(No Model.)

2 Sheets—Sheet 1.

F. E. TURNER.

ELEVATOR.

No. 605,937. Patented June 21, 1898.

Fig. 1.

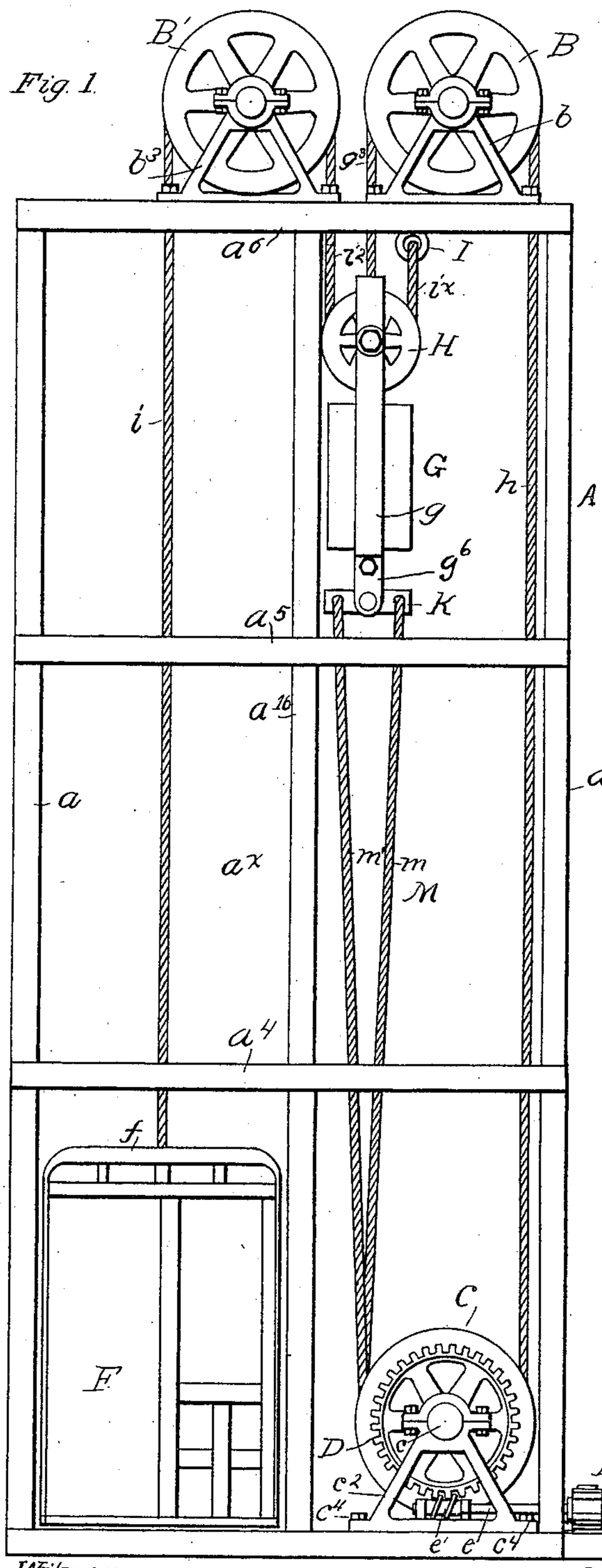
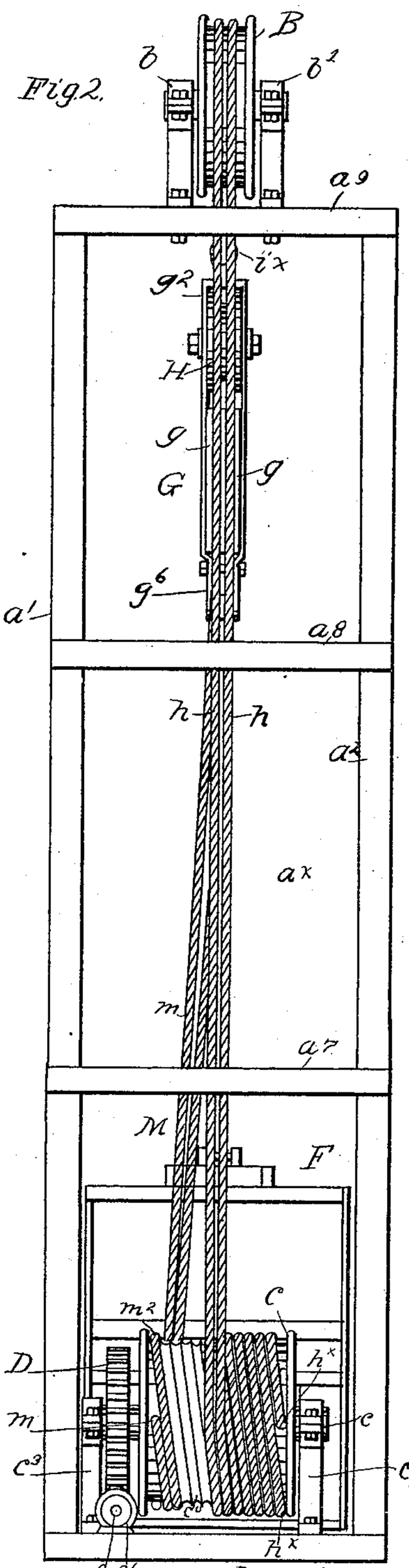


