No. 826,821. PATENTED JULY 24, 1906.

A. AKER.

ELEVATOR.

APPLICATION FILED AUG. 17, 1905.

4 SHEETS—SHEET 1.

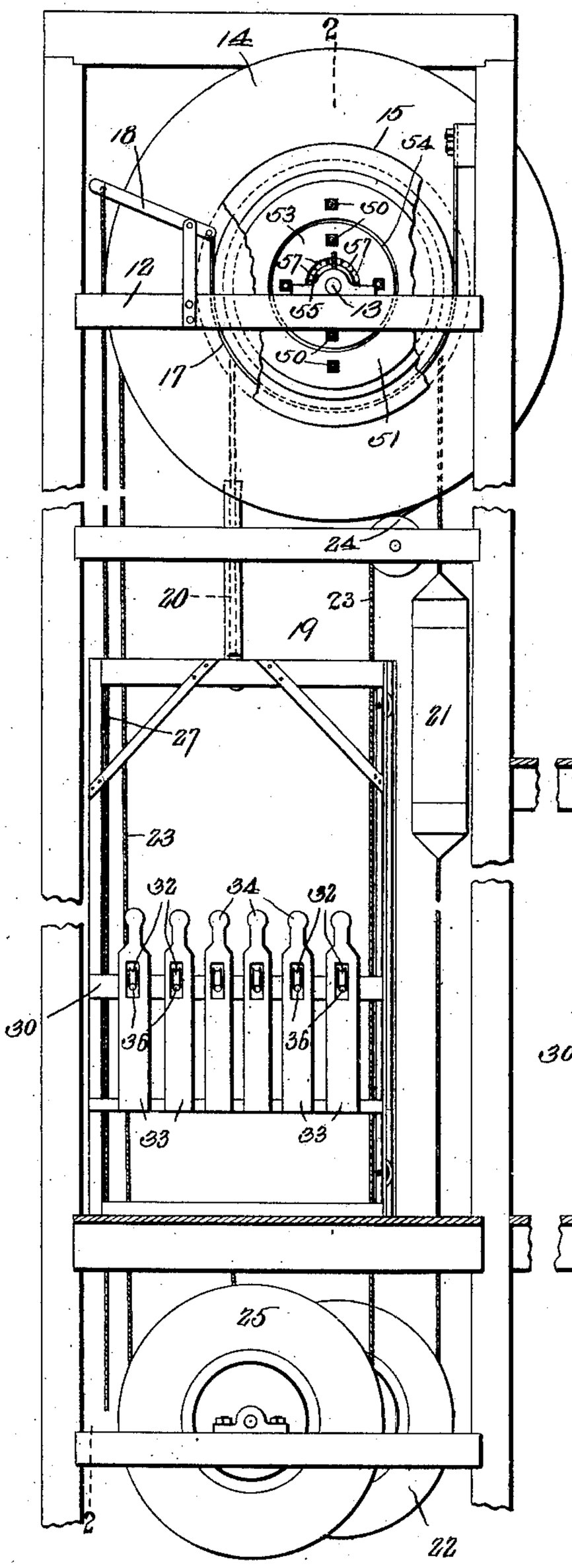

Fig. 1.

