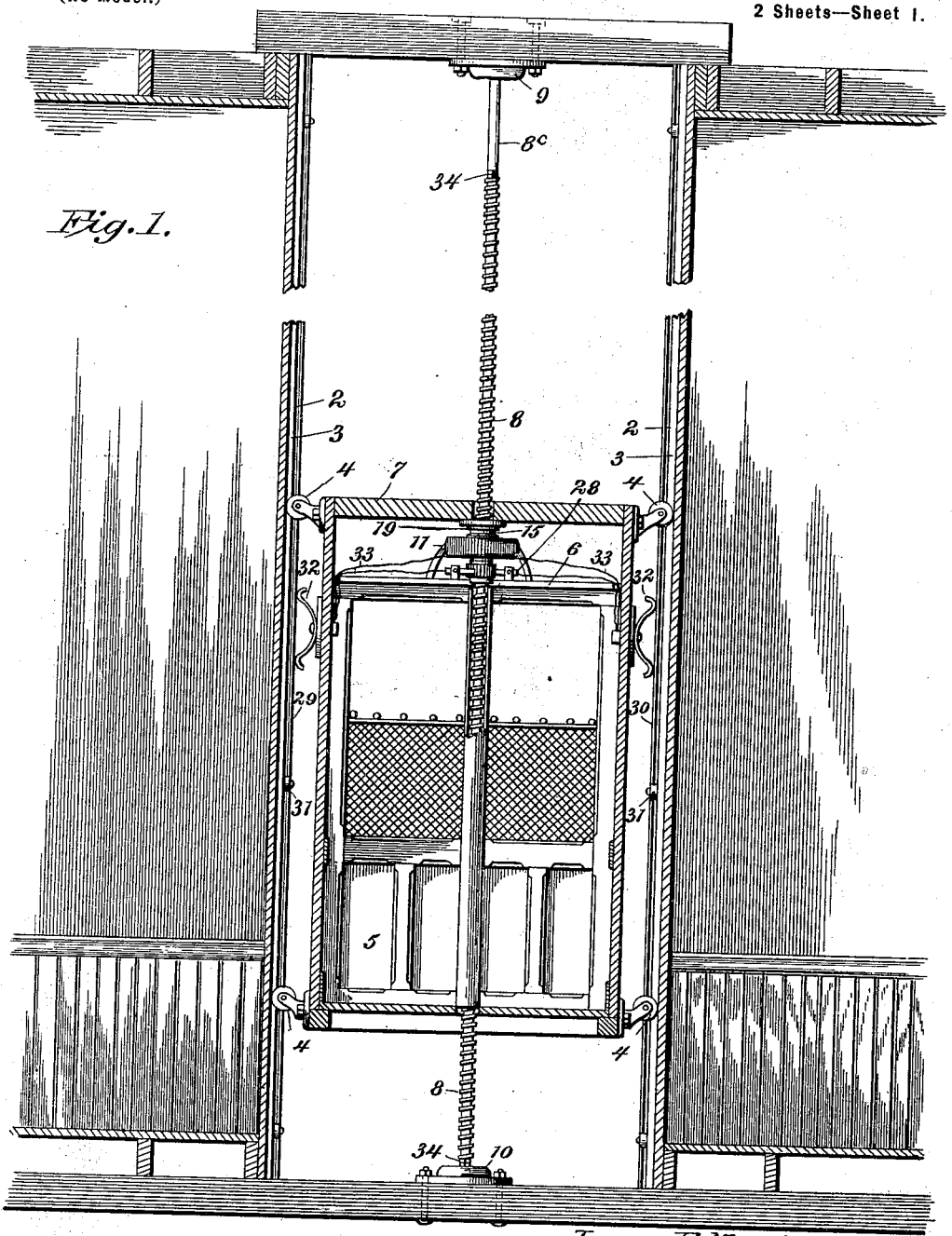
No. 647,980. Patented Apr. 24, 1900.

J. F. MORRISON & O. M. WOODROW.

ELECTRIC ELEVATOR.

