Oct. 21, 1952 L. J. ZADROZNY 2,614,332

CRUTCH GAUGE

Filed April 25, 1951 2 SHEETS—SHEET 1

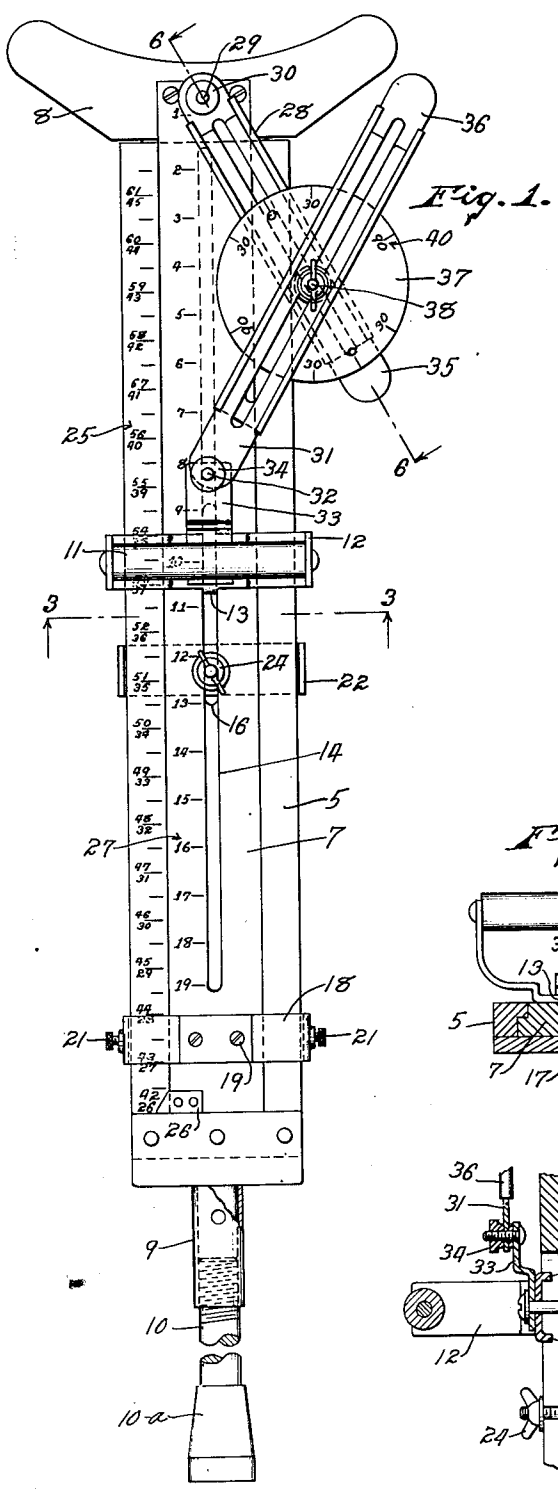


Fig. 1.

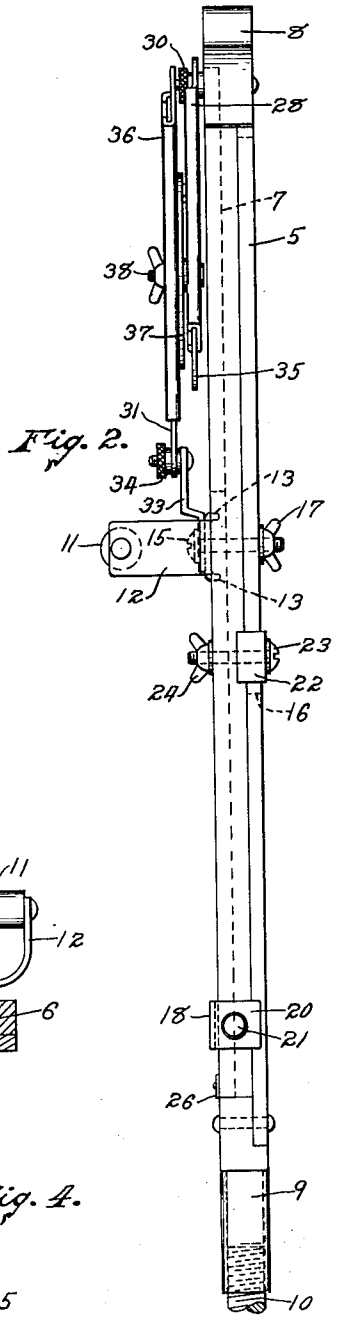


Fig. 2.