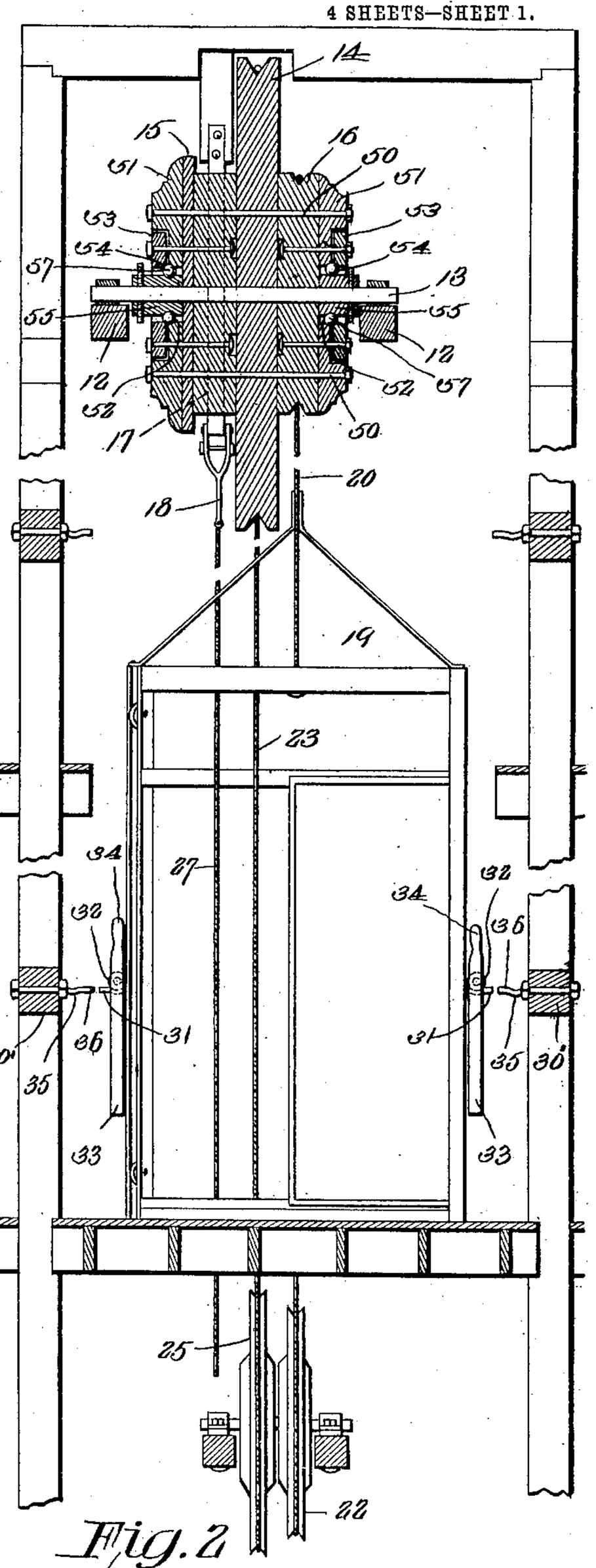

Fig. 2.

Witnesses

E. F. Clewett

Jno. E. Parker

Anton Aker, Inventor

by Church & Co.

Attorneys

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4 SHEETS—SHEET 2.

