No. 689,509. Patented Dec. 24, 1901.

M. E. NEENAN.

ELEVATOR.

(Application filed Nov. 17, 1900.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 1.

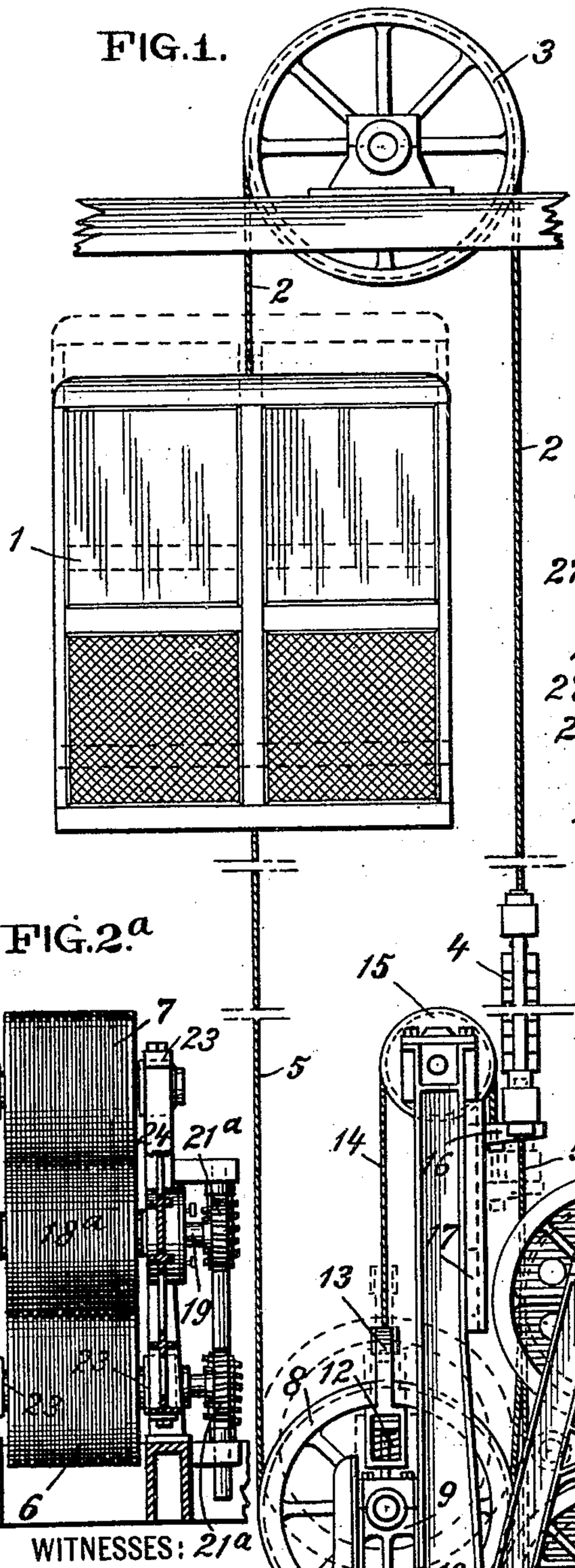

FIG. 2.

