(No Model.) 3 Sheets—Sheet 1.

T. M. MARTIN & J. PARKINSON.

ELEVATOR OR OTHER CARRIER.

No. 561,679. Patented June 9, 1896.

Fig. 1.

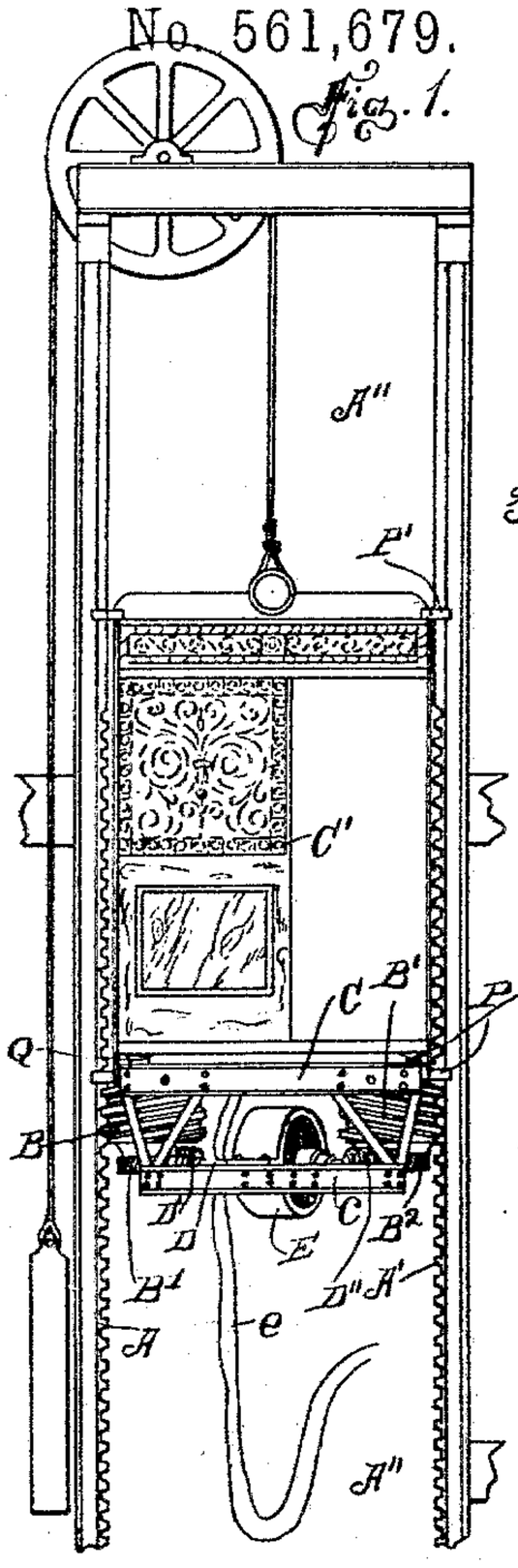


Fig. 2.

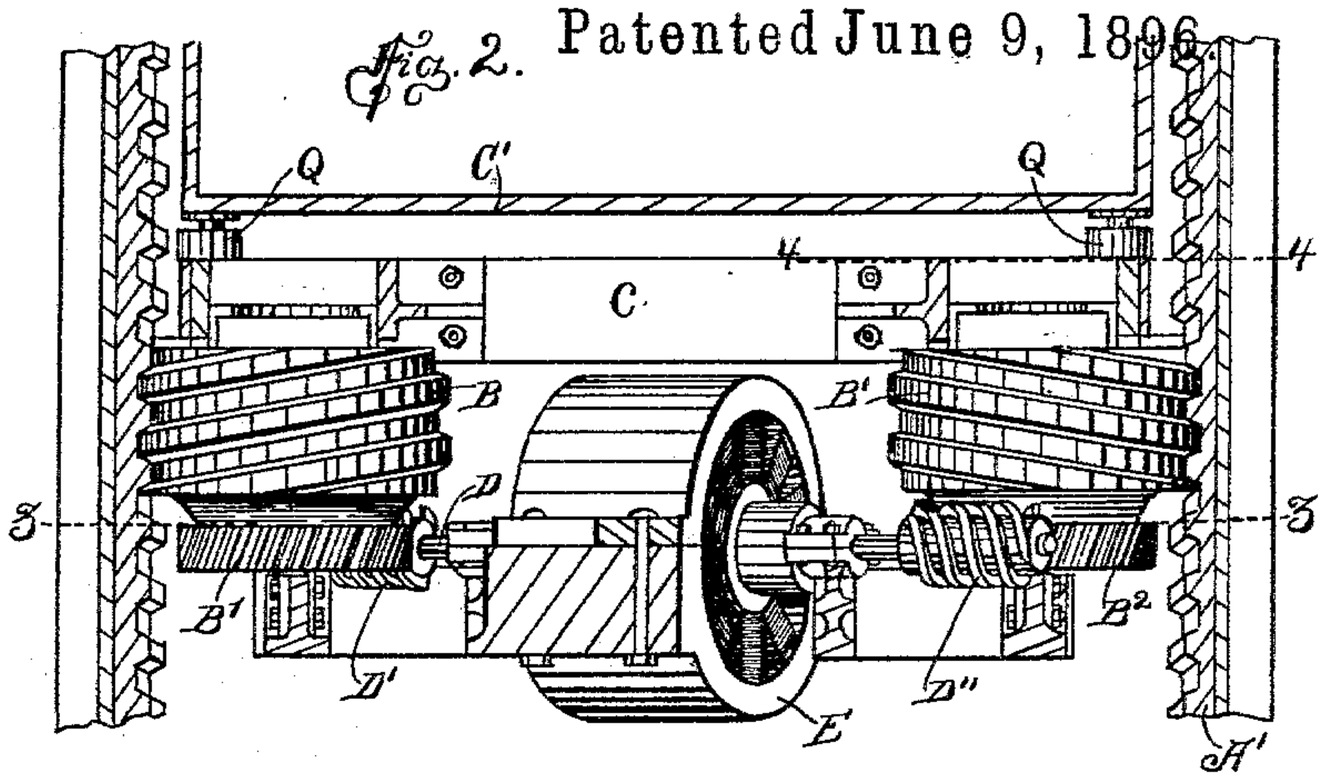


Fig. 3.

