No. 756,444. PATENTED APR. 5, 1904.

H. R. WELLMAN.

ELECTRIC ELEVATOR.

APPLICATION FILED JUNE 30, 1903.

NO MODEL.

FIG.1.

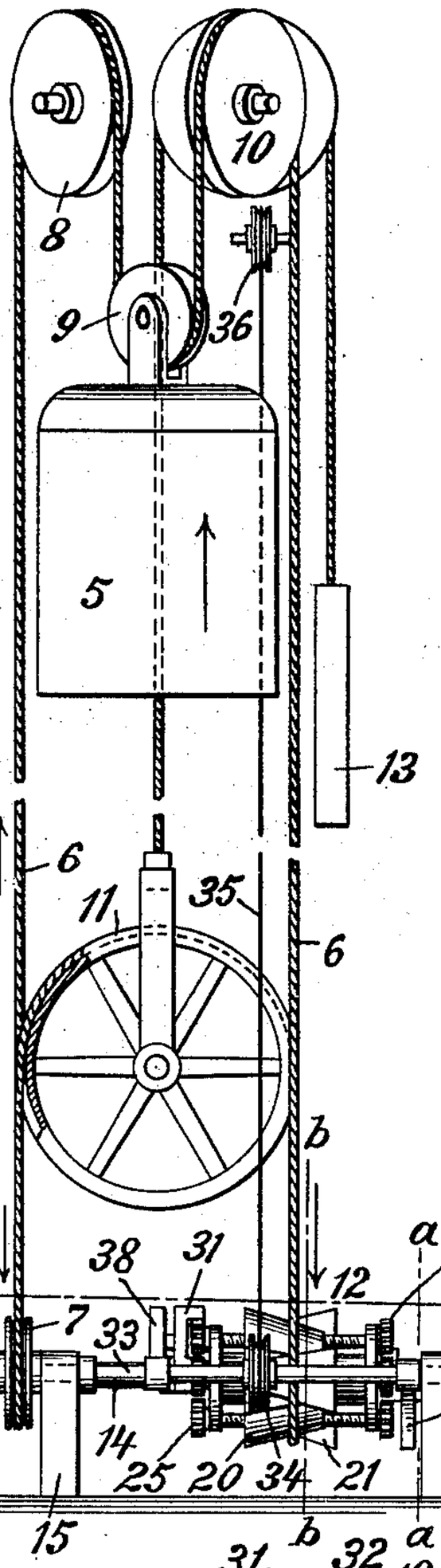


FIG.2.

