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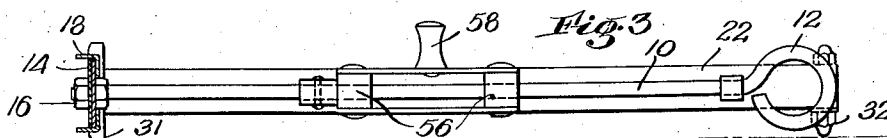
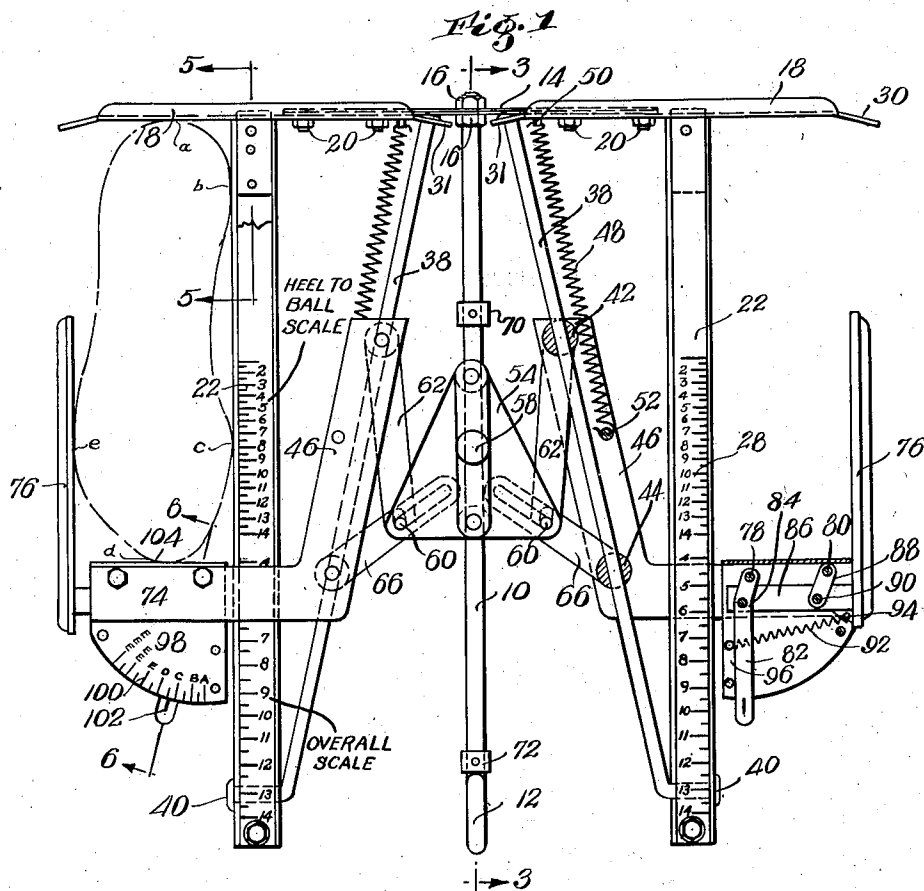
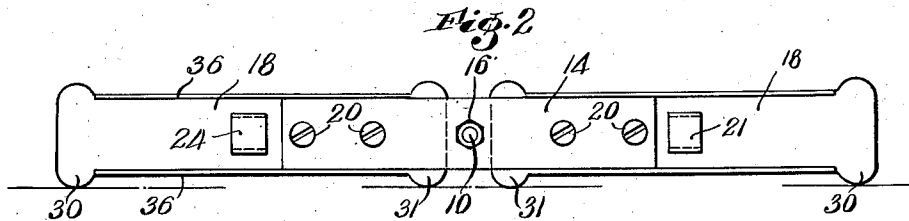
H. E. CLARKE