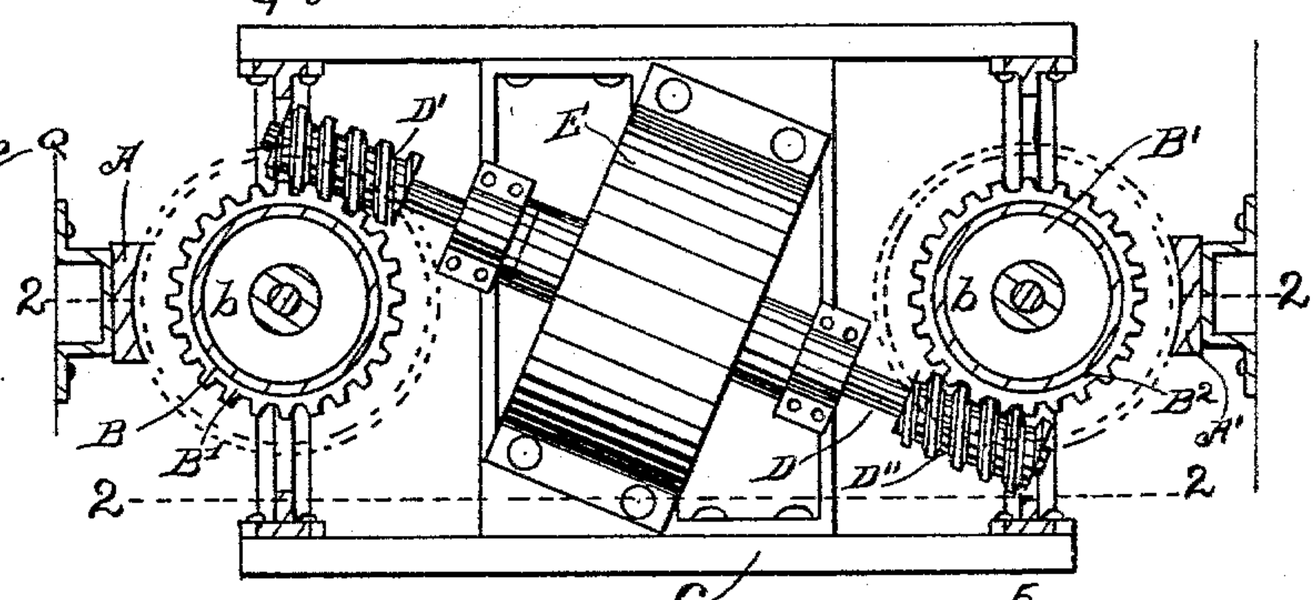


Fig. 4.

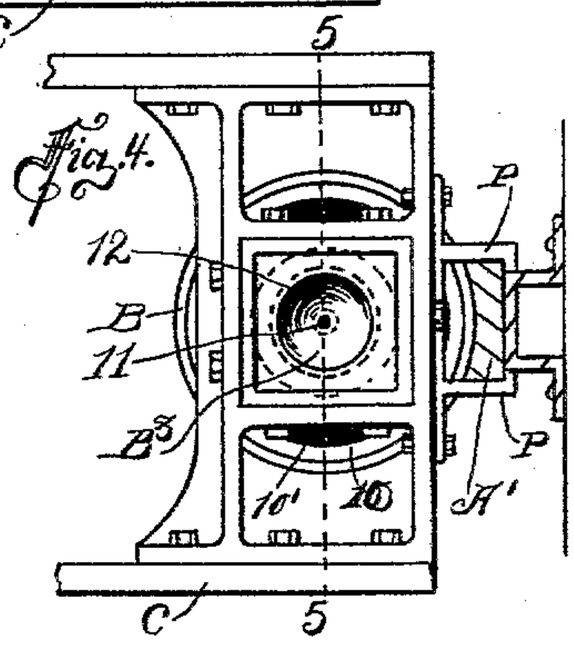


Fig. 5.

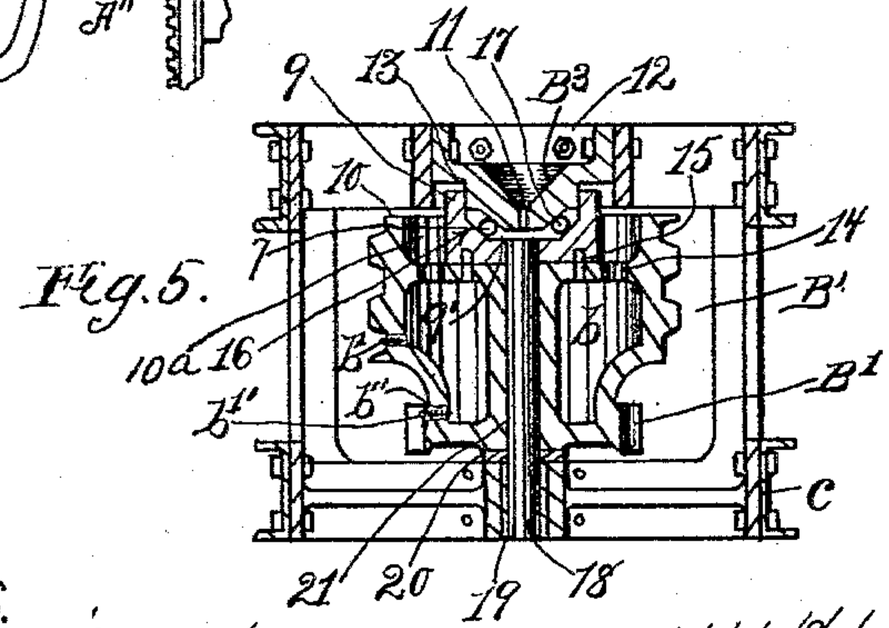


Fig. 6.