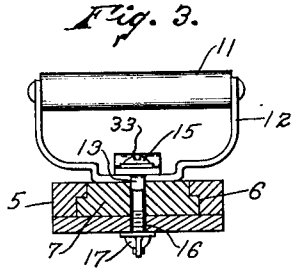


Fig. 3.

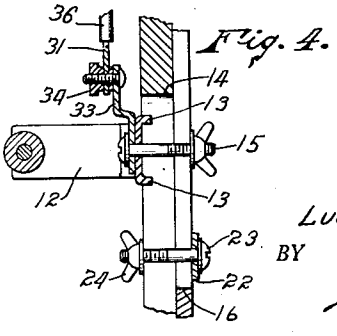


Fig. 4.

INVENTOR.
LUCIAN J. ZADROZNY
BY
Louis V. Lucia
ATTORNEY.

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Fig. 5.

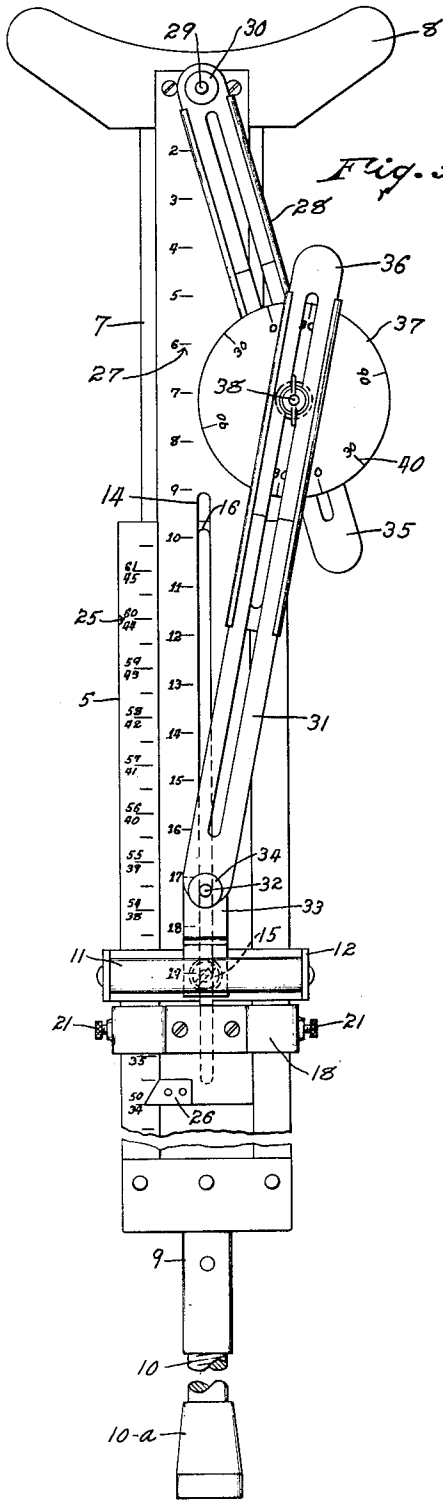


Fig. 7.

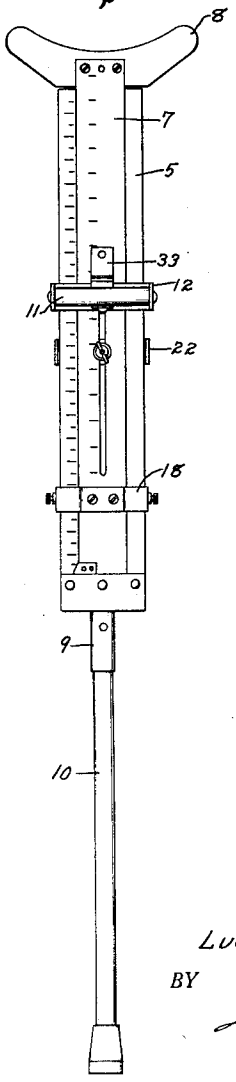
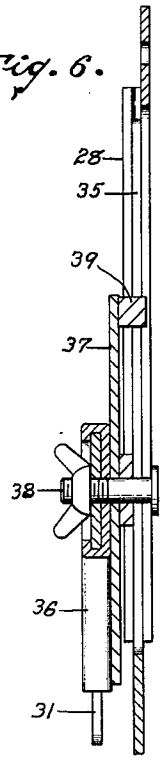


Fig. 6.