(No Model.) (Application filed Apr. 10, 1899.) 2 Sheets—Sheet 1.

Fig. 1.



Witnesses
Howard D. Orr.
O. E. Doyle

James F. Morrison,
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By their Attorneys.
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Fig. 2.

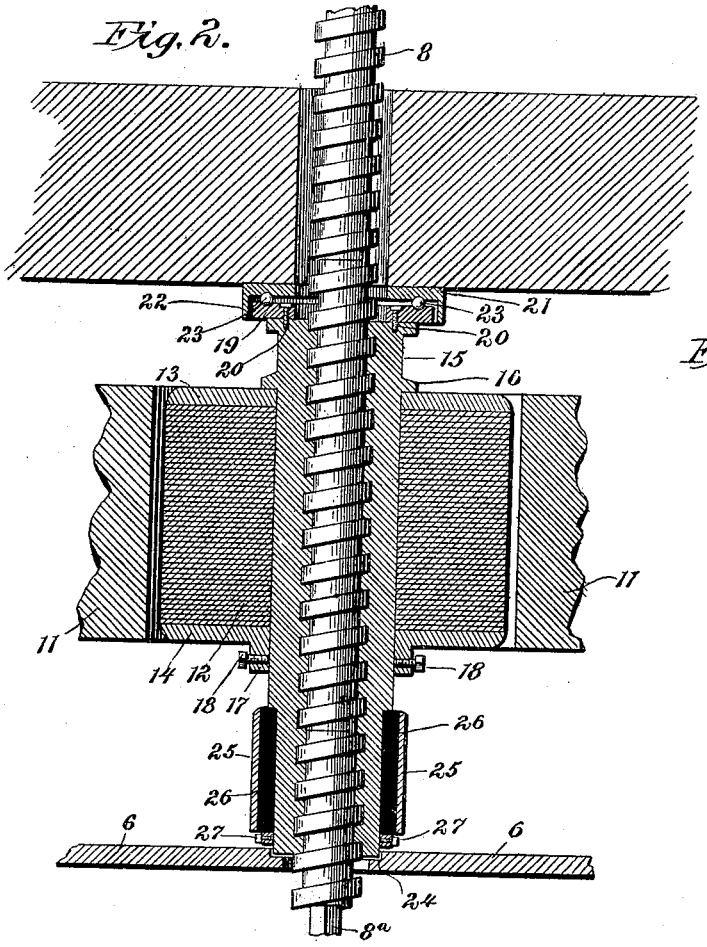


Fig. 3.

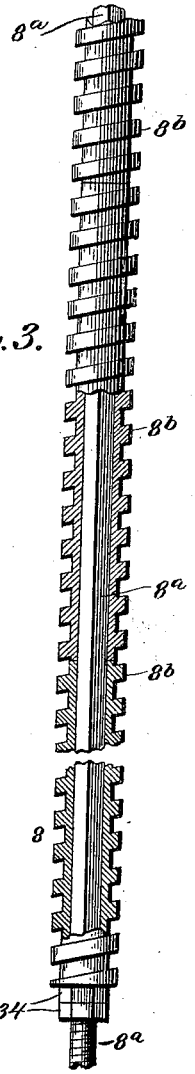
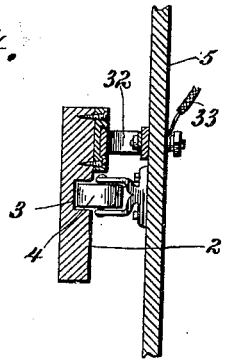


Fig. 4.



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UNITED STATES PATENT OFFICE.

JAMES F. MORRISON AND ORLANDO M. WOODROW, OF WELLSTON, OHIO, ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO ROBERT F. GODDARD AND ELLSWORTH E. MORAN, OF SAME PLACE.

ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 647,980, dated April 24, 1900.

Application filed April 10, 1899. Serial No. 712,436. (No model.)