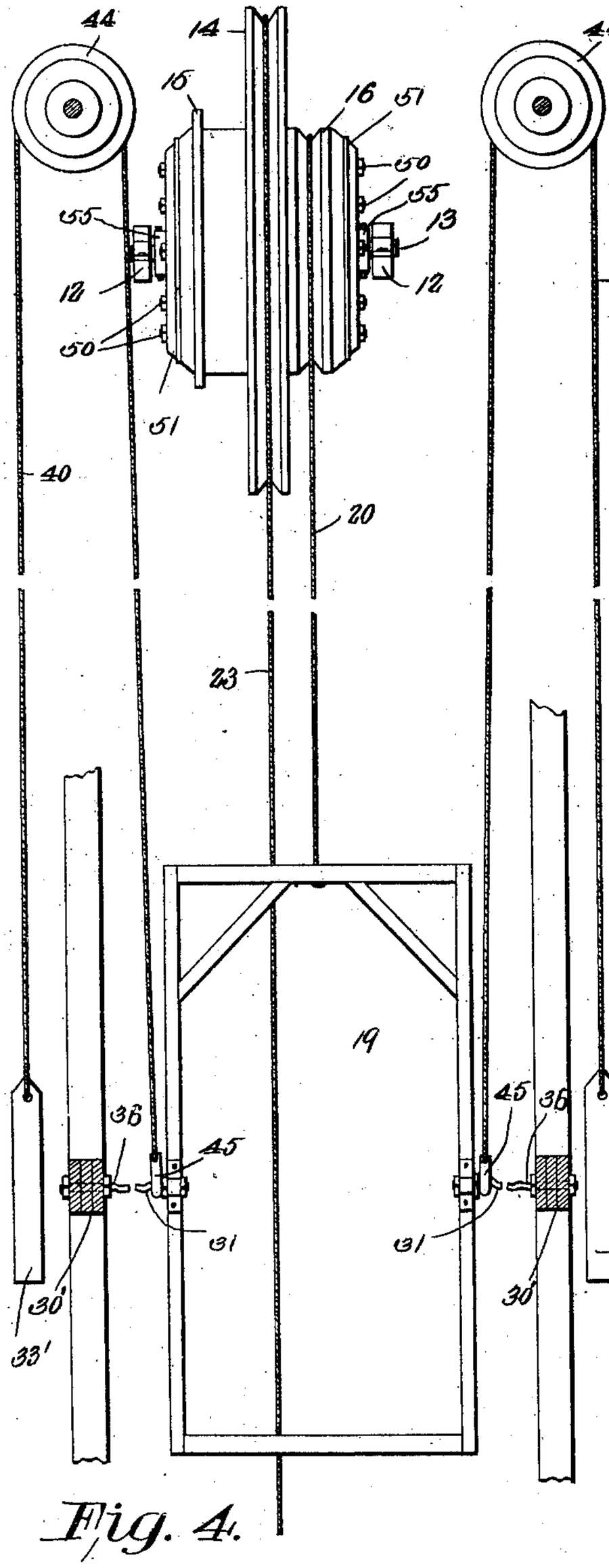

Fig. 4.

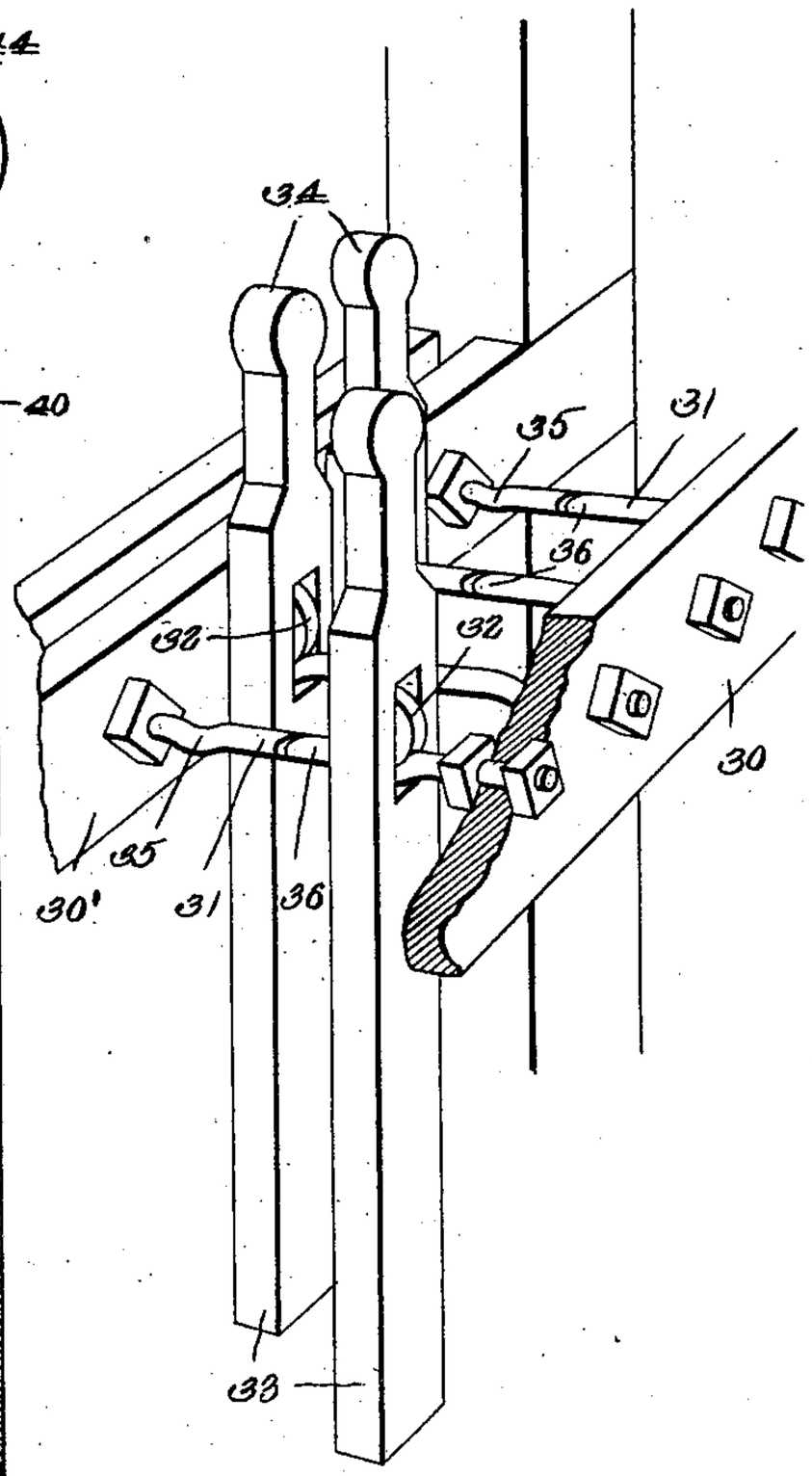

Fig. 3.

