May 3, 1955

G. K. CHAPIN

2,707,477

WALKING CRUTCH

Filed April 24, 1950

2 Sheets-Sheet 1

Fig. 1.

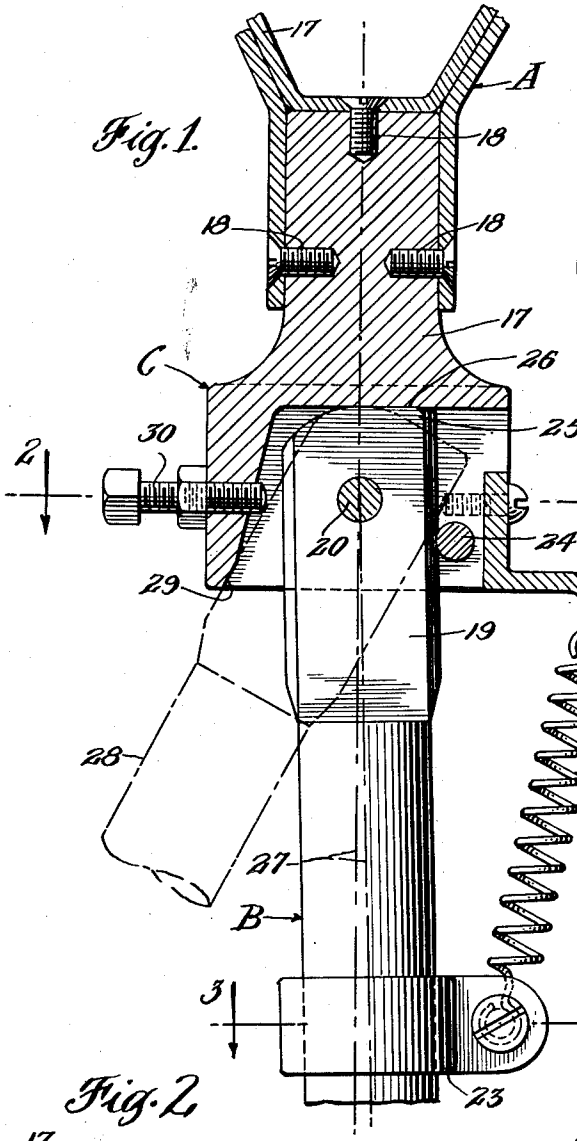


Fig. 3.

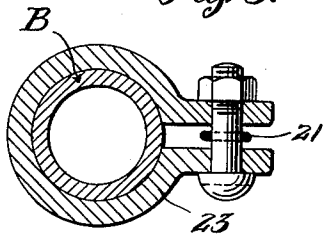


Fig. 4.

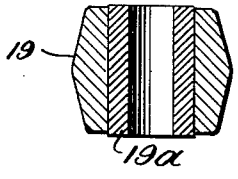
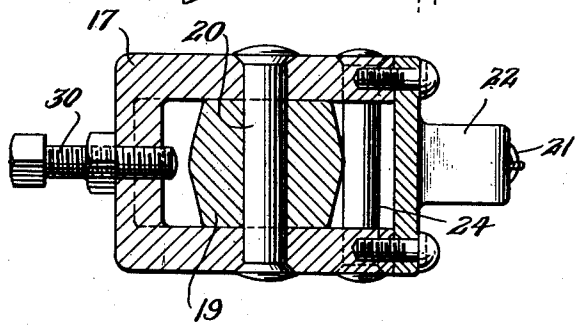


Fig. 2.



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Fig. 7.

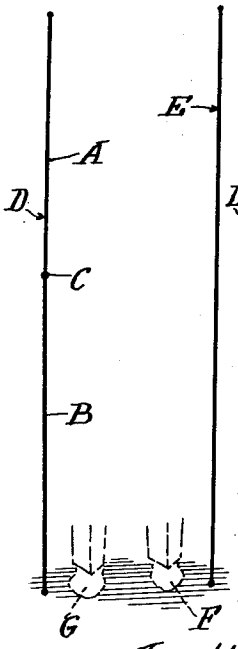


Fig. 8.