To all whom it may concern:

Be it known that we, JAMES F. MORRISON and ORLANDO M. WOODROW, citizens of the United States, residing at Wellston, in the county of Jackson and State of Ohio, have invented a new and useful Electric Elevator, of which the following is a specification.

Our invention relates to electrically-operated elevators, and has for one object to simplify and improve the construction and relative arrangement of the motor and coöperating parts which are carried by the car or cage, particularly when the armature-shaft is constructed to form a feed-nut for coöperation with the elevator feed-screw or when the armature is attached directly to or is built upon a feed-screw which also carries one member of the commutator.

A further object of the invention is to simplify and improve the construction and relative arrangement of the parts whereby the thrust of the feed-nut is communicated to the frame of the elevator car or cage.

A further object of the invention is to provide an improved construction of feed-screw.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a view of an elevator hatchway and car provided with an electrical car-operating mechanism constructed in accordance with our invention. Fig. 2 is a detail sectional view of the car-operating mechanism and the adjacent portions of the car-framing. Fig. 3 is a detail view, partly in section, of a portion of the feed-screw to show the laminated construction thereof. Fig. 4 is a detail horizontal section of one of the car-guides and the adjacent portion of the car to show the relative positions of the guiding devices, the electrical conductor, and the contact-shoe.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

In the hatchway or well are arranged the vertical car-guides 2, which may be provided with grooves 3 to receive the guide-rollers 4, mounted upon brackets on the elevator car or cage 5, said car being of the ordinary or any preferred construction to suit the purpose for which it is designed, but being shown in the present drawings as of the passenger type.

Spaced from the roof or other transverse members 6 of the car and also carried by the car is a cross-beam 7, both of these transverse members having openings through which extends a feed-screw 8, which is of a length corresponding with the path of the car and which is terminally secured in stepped bearings 9 and 10 at the upper and lower ends of the shaft or hatchway, said feed-screw being secured against rotary movement.

The motor embodies field-magnets 11, which are carried by the car, and an armature 12, having upper and lower armature-plates 13 and 14, said armature being built upon a central tubular shaft or sleeve 15, which constitutes a feed-nut having a female thread to engage the thread of the feed-screw, whereby when the armature is rotated with said shaft it is fed longitudinally of the feed-screw. Contiguous to the exterior surface of the upper armature-plate the feed-nut or armature-shaft is provided with an annular shoulder 16, consisting in the construction illustrated of an annular projection from the exterior surface of the sleeve forming the nut, and the lower armature-plate is provided with a collar 17, fitted with set-screws 18, which engage the exterior surface of the sleeve, and thus prevent downward displacement of the armature proper with relation to the sleeve.

Secured to the upper end of the feed-nut, which extends beyond the upper armature-plate, is a thrust-plate or disk 19, preferably held in place for rotation with the feed-nut by means of screws 20 or equivalent fastening devices, and interposed between this thrust-plate and the under surface of the cross-beam 7 is a bearing-plate 21, which may, as illustrated, be flanged peripherally at 22 to receive the thrust-plate, while in the adjacent faces of the thrust and bearing plates are

formed registering ball-races for the reception of the antifriction-balls 23. The weight of the car is supported by the feed-nut through the antifriction-bearing formed by the coöperating thrust-plate 19 and bearing-plate 21; but by reason of the antifriction construction of this bearing we are enabled to obtain an efficient operation of the car, both in ascending and descending, with the minimum expenditure of electrical energy. Obviously the armature proper and the shaft 15, forming the feed-nut, must be secured together against relative rotation, whereby the rotary motion of the feed-nut is controlled efficiently by the armature. Furthermore, the feed-nut extends downward beyond the lower armature-plate and is seated at its lower extremity in a step-bearing 24, formed in the lower transverse frame member or roof 6 of the car, whereby said step-bearing and antifriction thrust-bearing constitute means for preventing endwise movement of the feed-nut with relation to the car. Said lower extension of the feed-nut carries a commutator-shell 25, provided with suitable insulation 26 and held in place by means of set-screws 27, and in cooperative relation with said shell are the commutator-brushes 28, mounted upon a fixed member of the car-framing, such as the transverse element 6. The field-magnets 11 are also supported directly by the car-framing.