2,394,149

FOOT MEASURING DEVICE

Filed May 12, 1942

2 Sheets-Sheet 1



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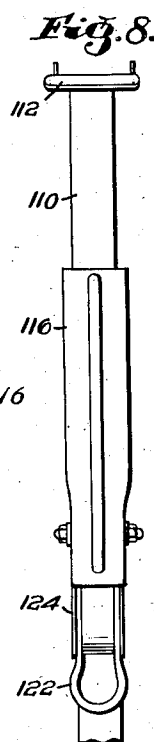
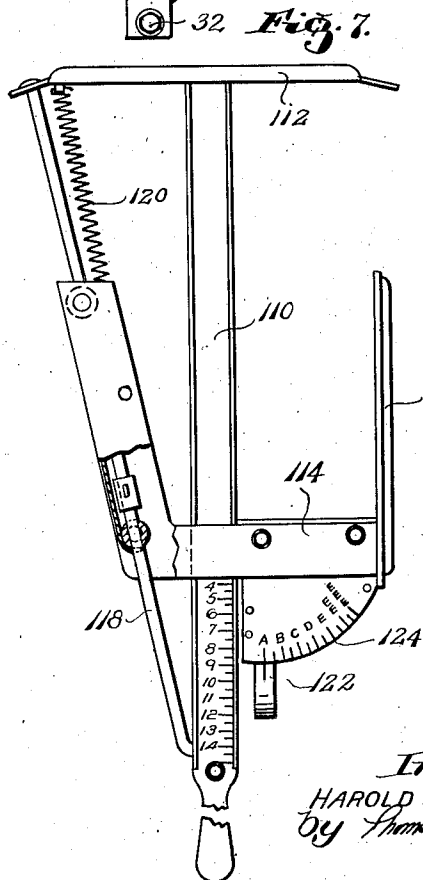
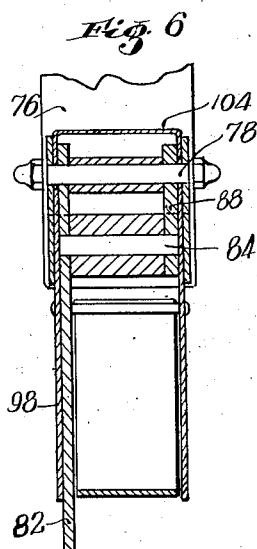
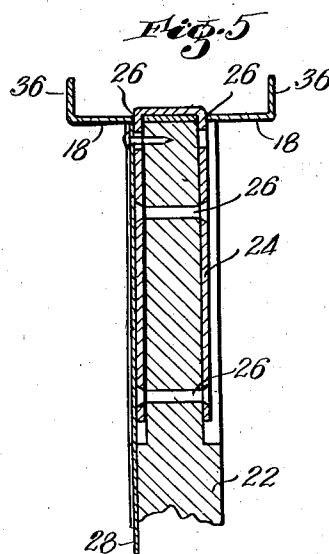
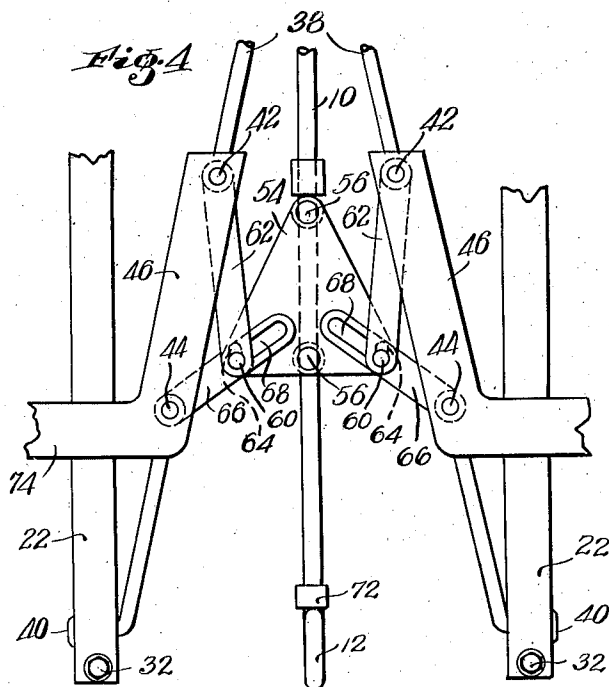
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FOOT MEASURING DEVICE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,394,149