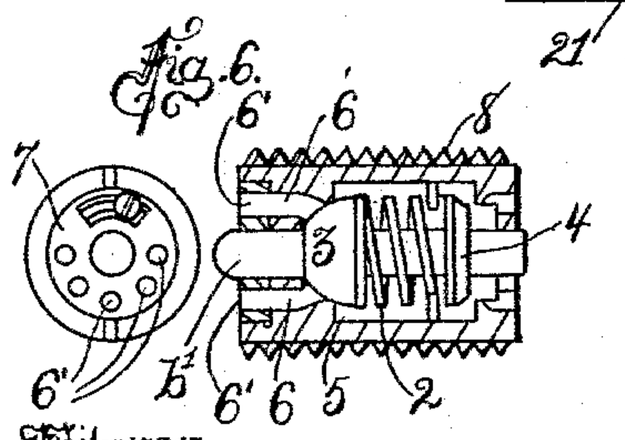
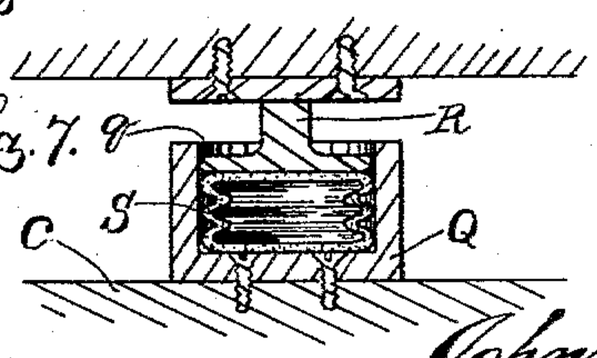


Fig. 7.



Witnesses.

P. M. Harbeson.

F. B. Alverson.

Inventors.

John Parkinson

Thomas Morcom Martin.

By

Hazard & Townsend

Their Attys.

(No Model.) 3 Sheets—Sheet 2.

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ELEVATOR OR OTHER CARRIER.

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Fig. 8.

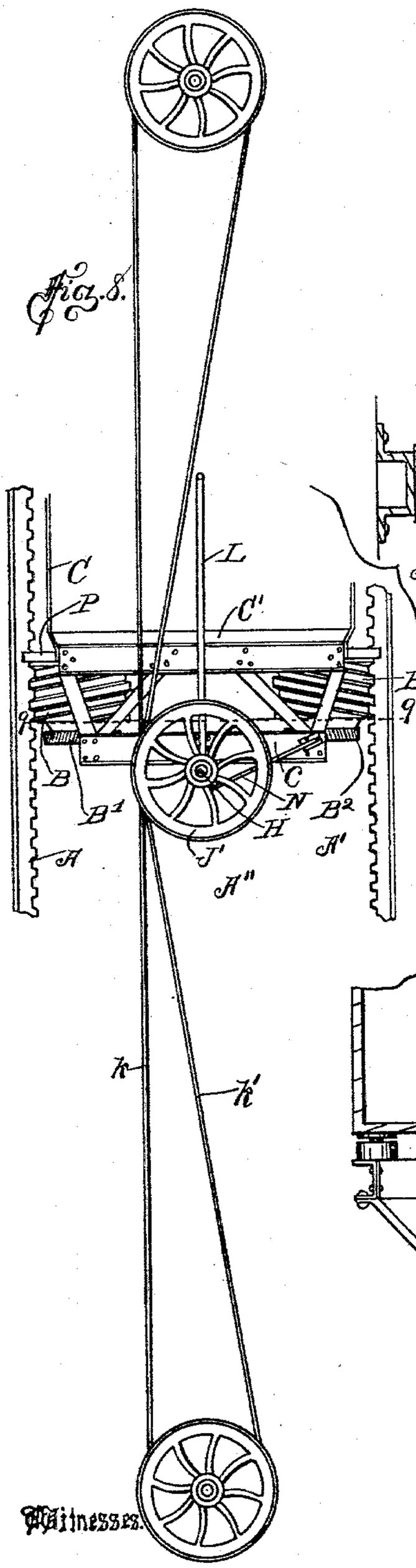


Fig. 9.