Witnesses

E. J. Hollowell

Jno. E. Parker

Anton Aker,

Inventor

by Church & Co

Attorneys

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4 SHEETS—SHEET 3.

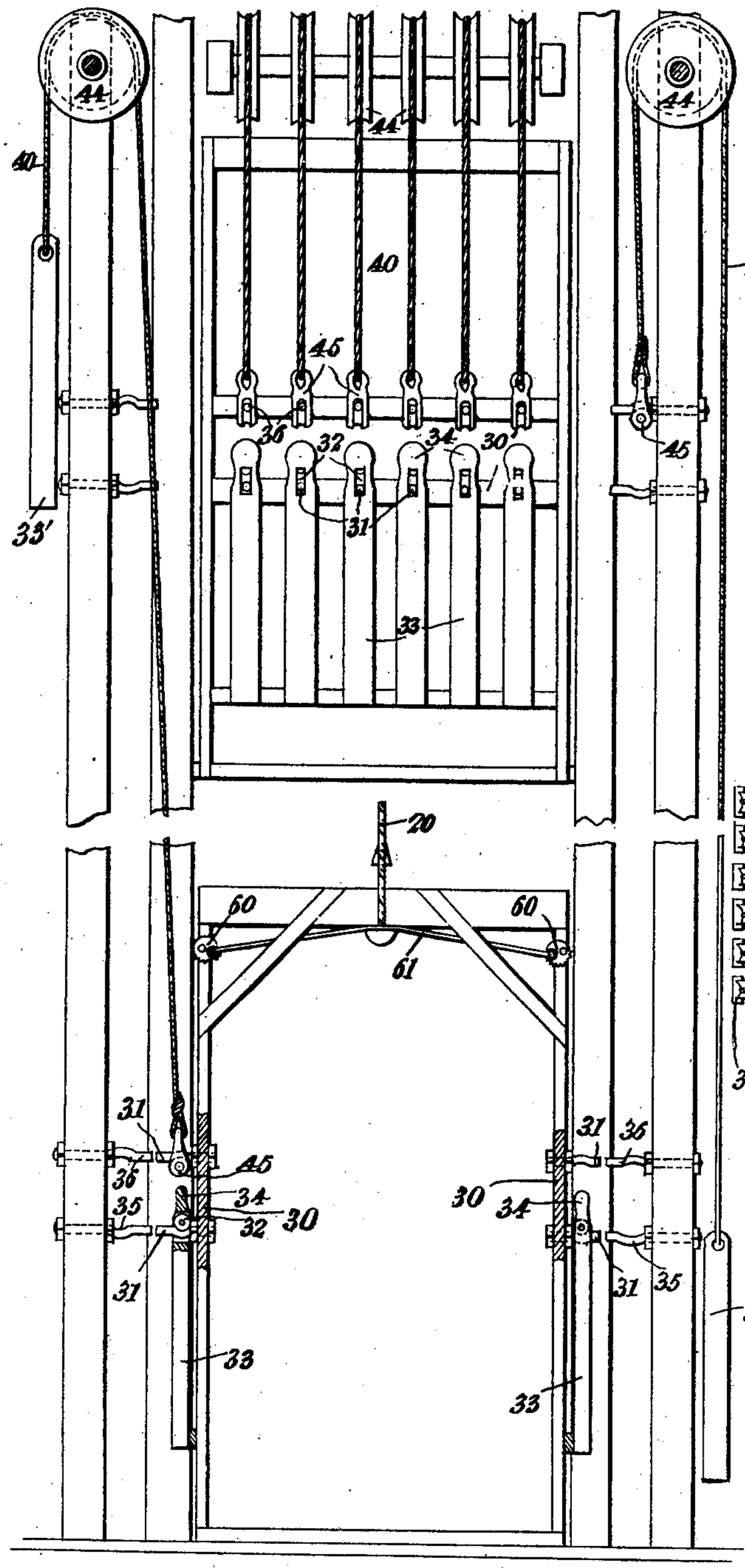
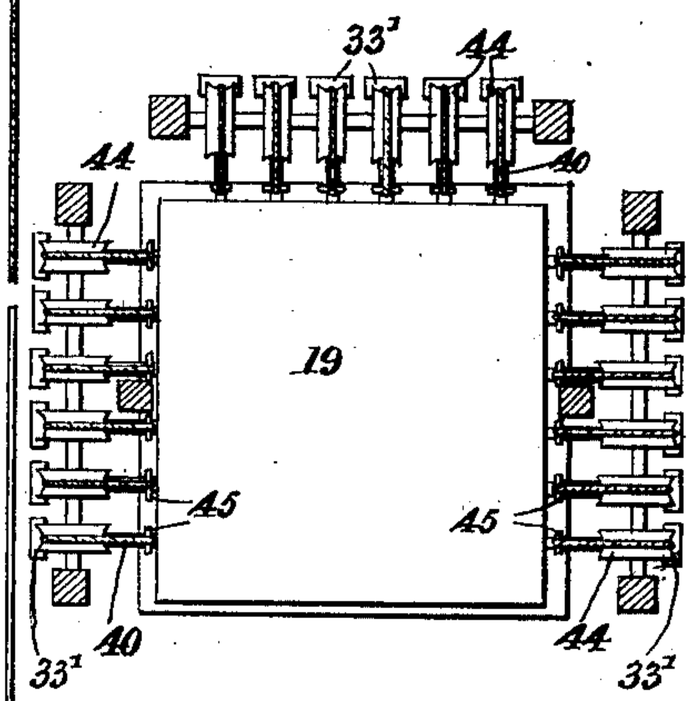