FOOT MEASURING DEVICE

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6 Claims. (Cl. 33—3)

This invention relates to improvements in a foot measuring device of the type which is used to measure the foot in the terms of shoe sizes for proper fitting of shoes. The foot measuring device is of the type for accurately determining the length size measurement both overall from heel to toe and from heel to ball, and the width size measurement which is automatically adjusted to compensate for variations in length size read either overall or from heel to ball.

The present invention is an improvement over the foot measuring device disclosed in my Patents Nos. 1,582,636, granted April 27, 1926, and 1,962,101, granted June 5, 1934. In my prior Patent No. 1,582,636 the foot measuring device comprises a casing having a heel plate which is engaged by the inside margin and heel of the foot, the casing having a longitudinally movable toe plate for indicating the overall length of the foot, the toe plate being provided with a laterally movable side plate for indicating the width of the foot. In this prior device the foot is placed on the floor or other support and the device is free to adjust itself around the foot. One objection to this prior foot measuring device is that the side plate, although free to move inwardly against the foot, cannot be pushed outwardly by lateral pressure of the foot and requires a manual operation by the fitter to avoid incorrect indications of the width size. The device in my Patent No. 1,962,101 has a bed plate upon which the foot must be accurately placed in order to obtain correct measurements.

It is common practice in shoe fitting to determine the proper shoe size by measuring only one foot. This practice cannot be recommended since the foot which is not measured may require a larger size. There is a great advantage in using a device which indicates the length and width size of both feet at the same time. With such a device the fitter may quickly determine which foot is larger and select shoes which will properly fit the feet.

Shoe fitting devices which require considerable care and attention on the part of the fitter in placing the foot in proper relation to the device and in manually adjusting indicating devices against the foot are objectionable as accurate measurements cannot be obtained where manual adjustments are required. The foot measuring device should be free from direct vertical pressure of the foot but fully responsive to lateral pressure due to spreading of the feet so that the measurements are read while there is an even

pressure against the toe and heel and on the opposite sides of the foot.

It is an object of the present invention to provide a foot measuring device which will automatically adjust itself about the foot to bear evenly with uniform pressure at all points of contact with the foot whereby the proper shoe size in terms of length and width may be read by the operator.

10 It is a particular object of the present invention to provide a side bar or measuring stick having a heel plate fixed thereto and a toe plate movable with respect to said side bar, the toe plate having a parallel bar linkage for mounting a laterally movable side plate or side wing whereby the width size of the foot is determined by the movement of the side plate with respect to the toe plate.

It is further an object of my invention to provide a unitary foot measuring device adapted to automatically indicate the proper shoe size in terms of length and width for both the right and left feet simultaneously, the parts of the device which contact each foot being independently movable with respect to the corresponding parts of the device which engage the other foot.

Further objects and advantages of my improvements will be more readily apparent from the following description of preferred embodiments thereof as illustrated in the attached drawings, in which:

Fig. 1 is a plan view of the double foot measuring device partially shown in section and diagrammatically indicating the position of one foot;

Fig. 2 is a rear elevation of the device;

Fig. 3 is a vertical section taken on the plane indicated 3—3 in Fig. 1;

Fig. 4 is a fragmentary enlarged plan view showing the means for mounting and guiding the movement of the toe plates;

Fig. 5 is a detailed sectional view taken on the plane indicated 5—5 in Fig. 1;

Fig. 6 is a sectional view taken on the plane indicated 6—6 in Fig. 1;

Fig. 7 is a plan view showing my foot measuring device designed for measuring only one foot at a time; and

Fig. 8 is a fragmentary side elevation of the device shown in Fig. 7.