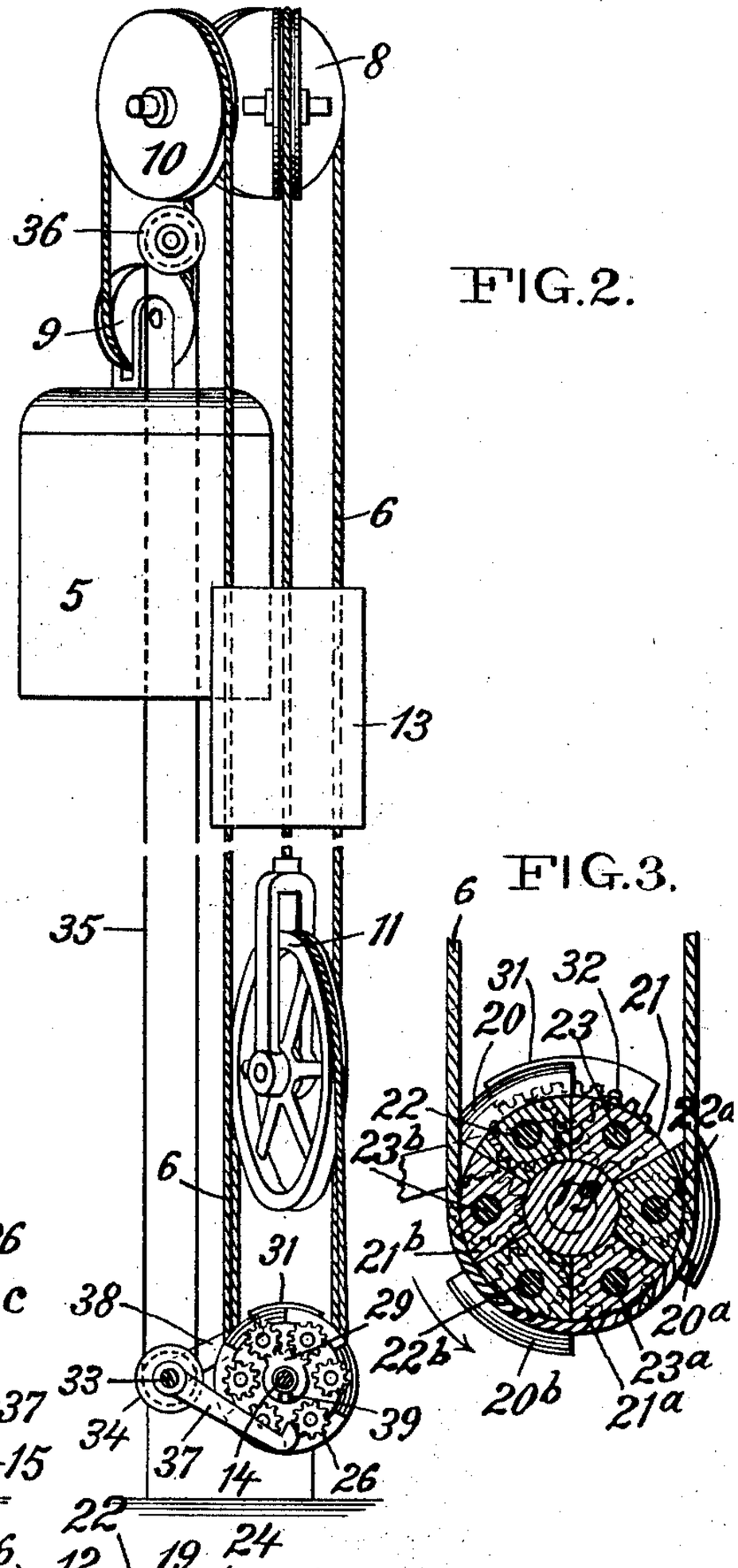
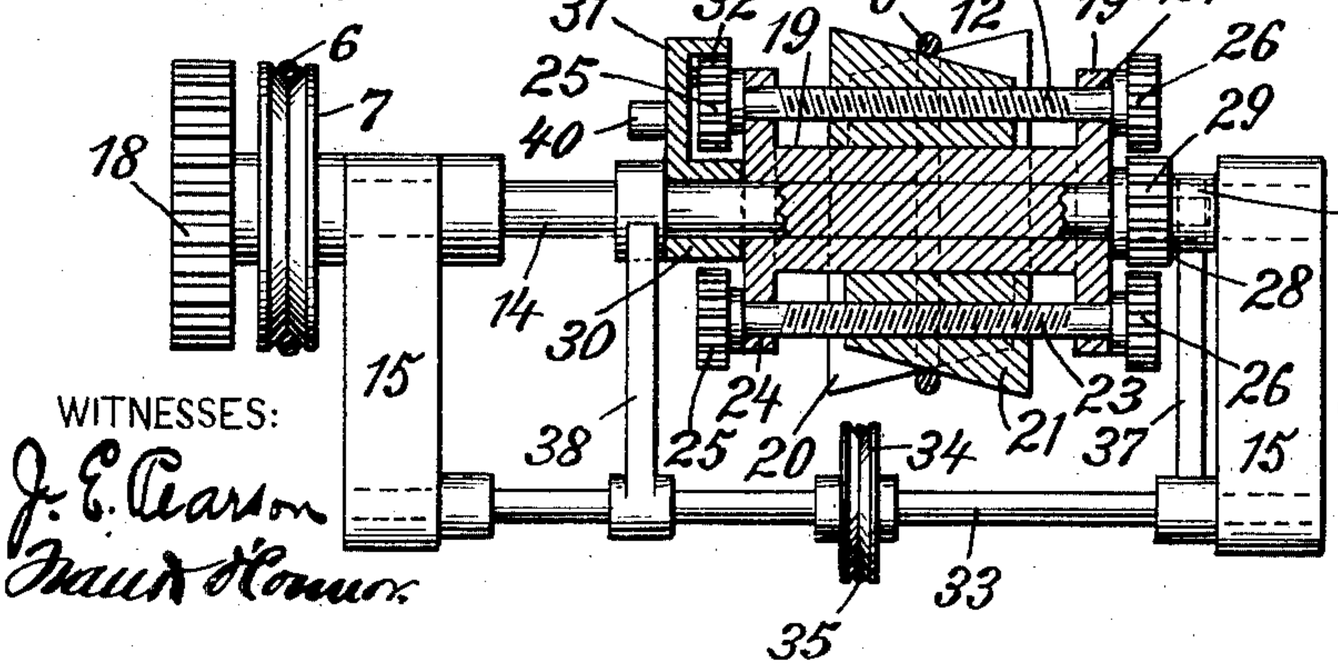