Fig. 5.

Fig. 6.



Witnesses

E. F. Stewart

Jno. G. Parker

Anton Aker

Inventor

by Church & Co

Attorneys

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A. AKER.

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4 SHEETS—SHEET 4.

Fig. 7.

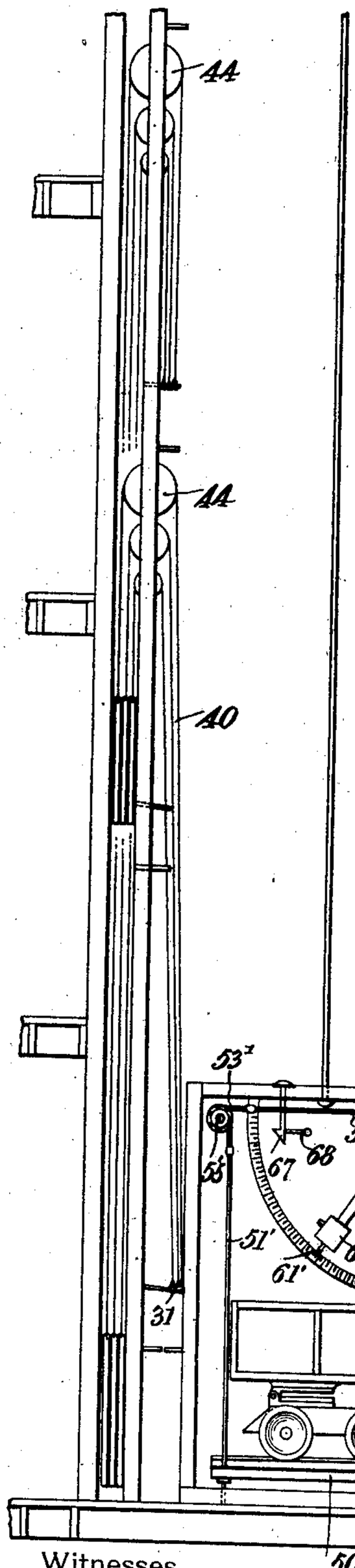
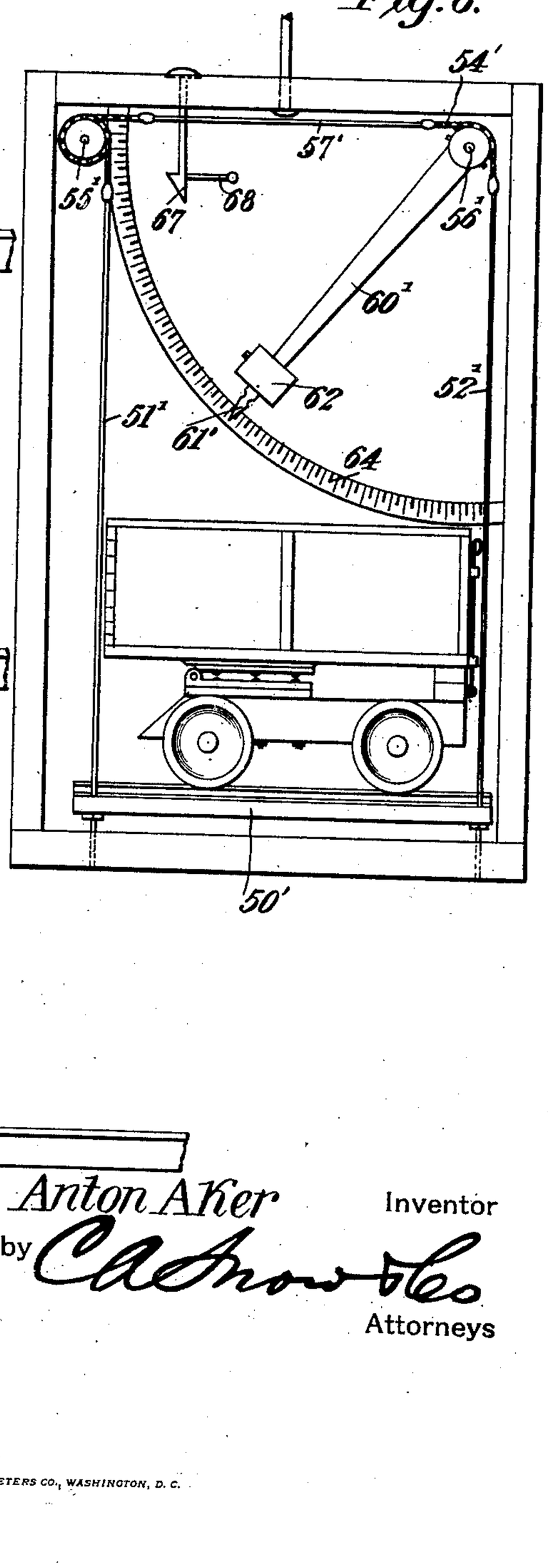