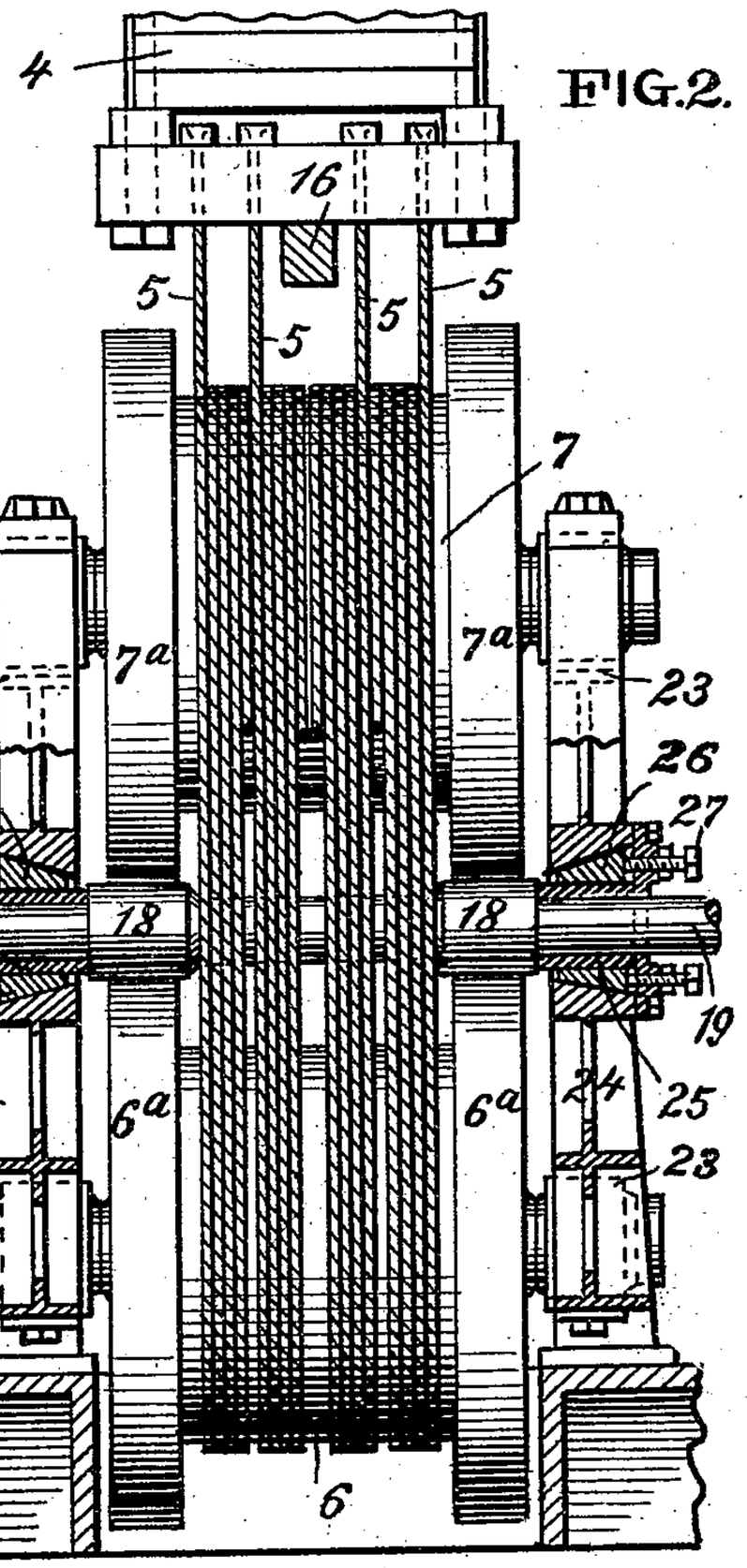

FIG. 2a.

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FIG. 3.

FIG. 4.