The foot measuring device disclosed in Figs. 1 to 6 is not provided with a base as it fits around the feet which are placed upon the floor or other suitable surface. The device is, therefore, free from vertical foot pressure. The central rod 10 may be provided at its outer end with a suitable

handle 12 and is secured at its inner end to a spring plate or spring plates 14 which extend laterally in opposite directions from the rod 10. The rod 10 is fixed to the spring plates 14 by tightening the nuts 16 which are threaded on the rod 10. A pair of rigid heel plates 18 are fixed to the spring elements 14 by nut and bolt attaching means 20. It should be noted that the heel plates have flat inner surfaces to accommodate wide heels without giving incorrect measurements.

A pair of spaced bars or measuring sticks 22 which may be of wood are rigidly secured to each of the heel plates 18 by means of U-shaped metal strap members 24 which pass through slots 26 formed in the metal heel plates 18, the straps being attached by the rivets 26 to the sticks 22. The sticks 22 have the strips 28 fixed to the top surfaces thereof which have arcuately applied measurement indications for heel to ball length and heel to toe length.

The device is supported on the floor by the end portions 30 and 31 of the heel plates 18 which form supporting feet while the front ends of the sticks 22 are provided with rest members 32 to support the other end of the measuring device as shown in Fig. 2. The device as a whole is therefore free to adjust itself automatically about the feet which rest on the floor.

The central portion of the heel plates 18 is formed with reinforcing flanges 36 which are turned away from the inner surface of the heel plates. The inner ends 31 of the heel plates are bent away from the leaf springs 14 and are fixed to the diagonally disposed rods 38 which are attached at their outer ends 40 to the outer ends of the sticks 22.

Each of the rods 38 acts as a guide rod for the movement of a pair of pins 42 and 44 to the upper and lower ends of which are attached the L-shaped plates 46. Each pair of plates 46 together with the pins 42 and 44 are movable by the tension of a spring 48 tending to retract the plates 46 towards the heel plates 18. Each spring 48 is fixed at 50 to a heel plate 18 and is attached by a pin 52 to a pair of the plates 46.

Mechanism is provided for producing manual movement of the plate members 46 against the force of the springs 48. A slide member 54 is guided for movement on the rod 10 by means of the pins 56. The top of the slide 54 has a handle 58. The base of the slide 54 is a triangular plate at the forward corners of which are pins 60 to which are connected the link members 62. The links 62 at the opposite ends are connected to the pins 42 which slide on the rods 38. The links 62 at the points of connection with the pins 60 may be provided with the short slots 64 to permit a small amount of movement between the pins 60 and the links 62. Additional links 66 are provided between the pins 44 and the pins 60. These links 66 are formed with slots 68 to receive the pins 60. It will be understood that by pulling on the handle 58, the slide 54 will be moved forwardly on the rod 10 and movement will be transmitted through the links 62 and 66 to the plates 46 which will also move forwardly with respect to the inclined guide rods 38. The lost motion slots 64 and 68 provided in the links 62 and 66 are intended to permit a certain degree of movement of the frames of the individual measuring units on each side of the central rod 10 comprising the stick 22, the heel plate 18, the guide rod 38 and the plates 46. Each frame unit may move independently due to the provision of the spring plates 14 through which

each of the side frame units is connected to the central rod 10. The purpose of this flexible independent movement of the measuring means for each foot will be more readily apparent from the subsequent description of the use of the device as a whole.

The inward movement of the slide 54 with respect to the rod 10 is limited by the stop member 70 and the outward movement is similarly limited by a stop 72. The outer arms 74 of the plates 46 extend transversely and outwardly with respect to each of the measuring sticks 22 and overlap the top and bottom sides of the sticks 22. These outwardly directed arms 74 provide means for mounting the outwardly movable side plates 76, mechanism being provided for reading the width size of the feet in accordance with the position of each of the plates 76 with respect to its associated arms 74.

