G. HIPWOOD.

CRUTCH.

APPLICATION FILED SEPT. 27, 1915.

1,183,008. Patented May 16, 1916.

Fig. 2.

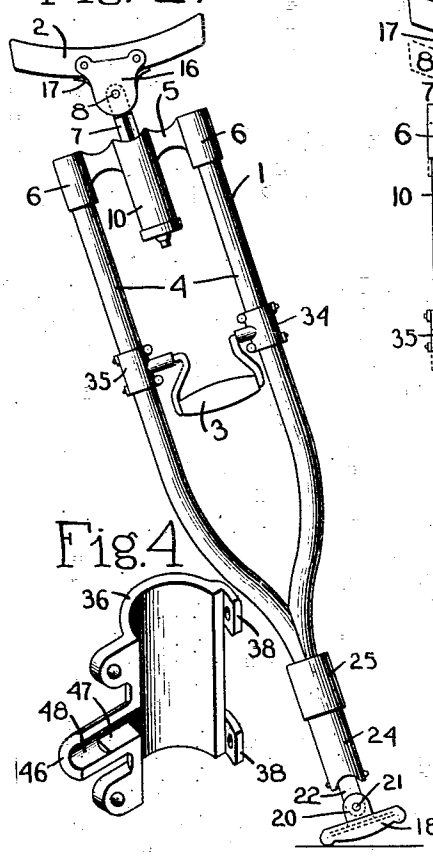


Fig. 1

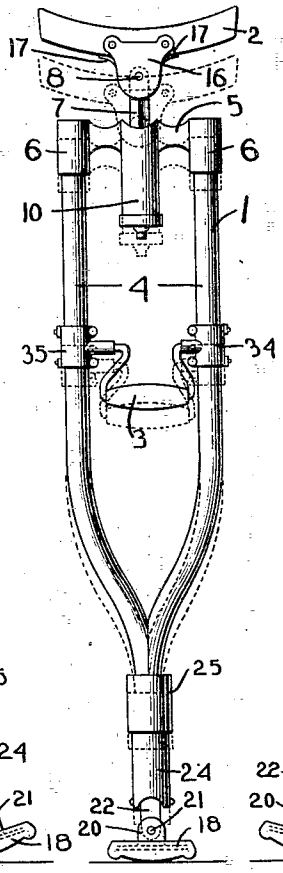


Fig. 3.

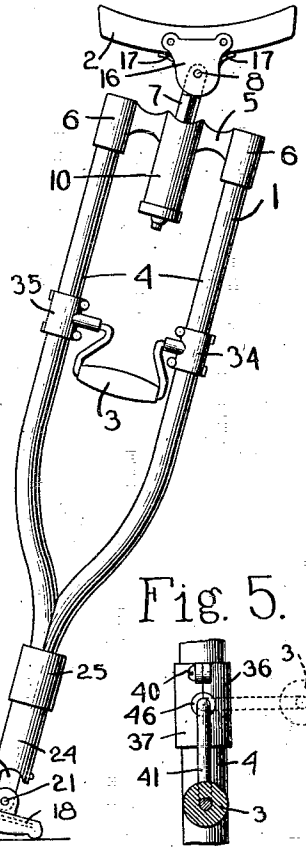


Fig.4

Fig. 5.

Fig. 6.

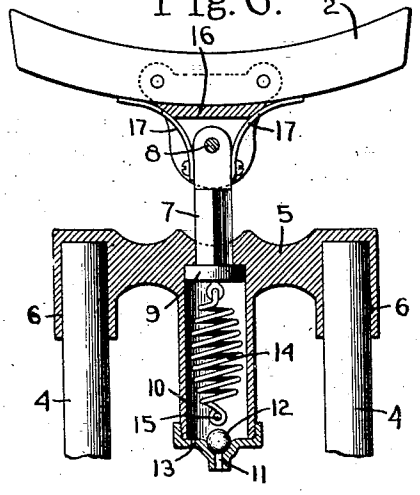


Fig. 7.

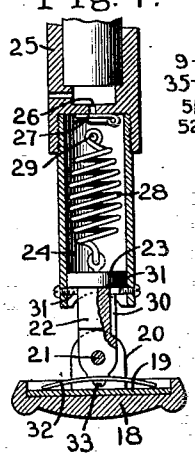


Fig. 8.