Fig. 2.



Witnesses.
C. A Gray
A.B. Jacobus

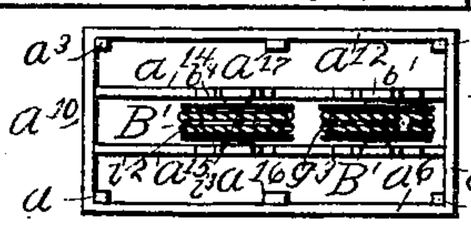


Fig. 3

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(No Model.)

2 Sheets—Sheet 2.

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Fig. 4.

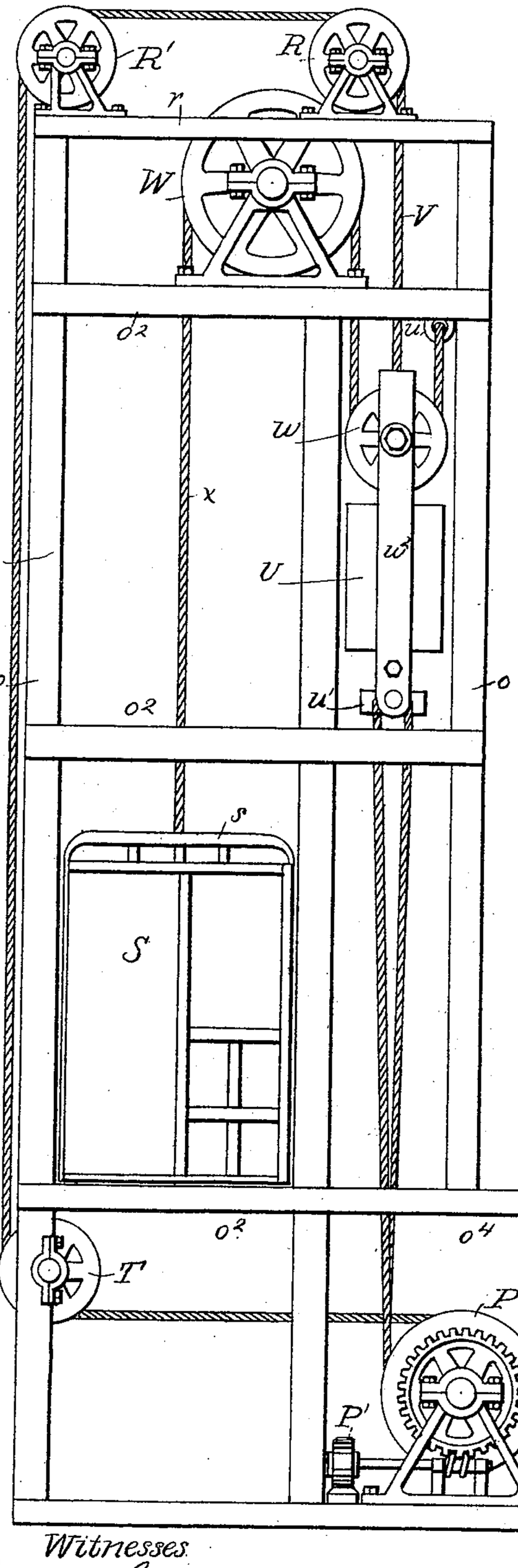
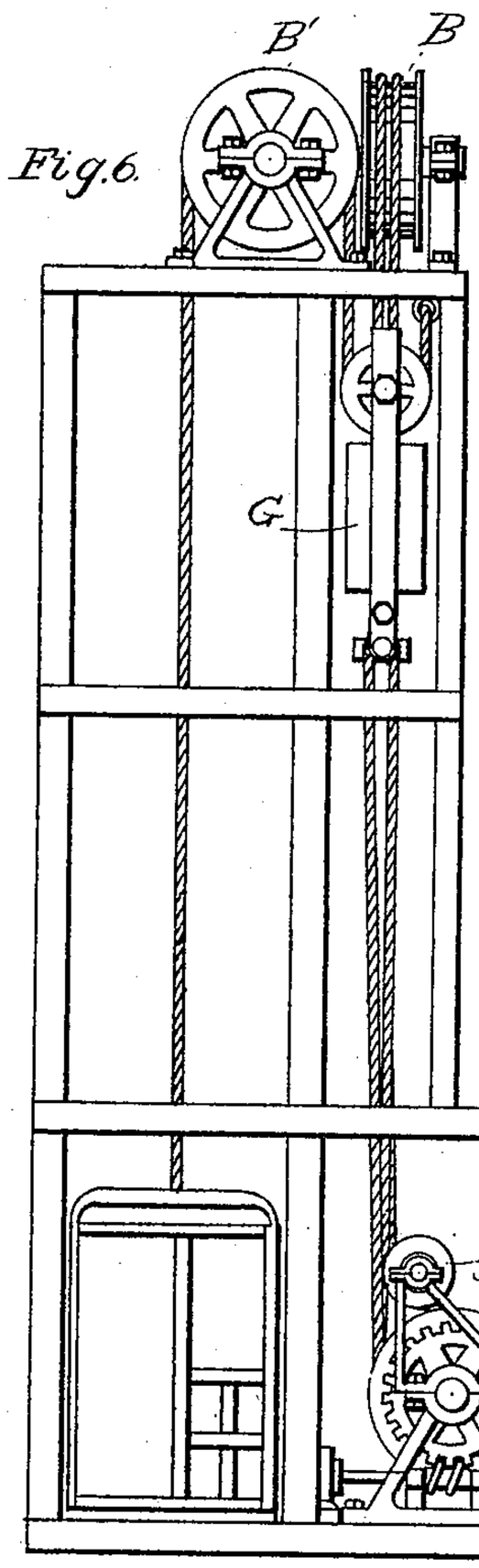