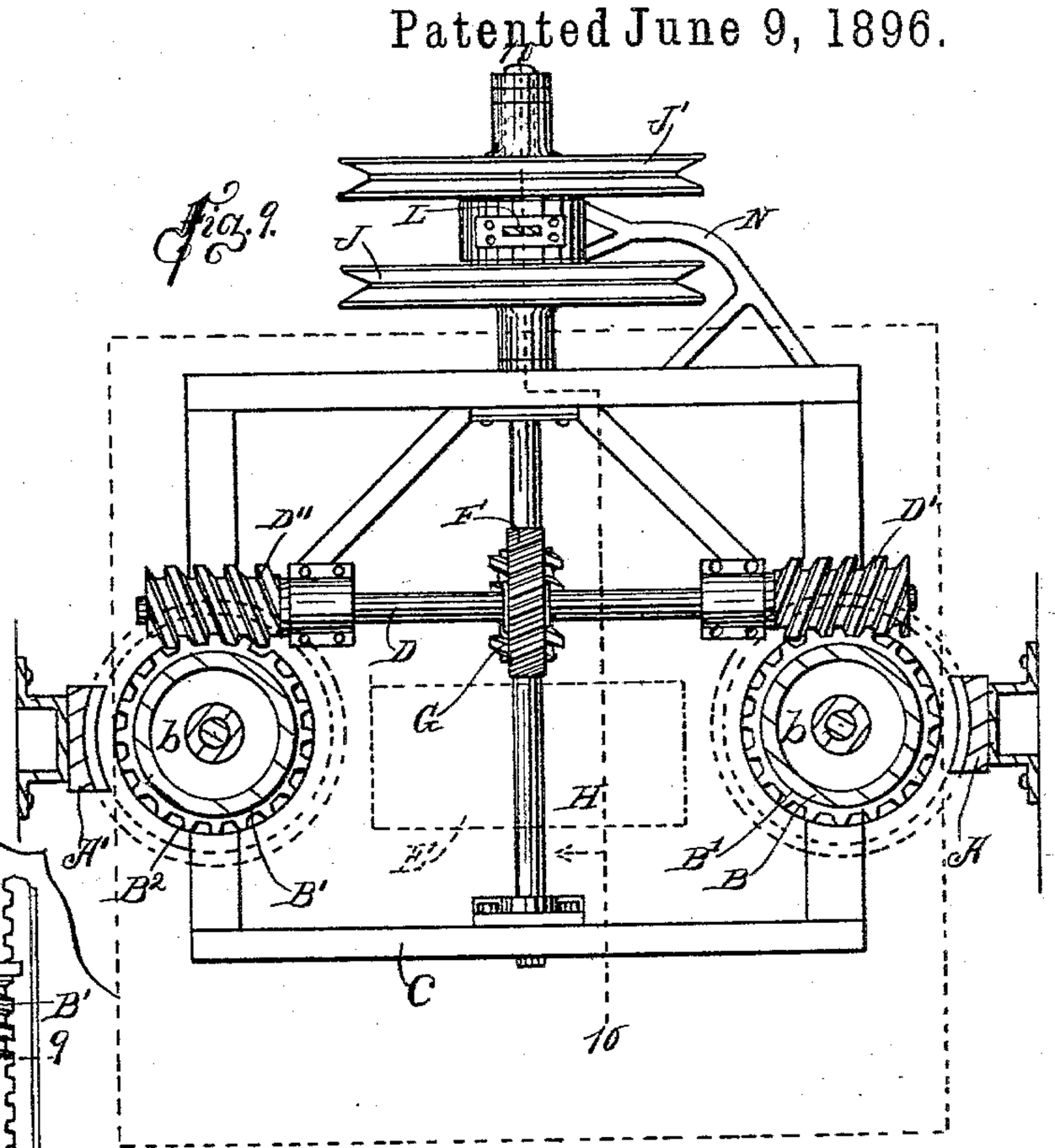
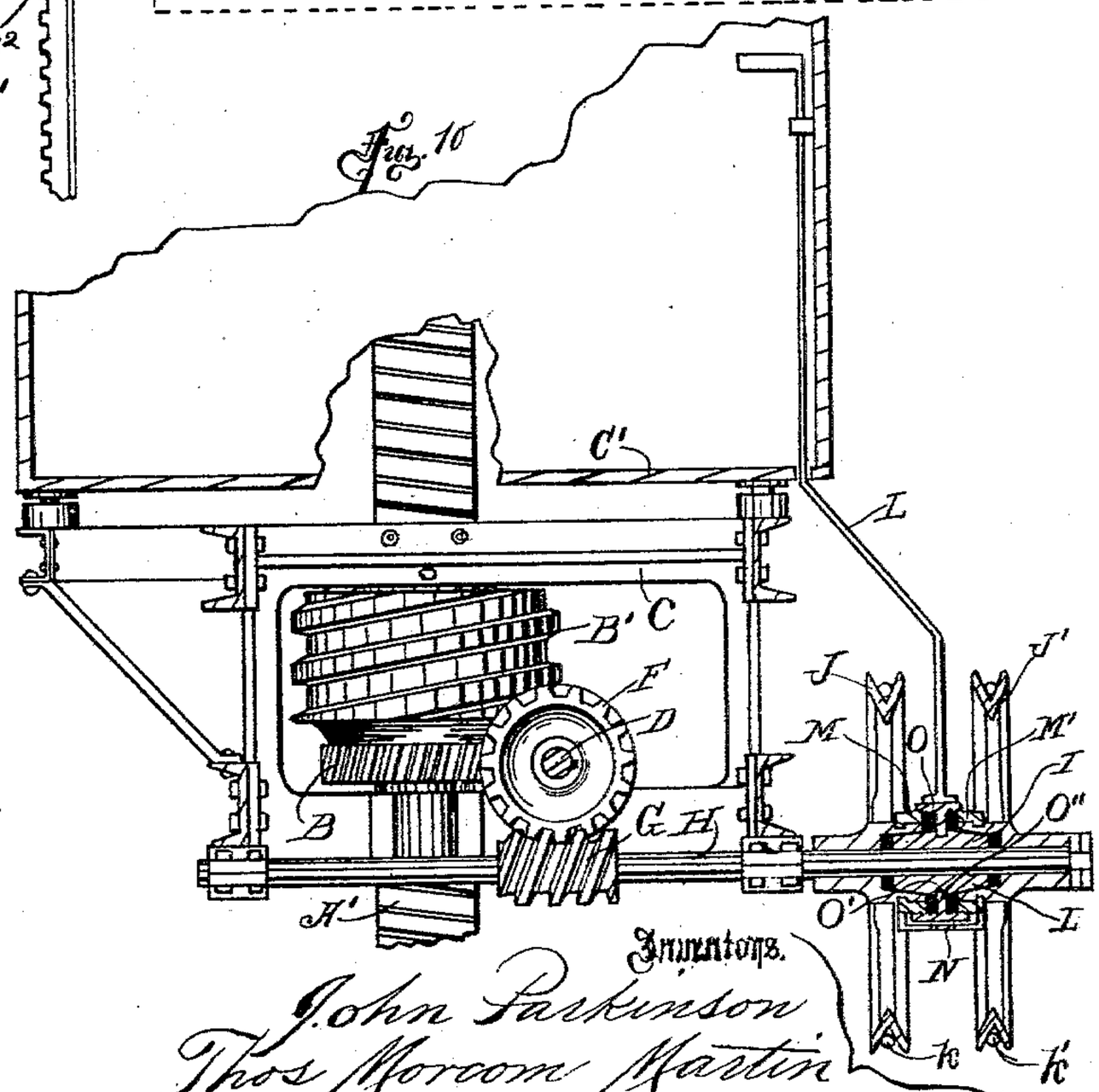


Fig. 10.



Witnesses.

P. H. Harbeson.

T. B. Atwinson

Inventors.

John Parkinson

Thos Morcom Martin

by Hazard & Townsend.

Their Attys.

(No Model.) 3 Sheets—Sheet 3.

T. M. MARTIN & J. PARKINSON.

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Fig. 11.

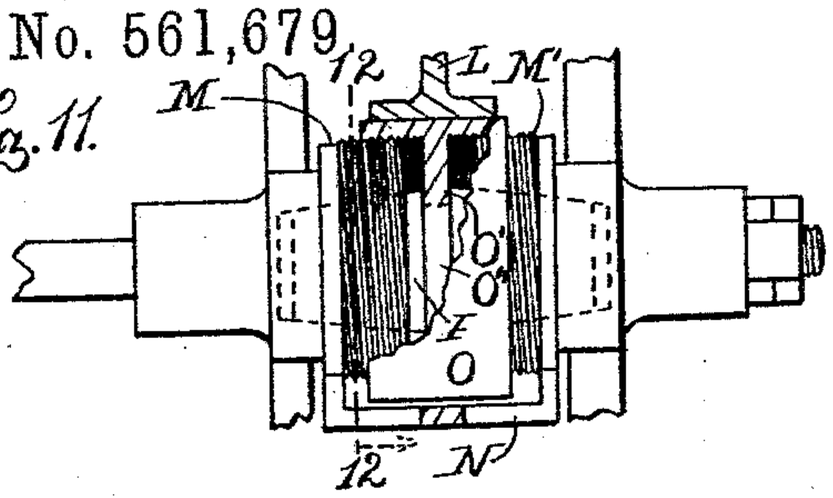


Fig. 12.