Any suitable or preferred means for conveying electrical energy to the motor may be employed, and therefore we have deemed it sufficient for the purposes of illustration to show a construction corresponding substantially with that disclosed in our said former patent, the same consisting of conductors 29 and 30, arranged parallel with the path of the car in suitable insulators 31, contact-plates 32, carried by the car and in permanent contact with said conductors, suitable insulation being employed, and connections 33 between the contact-plates and the members of the motor.

From the above description it will be seen that the arrangement of the motor is such as to secure compactness, while the communication of thrust from the feed-nut to the framing of the car is accomplished directly and with the minimum loss of energy by reason of friction, and, furthermore, when the armature is at rest it forms an efficient lock whereby the elevator-car is held in a fixed position.

The feed-screw which we employ in connection with the mechanism above described is of sectional construction in that it comprises a central stiffening-core 8^a, upon which are threaded hollow thread-bearing sections 8^b, of comparatively-short lengths, and which may be of aluminium or other durable and so-called "antifriction" material. These tubular sections have an interlocking connection with the core, as by forming the latter of square or angular cross-sectional contour and adapting the bore or interior of each lamina or section to fit said contour, and the exterior elements constituting the shell of the feed-screw may be held in place against axial or endwise displacement by means of suitable nuts 34, threaded upon the portions of the core beyond the extremities of the terminal shell-sections. Also, as in the construction illustrated in our said former patent, the threads of the feed-screw may be omitted for a distance at the upper portion thereof, as shown at 8^c, to prevent the upper portion of the car-framing from striking the framing of the shaft or hatchway should the operation of the motor, through neglect or otherwise upon the part of the operator, continue after the car has reached the limit of its upward movement. This smooth or unthreaded portion of the feed-screw allows the feed-nut to turn idly thereon when the car thus reaches its limit of movement.

The advantages derived from the sectional construction of the feed-screw resides in the fact that the shell or threaded portion thereof may be made in short sections to reduce the cost of manufacture and also in the fact that said shell may be made of a material capable of reducing friction in the contact therewith of the feed-nut, while the necessary rigidity may be imparted by the core. Other advantages also of this construction will be apparent to those skilled in the art, and it will be understood that various changes in the form, proportion, and the minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having described our invention, what we claim is—

1. In an elevator, the combination, with a screw rigidly secured within the well, of a cage loosely mounted upon the screw, the top of which is provided with two perforated transverse framing members, the lower one of which is provided with a step-bearing, a bearing-plate secured to the under side of the upper member, a feed-nut upon the screw and engaging the screw throughout the length of the nut, the upper end of which nut engages with said plate and the lower end fits within said step-bearing, an armature upon the nut, and means for rotating the armature and the nut.

2. In an elevator, the combination, with a screw rigidly secured within the well, of a cage loosely mounted upon the shaft, the top of which is provided with two perforated framing members, of a flanged and perforated annularly-grooved bearing-plate secured to the under side of the upper member, a feed-nut upon the screw, the upper end of which is provided with a removable annularly-grooved thrust-plate, the groove in said plate registering with the groove in the bearing-plate, and the intermediate portion is provided with an annular shoulder, antifriction-bearings within said grooves, an armature

upon the nut, the upper plate of which bears against the shoulder and the lower plate is provided with a collar, set-screws through the collar, a brush below the armature and means for rotating the armature and the feed-nut.

3. In an elevator, the combination, with a screw rigidly secured in the well, of a cage loosely mounted thereupon, and provided with a feed-nut for moving the cage upon the same, said screw comprising a continuous core angular in cross-section, of a series of sections of aluminium upon the core, each section being provided with an angular perforation to fit upon the core, and having its exterior screw-threaded, the screw-threads of the different sections registering with each other.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JAMES F. MORRISON.
ORLANDO M. WOODROW.

Witnesses:
FRANK C. WILSON,
ORIN KELLY.