Fig. 6.



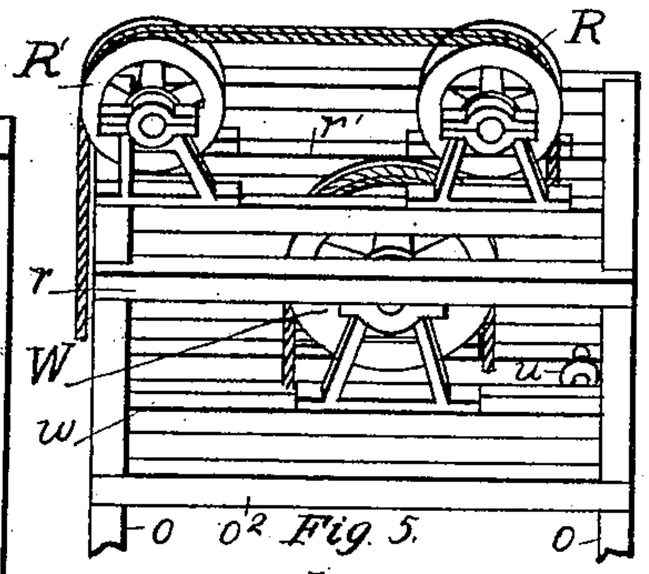


Fig. 5.

Witnesses.
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UNITED STATES PATENT OFFICE.

FREDERICK E. TURNER, OF KANSAS CITY, MISSOURI.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 605,937, dated June 21, 1898.

