement is substantially the center of articulation of the ankle of a patient's foot secured to the foot plate. Thus the foot plate can be secured to a woman's foot, which has been changed because of wearing high heels or the like, and where the ball of the foot rests normally

below the level of the heel, as well as to a foot which has not been so affected and wherein the wearer has normally worn flat or lower heels.

It is a further object of the invention to provide foot straps which eliminate the cutting or tailoring of the bandages to individual cases and where straps may be used with patients of varying sizes and which will automatically fit, do not require the use of a multiple number of layers, and may be applied in a matter of seconds.

The above mentioned general objects of my invention, together with others inherent in the same, are attained by the device illustrated in the following drawings, the same being a preferred exemplary form of embodiment of my invention, throughout which drawings like reference numerals indicate like parts:

Figure 1 is a view in elevation showing a fragment of traction means and showing a fragment of a foot adjacent a foot plate and the straps have been removed;

Fig. 2 is a plan view showing a foot of a patient in place and whereon strap has been applied in place and only a fragment of the second strap is indicated;

Fig. 3 is a view similar to Fig. 2 except that both straps have been secured in place;

Fig. 4 is a plan view of the foot plate;

Fig. 5 is a plan view with portions broken away of a strap means which may be used in this invention; and

Fig. 6 is a view with parts in section and parts in elevation of a buckle device which may be used in this invention.

In Figure 1 of the drawings the following parts of a traction applying means will illustrate a way of providing traction to the foot plate of this invention. In said figure 7 represents a traction nut, 8 a fragment of a yoke, 9 a sleeve, 10 a locking screw, and 11 a threaded traction shaft. By the structure illustrated by parts 7 to 10 inclusive a traction shaft 11 can be moved in a longitudinal direction by manipulation of the traction devices, such as traction nut 7. The shaft 11 carries a clamp means 12 so that the arcuate arm 13 may be slidingly supported by the shaft 11 for angular movement in a circle around the center of curvature of the arcuate arm 13. Also is provided the locking screw 14 so that any adjusted position of the arcuate arm 13 may be maintained. The center of curvature of the arcuate arm 13 coincides substantially with the center of articulation of the foot about the ankle joint and thus the arcuate arm 13 may be adjusted and yet the threaded shaft 11 can be maintained in anatomical alignment with the axis of the tibia or shaft which is involved.

The arm 13 detachably supports a foot plate 15 and this may be accomplished by securing a U shaped member 16 to one end portion of the arm 13 and providing said U shaped member 16 with a plate receiving slot therein and thus the lower end of the plate 15 or the heel end of said plate is detachably secured to U shaped member 16.

An arm 17 is detachably secured to the arcuate arm 13 by means of a locking screw 18. Upon loosening of locking screw 18 the arm 17 can rotate about 18 as an axis and thus the lower or heel end of a foot plate 15 may be angularly moved and out of the slot carried by the U shaped member 16. In moving the parts in the opposite direction, the lower or heel end of the foot plate 15 can be inserted in the slot in the U-shaped member 16 by angular movement of the arm 17 about 18 as a pivot and after the parts are in the proper position, then the locking screw 18 can be tightened. In the event that a cast has been wrapped about a limb, such as the foot 19 shown in the drawings, then upon loosening of the locking screw 18, the heel end of the foot plate 15 may be released and then due to the wedge or tapered shape of the foot plate 15, the plate 15 and the foot 19 may be relatively moved in opposite directions and then the foot plate 15 can be removed from below the cast and the cast still remain on the foot 19 of the patient.

The foot plate 15 is slightly narrower than the width of a foot of a patient at the ball joint and heel levels for whom the foot plate is designed to interfit. Also, the foot plate 15 is provided with suitable marking means 20 and if the foot of a patient is secured to the foot plate with the axis of the shaft aligned with the marking means 20, then any traction on shaft 11 can be aligned with the anatomical axis of the bone involved and any turning of member 13 will be about the ankle joint of the patient's foot.

As means to secure the end portions of straps to the assembly, I have indicated, as for example in Fig. 4, upper left tong 21, upper right tong 22, lower left tong 23, and lower right tong 24. The upper tongs 21 and 22 are secured to a bracket 25 which bracket is carried by arm 17 and the lower tongs 23 and 24 are secured to a bracket 26 which bracket is carried by the arm member 16.

For more convenient operation preferably the buckles are carried by the straps and thus buckle receiving tongs 21 to 24 are connected with the foot plate as previously described. Also, preferably two straps are employed which comprise for one strap, strap portions 27 and 28 and for the other strap, strap portions 29 and 30—the parts of the strap being numbered as indicated for easier description and illustration of the application of the straps. Also, said straps are preferably secured together at a location indicated as 31 and such location is marked as a portion which will be placed against the skin of a patient and at a location which will be the back side of the ankle of the patient. Also, it is preferable that each of the straps 27—28 and 29—30 carry suitable buckles, a type of which is shown enlarged in Fig. 6 of the drawings.