It will be understood that the mechanism through which each of the plates 76 is mounted is the same on each side of the double foot measuring device. Vertical pins 78 and 80 are fixed to the arms 74. The pin 78 forms a pivot for the movable lever 82 which is connected by a pin 84 to an arm 86 which extends at a right angle from and is fixed at its outer end to the side plate 76. Links 88 are pivoted on the pin 80 and connected to the arm 86 by the pivot pin 90. The arm 86 of the side plate 76 is mounted through the lever arm 82 and the links 88 so as to maintain substantial parallelism between the side plates 76 and the associated measuring stick 22. A tension spring 92 is connected at 94 to the arm 86 and is fastened at the other end to a fixed pin 96.

The linkage for mounting the side plate 76 is enclosed in a housing 98. The housing at its forward margin is arcuately curved as shown in Fig. 1 and the top surface thereof is provided with a scale 100 from which may be read the proper width size according to the position of the protruding end of the lever arm 82 which has an indicating marking 102 thereon. It will be noted that each side plate 76 is free to move in either direction inwardly or outwardly with respect to its associated measuring stick 22. The inner part of the casing 96 forms a toe plate 104 adapted to engage the toe of the foot.

The foot measuring device is placed on the floor or a suitable platform, resting upon the feet 30 and 31 and the feet 32 so that it is free to readily move about on the support. The operator, while holding the device by the handle 12, pulls forwardly on the handle 58 thereby causing the slide 54 to move forwardly and transmit movement through the levers 62 and 66 to the toe plate means. The toe plates will therefore be moved forwardly to the full extent of the permitted movement and at the same time the side plates 76 will move outwardly with respect to the measuring sticks 22. The device is then ready to receive the feet of the person whose feet are to be measured. The feet are placed with their inner sides against the outer sides of the measuring sticks 22. The operator, by pulling on the handle 12, will move the device as a whole to bring the heel plates into contact with the heels of the feet. It will be understood that due to the flexible character of the device that the heel plates may have a limited extent of independent movement so that the plates will come into contact with the heels of both feet. The slide handle 58 is then released and the operator may assist the return movement of the toe plates into con-

tact with the toes of the foot. The springs 48 are intended to be relatively light springs which will act to keep the heel plates and toe plates in contact with the heels and toes of the feet when the operator removes his hands from the device. The side plates will come into contact with the outer sides of the feet as the toe plates move rearwardly, and it will be understood that the side plates 76 may readily move outwardly with respect to the toe plates due to the provision of the parallel links through which the side plates are connected to the toe plates. The springs 92 maintain contact of the side plates against the outer sides of the feet and the measuring sticks against the inner sides of the feet independent of any manual adjustment by the operator.

As shown in Fig. 1, each foot makes contact at five points, namely, at *a* where the heel abuts against the heel plate; at *b* where the side of the heel contacts the measuring stick 22; at *c* where the inside of the ball contacts the stick 22; at *d* where the toe contacts the toe plate 104; and at *e* where the outside of the ball of the foot contacts the side plate 76. The proper length size may then be read from the scales on the strips 28.

Accredited authorities recommend that foot measurements be taken with the foot extended to its full extent which may occur under conditions of standing or walking. Thus it is preferable that an individual foot be measured with the entire weight of the body applied to that foot. The recognized military authority, Colonel Munson, recommends that marching shoes be fitted by taking the measurements of a foot with the entire weight of the body plus a weight equivalent to a forty-pound pack applied to the foot. The recommended practice, however, is not generally followed and shoe fitting devices are used with the person whose foot measurements are to be taken in a sitting position or in a standing position with the weight evenly distributed between the feet. Although I recommend that my device be used in a manner that will eliminate so far as possible the exercise of judgment on the part of the operator so that the device may be used by untrained operators, it will be understood that my device will give results comparable to other devices even though the recommended practice is not followed.