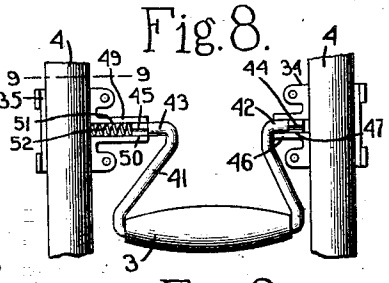


Fig. 9.



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UNITED STATES PATENT OFFICE.

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CRUTCH.

1,183,008. Specification of Letters Patent. Patented May 16, 1916.

Application filed September 27, 1915. Serial No. 52,804.

To all whom it may concern:

Be it known that I, GEORGE HIPWOOD, a citizen of the United States, residing at Boston, county of Suffolk, State of Massachusetts, have invented an Improvement in Crutches, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates to crutches and has for its general object to provide an improved crutch which is more comfortable and convenient to use than the ordinary crutch in which the arm piece is rigid with the crutch body.

When an ordinary crutch is used the swinging movement of the crutch relative to the body causes a sliding movement of the arm rest underneath the arms, and this not only wears out the clothing, but is often the cause of more or less chafing. Further, when the crutch is swung forward to take a step and then the body is moved forward on the crutch, the crutch will turn about its lower end which rests on the ground and the arm rest of the crutch will move in the arc of a circle having the lower end of the crutch as its center. This movement of the arm rest of the crutch lifts the body of the person until the crutch comes into a vertical position, after which the body is lowered slightly. This lifting of the body at each step makes the use of a crutch more or less uncomfortable. In devising my present invention I have aimed to provide a crutch which will eliminate the above-named disadvantages and which can be used with comfort by a cripple.

In order to obviate the undesirable lifting motion of the body as the crutch is swung through its vertical position, I propose to make my crutch longitudinally yieldable so that when the crutch begins to receive the weight of the user it will contract slightly so that as it moves through its vertical position its length will be shortened sufficiently to avoid the undesirable lifting motion of the user's body. I also propose to pivotally secure the arm rest to the crutch body thereby eliminating the undesirable sliding movement of the arm rest under the arm pits as the crutch is swung relative to the body.

In the preferred embodiment of my invention the arm rests are pivotally and pneumatically sustained on the crutch body, thus providing a cushion crutch which will yieldingly sustain its load. I will also preferably pivotally and pneumatically connect the foot of the crutch to the body thereof, so that the crutch has a pneumatic cushion at each end. I have also provided an improved handle which can be placed in a position at one side of the crutch body where it is more convenient to grasp it than if it were placed in the plane of the body. I have also improved the crutch in various other ways, all as will be more fully hereinafter set forth.

In order to give an understanding of my invention I have illustrated in the drawings a selected embodiment thereof which will now be described, after which the novel features will be pointed out in the appended claims.

Figure 1 is a side view showing a crutch embodying my invention; Figs. 2 and 3 are similar views showing the crutch in different positions; Fig. 4 is a perspective view of one half of one of the handle-holding clips; Fig. 5 is a fragmentary view showing the handle in two different positions; Fig. 6 is a vertical sectional view through the upper end of a crutch embodying my invention; Fig. 7 is a similar view through the foot of the crutch; Fig. 8 is a side view of the handle of the crutch; Fig. 9 is a section on the line 9—9, Fig. 8.

1 is the body portion of my improved crutch and 2 the arm rest thereof. The body portion may be made in any suitable or usual way and is herein shown as provided with the two side members 4 between which the handle 3 is received. The upper ends of the side members are secured to a cross-piece or head 5 to which the arm rest 2 is secured. This head or cross-piece 5 is shown as provided with two sockets 6 into which the upper ends of the side members 4 are received. The connection between the arm rest 2 and the body of the crutch is a pivotal yielding connection and in the preferred embodiment of my invention I provide for this by employing a plunger 7 which is slidably mounted in the cross-head 5 and to which the arm rest 2 is pivoted, as at 8, said plunger being acted upon by suitable cushion means by which it is yieldingly sustained. In the construction herein shown this cushion means is partially pneumatic and partially a spring means. The plunger 7 is shown as provided with a head 9 which operates in a cylindrical chamber 10 formed on the cross-head 5. This chamber has an air inlet port 11 which is controlled by a ball valve 12 and

will preferably be provided with a leak-port 13.