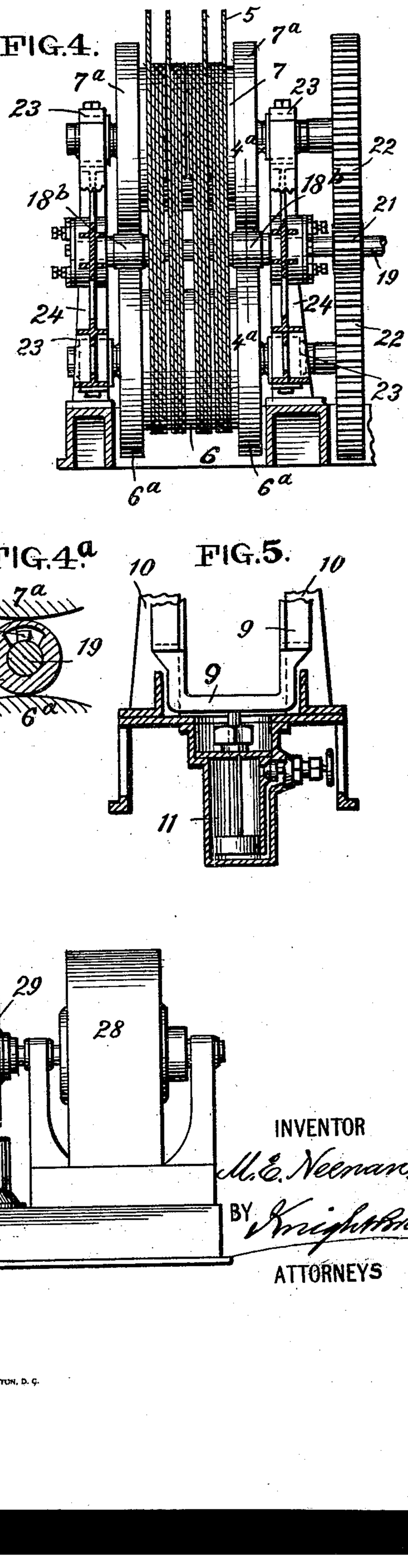

FIG. 4a.

FIG. 5.

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UNITED STATES PATENT OFFICE.

MICHAEL E. NEENAN, OF NEW YORK, N. Y.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 689,509, dated December 24, 1901.

Application filed November 17, 1900. Serial No. 36,851. (No model.)

To all whom it may concern:

Be it known that I, MICHAEL E. NEENAN, a citizen of the United States, and a resident of the borough of Manhattan, in the city and State of New York, have invented certain Improvements in Elevators, of which the following is a specification.

The subject of my invention is a balanced, direct-draft, frictional rolling elevator mechanism having a pair of friction-drums and an interposed rolling thrust member, over and under which drums the elevator-rope is coiled, said mechanism constituting an intermedium for delivery of power from a motor to the rope from which an elevator-car is suspended, while the opposite end or part of said rope is suspended from the bottom of the car.

The improvements consist in features of novelty hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of an elevator, illustrating my invention. Fig. 2 is a front elevation of the friction-drums and their accessories on a larger scale, partly in section, with a part of the counterbalance-weight. Fig. 2ª is a detail sectional elevation of the same on a smaller scale, illustrating a modification. Fig. 3 is a front elevation of the said elevator. Fig. 4 is a front elevation of the driving-drums and accessories, illustrating the addition of cogged gearing for driving the same. Fig. 4ª is a detail cross-section on the line 4ª of Fig. 4. Fig. 5 is a vertical section of a detail hereinafter described.

The elevator-car 1 runs on customary vertical guide-rails (not shown) and is suspended by ropes 2, passing at the top of the car-well over a suspension-sheave 3, from which they descend to a guided counterbalance-weight 4, from the bottom of which the ropes 5 are carried downward beneath and around a pair of frictional drums 6 7, embracing the drums and extending over and under the same in a sufficient number of coils to effect the movement of the car by friction of the ropes on the drums, the drums being so mounted and placed as to guide the ropes straight from drum to drum.

From the friction driving drums 6 7 the ropes 5 are carried beneath a tension-sheave 8, Fig. 1, and from thence upward to the bottom of the car 1, to which they are attached, thus establishing a perfect rope-counterbalance by the rope itself.

The tension-sheave 8 is journaled in a vertically-slidable frame 9, (shown in detail in Fig. 5,) guided in vertical ways 10 and checked from sudden ascent by a dash-pot 11 of common form, thereby preventing the car from bouncing when stopped quickly, and the necessary tension is governed by the weight of the tension-sheave and of the vertically-slidable frame 9, in which the sheave 8 is journaled. The frame 9 is made as light as is consistent with strength, and any necessary weight to provide the required tension is added to and revolves with the revolving sheave itself. As the weight of the sheave is sustained directly by the rope 5 and not by the boxes in which the sheave-journals run, this addition of weight does not increase friction on the sheave-shaft bearing. The frame 9, in which the tension-sheave 8 has its bearings, is connected through the medium of springs 12 and a yoke 13 to a rope 14, which passes over a sheave 15 and is attached to a slide member 16, running in vertical guideways 17, the said member 16 being mounted in such position that the counterbalance-weight 4 of the car 1 when approaching the downward limit of its movement forces down the slide member 16, thereby lifting the tension-sheave 8, slacking the ropes 5, and relieving the friction on the drums. The upward movement of the car is thus automatically arrested when it reaches the upper limit of its run, both by the cessation of frictional draft on the hoisting-rope and by the reverse action of the car counterbalance-weight 4 and car striking power-controlling devices suitably located near the bottom and which also control the upper and lower limits of car run. (Not shown.)

