

F. S. ROOT.
INVALID LIFTING DEVICE.
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1,239,524.

Patented Sept. 11, 1917.

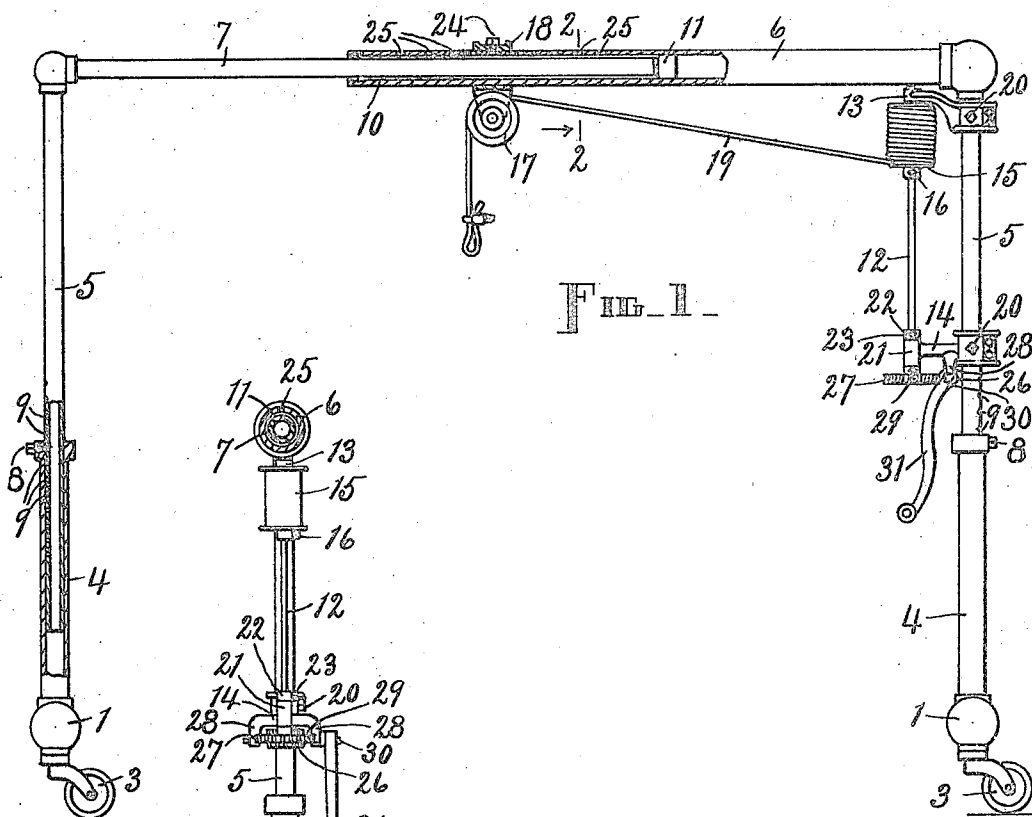


FIG. 1.

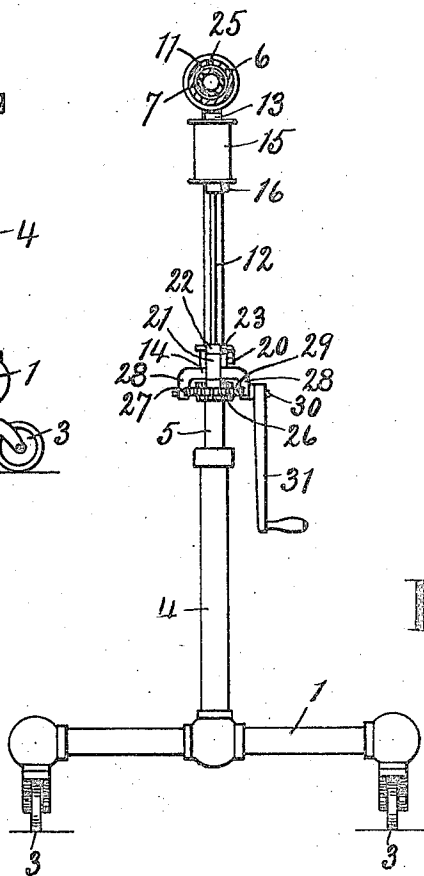


FIG. 2.

WITNESS
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INVALID-LIFTING DEVICE.

1,239,524.

Specification of Letters Patent.

Patented Sept. 11, 1917.

Application filed August 14, 1915. Serial No. 45,520.

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 a new and useful Invalid-Lifting Device, of which the following is a specification.

My invention relates to improvements in devices designed for lifting and moving 10 cripples, invalids, and helpless and afflicted persons generally, and consists of a certain peculiar supporting structure, which is provided with hoisting means, and is preferably 15 adjustable, such structure being capable of spanning a bed, from the floor, and of being moved freely on the floor when the patient is suspended therefrom, as well as when without its load, all as hereinafter set forth.