Application filed December 17, 1897. Serial No. 662,358. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK E. TURNER, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Elevators; and I do hereby declare that the following is a full, clear, and exact description of the invention, such as will enable others to make and use the same, reference being had to the accompanying drawings, forming a part of this specification.

The object of my invention, primarily, is to economize the power and relative cost of moving a load in operating freight and passenger elevators; second, to utilize the gravity of a weighted body to raise the car and one-half its maximum load; third, to transmit the power of the drum direct to the counterweight instead of to the car; fourth, to increase the speed of the counterbalanced car from a slow-running motor, and, fifth, to prevent sudden jar ordinarily transmitted from the drum to the car in an incipient movement to either ascend or descend.

My invention consists in the novel construction and arrangement of parts hereinafter more specifically pointed out in the claims.

In the drawings, Figure 1 is a side view of an elevator-hatchway, showing the car, the drum, and the motor at the bottom of the hatchway, and my improved devices for the transmission of power to elevate the car. Fig. 2 is an end view in elevation of the hatchway and power-transmitting devices as seen in Fig. 1. Fig. 3 is a plan view of the elevator-hatchway as seen in Fig. 1. Fig. 4 is a view of the elevator-hatchway as seen in Fig. 1, showing alternate arrangement of the power-transmitting devices. Fig. 5 is a front view of the elevator-hatchway as seen in Fig. 4, as seen at the upper end in perspective. Fig. 6 is a view of the hatchway upon a reduced scale, showing means for diverting the power-transmitting rope on the drum.

Similar letters of reference indicate corresponding parts in all the figures.

Referring to the drawings, $a^{\times}$ represents an elevator shaft or hatchway for the ascent and descent of an elevator-car and consists of a rectangular-shaped frame A, extending from the ground or the usual level of the foundation of a building upwardly to the upper story of said building. The frame A, as illustrated, consists of the front corner-posts $a\ a'$ and rear corner-posts $a^2\ a^3$, arranged in a vertical position and at the respective corners of the frame A.

$a^4\ a^5\ a^6$ are wall-plates, each plate extending transversely from the corner-post a to the corner-post a' at the respective heights of the several floors in the building. From the front corner-post a' to the rear corner-post a^2 upon one side of frame A and upon a level with plate a^4 is extended a wall-plate a^7, and at the respective levels of the wall-plates $a^5\ a^6$ are the respective wall-plates $a^8\ a^9$, extending from the corner-post a' to the corner-post a^2. The front and rear corner-posts $a\ a^3$ upon the other side of frame A are bound together by wall-plates extending from one post to another at the same described height of the several floors of the building as described of the plates $a^7\ a^8\ a^9$, the upper wall-plates extending from one post to another at the same described height of the several floors of the building as described of the plates $a^7\ a^8\ a^9$, the upper wall-plate upon said side being shown at a^{10} in Fig. 3, and the rear wall-plates, extending from post a^2 to post a^3, are also at the same described height of the wall-plates $a^4\ a^5\ a^6$, the upper rear wall-plate being shown at a^{12} in Fig. 3.

Extending from the wall-plate a^9, at the upper end of the shaft to the wall-plate a^{10}, are separate parallel pulley-supporting beams $a^{14}\ a^{15}$, upon one of which beams a^{14}, at a point about one-third the described distance from the wall-plate a^9 to the wall-plate a^{10}, is an upwardly-extended pulley-bracket b, and upon the other beam a^{15}, directly opposite the bracket b, is a bracket b', upon which brackets is journaled the grooved cable-pulley B. Upon the beams a^{14} and at a point in advance of the brackets $b\ b'$ about two-thirds the described distance from the wall-plate a^9 to the wall-plate a^{10} is a bracket b^3, and opposite the bracket b^3 on the beam a^{10} is a bracket b^4, upon which is journaled a grooved cable-pulley B', said pulley being of sufficient size or proportionate to the size of the hatchway $a^{\times}$.