Fig. 8.



Witnesses

E. F. Allen

Jno. E. Parker

Anton Aker Inventor

by Church & Co.

Attorneys

UNITED STATES PATENT OFFICE.

ANTON AKER, OF HELENA, MONTANA, ASSIGNOR OF ONE-FOURTH TO EDWARD HORSKY, OF HELENA, MONTANA.

ELEVATOR.

No. 826,821. Specification of Letters Patent. Patented July 24, 1906.

Application filed August 17, 1905. Serial No. 274,578.

To all whom it may concern:

Be it known that I, ANTON AKER, a citizen of the United States, residing at Helena, in the county of Lewis and Clarke and State of Montana, have invented a new and useful Elevator, of which the following is a specification.

This invention relates to elevators, and has for its principal object to provide a novel means for counterbalancing the load to be raised or lowered, so that the weight of the car, its appurtenant parts, and the load will be equal to the counterbalance-weight and it will be merely necessary to overcome friction in moving the car in either direction.

A further object of the invention is to provide a structure in which the car and the well timbers or frame are provided with alining pins or bolts for the reception of slidably-mounted weights, which may be shifted with but slight effort from a pin on the car to a pin on the stationary frame, or vice versa, in accordance with the weight of the load, and in this connection a further object is to provide weight-supporting pins of such nature as to permit ready manipulation of the weights and to provide for the retention of the weights in adjusted position.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of an elevator constructed in accordance with the invention. Fig. 2 is a transverse sectional view of the same on the line 2 2 of Fig. 1, the car being shown in elevation. Fig. 3 is a detail perspective view of a number of the adjustable weights. Fig. 4 is an elevation illustrating a slight modification of the invention. Fig. 5 is a sectional elevation illustrating a further modification of the invention. Fig. 6 is a plan view of the apparatus shown in Fig. 5, the view being on a somewhat smaller scale. Fig. 7 is an elevation, partly in the nature of a diagram, showing an elevator-car arranged in a building having a plurality of floors and counterweights arranged at each floor in position to be connected to or disconnected from the car. Fig. 8 illustrates, on an enlarged scale, the automatic mechanism for weighing the load received on the car.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The elevator forming the subject of the present invention is designed for use in factories or other buildings where material is elevated to the upper floors and then after being operated upon is again lowered to the ground floor, the weight in each direction being approximately equal.

Arranged within the well or shaft are the usual guide-timbers and the upper and lower frame members, the upper frame 12 being provided with bearings for the reception of a transversely-disposed shaft 13, on which is mounted a hoisting and brake drum, which in the present instance is shown as formed of three grooved members 14, 15, and 16, these being rigidly secured together or formed integral with each other, if desired. The grooved portion of the member 15 is partly encircled by a band-brake 17, one end of which is rigidly secured to the fixed frame and the opposite end to an operating-lever 18.