FIG.3.

FIG.4.



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No. 756,444. Patented April 5, 1904.

UNITED STATES PATENT OFFICE.

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ELECTRIC ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 756,444, dated April 5, 1904.

Application filed June 30, 1903. Serial No. 163,799. (No model.)

To all whom it may concern:

Be it known that I, HAROLD ROBINSON WELLMAN, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Electric Elevators, of which the following is a specification.

My invention relates to elevators of the type employing an endless rope wherein the upward or downward movement of the elevator-car, as well as its speed of movement, may be effected and varied by altering the linear velocity of the rope at one of its driven points or otherwise by varying the diameter of one of the driving-sheaves over which the rope passes.

My invention consists in the construction of the driving-sheave of variable diameter and in the means employed for actuating the movable parts of said sheave to change the effective diameter of the sheave.

The object of my invention is to provide means for changing the effective diameter of such sheave by moving such portions of the sheave as at the time are not subjected to the pressure or strain of the rope passing over the sheave.

The accompanying drawings will serve to illustrate my invention.

Figure 1 is a front elevation. Fig. 2 is a side elevation and section taken on the line *a a* of Fig. 1. Fig. 3 is a partial side elevation and section taken on the line *b b* of Fig. 1. Fig. 4 is a plan and horizontal section taken on the line *c c* of Fig. 1.

In the drawings, 5 indicates the elevator-car; 6, endless rope which is carried over the sheave 7 and pulleys 8 9 10 11 and sheave 12 of variable diameter. The pulley 11 is counterweighted by the weight 13. The sheaves 7 and 12 are mounted on and secured to the shaft 14, carried in standards 15, and adapted to be moved at constant speed by means of the motor 16 and the interposed gears 17 18 between the motor and the shaft.

The sheave 12 of variable diameter consists of the hub or spool 19 and the six cone-shaped members 20 20^a 20^b 21 21^a 21^b, whose lower surface conforms in shape to that of the hub 19 and whose upper surface is inclined downwardly in opposite directions toward each other. Each of these members has a screw-thread upon its interior and is mounted upon an exteriorly-threaded shaft, of which there are six, 22 22^a 22^b 23 23^a 23^b. The inclination of the screw-threads on the shafts 22 22^a 22^b are opposite in direction to those on the shafts 23 23^a 23^b. The shafts are mounted in bearings 24 at each end of the hub or spool, and upon opposite ends of the shafts are the gears 25 26.

Mounted loosely upon the shaft 14 at the right of the spool is a sleeve 27, from which projects in an upward direction a plate or arm 28, having an arc-shaped rack 29 formed in its upper edge. Mounted loosely upon the shaft 14 at the left of the spool or hub is a sleeve 30, from which projects in an upward direction an arm or plate 31, which is turned at a right angle at the top and has formed in its under surface an arc-shaped rack 32. The construction of the rack at the right is best shown in Fig. 2 and that at the left in Fig. 3.

Mounted in the standards 15 is a shaft 33, on which is secured a pulley 34, over which passes an endless rope 35, which is carried through the elevator-car and over a pulley 36 at the top of the elevator-shaft. Secured to the shaft 33 are the detents 37 38. The detent 37 is adapted to engage with a pin 39, which projects horizontally to the right from the sleeve 27, and the detent 38 is adapted to engage with a pin 40, which projects horizontally to the left from the sleeve 30.