In practicing my invention, the traction shaft 11 is loosened to the extent necessary so that a foot 19 will comfortably rest against a foot plate 15 of a size which is slightly narrower than the width of the foot at the ball of the foot and at the heel of the foot. Thereafter, the locking screw 14 is loosened so that a foot may be put under flexion, that is, with the toe end of the foot down and the heel end of the foot up, or can be put under extension with the heel portion down and the toe portion up or level, as required by individual patients. Normally flexion is desired. All of these movements can take place by angularly moving arcuate arm 13 in the slot in the clamp means 12 and thus all of the movement will be about the ankle joint. Also, the foot is generally aligned with the marking means 12 and upon final adjustment it is positively so aligned and held in such position. Then the portion 31 of the straps is placed centrally of and at the back part of the ankle of a patient. Then a strap, such as 29—30, encircles the ankle of a patient and the portions 29 and 30 cross on the dorsum or top of a foot and are angularly disposed to engage opposite sides of a foot at the level of the ball joint, or the head of the meta-

tarsals, and then the straps cross below the plate and the portion 29 connects to tong 21 and the portion 30 connects to the tong 22.

By thus positioning the parts, the free end of the portion 29 and the free end of the portion 30 will be back of plate 15 and in a convenient location to be tightened and with least interference from the other parts of the structure. As indicated in Fig. 6 of the drawings the type of buckle preferably to be employed is a spring loaded buckle and employs two jaw members 32 and 33 which are resiliently urged into locking position by a spring 34. The jaw member 32 is provided with an opening 35 so that the opening 35 will interfit over one of the tongs 21 to 24 with the jaw 32 adjacent and the jaw 33 remote from a tong. Thus, as viewed in Fig. 6 of the drawings the end of the strap which is to the right or which is in the direction of jaw member 33 will be the free end of a strap. Also, a strap, such as 27—28, or 29—30, may be used in connection with the buckle. In all figures except Fig. 6, thus the buckle is generally numbered 37.

After a strap 29—30 has been placed about the foot of a patient as previously described, the buckle 37 carrying the strap portion 29 is attached to the tong 21 and the buckle 37 carrying the strap portion 30 is attached to the tong 22. Then the free end of the strap portions 29 and 30 are adjusted to align the axis of the shaft with the marking means 20, best shown in Fig. 4. Then the remaining strap 27—28 is put in position and adjusted. Obviously, the remaining strap 29—30 can be a separate strap and not secured to the strap 27—28, but for purpose of convenience I desire to attach them as previously indicated. The remaining strap 27—28 is applied with the two portions encircling the leg and crossing at the front ankle of the patient. Then the portion 27 passes substantially downwardly and passes by the foot of the patient at the level of the heel, and then angularly backwardly below the plate 15 in the direction of tong 23. The portion 28 passes downwardly at substantially the level of the heel of the patient and then angularly backwardly below plate 15 and toward the tong 24.

In all instances the free ends of the strap are to the rear of plate 15, or on the opposite side to that of the patient, and thus they may be readily manipulated and the portions 29 and 30 can be adjusted to give the proper height and the portions 27 and 28 can be tightened to properly lower the foot of the patient so that when all straps are tightened then the foot will be firmly secured in place and the axis of the bone shaft will be aligned with the marker 20.

In the event that it is desired to place a foot on a foot plate and secure it in the manner previously described, and thereafter to provide a cast about the foot plate and straps, the straps will be wrapped in wax paper so that the cast forming material will not adhere to the straps and then after the cast is completed, the locking screw 18 may be unloosened so that the foot plate 15 can be swung clear of the member 16. Also, the buckles will be removed from the tongs and the buckles will be removed from the straps. The wedge shaped foot plate 15 and the foot can be moved relative each other so that the cast and foot can be slid relatively in a direction toward the narrow end of the foot plate 15 and the foot plate 15 thus removed from the cast. Also, as the straps are not an integral part of the cast and are not secured thereto by reason of the protection of the wax paper, then the straps can be slid out of the cast by engaging the same toward the heel portion or substantially at the location of 31. An important reason for removing straps is the comfort of a patient.

By having the foot plate 15 slightly narrower at the ball and heel levels than the feet which are to be secured thereto, there will be a positive pressure by reason of the various strap portions mentioned as the strap portions pass at the level of the ball of the foot and pass at the level of the heel of the foot. If the foot is narrower than the foot plate then the holding force of the strap holding the feet on the foot plate will be substantially lessened as a foot can move relative a strap and foot plate unless excessive pressures are involved. Also, if the width of the foot is too much wider than the foot plate, there will be a tendency to crimp or turn the flesh of the patient about the foot plate and cause discomfort to the patient as well as to lessen the holding effect.

In the foregoing description of my invention it is thus evident that I have provided a simplified manner of securing a foot of a patient to a foot plate in a manner which is rapid, highly efficient, and certain in results.

Obviously, changes may be made in the forms, dimensions, and arrangement of the parts of my invention, without departing from the principle thereof, the above setting forth only a preferred form of embodiment.

I claim:

1. An orthopedic foot plate device comprising a traction means; an arcuate frame member connected with said traction means for angular movement about its center of curvature and with its said center aligned with and opposite said traction means; and a foot plate, for supporting a foot with the ankle joint substantially aligned with the center of curvature of the arcuate frame member, secured to said frame member.