The car 19 is supported by a hoisting-cable 20, which passes around the grooved member 16 and carries a counterweight 21, clamped on the cable in the usual manner, said cable being continued around a sheave or wheel 22 and being secured to the bottom of the car in order to prevent swaying of the counterweight. The grooved member 14 receives a power-cable 23, which is guided through the car partly by means of a small wheel 24, the lower end of this cable passing around a guiding-sheave 25 at the bottom of the shaft and both runs of the power-cable being accessible by a person on the car to permit hoisting or lowering of said car. To the brake-lever 18 is secured a rope or cable 27, that is also accessible from the car, and which may be pulled at any time in order to arrest the ascent or descent of said car.

Projecting from cross-beams 30 at opposite sides of the car, Fig. 1, are weight-carrying pins 31, arranged to receive the supporting-rollers 32 of the weights 33, the latter being preferably provided with handle members 34 for convenience in shifting them to and from the pins 31, and near the base of each pin a recess 35 is formed, preferably by slightly bending the pin, in order to form a

seat for the roller 32, and thus prevent accidental movement of the weight. The stationary frame 30′ is provided with a set of pins 36 of a construction similar to the pins 31, and preferably there is a set of pins 36 at each floor of the building, and when the car is stopped at any floor its pins 31 will be in alinement with a corresponding set of stationary pins 36, carried by the guiding frame or timbers 30′ of the well.

The weights 33 are preferably graduated—that is to say, there may be two of one hundred pounds each, two of eighty pounds each, and thence gradually lowering to weights of twenty or twenty-five pounds each—so that by shifting the position of the weights from the pins 31 to the pins 36, or vice versa, the effective weight at the car end of the hoisting-cable will be increased or diminished to any desired extent.

Where the device is used as an elevator in a private house or the like, a person entering the car will first adjust the weights in accordance with his own weight—that is to say, supposing the car to be perfectly balanced with all of the weights hanging on the pins 31, a person weighing one hundred and fifty pounds would on entering the car shift weights equal to one hundred and fifty pounds from the pins 31 to the pins 36 and then may ascend to any floor by a slight pull on the cable 23, it being merely necessary to overcome friction, and in practice weights may be shifted to or from the car at any floor in accordance with requirements, so that the car may balance the counterweight at all times.

In the construction shown in Fig. 4 the weights 33′ are hung on cables 40, extending over suitable sheaves 44 at the top of the well, the opposite ends of the cables having rings 45 arranged to engage the pins 31 and 36. This construction is found of value in case a heavy load is to be lowered from one floor to another, in which case the rings 45 of the weights necessary to counterbalance the load are moved over the pins 31 of the car, and the latter is then allowed to descend, while the weights 33′ are moved and their power stored for future use. When the car has been lowered, the rings 45 are shifted from the pins 31 to the stationary pins 36, and one or more may be shifted back to the pins 31 in accordance with any load which it is desired to place on the car and to elevate to another floor.

In the manufacture of the device it is preferred to arrange the ends of the pins on lines oblique to the longitudinal axis of said pins, as shown in Fig. 3, so that a wheel moving from one to the other may be shifted without jar, and in the case of ring 45 there will be no danger of the ring slipping between the pins.

In the construction shown in Figs. 5 and 6 the weights of Figs. 1 and 3 have been combined and the weights are arranged on three sides of the shaft and car instead of two sides only, as in the remaining figures.

Fig. 5 illustrates the arrangement of the weight-receiving pins 31 and 35 for the reception of the slidable weights, and, further, shows an additional series of pins 31 and 36 to receive the eyes or rings 45 of the weighted cables 40.

As before described, the weights are attached to or removed from the elevator-cage at any convenient point on the latter, either side, bottom, or top, for the purpose of counterbalancing the load to be raised or lowered, and the apparatus is found of considerable value in factories where raw material of a certain weight is hoisted to the upper floors and the finished material of approximately the same weight is again lowered to the ground floor.

During the upward movement of the cage, especially where a heavy load is to be hoisted, the eyes at the ends of the weighted cables are attached to said cage, and the weights serve to counterbalance the load and assist in hoisting the latter. When the load has reached the upper floor, the eyes of the weighted cables may be removed from the cage and placed on the pins projecting from the shaft, so that if at the next down trip the corresponding weight is to be lowered the eyes may be again shifted to the cage-pins, or if a lesser weight is to be lowered only a fraction of the counterbalancing-weights are attached. In this way power may be stored at either end of the shaft and very heavy loads may be manipulated by a single operator without aid of any auxiliary engine or similar power.