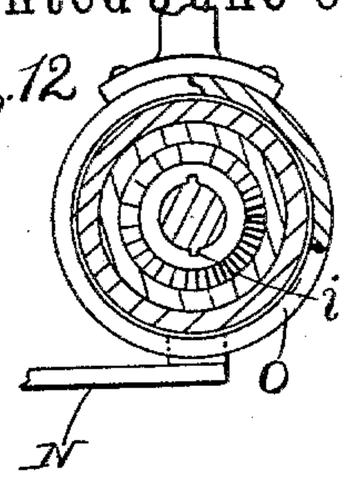


Fig. 13.

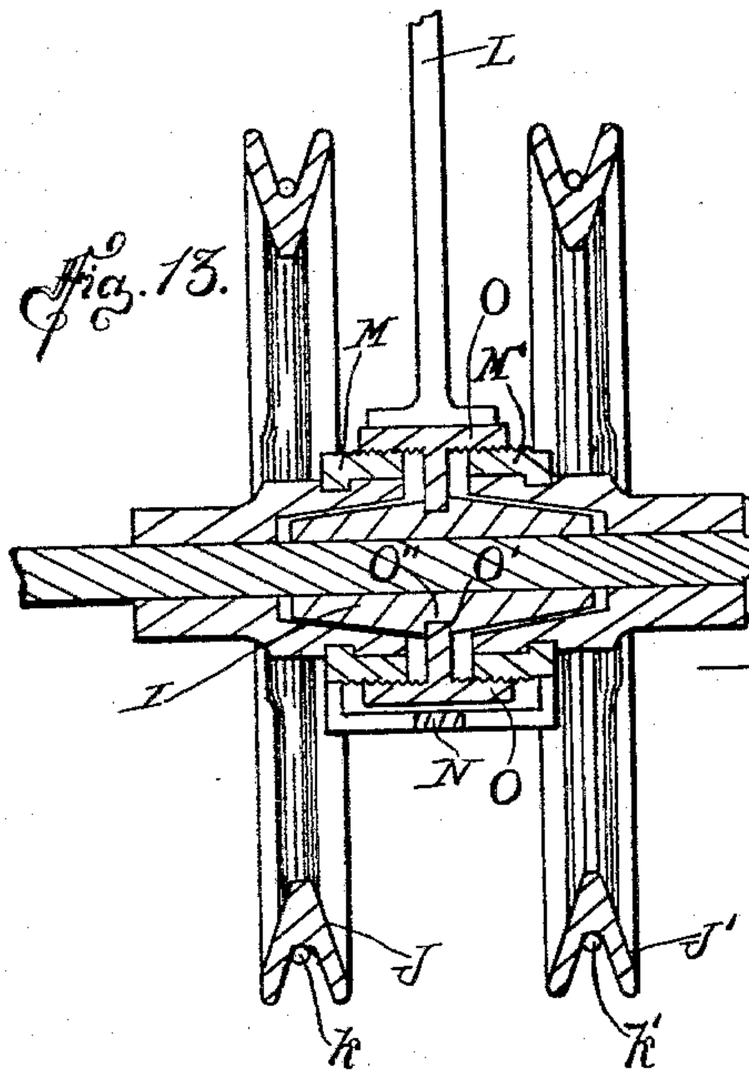


Fig. 14.

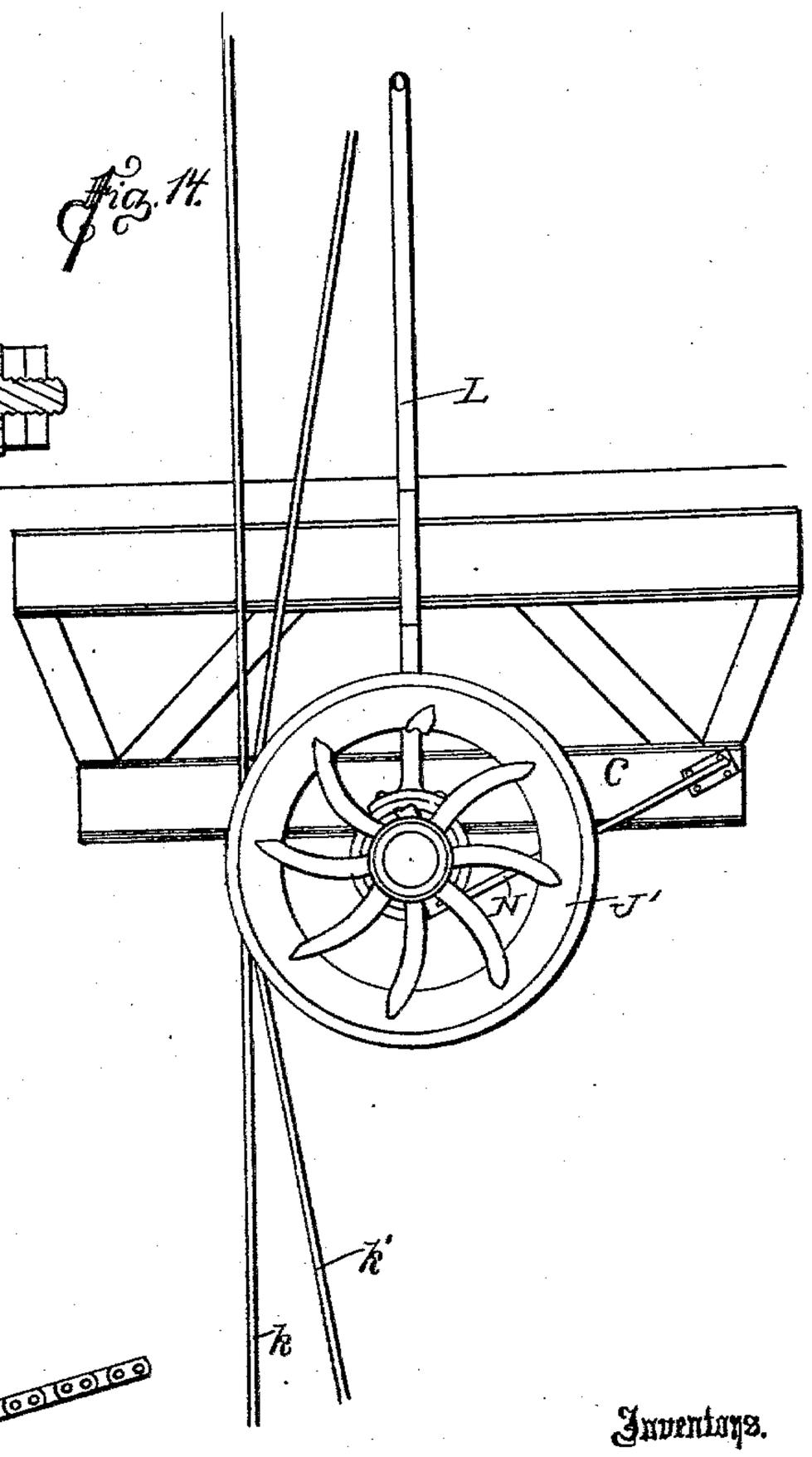
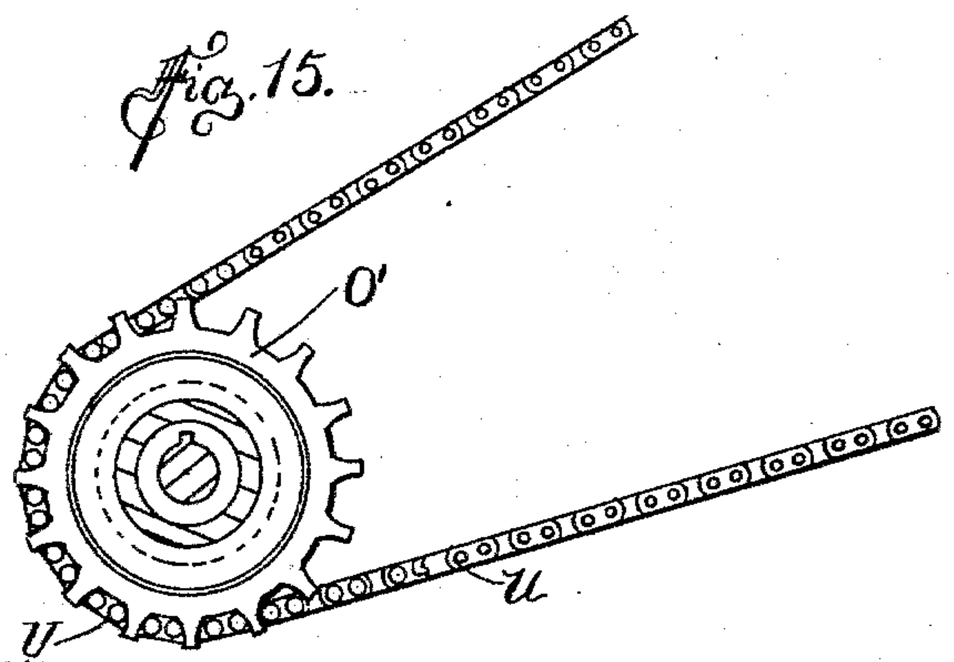