14 is a spring, one end of which is fastened to the plunger 9 and the other end of which is secured to a cross-pin 15 extending across and secured to the cylinder 10. The spring 14 is constructed to resist the downward movement of the plunger 7, and the air cushion formed beneath the head 9 also tends to resist such downward movement. As the weight is applied to the crutch, however, the air will gradually escape through the leak-hole 13, thus permitting a gradual downward movement of the arm rest 2. When the weight is relieved from the arm rest, the spring 14 will return said arm rest to its upper position, and during this movement the ball-valve 12 will permit the air to freely enter the cylinder. I will preferably make the spring 14 with larger coils or turns at its central portion than at its ends as this provides a graduated spring. The larger central coils will be more flexible than the smaller end turns of the coil so that when the weight comes on the arm rest the larger center coils of the spring will close together first and as the weight increases the end coils will then come into play.

The arm rest 2 is shown as having a bracket 16 secured thereto which in turn is pivoted to the plunger 7 at 8. 17 designate two centering springs which are secured at one end to the plunger 7 and at the other end rest against the underside of the arm rest 2, said springs thus serving to yieldingly hold said arm rest in its central position. The plunger 7 will preferably be made non-circular thereby to prevent it from turning and insuring that the arm rest 2 will always be held in proper position.

18 indicates the foot of the crutch. This will preferably be made of rubber to which is secured a metal backing 19 having ears 20 that are pivoted at 21 to the lower end of a plunger 22. This plunger 22 is provided with a head 23 which is received in a cylindrical air chamber 24 formed in the ferrule element 25 at the bottom of the crutch body. This air chamber is provided with an air inlet port 26 which is normally closed by a valve 27, the latter being constructed to open inwardly and when closed to allow a slight leakage.

28 is a spring similar to the spring 14, one end of which is secured to the plunger 23 and the other end of which is secured to an anchoring pin 29 extending transversely to the cylinder 24. This spring 28 tends normally to expand and thus to hold the plunger 23 in its lowermost position. When weight is applied to the crutch, the plunger 23 will move upwardly against the resistance of the spring 28 and the air cushion in the chamber 24, and if the weight is continued the air will gradually leak from the chamber 24 to allow still further upward movement of the plunger. When the weight is relieved, the spring will return the plunger to the lowest position and air will be drawn in freely through the port 26. In order to prevent the foot from turning the plunger 22 is provided with grooves 30 in which are received the ends of guiding pins 31.

32 designates a centering spring which operates normally to hold the foot 18 in its central position. This spring is in the form of a leaf-spring which is secured centrally to the lower end of the plunger 22 by a screw 33, the ends of the spring resting against the backing plate 19. This spring will thus tend to hold the foot in the position shown in Fig. 7.

The handle 3 of the crutch is constructed to be vertically adjustable on the body 1 so as to permit it to be placed at the most convenient height for the user of the crutch. For this purpose the handle is sustained by clips 34, 35 that are adjustably clamped on the side members 4 so that they can be raised or lowered. Each of the clips herein shown is made in two parts 36, 37, the part 36 having apertured ears 38 extending therefrom and the part 37 having projections 39 to enter the apertures of said ears. The two parts of each clip are clamped together by clamping screws 40. When the screws 40 are loosened the clips may be adjusted to any desired position on the crutch body, after which they may be clamped in position by tightening up the screws 40.

I will preferably provide a connection between each handle 3 and its clips 34, 35 which will permit the handle to be folded down into line with the side members 4 or to be swung out into a position at right angles thereto, as shown in dotted lines Fig. 5. Said connection is also constructed so that it will lock the handle in either one of these positions. Any suitable way of connecting the handle to the clips to permit this operation may be employed.

In the construction herein shown the handle 3 is mounted on a bail member 41, the arms of which are bent laterally, as at 42 and 43, to enter sockets formed in the clips 34, 35. The end 44 of the laterally-bent portion 42 is made non-circular and the end 45 of the laterally-bent portion 43 is also made non-circular. The clip 34 is made with a boss 46 having a socket, the inner end 47 of which is non-circular in shape to fit the non-circular portion 44 of the bail, and the outer end 48 of which is circular in shape. The clip 35 is also provided with a boss 49 having a socket, the outer end 50 of which is non-circular in shape to fit the non-circular portion 45 of the bail, and the inner end 51 of which is circular in cross-section.

