(No Model.) 2 Sheets—Sheet 1.

N. P. OTIS.

ELEVATOR.

No. 567,158. Patented Sept. 8, 1896.

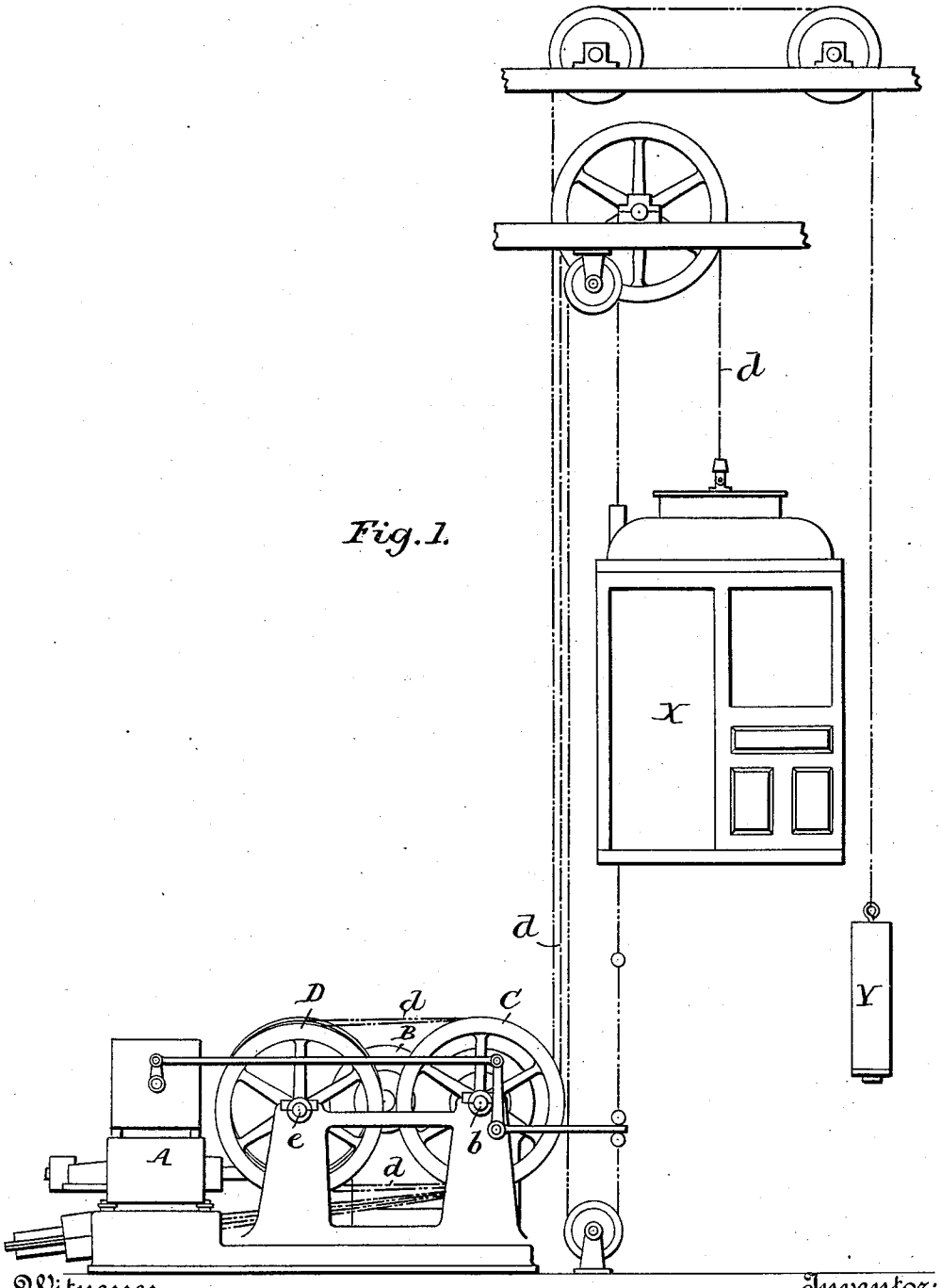

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

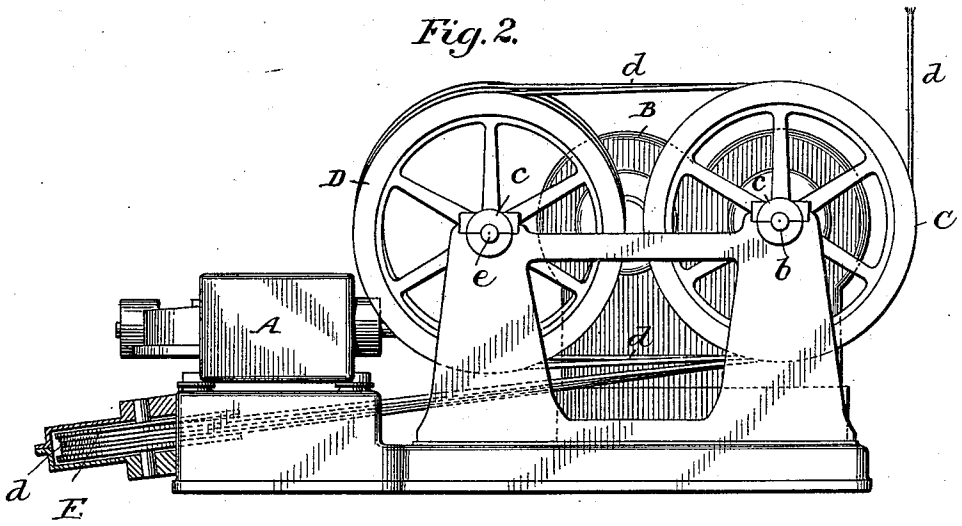


Fig. 3.

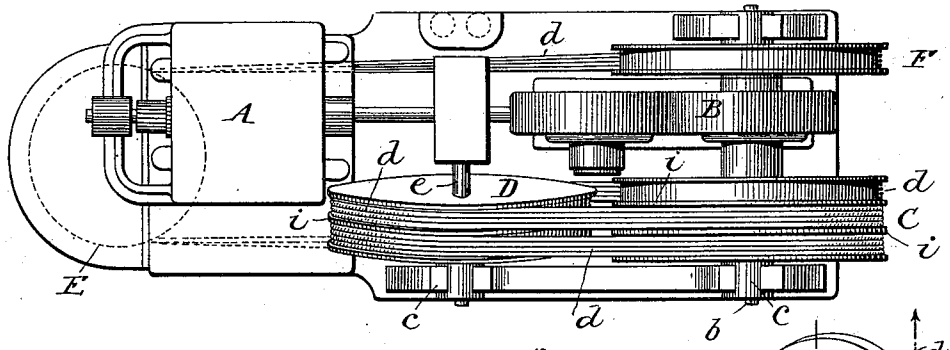
