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INVALID LIFTING DEVICE.

APPLICATION FILED APR. 14, 1913. RENEWED DEC. 26, 1913.

1,103,436. Patented July 14, 1914.

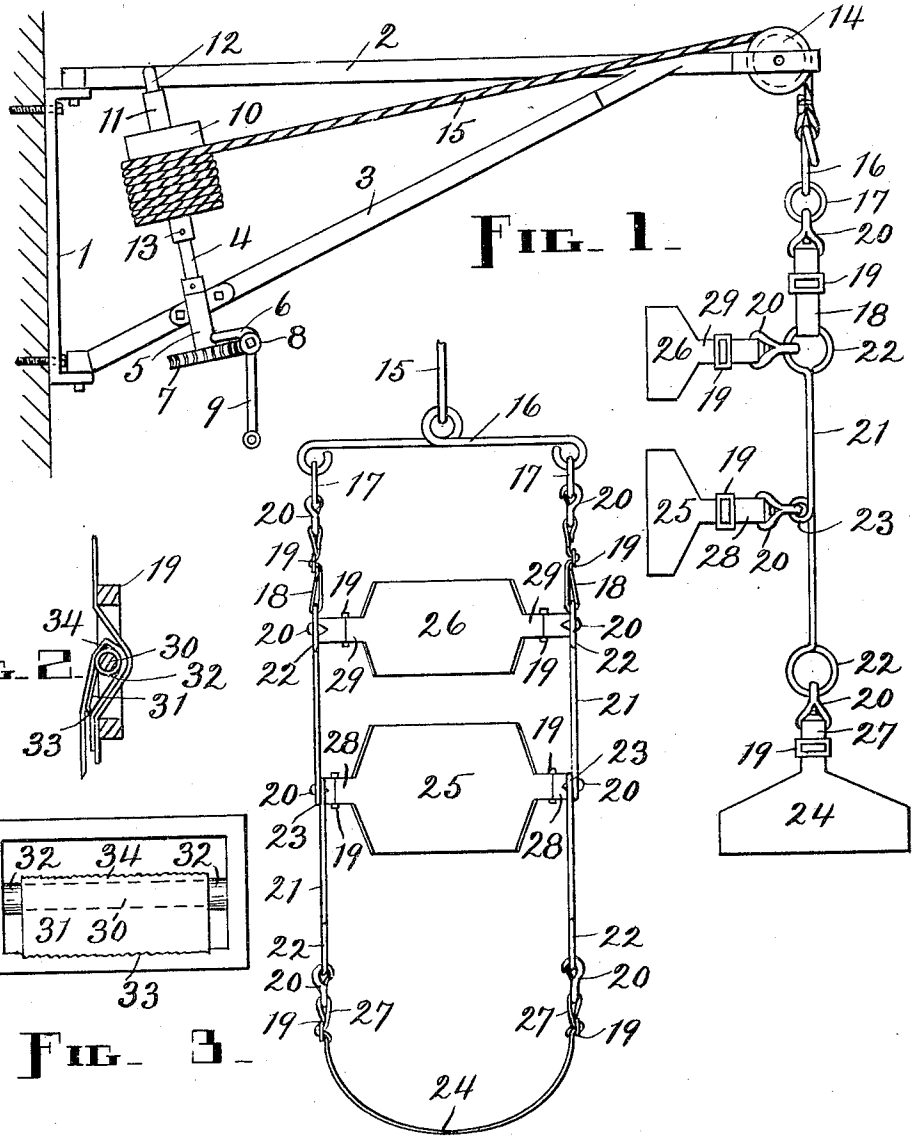


FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

WITNESSES:

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INVALID-LIFTING DEVICE.

1,103,436. Specification of Letters Patent. Patented July 14, 1914.

Original application filed April 13, 1912, Serial No. 690,470. Divided and this application filed April 14, 1913, Serial No. 760,868. Renewed December 26, 1913. Serial No. 808,884.

To all whom it may concern:

Be it known that I, FRANCIS S. ROOT, a citizen of the United States of America, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Invalid-Lifting Devices, (the same being a divisional part of my application filed in the United States Patent Office April 13, 1912, and serially numbered 690,470,) of which the following is a specification.

My invention relates to improvements in devices designed for moving cripples, invalids, and helpless and afflicted persons generally, and consists of a certain peculiarly constructed sling for the patient, such sling being adapted for use with a suitable crane or equivalent appliance, and of such special auxiliary and subsidiary parts and members as may be needed to render the device practicable and efficient, all as hereinafter set forth.