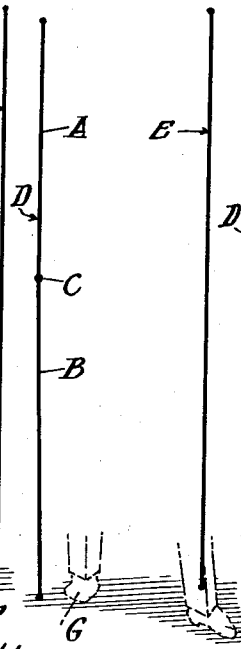


Fig. 9.

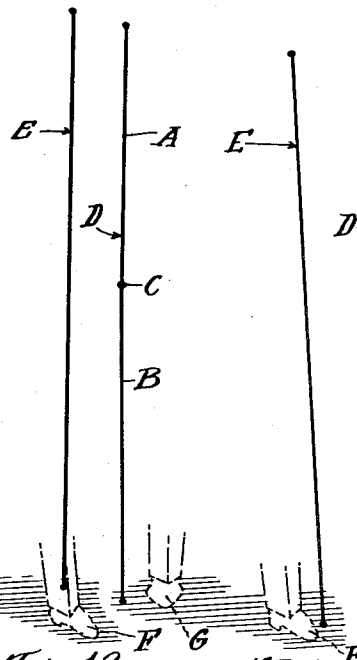


Fig. 10.

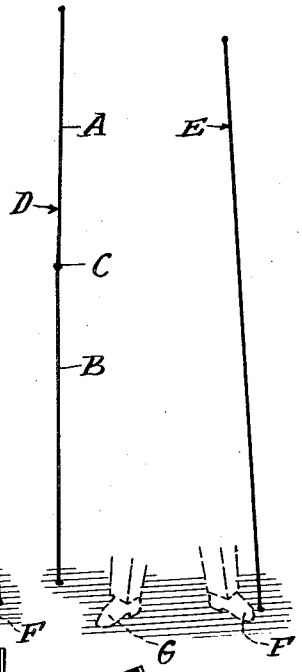


Fig. 11.

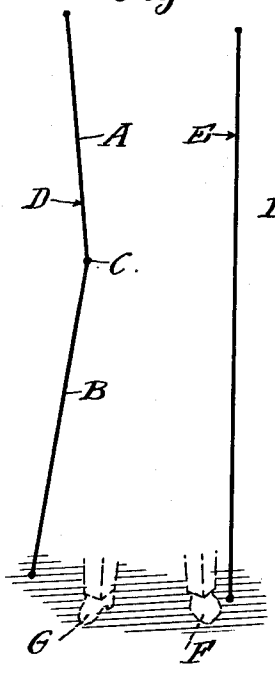


Fig. 12.

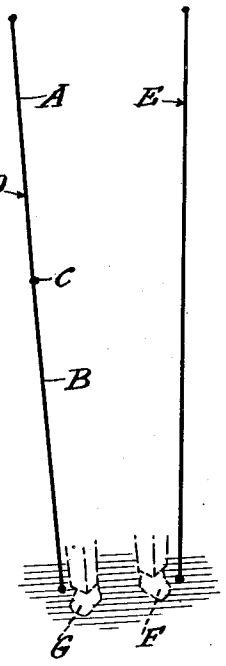


Fig. 5.