At the bottom of the hatchway $a^{\times}$ within the frame A and at a point near the corner-posts $a'\ a^2$ and in a vertical line passing

through the pulley B on the beams a^{14} a^{15} is a cable-drum C, actuated by the elevator-engine, mounted upon the shaft *c*, which shaft is journaled in suitable journal-boxes upon the brackets c^2 c^3, the said brackets being secured to a foundation prepared at the bottom of the shaft in the usual manner, and to which foundation the brackets c^2 c^3 are bolted by the bolts c^4. The drum C is provided with the peripheral spiral grooves c^0 for guiding the cable in its spiral path during the winding of the cable, as hereinafter described. On shaft *c* and between the drum C and the bracket c^3 is keyed a gear-wheel D of the proper diameter for speed. Upon the same foundation made for the brackets c^3 c^4 and a short distance from the drum C is a motor E, having a driving-shaft *e*, which shaft extends at right angles to the plane of the shaft of drum C, and directly beneath the gear-wheel D and upon the end portion of which shaft is a worm e', which engages with the teeth of the gear-wheel D. The motor E receives its source of supply from the proper energizing source, and in ordinary cases where an electric plant is employed the poles of the motor are coupled with the conducting-wires of the generator.

The elevator-car F is of the ordinary description employed more particularly for the conveyance of passengers from one floor to another and is arranged in said hatchway $a^\times$ adjacent to the corner-posts a a^3 and is guided in its vertical movements by said corner-posts upon one side of the car and by the vertical guides a^{16} a^{17}, connected with the front and rear wall-plates of frame A, respectively, at points in said wall-plates equidistant from the front posts a a' and also equidistant from the rear posts a^2 a^3.

In the hatchway $a^\times$ and a short distance from the guides a^{16} a^{17} for the elevator-car in the direction of the posts a' a^2 and at the upper end of hatchway $a^\times$ in the position as seen in Fig. 1 is a suspended heavy body or weight G, being sufficiently heavy to raise the car and one-half its maximum load on the end of the cable *i*.

Upon each side of the weight G is a bar *g*, secured in a vertical position to said sides of said weight at an intermediate point from the outer edges of the weight, both bars extending a short distance above the upper end of said weight and bent at right angles and said ends connected with each other at g^2 by welding in the usual manner. Between the bars *g g*, above weight G, is a small grooved pulley or sheave H, journaled in said bars. With the portion g^2 of the bars *g g* is connected one end portion of separate cables *h h*, the other ends of which separate cables are extended over the pulley B on the beams a^{14} a^{15}, thence downwardly within beams a^8 a^9, and connected at $h^\times$ $h^\times$ with the drum C and with the portion of said drum near standard c^2, thence wound around said drum within the grooves c^0 a sufficient number of times to allow for the descent of the weight G and the corresponding elevation of the car F. With the under side portion of the separate beams a^{14} a^{15}, at a point beneath pulley B, is connected an eyebolt *l*. With bolt *l* is connected the separate ends $i^\times$ $i^\times$ of one end portion of separate cables *i i*, which cables extend downwardly to form a loop i^2 around sheave H, thence in an upward direction over the pulley B′, and thence downwardly in the direction of the car F and connected with the top portion *f* of said car. The bars *g g*, supporting the weight G, also extend downwardly a short distance below the line of the lower end of said weight, as at g^6 g^6, and between said portions of said bars is an equalizing-bar K.

With the cable-drum C are connected at one end the separate cables *m m′*, which are extended around the drum C in opposite directions from that described of the cables *h h*, and the other ends are extended in an opposite direction and connected with the equalizing-bar K beneath the weight G. In the operation of the drum C, first to elevate the car F, which for the purpose of illustration is, as shown in Fig. 1, at the bottom of the hatchway $a^\times$, the power from motor E through the shaft *e* rotates the drum C, and the cables *h h* on drum C are unwound in groove c^0 in said drum, and the cable *m m′*, connected with the equalizing-bar K beneath weight G, is wound around said drum. The weight G counterbalancing the weight of the car and one-half of the maximum load desired to be raised and the power to be exerted on drum C is simply, in lowering the car, when the load is greater than one-half the maximum load, to raise a weight equal to the difference between the load on the car and one-half the maximum load and also to overcome the friction, and is exemplified as follows, it being observed that in the descent of weight G the loop is lengthened and the speed of said weight is one-half the speed of the car F in traveling in either direction. Consequently the weight G travels but one-half the distance traveled by the car F. Thus the power to raise the weight of the car and one-half of its maximum load is furnished by the weight G instead of by the motor E. Estimating the weight of the car F at five hundred pounds and the maximum load to be raised in the car at one thousand pounds, or fifteen hundred pounds in the aggregate to be raised, and neglecting friction, the counterweight G is required to weigh two thousand pounds, which will exert one thousand pounds on the part of the cables *i*, attached to the car. Hence the power necessary to be exerted by the motor will be that necessary to raise the amount of weight constituting the difference between twice the weight of the car and its load and the weight of the counterweight G and also overcome the natural friction of the various parts of the elevating devices.