INVENTOR.
LUCIAN J. ZADROZNY
BY
Louis V. Lucia
ATTORNEY

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CRUTCH GAUGE

Lucian J. Zadrozny, New Britain, Conn.

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4 Claims. (Cl. 33—174)

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This invention relates to a crutch gage and more particularly to a device for accurately fitting crutches to persons.

An object of this invention is to provide a crutch gage which may be readily adjusted to a person, so as to determine the most comfortable length and position of the crutch handle, and which may be actually used by the person until the most comfortable length and position of the crutch has been definitely determined.

It is a further object of the invention to provide such a gage which, when finally adjusted, will indicate the accurate length of the crutch and the position of the handle, so that a conventional crutch may be modified to correspond with the indications given by the gage.

A still further and important advantage of my invention is the provision of a goniometer in combination with said gage for accurately determining the theoretical position of the crutch handle which corresponds to the arm measurements of the person to which the crutch gage is fitted.

Further objects and advantages of this invention will be more clearly understood from the following description and the accompanying drawings in which:

Fig. 1 is an elevational view of my improved crutch gage with parts thereof broken away.

Fig. 2 is a side view of said crutch gage.

Fig. 3 is a sectional end view on line 3—3 of Fig. 1.

Fig. 4 is a sectional side view of a portion of the crutch gage.

Fig. 5 is a view similar to Fig. 1, but showing the crutch gage in adjusted position.

Fig. 6 is an enlarged sectional side view of the goniometer on line 6—6 of Fig. 1.

Fig. 7 is an elevational view of the crutch gage on a reduced scale and showing the same adjusted for a different length and handle position.

In the embodiment of my invention which is illustrated in the drawings, my improved crutch gage comprises a frame 5 having a dove-tailed guideway 6 in which there is slidably mounted a slide bar 7 which carries the crosspiece 8 at the upper end thereof. The lower end of the frame 5 has secured thereto a connecting member 9 to which there is detachably secured an extension bar 10 that is preferably threaded to the said connecting member. The said bar 10 has a rubber tip 10–*a* secured thereto to prevent slippage of the crutch while in use.

The bar 7 adjustably carries a handle 11 thereon which includes a U-shaped bracket 12 that is slidably adjustable on the said slide bar 7. This

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bracket has projections 13 on the base thereof which extend into a longitudinal slot 14 in the said slide bar for guiding the bracket on the said bar. A clamping screw 15 extends through the said base, the slot in the slide bar and through a slot 16 in the frame 5 and the said clamping screw has a wing nut 17 thereon for clamping the bracket 12 in adjusted position upon the slide bar 7, and the said slide bar in adjusted position relatively to the frame 5.

In addition to the clamping screw 15, a clamping strap 18 is provided for adjustably clamping the slide bar to the frame. This strap 18 is secured to the front of the bar 7, by means of screws 19, and has perpendicular end portions 20 which carry clamping screws 21 that engage the opposite edges of the frame. An additional clamping strap 22 is provided at the opposite side of the frame 5 and clamps the said frame and slide bar 7 together by means of a clamping screw 23, which has a clamping nut 24, that extends through the slots 14 and 16 in said slide bar and frame.

The frame is provided, along one side thereof, with graduations 25 which are numbered to correspond to the different lengths at which the gage may be used. The lower numbers indicate the length of the crutch when the extension bar 10 is removed and a rubber tip, similar to the tip 10–*a*, is placed directly over the connecting member 9. The higher numbers indicate the length of the crutch when the extension bar 10 is used as shown in the drawings. The slide bar 7 carries, at the lower end thereof, an indicating pointer 26 which registers with the said graduations for indicating the length to which the regular crutch is to be altered.

The slide bar 7 also carries, along one side thereof, a series of graduations 27 and the center of the bracket 12 registers with said graduations to indicate the correct distance at which the handle of the regular crutch is to be placed from the crosspiece 8.