In constructing the upper portion of the hoisting mechanism the several wheels are rigidly secured together by bolts 50, and to the outer face of the wheels 15 and 16 are secured flanged rings 51, having ball-races 52. Secured to the rings 51 are auxiliary rings 53, having ball-races 54, and secured to the shaft 13 are collars 55, also having ball-races, and in these ball-races are antifriction-balls 57, which when properly adjusted will permit the turning of the several wheels with minimum friction.

Fig. 5 further illustrates a safety-catch in the form of a pair of eccentrically-mounted toothed wheels 60, arranged at the sides of the cage and normally held in inoperative position by a spring 61, which is held under stress by means of the hoisting-cable. Should the latter break, the eccentric gears will be thrust outward and their toothed portions will engage with the guide-rails at the side of the elevator-shaft, and thus stop the downward movement of the car.

In some cases it is desirable to so arrange the counterweights that weights may be applied to the car or removed from the car at

each floor of the building, this being especially the case where the building contains a large number of floors.

In the construction shown in Fig. 7 a plurality of supporting-sheaves 44 are arranged adjacent to each floor at which the car is to stop, and from these sheaves pass cables or chains 40, having counterweights at one end and provided at the opposite end with eyes or links to be attached to the pins 31, projecting from the car. In a building of considerable height—say of seven floors—two counterweighted cables will be arranged on each floor, and the car will be provided with a number of pins corresponding to the entire number of such cables, so that the latter could be placed in position or removed at any floor. During the operation of the apparatus illustrated in Fig. 7 the operator in ascending from the first floor will generally hook on a weighted cable, which will carry the car to the floor desired if at the time such a cable is within reach. If not, one of the lower sets of cables may be hooked on and a transfer made after the car has ascended one or two floors.

It is found desirable to provide means for determining the exact weight received on the car, so that the attendant may shift the proper number of counterweights for the purpose of balancing the load. To accomplish this, the car is provided with an auxiliary platform 50′, on which the passengers or freight are received. This platform is supported by a number of vertically-disposed suspension-rods 51′ 52′, that are provided at their upper ends with flexible sections 53′ 54′, respectively. These sections are preferably in the form of link belts and extend over sprocket-wheels or are otherwise connected to a pair of shafts 55′ and 56′, having journals at or near the top of the car. The two shafts are connected to each other by a rod 57′, one end of which may be coupled to the flexible member 54′, while the opposite end is connected to the shaft 55′ by a link belt or similar flexible connection 53′.

To the shaft 56′ is secured a lever 60′, the outer end of which is shaped to form an indicating hand or pointer 61′, and on the lever is an adjustable weight 62 in order to resist upward movement of the lever. This lever is arranged to travel over a graduated arc 64, and the extent of upward movement of said lever is controlled by the weight on the platform. At the top of the cage or car is a locking-catch 67, having an operating-handle 68, adapted to receive and hold the lever 60′ when the latter has been adjusted to a horizontal position. When the lever is moved up to this position, the weighing-platform 50′ is allowed to descend into contact with the platform of the car proper, and this will be the position of the parts when the load is received. To weigh the load, the attendant shifts the position of the catch 67, allowing the lever 60′ to fall to a position determined by the weight of the platform. In this manner the attendant is instantly informed of the weight to be counterbalanced and may readily shift the necessary counterbalance-cables.

Having thus described the invention, what is claimed is—

1. The combination with the car, of a set of weight-carrying pins projecting therefrom, a plurality of sets of stationary pins projecting from the walls of the elevator-shaft in the path of travel of the car, and a plurality of weights of graduated size, adjustable from one set of pins to the other, substantially as specified.

2. The combination with a car having a set of weight-carrying pins, of a set of stationary pins adjacent to the side of the car, the adjacent ends of the two sets of pins being beveled, and weights movable from one set of pins to the other to alter the effective weight of the car.

3. In apparatus of the class described, the combination with a car having a plurality of sets of projecting pins, of a plurality of sets of stationary pins projecting from the walls of the shaft, weights adjustable from one set of pins to the other to vary the weight of the car, and weighted cables having eyes also adjustable from one set of pins to another set of pins for the purpose of varying the elevating force.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ANTON AKER. [L. S.]

Witnesses:

CARL O. TEGNELL,

CHARLES J. GEIER.