To sustain the mutual pressure of the frictional drums 6 7 toward each other, a thrust member or members are interposed, which may consist of the motor-shaft 19, sustaining the thrust from the friction-surfaces of the enlarged ends 6ª 7ª of the respective friction-drums 6 7, as shown in Fig. 2, and for this purpose the said motor-shaft may be provided with frictional driving thrust pulleys or enlargements 18 18. If preferred, the interposed thrust member may consist, as shown in Fig. 2ª, of a friction member 18ª on the motor-shaft

19, of any preferred diameter relatively to the drums 6 7 and bearing on said drums from end to end. As the ropes pass from drum to drum beneath the lower and over the upper drum without completely encircling the respective drums, the rope-grooves do not require to be spirally disposed on the drums, but run in planes perpendicular to the axis. Hence no complication arises in fitting the periphery of the interposed thrust member 18^a to the peripheries of the drums 6 7.

If preferred, friction thrust-pulleys 18^b may be employed, as shown in Fig. 4, having a movement on the motor-shaft 19, limited by the tongues 20 thereon, as shown in the detail section, Fig. 4^a, and positive driving motion may be communicated to the drums by a cogged pinion 21, keyed on the motor-shaft 19 and gearing with cog-wheels 22, keyed on the shafts of the respective drums 6 and 7. The movement permitted to the thrust-pulleys 18^b on the motor-shaft 19 should be in excess of the lost motion between the teeth of the pinion 21 and the spur-wheels 22, taking into consideration the wear between them, so that the function of the thrust-pulleys may be limited to receiving the thrust, while the driving is effected by the spur-gearing. With this last-described device the friction-drums 6 7, by which the elevator-ropes are operated, will be driven positively by cog-gearing, or in the event of breakage or derangement of this gearing the motor-shaft 19 will drive or hold the drums 6 7 by friction through the medium of the friction-pinions 18^b.

Worm-gearing 21^a may be used, as illustrated in Fig. 2^a.

In order to adapt the drums 6 7 or their surfaces to grip and bear upon the interposed thrust member or members 18, 18^a, or 18^b, the journals of the said drums are mounted in adjustable or slidable boxes 23, as shown in Fig. 1 and indicated in dotted lines in Figs. 2, 3, and 4. This purpose may be effected by setting up the slidable boxes, as required, or by mounting them with some freedom of movement in the pedestals 24, as shown.

In order to maintain the motor-shaft 19 and its friction, driving, and thrust members 18 18^a 18^b in proper relation to the drums 6 7 or the members thereof, the journal-bearings 25 of the motor-shaft are sustained, adjusted, and fixed by wedges 26, set up, as required, by set-screws 27, as illustrated in section in Fig. 2, or said bearings may be fixed without any adjusting-wedges.

The friction contact-surfaces of the drums and interposed thrust members may be grooved in any preferred way to increase frictional or surface resistance between them, or suitable material may be interposed to increase friction and durability or decrease noise.

The motor-shaft 19 and drums may be driven by an electric or other motor 28 and a friction-brake 29 connected therewith to stop or retard the motion or hold the car, as required, acting in conjunction with suitable power-controlling mechanism extending between the car and motor and connected therewith.

From the above description it will be apparent that the tension device and any preponderant weight of the car and its load will draw the ropes 5 into close frictional contact with the drums 6 7, so as to provide the necessary friction between the rope and drums and also between the friction-surfaces of the drums and the interposed thrust members for running and sustaining the loaded car. The greater the load the greater is the friction required and applied by the ropes to the surface of the drums, and vice versa.

With drums arranged one above the other and interposed thrust means, as shown, the relative arrangement of the said drums and of the hoisting-rope relieves the drum-shaft bearings from strain, and as the weight 4 is adapted to counterbalance the car and the weight of the hoisting-drums and their accessories are adapted to approximately balance the strain on the fixed shaft-bearings, due to the resistance of the motor or brake to the load of the car, and the weight of said drums and accessories being proportioned to a fixed or average load of said car, as the case may be, the strain and friction on said bearings will be reduced accordingly. Under fixed conditions of load, (within certain limits,) which very often obtains, the strain on the fixed bearings of the elevator motive mechanism will be practically balanced. In connection with a motor that can hold a load when stationary the brake can be dispensed with. In practice the car will of course be provided with a customary safety device to prevent falling in event of breakage of the hoisting-rope.