In using my device, the overall or heel to toe length scale is first read. The overall length size may be sufficient in fitting certain types of shoes to the feet, but I have shown in Fig. 1 the provision of separate scales for reading the heel to ball length in terms of shoe size. It will be understood that a normal foot will measure the same shoe size whether the measurement is taken overall or from heel to ball. With my device the heel to ball length size may be read by the operator using his thumb to find the ball joint and reading across on the heel to ball scale, which scales are arranged inwardly of the measuring sticks with reference to the overall length scales. If the reading of the heel to ball length size indicates a larger size than the overall length size, the feet may be fitted to shoes of the larger size. For example, in Fig. 1 the foot shown measures $6\frac{1}{2}$ overall and $7\frac{1}{2}$ heel to ball. In such case the foot should be fitted to a $7\frac{1}{2}$ shoe size, or at least to a 7 shoe size. This fitting will leave more room between the end of the toes and the end of the shoe, but the ball length of the shoe will

fit the foot more accurately than would a shoe of $6\frac{1}{2}$ length size.

It will be understood that the operator should read the length measurement for each foot and it may be found that one foot is longer than the other. In this case the shoe size should be selected from the measurements of the longer foot.

As in my prior Patent No. 1,582,636, the movable toe plate that carries the movable side plate moves at an angle with respect to the measuring stick so that the side plate will move outwardly with respect to the measuring stick the distance of a width size for each unit of overall length size that the toe plate is moved forward, it being understood that a 9-C foot is wider than a 7-C foot in the standard system of shoe sizes. The proper size width may be readily determined from the position of the indicator 102 on the lever 82 with respect to the width scale 100. It should be understood that as the weight of the body is applied to the foot, the sides of the foot will spread outwardly and with my device the spreading of the foot will cause the side plate 76 to move outwardly with respect to the measuring stick so that an even pressure is applied to both sides of the foot. If the foot were resting on a bed plate with a fixed side bar, the foot would have to move on the bed plate to accommodate the spreading of the foot, otherwise there would be too great a pressure against the side bar. If it has been determined that the feet should be fitted to shoes of a length size greater than that indicated by the overall length size scale, the toe plates should first be moved forwardly so that the selected overall length size is indicated before reading the width size scale. For example, in Fig. 1 if it is determined to fit the shoes to a $7\frac{1}{2}$ length size from reading the heel to ball scale, the toe plates will be moved forwardly until $7\frac{1}{2}$ is indicated on the overall scale and the width measurement will then be read. This would indicate a B width and the feet would be fitted to $7\frac{1}{2}$ B shoes, whereas if the shoes were fitted from the overall length scale without reading the heel to ball scale, the feet would be fitted to $6\frac{1}{2}$ C shoes.

It will be understood that it is advantageous to use the springs 48 and 92 for causing the toe plate and the side plate to resiliently remain in contact with the foot under light pressure but that the device could still be used without the springs if the operator uses care in pressing the toe plate and side plate into contact with the foot.

Fig. 7 illustrates a measuring device adapted to measure one foot at a time. Thus the device as shown in Fig. 7 would be used in the position shown for measuring the left foot and then turned over to measure the right foot. The device as shown comprises the central measuring stick 110, the heel plate 112, the movable toe plate 114 and the movable side plate 116. The toe plate 114 is guided for movement on the rod 118 and is normally held in retracted position by the spring 120. The stop member 121 limits the movement of the toe plate 114 in either direction. The overall foot length is measured on the scales which are suitably provided on the upper and lower surfaces of the measuring stick 110. Thus the heel to toe length would be indicated by the forward edge of the movable toe plate where it crosses the surface of the measuring stick. The proper shoe width size will be indicated by the movement of the arm 122 with respect to the scale 124. The lever 122 is loop

shaped as shown in the side view of Fig. 8 to serve as a handle for manually moving the toe plate 114 forwardly to open the device for receiving the foot to be measured.