The object of my invention is to provide a safe, simple, and easily manipulated sling of the class designated above and for use with suitable hoisting and lowering means, which is convenient both for the patient and nurse or attendant. With this device a sick or crippled person can be raised comfortably and without difficulty from a bed into a sitting position and while in such position removed from the bed and placed on a chair or another bed, for example, and can with equal facility be returned to the first-mentioned bed and to reclining position. This and other objects and advantages which will appear in the course of the following description I attain and secure by the means illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a lifting device in which is embodied a practical form of my invention; Fig. 2, an enlarged detail in section of one of the strap fasteners, illustrating its application to a strap; Fig. 3, a side elevation of such fastener alone, and Fig. 4, a front elevation of the sling, which is that part of the lifting device as a whole that forms the particular subject matter of this application.

Similar figures refer to similar parts throughout the several views.

Two essential features or elements are necessary in an invalid lifter one of which, the subject of this application, is a simple and convenient appliance or sling for direct application to the patient, while the other is a crane or equivalent device, such as the one herein shown and briefly described, and which forms the subject matter of the application of which this is a divisional part, for lifting the patient through the medium of said sling, swinging, and lowering said patient, through the same medium.

I am aware that there are other slings designed for handling the sick and crippled, but know of none which embodies in so simple and practical a manner the necessary features as mine or is made up of similar parts and combinations of parts.

Before describing the sling in detail, I will point out the principal parts of the crane, as a whole, shown in the first view. Said crane comprises a bracket 1, a horizontal arm 2 and a brace 3 pivotally connected with said bracket, a shaft 4 journaled in a sleeve 5 attached to said brace and having a bracket 6, a gear 7 secured to said shaft, a worm 8 journaled in said bracket and in engagement with said gear, a crank 9 on one end of the worm shaft, a winding drum 10 having a sleeve 11 mounted on said shaft and on a post 12 that projects from said arm, a pin 13 to secure said sleeve to said shaft, a pulley 14 mounted at the front end of said arm, and a rope 15 which has one end attached to said drum and has the sling attached thereto at the other end, after passing over said pulley. Passing now to the aforesaid sling, it will be observed that the same consists of a rigid cross-bar 16, a pair of rings 17, a pair of straps 18, a plurality of strap fasteners or brackets 19 and of snap-hooks 20, a pair of side rods or connectors 21, each having an eye 22 at either end and an intermediate eye 23, a seat 24, a back support 25, and a head support 26. The cross-bar 16 is attached at the center to the free end of the rope 15, and has the straps 18 suspended from its ends, that is, from the ends of said cross-bar, by means of the rings 17 and a pair of the snap-hooks 20. The connectors 21 hang by their upper eyes 22 from the straps 18. The seat 24 is provided with end straps 27—27 which are connected with the lower eyes 22, and the back support 25 is provided with end straps 28—28 which are connected with the eyes

23 by means of two or more of said snap-hooks. The head support 26 has end straps 29—29, similar to the straps 27 and 28, which are connected with the upper eyes 22 by means of the fourth pair of snap-hooks 20. A buckle 19 is furnished each of the above-mentioned straps so that it can be adjusted to increase or decrease the length of the same. In an apparatus like this sling a wide range of adjustment for the straps is needed, such adjustment sometimes amounting, however, to a mere fraction of an inch, for which reason ordinary tongue-provided buckles are not suitable, because every point of adjustment for them or for the straps must depend upon a hole in the latter; besides the wide range of adjustment required for the straps, the fastening means therefor must be so strong and positive that there is no possible danger of accident to the patient by the giving way of the straps, and ordinary sliding buckles, even when equipped with teeth, are not sufficiently dependable on account of their liability to slip under great strain. It was necessary, therefore, for me to produce an entirely new type of fastener or buckle, and this I have done in the buckle 19 with which the straps can be adjusted to any extent, whether great or small, and after such adjustment can be held with absolute security. This buckle, of which eight are used in the present embodiment of my invention, is described below.

The buckle 19 consists of a substantially rectangular frame having a central cross-bar 30 and provided with a double serrated clasp 31. The clasp 31 has end hubs 32—32 that fit the cross-bar 30 and pivotally support said clasp on said cross-bar, and said clasp is of such dimensions that it is capable of bridging the space between the cross-bar and one of the sides of the buckle frame which is parallel with such bar. The longitudinal edge of the clasp 31 that is adapted to be brought into engagement with or operative relation to the aforesaid frame side is serrated, as represented at 33, and the opposite longitudinal edge which extends into the space between the cross-bar 30 and the other frame side is also serrated, as represented at 34.