Fig. 15.



Witnesses.

W. Harbeson.

F. B. Alvarson

Inventors.

John Parkinson

Thomas Morcom Martin

by Hazard & Townsend

Their Attys.

UNITED STATES PATENT OFFICE.

THOMAS MORCOM MARTIN AND JOHN PARKINSON, OF LOS ANGELES, CALIFORNIA, ASSIGNORS TO THE PACIFIC ELEVATOR COMPANY, OF SAME PLACE.

ELEVATOR OR OTHER CARRIER.

SPECIFICATION forming part of Letters Patent No. 561,679, dated June 9, 1896.

Application filed August 9, 1894. Serial No. 519,840. (No model.)

To all whom it may concern:

Be it known that we, THOMAS MORCOM MARTIN and JOHN PARKINSON, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Elevators and other Carriers, of which the following is a specification.

The propelling device hereinafter set forth is applicable for horizontal as well as vertical operation, but we will show it applied to vertical elevators, for the reason that it is more specially designed for that work.

Our invention more particularly relates to that type of elevators in which the cage is operated by a worm or screw.

An objection to the former elevators of this type is the noise of operation caused by the resonance and the rattling of the numerous gears.

Our improved construction enables us to place the driving machinery in more compact form and thus to economize space. This construction also enables us to operate the elevator with much simpler machinery than that which was heretofore necessary.

The object of our invention is to overcome the above objections and produce an elevator which will give increased security against accident and which will be lighter and more practical and efficient than other elevators having comparative qualities of safety; also, to secure greater simplicity of construction and produce an elevator not having any of the objectionable features pertaining to other elevators of that type in which the elevator is raised and lowered by the operation of a traveling worm.

Another object is to provide a superior simple device for propelling both vertical and horizontal carriers.

Our invention is adapted for operation both by electrical motor carried with the elevator or other carrier and also by machinery receiving its power through an endless cable. We believe the electrical-motor arrangement to be most desirable for passenger-elevators in which high speed is preferred, but, so far as we are aware, the application of the electrical motor to the driving-shaft does not involve invention over the application, as herein shown, of the power by means of an endless cable, and for that reason we explain both ways of applying the power in this application and make specific claims to the appliance for receiving the power from the endless cable.

Our invention comprises a carrier having two traveling worms arranged upon opposite sides of its frame and meshing, respectively, with parallel racks and means for rotating the worms to cause them to simultaneously travel along such racks in the same direction.

A special feature of improvement which gives to our construction great compactness is the provision, in a carrier having a driving-worm to which is fixed a cog-wheel, of a driving-shaft having a driving-worm arranged meshing with such driving cog-wheel. By this special arrangement elements of gearing heretofore deemed necessary are dispensed with.

Our invention also comprises various features of construction and arrangement and combinations of parts hereinafter more fully specified whereby we carry our invention into effect as applied to elevators.

The accompanying drawings illustrate our invention.