The operation of my device is as follows: Assuming the effective diameter of the sheaves 7 and 12 at any given time to be the same, no motion will be imparted in an upward or downward direction to the elevator-car 5. If, however, the effective diameter of the sheave 12 is altered relative to that of the sheave 7 the linear velocity of the endless rope 6 will be increased or decreased, depending upon whether the effective diameter of this sheave 12 is greater or less than that of the sheave 7. Assuming the effective diameter of the sheave

12 to be greater than that of the sheave 7, the linear velocity of the rope at the sheave 12 will be greater than that at the sheave 7, and consequently the elevator-car will rise. Conversely, if the linear velocity of the rope at the sheave 12 is decreased the car will descend. It will be observed that the endless rope 6, irrespective of the effective diameter at the time of the sheave 12, bears upon the cone-shaped members at the time at the bottom of the sheave, while the members at the time at the sides of the sheave are under little pressure and those at the time at the top of the sheave are under no pressure. Practically it is not possible to move the members at the time at the bottom of the sheave, owing to the strain exerted by the rope; but those at the top may be freely moved. To effect this movement to bring the members together, the endless rope 35 is lifted. This movement of the rope rotates the shaft 33 through the pulley 34, causes the detent 38 to move in an arc of a circle and into the path of movement of the pin 40, projecting from the sleeve 30, thereby engaging the hook and holding the sleeve 30 in a fixed position. Conversely, when it is desired to decrease the effective diameter of the sheave 12 the endless rope 35 is moved downward, which rotates the detent 37 in an arc of a circle to engage with the pin 39 on the sleeve 27. It will be understood that the sleeves 30 and 27 normally rotate in unison with the spool and that when neither of these sleeves is held in a fixed position the gears 25 or 26, as the case may be, are brought in contact with either the rack 29 or 32 on the sleeves, thereby rotating the shafts and moving the members 20 20^a 20^b 21 21^a 21^b outward or inward relatively to each other, and thus gradually changing as the successive members are moved toward or from each other the effective diameter of the sheave 12.

I wish it understood that I do not limit myself to the precise method shown for moving the members of the sheave 12 which at the time are not under tension or strain, as means other than that shown may be employed.

Having thus described my invention, I claim—

1. In an elevator, the combination with an endless rope, of a sectional expansible sheave, together with means for moving such sections of the sheave as at the time are not subjected to the strain of the rope.

2. In an elevator, the combination with an endless rope, of a sheave of variable diameter, said sheave formed of a series of coacting members, together with means for moving such of said members as at the time are not subjected to the bearing strain of the rope.

3. In an elevator, the combination with an endless rope, of a sheave of variable diameter, said sheave consisting of a hub member, two series of conical members, means for moving oppositely-disposed members of each series toward or from each other, and means under the control of the operator of the elevator for determining the direction and degree of movement of said conical members relative to each other.

4. In an elevator, the combination with an endless rope, of a sheave of variable diameter, said sheave consisting of a hub member, two series of conical members, threaded shafts for moving said conical members, gears on the opposite ends of said shafts, sleeves carrying racks, and means for throwing one or the other of said racked sleeves into engagement with the gears on the ends of the shafts.

5. In an elevator, the combination of a driven shaft, a sheave of fixed diameter on said shaft, a sectional sheave of variable diameter on said shaft, an endless rope carried over said sheaves, together with means for moving such sections of the sheave of variable diameter as at the time are not under strain from the rope.

6. In an elevator, the combination of a driven shaft, a sheave of variable diameter on said shaft, said sheave comprising two series of oppositely-disposed members whose external surfaces are inclined toward each other, threaded shafts for moving said members, gears on opposite ends of said shafts, two rack-sleeves loosely mounted on said driven shaft and normally adapted to rotate in unison with the shaft, pins projecting from said sleeves, pivotally-mounted detents, together with means for throwing said detents into engagement with one or the other of said pins on said sleeves.

7. In an elevator, a sheave of variable diameter, comprising two series of oppositely-disposed conical members, arranged around a central hub, threaded shafts for actuating said members, gears on the ends of said shafts, together with means for successively producing a relative movement between pairs of said conical members.

In testimony whereof I affix my signature in the presence of two witnesses.

HAROLD ROBINSON WELLMAN.

Witnesses:
I. WERTHEIMER,
P. B. LIEBERMANN.