52 is a spring inclosed within the boss 19 and bearing against the end 45 of the bail. This spring is an expanding spiral spring and it normally tends to hold the bail in the position shown in Fig. 8, that is, with the non-circular end 44 in the non-circular portion 47 of the socket and with the non-circular portion 45 of the bail in the non-circular portion 50 of the socket. With the parts in this position the handle will be locked from turning and one arm of the bail will rest against the end of the boss 46. By moving the handle laterally or to the left, Fig. 8, against the spring 52, the non-circular portions 44 and 45 will be withdrawn from the non-circular portions of the sockets and entered into the circular portions of the sockets. When in this position the bail can be swung about the sockets as an axis to swing the handle 3 from the full to the dotted line position or vice versa. When the handle is in its adjusted position the spring 52 will move it to the right, Fig. 8, thus causing the non-circular portions 44, 45 of the bail to be entered into the non-circular portions of the sockets thereby locking the handle from turning movement.

It will be more convenient for most people to have the handle in the dotted line position Fig. 5 because when in this position the handle is situated where it can be grasped without the necessity of turning the wrist or bending the elbow.

My improved crutch is exceedingly easy and comfortable to use, partly because the weight of the person is yieldingly and pneumatically sustained and partly because when the crutch is moved from the position shown in Fig. 2 through the position shown in Fig. 1 to the position shown in Fig. 3, during the walking operation, said crutch will yield longitudinally, thus avoiding the discomfort the user experiences in being lifted as the crutch swings past its vertical position. Further, the pivotal connection between the arm support 2 and the crutch body avoids the discomfort involved in the swinging of the arm rest 2 under the arm.

Another advantage of the construction herein described is that the novel features thereof may be readily applied to any crutch. This can be easily done by removing the arm support from the ordinary crutch and inserting the upper ends of the side members 4 into the sockets 6 of a cross piece 5 embodying my invention and by substituting for the ferrule or foot of the crutch a ferrule or foot constructed as herein illustrated. A crutch of ordinary construction can thus be converted into one embodying my invention at a minimum expense.

I claim:

1. In a crutch, the combination with a body portion presenting two side members and a yoke or cross-head connecting said members at their upper ends, said yoke being provided with an air cylinder, of a plunger fitting said cylinder, and an arm rest secured to said plunger, downward movement of said plunger being resisted by the confined body of air in the cylinder.

2. In a crutch, the combination with a body portion presenting two side members and a yoke or cross-head connecting said members at their upper ends and provided with an air cylinder, of a plunger fitting said cylinder, an arm rest secured to said plunger, downward movement of said plunger being resisted by the confined body of air in the cylinder, and a spring acting on the plunger for returning it to elevated position.

3. In a crutch, the combination with a body portion presenting two side members connected at their upper ends by a yoke portion said yoke portion being provided with an air cylinder, of a plunger fitting said cylinder, an arm rest secured to said plunger, and an inwardly-opening check valve leading to said air cylinder beneath the plunger whereby downward movement of the plunger is resisted by the confined body of air.

4. In a crutch, the combination with a body portion presenting two side members connected at their upper ends by a yoke portion provided with an air cylinder, of a plunger fitting said cylinder, an arm rest secured to said plunger, an inwardly-opening check valve leading to said air cylinder beneath the plunger whereby downward movement of the plunger is resisted by the confined body of air, and a spring for assisting in returning the plunger to elevated position.

5. In a crutch, the combination with a body portion, of a handle therefor adapted to be swung into different angular positions, and means to lock the handle in its adjusted position.

6. In a crutch, the combination with a body portion, of a handle, means securing the handle to the body portion for both vertical and lateral adjustment.

7. In a crutch, the combination with a body portion, of handle-supporting clips sustained thereby, a handle pivotally mounted in said clips for lateral swinging movement, and means to lock the handle in different adjusted positions.

In testimony whereof, I have signed my name to this specification.

GEORGE HIPWOOD.