Figure 1 is a fragmental view in side elevation showing the cage and propellers of our improved elevator in place in its shaft, which is shown in vertical section. Fig. 2 shows in side elevation the driving machinery in place in the elevator-shaft, which, together with the cage, is shown in vertical mid-section. Lines 2 2, Fig. 3, indicate where the guides and the frame which support the machinery are sectioned. Fig. 3 is a section viewed from above on line 3 3, Fig. 2, except that the motor and the driving-worms are intact. Fig. 4 is a plan showing one of the traveling worms and its supporting-frame, and also showing a section of one of the racks. Lines 4 4, Fig. 2, indicate the point at which the rack is sectioned. Fig. 5 is a vertical mid-section on line 5 5, Fig. 4. Fig. 6 shows in sectional detail and front elevation the valve for emitting oil from the oil-reservoir which is in the traveling worm. Fig. 7 is a vertical

mid-section of one of the cushion-supports for the car. Fig. 8 is a fragmental elevation showing the machinery for applying the power by cable. Fig. 9 is a plan, partly in section, showing the said machinery adapted for operation with an endless cable. In this view we have indicated by dotted lines the position of an electrical motor which might be applied to the power-shaft shown. Line 9 9, Fig. 8, indicates the line at which the parts are sectioned. Fig. 10 is a detail fragmental elevation, partly in section. In Fig. 9 line 10 10 indicates the line of section of this view and the small arrow indicates the direction of sight. Fig. 11 is a detail, partly in section, showing the reversing mechanism. Fig. 12 is a sectional detail on line 12 12, Fig. 11. Fig. 13 is an axial section of the reversing mechanism. Fig. 14 is an elevation illustrating said mechanism. Fig. 15 shows an endless chain arranged for reversing.

A A′ indicate parallel guide-racks having their rack-faces concave and presented toward each other and toward the inside of the elevator-shaft A″.

B B′ indicate the traveling worms secured together by the carrier-frame *c* and respectively fitted to and seated in the concave rack-faces of said racks and connected with the elevator cage-frame C and with suitable mechanism for driving the worms to cause them to simultaneously travel along their respective racks in the same direction. The threads of the traveling worm are arranged at a wide angle with the racks, so that the weight of the load will not rotate the worms.

Various means for applying the motive power to the worms may be devised, and we have illustrated in the accompanying drawings two forms of means for the purpose, but we will first describe the appliance for lubricating the traveling worms B B^1 and their drivers. This is illustrated in Figs. 4, 5, and 6. The two traveling worms are identical in construction. Each traveling worm is provided with an internal oil-chamber *b*, which has its discharge through valved outlets *b′ b″*, each of which is provided with a yielding valved plunger or valve-pin. Each pin carries two valves and projects beyond the face of the worm. The valve-pin b^1 of outlet *b′* projects into the space between the threads of the worm, and the other pin $b^{1\prime}$ of the outlet *b″* projects between the teeth of the worm's driving-cog B^1, so that at each revolution of the traveling worm the pins b^1 $b^{1\prime}$ of the valves *b′ b″* will be pressed inward by contact with the parts with which the worm and its driver are geared. The valved outlets are identical in construction.

2 indicates a spring which normally holds the valve-pin b^1 in its closed position. The spring-pressed valve-pin b^1, which projects outward beyond the face of the worm, is provided with two valves 3 and 4, which reciprocate in a valve-chamber 5 to alternately close the inlet and outlet thereof. The valve 3 closes the outlet from the valve-chamber when the valve-pin is in its normal outwardly-pressed position, and the valve 4 is arranged to close the inlet into such valve-chamber when the valve-pin is forced inward by contact with the rack with which the worm is geared. By this arrangement the valve-chamber 5 is supplied with oil from the oil-chamber *b*, and at each revolution of the worm the pin is pushed in and a small quantity of oil is allowed to flow out to lubricate the bearings.

The outlet from the valve-chamber 5 consists of a series of ducts 6, which are controlled by a revolving plate 7, provided with holes 6′, arranged to register with and form the outlet of such ducts. The amount of discharge is increased or diminished by rotating the plate.

The entire oil-discharging-valve contrivance is mounted within a plug 8, which is screw-threaded and arranged to screw into the worm or cog B B^1.

The valves *b″* discharge after the manner above described, and this oils the driving cogs and worms.

The upper face of the traveling worm is provided with two flanges 9 and 10 coaxial with the worm. The inner flange 9 forms a bearing with the pivot B^3, which holds the upper end of the worm in place. The pivot B^3 is chambered at its top and provided with a duct 11 to admit oil within the antifriction-chamber 9′ formed by the flange 9, so that when oil is poured into the chamber or receiver 12 of the pivot B^3 it will flow down into the chamber 9′ formed by the flange 9 and will thence flow over the rim of said flange and into the space 10′ between the said flange and flange 10. A duct 13, leading up the inner side of flange 9, is provided to increase the flow of oil, so that the interior oil-chamber *b* can be filled by pouring oil into the receiver 12. Ducts 14 communicate between the chamber *b* and the space 10′ between the flanges 9 and 10, so that the oil which flows over flange 9 will pass down into the oil-reservoir *b*.

For convenience of construction we form the pivot-seat 16, including the flange 9, separate from the main body of the worm B and secure the same to the main body of the worm by dowel-pins 15. This allows the pivot-seat 16 to be removed for the purpose of truing the same or replacing it when it has become worn. The pivot bearing or seat is provided with antifriction-balls 17. We have secured the traveling worm in its position by an axle or pin 18, which rotates in journals 19, which are secured to the carrier or frame *c*.

The weight of the load carried by the car C′ is borne by the antifriction-balls and pivot on the upper side of the worm. The weight sustained by the bottom bearing of the traveling worm is practically *nil*, and we do not consider it necessary to provide any antifriction device at that end further than the brass washer 20 and suitable means for oiling the

lower bearing. An oil-duct 21, communicating with the oil-chamber of the pivot-seat, is arranged to supply oil to the lower bearing.

D indicates the driving-shaft, which is provided at each end with a driving-worm. D′ and D″ indicate said driving-worms, which are respectively geared with the driving-cogs B^1 and B^2. The driving-worms D′ and D″, the driving-cogs B^1 and B^2, and the traveling worms B and B′ are so arranged that the rotation of the shaft in one direction will drive both of the traveling worms in the same direction along their respective racks. By thus providing the traveling worm with a cog-wheel which meshes with the driving-worm the elevating mechanism is positively locked against reverse movement, the backward transmission of power from the traveling worms to the driving mechanism being absolutely prevented, and perfect security is attained, the operation of the motor being necessary to effect any movement whatever of the elevator, and in case of accident to the motor or to any portion of the mechanism the cage is locked in its position with relation to the worm-racks until the motor is again operated.

The driving-shaft is adapted to be operated by any suitable means, but for rapid traveling I prefer to use an electric motor E, the armature of which is fixed to the driving-shaft. With this arrangement the armature-shaft and the driving-shaft are identical.

e indicates wires for transmitting the electric current to the motor.

It is to be understood that the electric current will be under the control of the operator within the car through the ordinary appliances in use for that purpose.