In order to determine the correct theoretical position of the crutch handle, for the particular person being fitted, I provide a goniometer in combination with my improved crutch gage. Such a goniometer includes an upper angle bar 28, that is pivotally and detachably secured at the pivotal point 29 by means of a stud having a securing nut 30 threaded thereto, and a lower angle bar 31 which is pivotally secured, at the point 32, by means of a nut 34 which is threaded to a stud that is carried at the end of an extension 33 on the handle bracket 12.

The said angle bars **28** and **31** each has slidably mounted thereon an extension bar **35** and **36**, respectively, which are adapted to be extended from said angle bars when required, as illustrated in Fig. 5.

Between the angle bars there is mounted a disc-shaped dial **37** which is secured to the goniometer by means of a clamping bolt **38** that extends through the longitudinal slots in the angle and extension bars and clamps the said bars and disc together in adjusted position. The said dial **37** is secured to the angle bar **28** by means of a projection **39** which extends into the slot in said angle bar and prevents rotation of the dial. Graduations **40** are provided on the dial to denote angle and thereby indicate the angular relation between the two angle bars **28** and **31** and facilitate the adjusting of the goniometer for the required angles.

My improved crutch gage is used in the following manner when it is desired to determine the proper length of a crutch and position of the crutch handle to fit a particular person:

Assuming that the crutch gage is being used for an adult and the extension bar is, therefore, attached to the connecting member **9**, the supporting bar **7** is moved vertically in the frame **5** to a position where the length of the crutch gage is considered correct for the person. The clamping screws **21—21** are then used to clamp the slide bar **7** in position. Any further adjustments may be made by simply loosening the screws **21—21**, after the length of the crutch has been accurately determined, the clamping screw **23** and the wing nut **24** are tightened to firmly secure the slide bar **7** to the frame in adjusted position.

After the crutch gage has been adjusted for length, as above described, the goniometer is adjusted to determine the theoretically correct position of the crutch handle **11** for the person being fitted. This is first done by measuring the person's upper arm from the shoulder to the elbow and then setting the clamping screw **38** at a corresponding distance from the pivotal point **29**. The forearm is then measured from the elbow to the center of the wrist and the screw **38** is placed at a corresponding distance from the pivotal point **32**. The angle bars **28** and **31** are then relatively adjusted at an angle of thirty degrees to each other, which has been determined to be the angle of optimum functional relationship between the upper arm and forearm of a person while using a crutch. This adjustment is obtained by moving the handle bracket **12** downwardly in the slot **14** to thereby rotate the angle bar **31** on the pivot screw **38** until it registers with the graduations indicating the thirty degree angle, as clearly illustrated in Fig. 5. When the goniometer has been thus adjusted, the clamping nut **17** is tightened to thereby secure the handle in the position to which it has been moved and which has been determined by the adjustment of the goniometer, and the handle will then be in the theoretically correct position for the person being fitted. Should the person being fitted have certain body deformities, the thirty degree angle may vary. In such cases, the best functional upper and forearm angle can be quickly determined by using the thirty degree angle as a starting basis and then adjusting the handle to the position at which the most efficiency is obtained.

After the crutch gage has been firmly secured in its adjusted position, the goniometer may be detached therefrom, by merely removing the securing nuts **30** and **34**, and the crutch gage may be used as a regular crutch and minor adjustments may be made until it has been definitely determined that the most satisfactory length of crutch and position of handle has been found for the maximum comfort of the person being fitted. The most suitable dimensions for the crutch length and position of handle may then be readily obtained from reading the graduations **25** and **27** and their related indicia, and a regular crutch is then altered to correspond to these dimensions.

It will be clearly understood from the foregoing description that my improved crutch gage provides novel means for accurately determining the correct position of the crutch handle, which has heretofore been very difficult to determine, and that the said position of the handle is obtained in accordance with a theoretical formula which is based upon the natural angular relation between the upper arm and forearm of a person while using a crutch and which angle has been found to give the most comfort and efficiency in the use of crutches.