20 The primary object of my invention is to provide a strong, safe, simple and easily manipulated invalid lifter, which is convenient in use and operation for both the patient and nurse or attendant, and is in 25 the nature of an improvement of the crane or wall-bracket lifter for which Letters Patent of the United States, No. 1,106,847, were issued to me August 11, 1914. I am able, with this device and a suitable sling, such a 30 sling as that covered by United States Letters Patent No. 1,103,436, issued to me July 14, 1914, to raise a sick or crippled person from a bed or other place of rest, convey such patient to another locality, either near 35 or remote, and there deposit him (or her), and to return the person to the first place of rest if desired, the several operations being effected without shock or jar to the person being moved or difficulty of any kind, 40 but on the contrary with a great degree of ease and comfort to such person.

The crane above referred to has not the range of action or operation that the new lifter possesses, and in some and possibly 45 many cases said crane can not be placed conveniently or to advantage if at all, either of which facts is an incentive and sufficient warrant for the production of an appliance such as the present device, which latter has 50 all of the desirable features of the older device and others besides, and is without the defects or limitations of said older device.

Other objects and advantages will appear in the course of the following description.

55 I attain the objects and secure the ad-

vantages of my invention by the means illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation in partial section of a preferred form of my device, and, 60 Fig. 2, an inside elevation of one end of said device, the horizontal connecting element between the end members being in section taken on lines 2—2, in Fig. 1, and the rope being omitted.

Similar numerals designate similar parts 65 throughout the several views.

This lifting device, broadly considered, comprises two end supports mounted on bases that can be moved easily on the floor, 70 a horizontal support connecting and rigidly attached to said end supports, and raising and lowering mechanism attached securely to one of said end supports and to said horizontal support, such mechanism includ- 75 ing a flexible member. The end supports are preferably constructed so as to be adjustable as to height, and the horizontal support is preferably constructed so as to be adjustable as to length. That part of the 80 raising and lowering mechanism that is carried by the horizontal support also is preferably adjustable on said support. The vertical and horizontal adjustments afforded the supporting structure itself enable the 85 same to be placed in position over beds having head and foot pieces of various heights and over beds of different lengths, while the horizontal adjustment provided for the aforesaid part of the raising and lowering 90 mechanism enables such part to be located at just the right point above the patient on the bed.

Passing now to a description in detail of the device shown in the drawings, it will 95 be seen that the supporting structure of the same, which may be termed a frame, consists of telescoping end supports, each of which comprises a base 1 which is mounted on anti-friction members, such as casters 3, 100 to enable said base and the entire device to be moved about readily, a tubular upright or hollow post 4 having its bottom end rigidly fixed in the center of said base, and an upright 5 with the lower portion thereof in 105 said post, and of a telescoping top support, which comprises a horizontal tube 6 rigidly attached at one end to one of the end uprights 5, and a rod 7 rigidly attached at one end to the other of said uprights and ex- 110

tending for a portion of its length into said tube. The uprights 5 and the rod 7 may or may not be tubular.

Each post 4 is provided at the top with a set-screw 8, and there is a series of recesses or holes 9 in the lower portion of each upright 5. The holes 9 in either of the uprights 5 are correspondingly opposite to those in the other upright, and said holes are positioned and adapted to receive the inner ends of the set-screws 8. By this means the uprights 5 are secured, after being raised or lowered to the desired extent in the posts 4, the set-nuts 8 not only securing said uprights at the desired elevation, but also preventing them from turning.

In order to prevent the tube 6 and the rod 7 from being drawn outwardly so far as to separate them or even to render the joint between them too weak, I may employ a bushing 10 in said tube and a collar 11 on said rod. The bushing 10 is tapped into the outer end of the tube 6 and extends some distance into said tube, and the inner end of the rod 7 is tapped into the collar 11, it being necessary, of course, to introduce said rod and collar into said tube before inserting and screwing into place said bushing. The rod 7 has a sliding fit in the bushing 10 and the collar 11 a similar fit in the tube 6, so that the parts are properly supported and at the same time capable of endwise movement. The adjacent ends of the bushing and collar come into contact, when the tube and rod, either or both, are drawn outwardly, and so limit such movement, and said bushing is long enough to insure a sufficiently strong joint in case the maximum separation be effected and the device be then used for the purpose for which it is intended.

The hoisting mechanism, that is to say the mechanism by means of which the patient is raised and lowered by the device, with the frame as a support, comprises a vertical spindle or shaft 12 journaled in brackets 13 and 14 which are rigidly attached to one of the uprights 5, a drum 15 secured to said shaft by a set-screw 16, means to revolve said shaft and drum, which means will presently be described, a sheave 17 mounted in a hanger 18 which in turn is mounted on the tube 6, and a chain or rope 19 that passes from said drum to said sheave and over the latter.