I claim:

1. A foot measuring device comprising a measuring stick, a heel plate in fixed relation to one end of said stick extending at right angles thereto, a toe plate disposed parallel to said heel plate, means supporting said toe plate for movement with respect to said stick in a direction at an angle to said stick, a side plate extending from said toe plate parallel to said stick, means comprising parallel links supporting said side plate for lateral movement with respect to said toe plate, said measuring stick having a length size scale thereon, said toe plate having a width size scale in fixed relation thereto, and indicating means movable with said side plate and cooperating with said width size scale.

2. In a foot measuring device for indicating the length and width of the foot in terms of shoe size, a measuring stick having a length size scale thereon, a heel plate fixed to one end of the measuring stick, a toe plate member mounted for resilient movement towards said heel plate, a side plate mounted for movement laterally with respect to said measuring stick, said side plate having an arm extending at right angles thereto towards said measuring stick, a pair of links pivotally connected to said arm and said toe plate member, said toe plate member including a casing having a width size scale thereon, one of said links having a lever arm connected thereto, said lever being movable in indicating relation to said width size scale.

3. A foot measuring device for indicating the length and width of a pair of feet in terms of shoe sizes comprising a pair of measuring sticks, each of said measuring sticks having a heel plate fixed to one end thereof and a toe plate mounted for longitudinal movement with respect to the measuring stick, each of the movable toe plates having a laterally movable side plate mounted thereon, a resilient connection between the pair of heel plates, and means interconnecting the pair of movable toe plates for moving said toe plates in a direction away from said heel plates, said means providing for independent relative movement of said toe plates in a direction towards said heel plates.

4. In a shoe size fitting device for a pair of feet, heel plate means for engaging the heels of a pair of feet, means extending forwardly from said heel plate means for engaging the inner sides of the pair of feet, toe plate means for engaging the toes of the pair of feet, said toe plate

means being mounted for movement with respect to said heel plate means and the means for engaging the inner sides of the feet, and a single manually operable control for moving said toe plate means.

5. In a shoe size fitting device for a pair of feet, heel plate means adapted to be engaged by the heels of a pair of feet, means extending forwardly from said heel plate means adapted to be moved into engagement with the inner sides of the pair of feet, toe plate means adapted to be moved into engagement with the toes of the pair of feet, said toe plate means being mounted for movement with respect to said heel plate means and the means for engaging the inner sides of the feet, side plate means movable to engage the sides of the pair of feet, said side plate means being mounted for movement with said toe plate means and laterally movable with respect thereto, a single manually operable control for moving said toe plate means and said side plate means, and means for indicating length and width sizes for the feet.

6. In a device for determining the length and width of a pair of feet in terms of shoe size, a pair of measuring sticks one of which is for the right foot and the other for the left foot, each of said sticks having a length size scale thereon, a pair of heel plates, each of said heel plates being mounted in fixed relation to one of said sticks and extending transversely with respect thereto, leaf spring means connecting the pair of heel plates, said leaf spring means permitting limited relative movement between said measuring sticks, a pair of guide members, each of said guide members being mounted in fixed relation to one of said sticks and extending at an angle thereto, a pair of toe plates, each of said toe plates being supported for movement by one of said guide members, said toe plates having arms extending parallel to said heel plates, a pair of movable side plate members, each of said side plate members being mounted on an arm of one of said toe plates for movement laterally with respect to the associated stick, a rod fixed at one end to said leaf spring means intermediate said heel plates, a control member mounted for movement on said rod, linkage connections between said control member and each of said toe plates, said linkage connections permitting limited relative movement between said toe plates and resilient means tending to move said toe plates toward said heel plates, said toe plates being movable away from said heel plates by movement of said control member.

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