It will be apparent that the hoisting-drums, tension device, and their accessories may be arranged in any preferred and suitable position relatively to the car and car-well and to each other, so as to economize space, avoid reverse bending of the ropes, and properly guide the same.

It will be observed that Figs. 1 and 3 show the top and bottom portions of the elevator structure with the car 1 at the upper end of its run, the ropes 2 and 5 and the counterbalance-weight 4 being cut to indicate indefinite length.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent—

1. In an elevator, the combination of the friction-drums 6, 7, the shafts of which rotate in suitable boxes; a friction rolling thrust member mounted in suitable boxes and sustaining the mutual inward pressure of said drums; an elevator-car; a suspension-sheave located at the top of the car-well; a rope from which the car is suspended, passing up over the suspension-sheave, thence down to and embracing the drums, and extending in coils

over and under the same, thence up under the car and suspended from said car; and a tension device acting on the rope beyond the drums; substantially as and for the purposes set forth.

2. In an elevator, the combination of the friction-drums 6, 7; suitable boxes in which the shafts of said drums rotate; an interposed driving-shaft 19; driving means mounted on said shaft sustaining the mutual inward pressure of the drums and communicating rotation thereto; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended, passing up over the said suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car and suspended from said car; substantially as set forth.

3. In an elevator, the combination of the friction-drums 6, 7; suitable boxes in which the shafts of said drums rotate; the interposed driving-shaft 19, having frictional surfaces sustaining the mutual inward pressure of the drums; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended, passing up over the suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car, and suspended from said car; and a tension device acting on the rope beyond the drums and in suspension from the car, to draw the said rope into frictional contact with the said drums; substantially as and for the purposes set forth.

4. In an elevator, the combination of the friction-drums 6, 7; suitable boxes in which the shafts of said drums rotate; an interposed driving-shaft 19; driving and thrust means carried by the shaft 19, sustaining the mutual inward pressure of the drums and imparting rotation thereto; a suitable brake to arrest the movement and hold the car as required; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended passing up over the suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car, and suspended from said car; substantially as set forth.

5. In an elevator, the combination of the friction-drums 6, 7; suitable boxes in which the shafts of said drums rotate; a driving-shaft 19; interposed rolling thrust means on said shaft supporting the mutual inward pressure of the drums; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended, passing up over the said suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car and suspended from said car; and a counterbalance-weight applied to the rope between the drums and the upper suspension-sheave, substantially as set forth.

6. In an elevator, the combination of the friction-drums 6, 7; slidable boxes in which the shafts of said drums rotate; a driving-shaft 19; interposed rolling thrust means on said shaft supporting the mutual inward pressure of the drums; an elevator-car; a suspension-sheave at the top of the car-well; and a rope from which the car is suspended, passing over the said suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car and suspended from said car; substantially as set forth.

7. In an elevator, the combination of a pair of friction-drums 6, 7, mounted one above the other; suitable boxes in which the shafts of said drums rotate; an interposed driving-shaft 19; means carried by said shaft constituting a rolling driving thrust-bearing between the drums, sustaining their mutual inward pressure and communicating rotation to said drums; an elevator-car; a suspension-sheave at the top of the car-well; and a rope from which the car is suspended, passing up over the said suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car and suspended from said car; substantially as set forth.

8. In an elevator, the combination of a pair of friction-drums 6, 7; suitable boxes in which the shafts of said drums rotate; an interposed driving-shaft 19; rolling thrust means on said shaft sustaining the mutual inward pressure of the drums; a pinion keyed on said driving-shaft, wheels mounted on the drum-shafts and driven by said pinion; an elevator-car; a suspension-sheave at the top of the car-well; and a rope from which the car is suspended, passing up over the said suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car and suspended from said car; substantially as set forth.

