Jan. 20, 1942. R. R. KNUDSEN 2,270,735

SCREW AND NUT GEARING

Filed Sept. 13, 1940

Fig. 1.

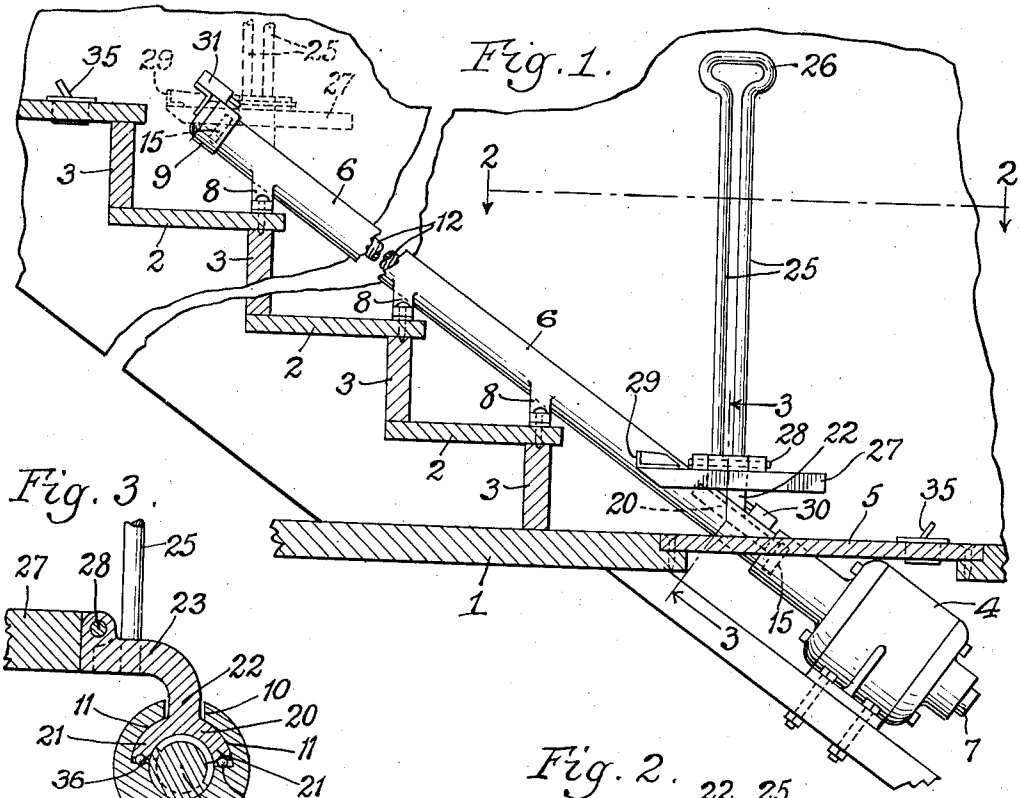


Fig. 3.

Fig. 4.

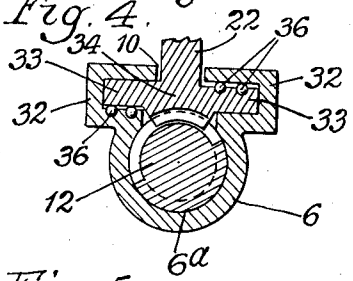


Fig. 5.

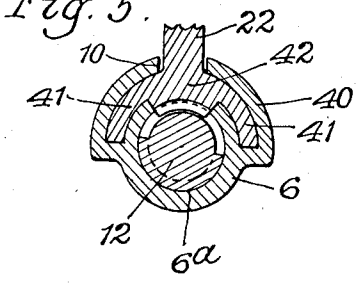
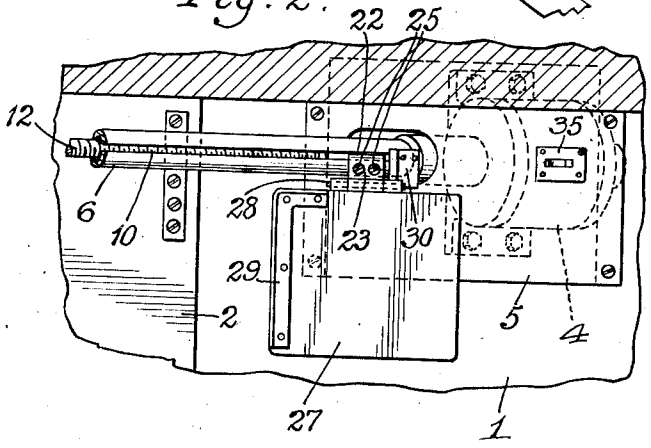


Fig. 2.



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SCREW AND NUT GEARING

Richard R. Knudsen, Chicago, Ill.

Application September 13, 1940, Serial No. 356,695

3 Claims. (Cl. 74—424.8)

My invention relates to an improvement in stair elevators.

It has for one purpose the provision of a stair elevator which will be simple and easy to ship and assemble, easy to apply, and efficient in use.

Another purpose is the provision of a stair elevator which shall provide a minimum of interference with the normal use of the stair structure.

Another purpose is the provision of improved means for supporting the conveyor screw of the elevator.

Another purpose is the provision of improved means for preventing undesired rotation of the elevator carriage.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawing wherein:

Fig. 1 is a vertical section with parts in elevation;

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

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

Fig. 4 is a similar section illustrating a variant form of conveyor screw support; and

Fig. 5 is a similar section showing a still further variation.

Like parts are indicated by like symbols throughout the specification and drawing.