The brackets 13 and 14 are sleeved to their upright 5 and rigidly secured thereto by means of set-screws 20—20. In the present case the brackets 13 and 14 are on the upright 5 to which the tube 6 is attached and said bracket 13 is located thereon immediately under said tube, while said bracket 14 is located above the uppermost hole 9 in said upright. Upon loosening the set-screws

20 the brackets 13 and 14 can be slipped down and off of their upright 5, provided the latter be removed from its post 4. The bracket 14 has a bearing 21 for the shaft 12, and a collar 22 is secured by a set-screw 23 to said shaft, above said bearing, to support said shaft.

One end of the rope 19 is fastened to the drum 15, and the other end of said rope hangs from the sheave 17. The sling, to which reference has been made, is attached to the free end of the rope 19. Thus it is seen that the free end of the rope, with its load, is raised or lowered by rotating the drum to wind or unwind said rope accordingly.

The hanger 18 is sleeved to the tube 6, and a set-screw 24 is provided to hold said hanger in place on said tube, such screw passing through the hanger sleeve into one of a series of recesses or holes 25 in said tube in proper relation to the set-screw. The holes 25 permit the hanger 18 to be adjusted nearer to or farther from the drum 15, and thus to change the position of the free end of the rope to whatever extent may be necessary or desirable.

I have found that a worm and gear drive for the shaft 12 is the best suited for my purpose, because with it I have all the power needed, am able to apply such power with very little manual exertion, and the mechanism is self-locking, that is, it is inoperative from the load, manual operation being required to lower the load as well as to raise the same. The last factor is very important from the standpoint of safety to both patient and operator, and besides places absolute control in the hands of the operator, and is as simple as it is efficient. A worm 26 and a worm-wheel 27 are therefore provided, the former being mounted in the bracket 14, between a pair of arms 28 which depend from said bracket, and the latter being secured, by a set-screw 29, to the shaft 12 under the bearing 21. The worm 26 is secured to a shaft 30 which is journaled in the bracket arms 28. A crank 31 is secured to the front end of the shaft 30. Upon turning the crank 31 in either direction, relatively corresponding motion is imparted to the shaft 12 through the medium of the shaft 30 and the intermeshing worm 26 and worm-gear 27.

The practical operation of the device is briefly described as follows:

In order to change the height of the frame, the set-screws 8 are loosened, the uprights 5 are raised or lowered in the posts 4, accordingly as the height is to be increased or decreased, and said screws are retightened, care being taken that the amount of adjustment is the same for both uprights, and that the inner end of each set-screw en-

ters one of the openings or holes 9. The length of the frame is increased simply by drawing the end supports farther apart, and decreased simply by moving said supports nearer together, the telescoping members which form the horizontal support sliding on and in each other. The set-screw 24 is loosened, when it is desired to change the location of the hanger 18 with its sleeve, said hanger is moved in whichever direction required, and said screw is retightened, care being exercised here again that the inner end of the set-screw enters one of the openings or holes 25. After all adjustments have been attended to and the frame is in position, the patient is raised by turning the crank 31 in the direction required to wind the rope 19 on the drum 15, it being assumed that the sling for the patient is attached to the free or inner end of said rope. After the patient has been elevated sufficiently the crank 31 may be released, since the worm members 26 and 27 will hold against the tendency of the weight of the patient to reverse them, and the frame with the patient suspended therein is rolled along on the floor to the desired locality. Upon arriving at the aforesaid locality the crank is turned in the opposite or reverse direction to lower the patient.

Usually the frame is placed diagonally of a bed, with the end support which carries the worm members at the head and adjacent to the front side of the bed, which locates the crank in a handy position, and the other

end support at the foot and adjacent to the back side of the bed.

This lifter can be very readily taken apart and put together again, and when set up ready for use occupies but little space comparatively.

The bases 1 are at right-angles to the horizontal top support, so that the device can not tip over sidewise.

More or less structural changes may be made in the lifter, in addition to those hereinbefore generally and specifically pointed out, and the shape and size may be modified, without departing from the spirit of my invention.

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

A frame, for an invalid-lifting device, comprising a pair of vertical end supports and floor supports therefor, a perforated tube rigidly attached to one of said end supports, a rod rigidly attached to the other of said end supports and extending part way into said tube, a hanger mounted for longitudinal adjustment on said tube, and a set-screw tapped into said hanger and adapted to pass through any one of the perforations in said tube into engagement with said rod, to fasten said tube and rod together and hold said hanger in place.

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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."