In order to mount the electric motor so as to preserve the equilibrium of the car, the driving-shaft D is preferably arranged diagonally across the cage, as indicated in Fig. 3. By this arrangement the motor can be conveniently placed in the center of the cage. The motor may be otherwise arranged, though, as indicated by dotted lines in Fig. 9.

Now referring to Figs. 8 to 14 we will describe the mechanism which we have invented for communicating power to the driving-shaft from an endless cable. F indicates a cog-wheel fixed to the driving-shaft D to rotate the same. G is a driving-worm meshing with the driving-shaft cog F. The driving-worm is fixed to a worm power-shaft H, which is provided with a double conical friction-clutch plug I, which is arranged to slide therealong and is caused to rotate therewith by the spline *i*. J and J′ indicate two driving-wheels arranged to be driven by the endless cable. One member *k* of the cable passes around one wheel and the return member *k′* passes around the other wheel, so that the two wheels are driven in opposite directions. L is the reversing-lever, by the operation of which the friction-clutch plug I is forced to clutch the wheel J when driven in one direction and to clutch the wheel J′ when driven in the other direction. When intermediate the wheels, as shown in Fig. 10, the plug does not engage either of the driving-wheels, so that when in that position the driving-wheels will rotate freely without rotating the shaft H; but when the plug is thrown into engagement with the wheel J the shaft H will be rotated in one direction, and when the plug is thrown into engagement with the wheel J′ the shaft H will be rotated in the other direction.

Figs. 10 to 13 show mechanism whereby we are enabled to operate the clutch with a great deal of power. M and M′ are stationary screw-threaded sleeves which catch upon and hold the hubs of the wheels J J′, respectively, but do not rotate with such wheels, being held stationary by the bracket-support N. The sleeves M M′ are screw-threaded and are respectively screwed into a nut O, which is controlled by the lever L, so that when the lever L is swung it will partially rotate the nut O, driving it in one or the other direction along said sleeves, thus shifting the friction-clutch plug I, which is controlled by the nut O, and causing it to be driven in the same direction in which the nut moves. The nut O is connected with the friction-clutch plug I by a collar *o′*, fitting into a groove *o″* in the plug.

To produce superior means for guiding the cage and holding it against lateral movement, we groove the racks to fit said traveling worms, so that the worms are respectively seated in the racks and the worms and the racks operate together to hold the cage in exact position. For the purpose of preventing any possibility of the racks springing away from the traveling worms we provide guide-hooks P, which embrace the rack sufficiently to prevent any separation of the rack from the worm. These hooks slide freely along the rack. Corresponding guide-hooks P′ are also provided at the top of the cage to prevent vibration.

The movement of the cage in starting and stopping is very smooth, owing to the manner in which the power is applied to drive the cage; but in order to provide against any jar resulting from the rapid movement which the machinery is capable of giving the cage we arrange suitable springs Q between the car-body C′ and the frame of the motor mechanism. Fig. 7 indicates the device which we apply for this purpose. Q′ is a metal cylinder fixed to the frame *c* of the carrier and provided with a chamber *q* in its upper face. R is a piston which reciprocates in this chamber and is supported therein by an air-sack S having corrugated sides. The head of the piston is thin and is rounded at its periphery to allow the piston to cant, so that one side of the car may be depressed more than the other when overloaded on one side.

In practical operation the rotation of the driving-shaft causes the traveling worms to drive the carrier-frame *c* along the track formed by the parallel racks, and since the

racks and worms fit each other snugly there is no rattling or other objectionable noise, and by the oiling device arranged upon the worms and their driving-cogs the machinery which receives the heaviest wear is kept constantly oiled.

The traveling worms will operate to drive the frame or carrier whether the racks are vertical, horizontal, or at some intermediate angle.

The rack and worm at each side of the carrier form guides for their respective sides of the carrier, and it is possible that in some situations the worm on one side of the carrier might be omitted and the guide be supplied in a simpler form, such as the jaws P', embracing the rack or equivalent guide-rail.

In Fig. 15 we have shown a sprocket-chain U for rotating the nut O', which is provided with sprockets for said chain. This is preferred to the lever, because it provides for a more ample rotation of the nut than can be secured with the lever L.

Now, having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination of the parallel racks; the frame; the two traveling worms provided with the driving-cogs and mounted in the frame and meshing with the racks respectively; the driving-shaft; the two driving-worms mounted upon such shaft and respectively meshing with the driving-cogs; the power cog-wheel mounted upon such driving-shaft; the power-shaft provided with a worm meshing in such power-cog; the power-wheels journaled on the power-shaft; suitable means arranged to drive the power-wheels in opposite directions; and suitable means for clutching the power-wheels to the power-shaft to rotate the shaft in opposite directions respectively.

2. The combination of the power-shaft; the two power-wheels journaled thereupon and driven by suitable means in opposite directions; the double conical clutch-plug arranged to slide upon the shaft and to rotate therewith between said wheels; the stationary screw-threaded sleeves arranged to hold the hubs of the power-wheels respectively; the nut screwing upon such sleeves and connected with the plug with suitable means, and means for rotating the nut to drive it along said sleeves to shift the clutch-plug.

3. A worm having an internal oil-chamber and provided in its periphery with an oiling device comprising a yielding valved plunger projecting beyond the face of the worm and arranged to engage the parts geared therewith, thereby to be operated at each revolution of the worm to discharge a lubricant between the worm and the gear with which it meshes.

4. The combination of the worm or cog wheel having the internal oil-chamber; the outlet therefrom provided with the valve-chamber; the plunger arranged in the valve-chamber and projecting outward beyond the face of the worm and provided with two valves arranged to reciprocate in the valve-chamber to alternately close the inlet and outlet thereof; the spring arranged to press the plunger outwardly, and a suitable gear meshing with the worm or cog and arranged to engage the plunger.

5. The combination of the worm provided with the internal valve-chamber and suitable outlet therefrom and the upwardly-projecting flange; the flanged pivot-seat secured to the worm inside said flange; and the pivot mounted in such pivot-seat and provided with the oil-receiving chamber and a suitable outlet opening into the pivot-seat.

6. The combination of the cylinder; the piston having a thin head; and arranged to reciprocate in the cylinder, and an air-sack having corrugated sides and arranged in the cylinder to support the piston.

THOMAS MORCOM MARTIN.
JOHN PARKINSON.

Witnesses:
JAMES R. TOWNSEND,
ALFRED I. TOWNSEND.