Referring to the drawing, 1 generally indicates a floor, from which rises a stair, including the steps 2 and the risers 3. 4 is any suitable reversible motor which may be located beneath the floor level, which may be concealed, for example by a readily removable lid or cover member 5. 6 is a tube extending from the motor in line with motor shaft 7. It is provided with any suitable brackets or supports 8, which may be screwed to or otherwise secured to the various steps 2. It terminates at its upper end in a cap 9 and is slotted along one side, as at 10. It is also provided with longitudinal parallel rectilinear grooves 11.

12 indicates a worm shaft, herein shown as extending from end to end of the tube 6. Any suitable bearing means may be provided for the ends of the shaft.

20 is a carrier, in effect a nut, screw threaded to conform to the threads of the worm 12. It is provided with outwardly extending keys or projections 21, which seat in and generally conform to the grooves 11, whereby relative rotation of the nut or carrier 20 and the tube 6 is prevented.

It will be understood that, in response to rotation of the motor and consequent rotation of the worm 12, the carrier 20 is moved longitudinally along the interior of the tube 6. The pads or washers 15 serve to cushion its movement at the ends.

The member 20 is also provided with an outward extension or bracket 22, passing through the slot 10. The slot is herein shown as being in the upper side of the tube 6, but it will be understood that it may be located elsewhere if desired. Since in the form of Figure 1 and following it is shown as in the upper side of the tube, I provide an angular extension 23 on the arm or bracket 22, to the upper side of which I may mount any suitable hand hold or support 25, herein shown as in the form of two rods with an upper handle or lip 26 joining them.

27 indicates a platform, upon which the user may stand. This platform is hinged, as at 28, with the side extension 23 of the bracket 22, in such fashion that it will be swung up out of the way at one side of the stairway when the elevator is not in use. The platform may be provided with a toe guard 29 to prevent injury to the user's toes.

I may connect the motor 4 with any suitable source of electric current and employ any suitable circuit therefor. The circuit, however, I have not indicated in detail.

It will be understood that I may provide limit switches 30 and 31 at the upper and lower end of the stairway, in such fashion that, when the elevator reaches either limit of its movement, it engages a limit switch, which breaks the motor circuit.

I may provide any suitable means for initiating rotation of the rotor when the operator is on the platform 27. I illustrate for example any suitable foot- or hand-operated switches 35, located at the foot and top of the stairs.

Referring to Fig. 4, I illustrate a modification in the shape of the tube 6. Whereas in the form of Fig. 3 the tube is shown as exteriorly cylindrical but with the interior enlargements or grooves 11, in the form of Fig. 4 the cylindrical portion of the tube has added thereto a rectilinearly bounded portion 32, in which extend arms 33 of the carrier 34. In both forms, however, the tube 6 includes an interior portion 6a, which actually receives and supports the screw 12. In both forms, if desired, roller bearings, or the like, 36 may be employed.

In the form of Fig. 5 I illustrate a further variation of form, in which an outer semi-cylindrical member 40 is employed, defining with the wall of the tube 6 arcuate slots which receive wings or projections 41 of the carrier 42. It will be

understood that in all forms the screw 12 is preferably supported directly upon the bottom or side portion of the tube 6, as at 6a.

It will be understood that the tube, or the lower part thereof, may be made intermittent or broken away at points to save metal. I may employ either a metal to metal sliding fit, as shown in Fig. 5, or roller bearings, or other suitable anti-friction means, as shown in Fig. 4. What is essential is that I provide some means for permitting the carrier 20, 34 or 42 to move along the tube 6 in response to rotation of the screw 12, while being held against rotation about the axis of the tube or screw. This is important to maintain the stability of the elevator platform 27 upon which the user stands.

It will be realized that, whereas I have described and illustrated a practical and operative device, nevertheless, many changes may be made in the size, shape, number and disposition of parts without departing from the spirit of my invention. I therefore wish my description and drawing to be taken as in a broad sense illustrative or diagrammatic, rather than as limiting me to my precise showing.

It will be understood, for example, that while it is in practice highly important that the worm 12 be supported upon the bottom of the tube 6, this support might be intermittent rather than continuous, in order to reduce friction, and the tube 6 might either be cut away along the bottom or provided with slightly raised portions engaging the worm at spaced points along the length of the worm.

I claim:

1. In combination, a worm, an inclined tube surrounding and supporting said worm, a nut including a threaded portion in mesh with one side of said worm, and a portion in bearing engagement with the opposed bearing portion of said tube, and a supporting extension extending outwardly from said nut, said tube having a longitudinal gap extending substantially from end to end thereof, through which said extension extends.

2. In combination, a worm, an inclined tube surrounding and supporting said worm, said tube having a substantially cylindrical bore to receive said worm, and an enlarged bore portion in communication therewith, said nut being located in said enlarged bore portion, said enlarged bore portion being defined by bearing shoulders adapted to receive opposed bearing surfaces of said nut, and a supporting extension extending outwardly from said nut, said tube having a longitudinal gap extending substantially from end to end thereof, through which said extension extends.

3. In combination, a worm, an inclined tube surrounding and supporting said worm, said tube having a substantially cylindrical bore to receive said worm, and an enlarged bore portion in communication therewith, concentric with the cylindrical bore but of greater radial extension, said nut being located in said enlarged bore portion, said enlarged bore portion being defined by bearing shoulders adapted to receive opposed bearing surfaces of said nut, and a supporting extension extending outwardly from said nut, said tube having a longitudinal gap extending substantially from end to end thereof, through which said extension extends.

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