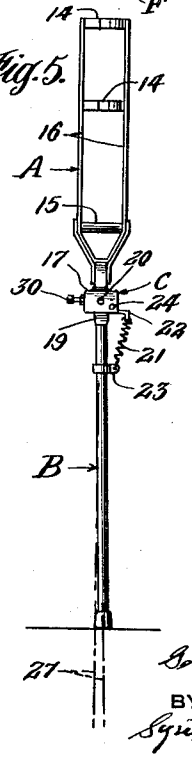
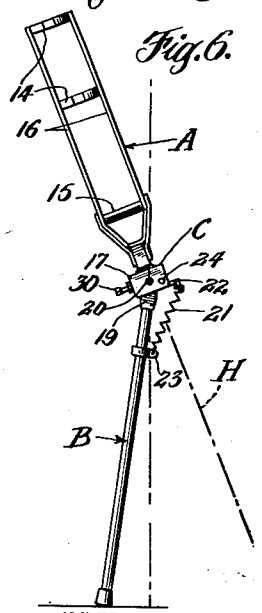


Fig. 6.



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WALKING CRUTCH

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Application April 24, 1950, Serial No. 157,799

10 Claims. (Cl. 135—49)

This invention relates to crutches and in particular to what may be termed a walking crutch in that it operates, as will appear, to move iself to stepping positions and thus relieves a user having arm muscle deficiencies of having to lift and move the crutch to advance stepping positions.

It is known that there are patients who would avail themselves more often of the opportunity of walking with crutches if it were not for the fact that they suffer from arm muscle deficiencies to the extent that they cannot lift a crutch and move it forward in the necessary manner without extreme difficulty and exertion and without help from others. In order to overcome these difficulties and to make it possible for such patients to comfortably use crutches without help from others, I have devised a crutch which with slight body motion will operate to move itself to stepping positions. Thus such patients are enabled to gain the orthopedic advantages of using crutches and thereby strengthen their deltoids.

The primary object of my invention is to provide a walking crutch having the advantages above set forth.

More specifically stated, it is an object of my invention to provide a spring jointed crutch which, without lifting it up and moving it forward through the use of the arm muscles, will through spring action move itself forward into stepping positions.

Another object of the invention resides in the provision of a spring jointed crutch which, although it is adapted to be intentionally buckled to obtain spring action for kicking it forward, so to speak, to its next stepping position, is also adapted to act as a solid or rigid crutch when it is leaned on in a normal manner.

Stated another way, it is an object of my invention to provide a jointed crutch adapted to act in the manner of a rigid crutch when leaned on in a normal manner and to act as a spring-actuated forward-stepping crutch when intentional buckling of the clutch is initiated by body action of the user.

Other objects have to do with simplicity of construction, lightness in weight, and adjustment to suit the user.

How the foregoing, together with such other objects and advantages as will hereinafter appear, are realized is illustrated in the acompanying drawings, in which—

Fig. 1 is a fragmentary vertical sectional view of the operating mechanism of a crutch constructed in accordance with my invention;

Fig. 2 is a plan section taken on the line 2—2 of Fig. 1;

Fig. 3 is a plan section taken on the line 3—3 of Fig. 1;

Fig. 4 is a plan section of a modified bearing I employ;

Fig. 5 is an elevational view of my crutch in its normal position;

Fig. 6 is an elevational view of my crutch with the joint tensioned and ready to spring into forward stepping position; and

Figs. 7 to 12 inclusive are diagrammatic views illustrating the preferred procedure in using the crutch of my invention.

The crutch comprises in general an upper arm portion

A, a lower shank portion B, and a spring joint C connecting said portions. The arm portion A is provided with arm rests or bands **14**, a hand rest **15**, and side members **16** of the usual construction employed in known rigid crutches.

The spring joint C of my invention comprises a socket member **17** secured to the lower end of the arm portion A as by means of screws **18**, a head **19** provided at the upper end of the shank portion B, a transverse pivot or hinge pin **20** carried by the socket member **17** for pivotally mounting the shank portion B, and a tension spring **21** connected at its upper end to the socket **17** as by means of a bracket **22** and at its lower end to the shank portion B as by means of a clamp **23**. The tension of the spring **21** may be altered to suit the user by adjusting the position of the clamp **23** on the shank B. In Figure 4 I have shown a bushing **19***a* in the head **19** which is replaceable in the event of wear of the joint.