2. An orthopedic foot plate device comprising a tapering foot plate of a width, at the ball joint level, less than the width of a patient's foot to be placed thereon and with the width at the heel level less than the width of such a patient's heel; buckle receiving tongs connected with the foot plate and positioned with two spaced tongs at the toe end and two spaced tongs at the heel end of the plate; a strap, with buckles on its end portions, adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions of the strap positioned about and encircling the ankle, thence in a crossed relation on the dorsum, thence angularly over the dorsum and engaging opposite sides of the foot and the foot plate at the level of the ball joint, thence below and angularly across the foot plate, and thence with the buckles secured to tongs at the toe end of the foot plate; and a second strap with buckles on its end portion adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions about and encircling the ankle, with the end portions in crossed relation on the dorsum, thence angularly to and engaging opposite sides of the foot and foot plate at the level of the heel of the patient, and thence below and angularly across the foot plate toward the tongs at the heel end of the plate, and thence with the buckles secured to the tongs at the heel end of the plate.

3. An orthopedic foot plate device comprising a traction means; an arcuate frame member connected with said traction means for angular

movement about its center of curvature and with its said center aligned with and opposite said traction means; and a foot plate, for supporting a foot with the ankle joints substantially aligned with the center of curvature of the arcuate frame member, pivotally connected with the frame member at one end and releasably secured to the frame member at the other end.

4. An orthopedic foot plate device comprising a tapering foot plate of a width, at the ball joint level, less than the width of a patient's foot to be placed thereon and with the width at the heel level less than the width of such a patient's heel; a plurality of strap securing means connected with the foot plate and positioned with two such means in spaced relation at the toe end and two at the heel end of the plate; a strap adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions of the strap positioned about and encircling the ankle, thence in a cross relation on the dorsum, thence angularly over the dorsum and engaging opposite sides of the foot and foot plate at the level of the ball joint, thence below and angularly across the foot plate, and thence with the end portions of the strap secured to the strap receiving means at the toe end of the foot plate; and a second strap adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions about and encircling the ankle, with the end portions in crossed relation on the dorsum, thence angularly to and engaging opposite sides of the foot and foot plate at the level of the heel of the patient, and thence below and angularly across the foot plate toward the strap receiving means at the heel end of the plate, and thence with the end portions of the strap secured to the strap receiving means at the heel end of the plate.

5. An orthopedic foot plate device comprising a tapering foot plate of a width, at the ball joint level, less than the width of a patient's foot to be placed thereon and with the width at the heel level less than the width of such a patient's heel; a plurality of strap securing means connected with the foot plate and positioned with two such means in spaced relation at the toe end and two at the heel end of the plate; a strap adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions of the strap positioned about and encircling the ankle, thence in a crossed relation on the dorsum, thence angularly over the dorsum and engaging opposite sides of the foot and the foot plate at the level of the ball joint, thence below and angularly across the foot plate, and thence with the end portions of the strap secured to the strap receiving means at the toe end of the foot plate; and a second strap secured to the first strap at the level of the portion engaging the heel of a patient, said second strap being adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions about and encircling the ankle, with the end portions in crossed relation on the dorsum, thence angularly to and engaging opposite sides of the foot and foot plate at the level of the heel of the patient, and thence below and angularly across the foot plate toward the strap receiving means at the heel end of the plate, and thence with the end portions of the strap secured to the strap receiving means at the heel end of the plate.

6. An orthopedic foot plate device comprising a traction means; an arcuate frame member connected with said traction means for angular movement about its center of curvature and with its said center aligned with and opposite said traction means; a foot plate, for supporting a foot with the ankle joint substantially aligned with the center of curvature of the arcuate frame member, secured to said frame member; and position indicating means on said foot plate with which the shaft of the tibia may be aligned to properly position the ankle joint of a foot.

7. An orthopedic foot plate device comprising a traction means; a foot plate connected with said traction means and having a width, at the ball joint level, less than the width of a patient's foot to be placed thereon and with a width at the heel level less than the width of such a patient's heel; a plurality of strap securing means connected with the foot plate and positioned with two such means in spaced relation at the toe end and two at the heel end of the plate; a strap adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions of the strap positioned about and encircling the ankle, thence in a crossed relation on the dorsum, thence angularly over the dorsum and engaging opposite sides of the foot and foot plate at the level of the ball joint, thence below and angularly across the foot plate, and thence with the end portions of the strap secured to the strap receiving means at the toe end of the foot plate; and a second strap adapted to be positioned on a patient with a loop at the back part of the ankle, with the end portions about and encircling the ankle, with the end portions in crossed relation on the dorsum, thence angularly to and engaging opposite sides of the foot and foot plate at the level of the heel of the patient, and thence below and angularly across the foot plate toward the strap receiving means at the heel end of the plate, and thence with the end portions of the strap secured to the strap receiving means at the heel end of the plate.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,383,928	Gassette	July 5, 1921
1,576,781	Phillips	Mar. 16, 1926

FOREIGN PATENTS

Number	Country	Date
193,523	Germany	Dec. 19, 1907