The buckle is applied or attached to a strap and the adjustment and securing of the parts are effected in the following manner: One end of the strap is first passed through the buckle frame in such a way as to locate portions of the strap behind the longitudinal sides of such frame and another portion of such strap in front of the cross-bar 16, and then said strap is looped and the aforesaid end carried up behind the clasp 31, over said cross-bar, and down between the teeth 33 and the adjacent side of the frame, the buckle being properly adjusted on the strap in the first instance, and the strap end being drawn into the aforesaid loop to the required extent in the second instance. The first reach of the strap is interposed between the buckle frame and that part of the strap that is engaged directly by the teeth 33. It is now plainly to be seen that a pull on the looped part of the strap, secured as just explained, meets with the resistance offered by the fixed end of said strap and with the resistance offered by the teeth 33 and 34. The latter resistance is very powerful because the pull on the loop forces the teeth 33 harder against the inner end portion of the strap and crowds the latter with more force into frictional engagement with the first reach of the strap, and at the same time the strap is drawn tightly into contact with the teeth 34 and by reason of such contact acts on the clasp to urge said teeth 33 still deeper into the strap, the total result being that the inner end of the strap is prevented from freeing itself from the teeth 33, and this portion of the strap is prevented from drawing out of engaging relation with said teeth 34, so that a double hold on the strap is provided and maintained. The construction of this buckle is such that either set of teeth alone would hold the strap, hence the two sets afford a double measure of security. To unfasten the strap, simply loosen the looped portion and that part of the strap which is within the grasp of the buckle, disengaging such portion from the teeth 34 and swinging the clasp 31 rearwardly so as to disengage the teeth 33 from the strap. The strap can now be readjusted, after which it is secured as before.

From the foregoing description of the buckle it will be understood how the several parts of the sling are readjusted and fastened by the buckles shown in connection therewith. The connectors 21 or equivalent members should be and are introduced into the construction of the sling, because they lend themselves so readily to the movements that are required of the seat 24 and the supports 25 and 26, and afford the necessary rigidity at the sides. The snap-hooks 20, although of usual and well-known construction, are very convenient for my purpose, since they can be so easily and quickly attached to and detached from the rings 17 and the eyes 22 and 23. Owing to the presence of the snap-hooks on both sides of the sling any one of the supporting members can be disconnected and again connected on either side of said sling or at either end of the member without difficulty. After properly adjusting the straps 18, 27, 28 and 29 by means of the buckles 19, and securing said straps by the same means, the device is usually operated in the following manner, assuming that a patient is reclining at full length on a bed

situated within range of said device. The crank 21 is rotated in the direction to pay out the rope 15 and let down the sling as far as is necessary. Then the snap-hooks 20 are detached from the eyes 22 and 23 on one side, the supporting members 24, 25 and 26 are passed under corresponding portions of the patient's body, the crane being swung into position to enable this to be done, provided said crane is not already in such position, and said snap-hooks are fastened to said rings again. Next the crank is rotated in the direction to wind the rope 15 on the drum 10, and so elevate the sling and raise the patient into a sitting position. In thus elevating the sling, the rings 17 straps 18 and connecting snap-hooks 20 first draw up the supports 26 and 25, through the medium of the connectors 21 and intervening parts, and so elevate the head and shoulders or upper part of the body before raising the other portions of the patient's body. The body of the patient above the hips is now upright, as are the connectors also, and the further elevation of the sling seats said patient fairly therein, the support 24 bearing most of the weight, and raises the patient clear of the bed. The crank 9 may be now released, if desired, since the worm and gear will hold the drum and prevent the rope from unwinding under the weight of the patient suspended therefrom. With the patient thus suspended the crane is swung in either direction, and the sling partially rotated, with the hanging part of the rope as a supporting axis, if necessary, to locate the patient in the proper position relative to a chair or other piece of furniture, or it might be a carriage. Nothing further remains to be done except to rotate the crank in the reverse direction and so lower the patient into or onto the chair or other supporting medium, and to remove the sling.

The patient is returned to the bed in practically the same way as he was removed therefrom, but during this operation the sequential movements of the body are reversed, that is to say, the descending sling allows the lower part of the body to rest on the bed first, then the back and head. The sequential operations or actions of the body-supporting members of the sling are rendered possible by the presence of the rings 17 and more especially by the presence of the connector eyes 22 and 23, the snap-hooks 20 slipping freely in such rings and eyes and having a range of movement therein that is ample for the purpose. The cross-bar 16 serves as the spreader of the sling, as well as the supporting member thereof, and is rotatable with the part of the rope 15 that hangs below the pulley 14, as previously observed. The supporting members 24, 25 and 26 with their straps are preferably made of canvas or webbing.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, in an invalid-lifting device, of a cross-bar adapted to be attached to a hoisting member, connectors having top, intermediate and bottom eyes, said connectors being supported from said cross-bar, a seat supported from the bottom eyes of said connectors, a back support connected with the intermediate eyes of said connectors, and a head support connected with the top eyes of said connectors.

2. The combination, in an invalid-lifting device, of a cross-bar adapted to be attached to a hoisting member, adjustable side straps supported from said cross-bar, connectors depending from said straps, a seat provided with adjustable and detachable means for attaching the same to said connectors at the bottom, a back support provided with adjustable and detachable means for attaching the same to said connectors at points intermediate of their ends, and a head support provided with adjustable and detachable means for attaching the same to said connectors at the top.

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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."