I claim:

1. A crutch gage comprising an elongated frame, a slide bar longitudinally slidable on said frame, a handle bracket longitudinally adjustable on the slide bar, a crosspiece carried on the upper end of the slide bar, and a goniometer for determining the correct theoretical position of said handle bracket; the said goniometer including a lower angle bar pivotally secured to and extending from the handle bracket, an upper angle bar pivotally secured at a point on the crosspiece and extending therefrom and angularly crosswise to the lower angle bar, and a dial secured to one of said angle bars and having indicia thereon for indicating the relative angle between said angle bars at which the goniometer is adjusted for determining the position of the handle.

2. A crutch gage comprising an elongated frame, a slide bar slidable longitudinally in said frame, a handle bracket carried on said slide bar and adjustable longitudinally thereof, a crosspiece carried upon the upper end of the slide bar, means for clamping the slide bar to the frame in adjusted position, and a goniometer for determining the theoretically correct position of the handle with relation to the crosspiece; the said goniometer including a lower angle bar pivotally secured to the handle bracket and extending upwardly therefrom, an upper angle bar pivotally secured at a point on the crosspiece and extending downwardly therefrom, each of said angle bars having longitudinal slots therein, a dial disc between said angle bars, a projection on said dial disc fitting into the slot of one of said bars for preventing rotation relatively thereto, a clamping screw extending axially through the disc and through the slots in said angle bars for clamping the said bars in adjusted position, and indicia on the disc for indicating relative angles between the said angle bars.

3. A crutch gage comprising an elongated frame, a slide bar longitudinally slidable on said frame, a crosspiece carried upon the upper end of the slide bar, means for clamping the slide bar to the frame in adjusted position for varying the length of the crutch gage, a handle bracket vertically adjustable on said slide bar for varying the distance between the said bracket and the crosspiece, a handle on said bracket, and a goni-

ometer for determining the accurate theoretical distance between the said crosspiece and handle; the said goniometer comprising a lower angle bar pivotally secured to and extending upwardly from the handle bracket, an upper angle bar pivotally secured at a point on and extending downwardly from the crosspiece, each of said angle bars including an extension bar slidable thereon and having aligned slots extending longitudinally through said angle bars and extension, a disc-shaped dial positioned between the said angle bars and having a projection slidably fitting within the slot in one of said angle bars, a clamping screw extending axially through the dial and the slots in the angle bars for clamping the said angle bars and disc together in adjusted position, and indicia upon said dial cooperating with one of said bars for indicating the required relative angle between the said angle bars to determine the proper distance of handle from the crosspiece, and means for clamping said handle in adjusted position.

4. A crutch gage comprising an elongated frame having a longitudinal groove in one side thereof, a slide bar longitudinally slidable in said groove, a crosspiece carried on the upper end of said slide bar, aligned slots extending longitudinally through the said slide bar and the portion of the frame forming the bottom of the groove, clamping means extending through said slots for adjustably securing the slide bar to the frame, a handle bracket carried on said slide bar and adjustable thereon, the said bracket having projections extending into the slot in the slide bar for guiding the bracket on the said slide bar, an extension on said bracket, and a goniometer for determining the correct theoretical distance between the crosspiece and the handle; the said goniometer including a lower angle bar pivotally secured to said extension and extending upwardly

therefrom, an upper angle bar pivotally secured at a point on the crosspiece and extending therefrom crosswise to the lower angle bar, both of said angle bars including extensions longitudinally slidable thereon and having aligned slots extending through said angle bars and extensions, a disc-shaped dial member positioned between the said angle bars and having a projection thereon extending into the slot of one of the said angle bars for preventing rotation of the said dial member relative thereto, a clamping screw extending through the said slots and dial member for securing the said angle bars and disc together in relatively adjusted positions, indicia on said dial member registering with the other angle bar for indicating relative angles between the said angle bars for which they are adjusted to determine the proper distance of the handle from the crosspiece, and means for securing the handle bracket in adjusted position, the said securing means comprising a clamping screw extending through the said handle bracket and the slots in the said slide bar and frame and being adapted to secure the handle bracket, the slide bar and the frame together in adjusted position.

LUCIAN J. ZADROZNY.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
39,854	Wemple	Sept. 8, 1863
725,612	Calentine	Apr. 14, 1903
885,339	Hargrove	Apr. 21, 1908
1,262,153	Wolf	Apr. 9, 1918
2,474,722	Blame	June 28, 1949
2,528,706	Osborn	Nov. 7, 1950