9. An elevator mechanism comprising a pair of friction-drums; suitable boxes in which the shafts of said drums rotate; a motor-shaft in driving connection with the drums; rolling thrust means interposed between the drums sustaining their mutual inward pressure; an elevator-car; a suspension-sheave located at the top of the car-well; and a rope from which the car is suspended passing over the suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, and thence underneath the car and suspended from said car; substantially as set forth.

10. In an elevator, the combination of a pair of friction-drums; suitable boxes in which the shafts of said drums rotate; a motor-shaft in driving connection with the drums; rolling thrust means interposed between the bearing-surfaces of the drums, sustaining their mutual inward pressure; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended passing

over the suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same; thence underneath the car and suspended from said car; a tension device acting on the rope beyond the drums, which rope is in suspension from the car, to draw it into frictional contact with said drums; and means to relieve the tension of the rope and its friction on the drums; substantially as and for the purposes set forth.

11. In an elevator, the combination of a pair of friction-drums; suitable boxes in which the shafts of said drums rotate; a motor-shaft in driving connection with the said drums; rolling thrust means interposed between the bearing-surfaces of the drums, sustaining their mutual inward pressure; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended passing over the suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car and suspended from said car; a tension device acting on the rope beyond the drums, which rope is in suspension from the car, to draw it into frictional contact with said drums; and a dash-pot connected with the tension device; substantially as and for the purposes set forth.

12. In an elevator, the combination of a pair of friction-drums; suitable boxes in which the shafts of said drums rotate; a motor-shaft in driving connection with the drums; rolling thrust means interposed between the bearing-surfaces of the drums, sustaining their mutual inward pressure; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended passing over the suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same; thence underneath the car and suspended from said car; a counterbalance-weight connected to the rope between the suspension-sheave and the drums; a tension device acting on the rope beyond the drums which rope is in suspension from the car; to draw it into frictional contact with said drums; and means to relieve the tension of the ropes and their friction on the drums; substantially as and for the purposes set forth.

13. In an elevator, the combination of a pair of friction-drums; suitable boxes in which the shafts of said drums rotate; a motor-shaft in driving connection with the said drums; rolling thrust means, interposed between the bearing-surfaces of the drums, sustaining their mutual inward pressure; an elevator-car; a suspension-sheave at the top of the car-well; a rope from which the car is suspended passing over the suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence underneath the car and suspended from said car; a counterbalance-weight connected to the rope between the suspension-sheave and the drums; a tension device acting on the rope beyond the drums, which rope is in suspension from the car, to draw it into frictional contact with said drums; and a dash-pot connected with the tension device; substantially as and for the purposes set forth.

14. In an elevator, the combination of the friction-drums 6, 7, mounted one above the other; slidable boxes in which the shaft-journals of said drums rotate; thrust driving members interposed between the said drums, mounted on an interposed shaft 19, sustaining the mutual inward pressure of the drums, and driving the same; an elevator-car; a suspension-sheave located at the top of the car-well; a rope from which the car is suspended, passing up over the said suspension-sheave, thence down to and embracing the drums and extending in coils over and under the same, thence up and under the car and suspended from said car; a counterbalance-weight applied to the rope between the drums and the upper suspension-sheave; a brake suitably located to arrest the movement and hold the car; a tension device acting on the rope beyond the drums, which rope is in suspension from the car, to draw the rope into tight contact with the drums; and a dash-pot attached to the tension device; substantially as and for the purposes set forth.

15. The combination of an elevator-car; a hoisting-drum; a rope from which the car is suspended, wound on the hoisting-drum passing beyond the same and suspended from the bottom of the car; a tension device acting on the rope beyond the hoisting-drum, and a dash-pot acting in conjunction with the tension device upon the rope suspended from the bottom of the car to prevent sudden or jumping movement of the car, substantially as set forth.

16. The combination of an elevator-car; a hoisting-drum; a rope from which the car is suspended, wound on the hoisting-drum passing beyond the same and suspended from the bottom of the car; a tension device acting on the rope beyond the hoisting-drum, means for retracting the tension from the rope at the end of the car movement and a dash-pot acting in conjunction with the tension device to prevent sudden movement thereof, substantially as set forth.

MICHAEL E. NEENAN.

Witnesses:
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