In Figs. 1 and 5 the two portions of the crutch are shown in their normal positions in which they are substantially in alignment approximating a straight angle and under spring tension. Spring **21** is on the forward going side. In order to so position the members I have provided a transverse stop pin or abutment **24** in engagement with which the head **19** is normally held by the spring **21**. In this normal position of the parts, the portion **25** of the head **19** contacts the wall **26** of the socket **17** to act as an additional stop.

The stop pin **24** is positioned in offset parallel relation to the pivot pin **20** and in a plane below the plane of the pivot pin, the amount of offset being such that the axis of shank portion B and the axis of arm portion A are slightly out of alignment when aforesaid crutch portions are held in this (the normal) position, under the influence of spring **21**. The amount of angular offset is generally indicated by the dot and dash lines **27** in Figures 1 and 5. Thus when weight is put on the crutch the head **19** of the shank and the stop pin **24** are forced into tight engagement to prevent unintentional buckling of the crutch in leaning on it in a normal manner. It is pointed out that the amount of offset of the stop pin is preferably such that the angle formed under the tensioning influence of the spring is only slightly less than a straight angle in order to have the crutch as straight as possible in its normal position.

In Figure 6 and in the dot and dash line position **28** of Figure 1, I have shown the angular relation of the two crutch portions when the crutch is intentionally buckled, it being noted that the parts are moved to this position against the action of the spring **21**. The external angle of the crutch then points in the forward direction. The extreme amount of angular movement in this direction is limited by the abutment **29** carried by the socket **17**, as clearly seen in Figure 1. However, the amount of this angular movement may be adjusted to suit the user by means of an adjusting screw **30**. As shown in Figure 1 the adjusting screw is in its outermost position of adjustment in which the head **19** engages the abutment **29**. When the screw is adjusted to provide a smaller angle of adjustment the head leaves the abutment **29** and the screw becomes the abutment.

Referring now to the diagrammatic Figures 7 to 12 inclusive, I have illustrated therein the method of using my improved crutch D under the right arm in association with a crutch E of the usual rigid form under the left arm. In the starting position of Figure 7, both crutches are placed alongside of the legs and the weight of the body is put on both crutches for balance and then the right arm crutch D is mainly leaned on and the left foot F is moved a step forward as shown in Figure 8. Next the left arm crutch E is moved forward to the position of the left foot F, as shown in Figure 9, still leaning

mainly on the right arm crutch D. Next the right foot G is moved forward to the position shown in Figure 10 with the weight on both crutches. Next weight is relieved from the right foot G and more weight is taken by the left foot F, and the body is moved to throw the right hip toward and against the right arm crutch D in the region of the joint C to break the joint and buckle the crutch to the position shown in Figures 11 and 6. In this position the tension of the spring **21** is increased and its force tends to move the shank portion of the crutch to the position indicated by the dot and dash line H in Figure 6. However, the crutch is being held downwardly against the floor so that the crutch remains in the position of Figure 11. Next a slight additional upward motion is given to the right hip and shoulder toward the right arm crutch D and this relieves weight from this crutch so that the shank portion is sprung or kicked forward to the position of the dot and dash line of H of Figure 6 and the crutch assumes the position of a step forward as shown in Figure 12. With the crutch in this new position a step forward is taken with the right foot G, the body brought forward to move the right arm crutch D to the upright position of Figure 7, and then the above procedure is repeated.

While I have described a procedure above in which one rigid crutch is employed, it will be understood that similar procedure would be followed where two crutches constructed in accordance with my invention are employed. In this connection, it is pointed out that there are many instances in which the use of only one crutch of my invention would be helpful.