In order that the car may descend, the drum C is rotated in an opposite direction to that

heretofore described by motor E, and cables *h h* are wound upon drum C, exerting on weight G, which has to be raised, and the cables *m m'* unwound simultaneously.

In Fig. 4 I have shown an alternate arrangement of the power-transmitting devices whereby the same results are accomplished as in Fig. 1, with, however, the novel application of the devices to hatchways having more contracted area, and in this construction the frame O is composed of corner-posts *o* at each floor-level, as described of the corner-posts and wall-plates of the frame A. In this instance, however, the corner-posts *o o* upon one side of the shaft extend downwardly within a basement o^4 beneath the first floor-level or wall-plate o^2 and said basement o^4 extends beyond the vertical line of the other corner-posts on the other side of frame O, thus affording space for the drum P, which is the same as drum C, and motor P', which is the same as motor E. Upon the top portion of frame O and on beams *r r* are the pulleys R R', the pulley R being arranged in position near the line of the wall-plate upon the side of the hatchway in which the car S is moved. In the apartment o^2, in a direct vertical line with the pulley R', is a pulley T, which is supported in position between the corner-posts *o o*. The weight U and sheave *w* are the same as the weight G and sheaves H in Fig. 1. With the weight-supporting bars w^2 of weight U is connected one end of the separate cables which pass over pulleys R R', thence outside of frame A downwardly to and over pulley T, thence to and over drum P, and connected with said drum as described of cables *h h*. Beneath the pulley R and mounted upon the beams *w w*, which are directly beneath the beams *r r* and parallel with said beams, is a single pulley W of the proper dimensions. With the eyebolt *u*, which is connected with the beams *w w* upon the other side of the shaft from that in which car S moves, is connected one end of separate cables *x*, the other ends of which cables pass beneath the sheave W, thence upwardly over sheave W', thence downwardly and connected with the top *s* of the elevator-car S.

In order to confine the passage of the cable *h h*, as in Fig. 1, to a less area than shown in said figures, the pulley R is shown, as in Fig. 6, being at right angles to the position seen in Fig. 1, and at the bottom of the hatchway the cable being deflected by a guide-pulley *y* in a vertical line with the sheave B, the arrangement of all the devices for elevating the car being otherwise the same as shown in Fig. 1.

In my improved system of transmission of power the distance traversed by the weight G lessens the power ordinarily required to elevate loads and the jar in moving from a stationary position is removed, the difference of the load in excess of the equilibrium of the car and weight G causing less shock to the motor-shaft than the combined weight of car and load, as in the ordinary elevator systems.

Having fully described my invention, what I now claim as new, and desire to secure by Letters Patent, is—

1. The combination with an elevator-car of car-operating devices comprising hoisting-cables and suitable carrying-pulleys therefor having stationary bearings, said cables each having one end secured to a fixed point, said hoisting-cable having loops a counterweight suspended in said loops, and a winding-drum adapted to control the movement of said weight means for operating said drum and separate cables one of which is wound in one direction around said drum and connected with said counterweight and the other cable wound around said drum in the other direction and extended over another carrying-pulley having suitable bearings and connected with said counterweight for the purpose described.

2. In elevators, an elevator-car, a hoisting-cable, separate carrying-pulleys, each having stationary bearings, one end of which car-hoisting cable is secured to a fixed point and the other end extended over one of said carrying-pulleys and connected with said elevator-car, said cable having a loop, a sheave suspended in said loop, a counterweight connected with said sheave, a motor and alternate cable winding and unwinding mechanism and separate weight-controlling cables the upper end portion of one of which cables is extended over the other cable-carrying pulley and connected with said counterweight and the upper end of the other cable connected direct with the counterweight and the lower ends of said cables connected with the said winding and unwinding mechanism and adapted to be wound and unwound in a corresponding degree as described.

FREDERICK E. TURNER.

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