I claim:

1. A walking crutch comprising an upper arm portion, a lower shank portion connected by a pivot to said arm portion, a first abutment carried by said arm portion engageable by said shank portion to limit the pivotal movement of the shank portion in one direction, a tension spring connected to said portions to position said shank portion against said first abutment, in which position the axes of the upper arm portion and the lower shank portion intersect whereby to prevent buckling of the crutch when body weight is applied to the upper arm portion, and a second abutment carried by said arm portion engageable by said shank portion to limit the pivotal movement of the shank portion in the opposite direction.

2. A walking crutch comprising an upper arm portion, a lower shank portion, a transverse pin pivotally connecting said portions, a transverse stop pin carried by said arm portion in offset parallel relation to said pivot pin and in a plane therebelow to limit the pivotal movement of the shank portion in one direction, a tension spring connected to said portions to position said shank portion against said stop pin, in which position the axes of the upper arm portion and the lower shank portion intersect whereby to prevent buckling of the crutch when body weight is applied to the upper arm portion, and an abutment carried by said arm portion engageable by said shank portion to limit the pivotal movement of the shank portion in the opposite direction.

3. A walking crutch comprising an upper arm portion, a socket member at the lower end of said portion, a lower shank portion, a head at the upper end of said shank portion fitting into said socket member, a transverse pin passing through said socket member and head to form a hinge joint for said arm and shank portions, an abutment carried by said socket member limiting relative angular movement of said portions in one direction to an angular position slightly less than a straight angle, a tension spring connected to said portions to normally

urge them into said position, in which angular position the axes of the upper arm portion and the lower shank portion intersect whereby to prevent buckling of the crutch when body weight is applied to the upper arm portion, and a second abutment carried by said socket member limiting relative angular movement of said portions in the opposite direction under pressure.

4. A walking crutch comprising an upper arm portion, a lower shank portion pivotally connected to said arm portion, an abutment carried by said arm portion engageable by said shank portion to limit relative angular movement of said portions in one direction to an angular position slightly less than a straight angle, a tension spring connected to said portions to normally hold them in said position, in which angular position the axes of the upper arm portion and the lower shank portion intersect whereby to prevent buckling of the crutch when body weight is applied to the upper arm portion, and a second abutment carried by said arm portion engageable by said shank portion to limit relative angular movement of said portions in the opposite direction.

5. A walking crutch comprising an upper arm portion and a lower shank portion mechanically interconnected and adapted for relative angular movement within defined limits, one of said limits being a load carrying position, mechanism associated therewith for defining said limits of angular movement, and resilient means normally positioning the portions at the load carrying position in which position the axes of the portions intersect.

6. A structure according to claim 5 having for the other limit of angular movement mechanism for adjusting said limit and further including mechanism for adjusting said resilient means.

7. A walking crutch comprising an upper arm portion and lower shank portion; pivot means interconnecting and providing for relative angular movement of said portions; mechanism for limiting the movement of the lower shank portion to a first position on one side and to a second position on the opposite side of the projected axis of the upper arm portion, including for the second position means to adjust the limit of movement; and resilient means normally positioning the lower portion to the first position in which position a plane containing said pivot and the axis of the lower portion intersects with another plane containing said pivot and the axis of the upper arm portion, the first said plane being inclined downwardly as it extends away from the pivot.

8. A walking crutch having an upper arm portion and a lower shank portion and a joint structure connecting said portions and providing for relative angular movement thereof into a first position in which the joint axis lies on one side of a line from upper tip to lower tip of the crutch, said upper tip being the principal point of thrust due to body weight, and into a load-carrying position in which the joint axis lies on the opposite side of said line; abutment means limiting relative angular movement of said joined parts to said load-carrying position in which the joint axis lies closely to said line, and resilient means reacting between said portions and urging them into said load-carrying position.

9. A construction in accordance with claim 1 wherein said second abutment is adjustable.

10. A construction in accordance with claim 4 further including means for adjusting the tension of said spring.

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