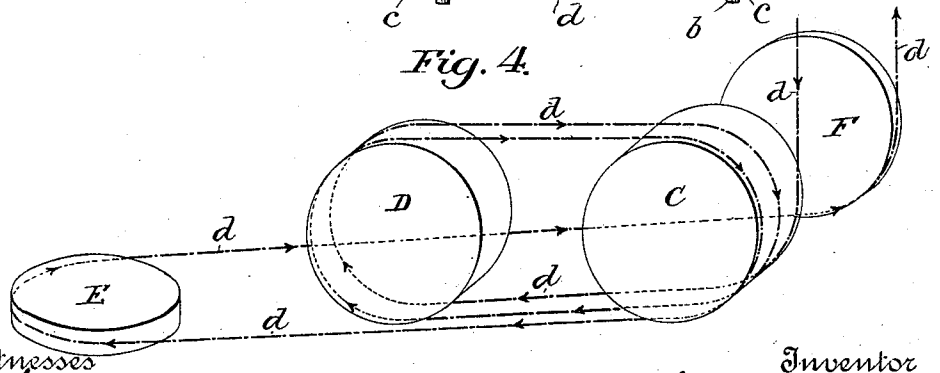


Fig. 4.



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UNITED STATES PATENT OFFICE.

NORTON P. OTIS, OF YONKERS, NEW YORK.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 567,158, dated September 8, 1896.

Application filed May 23, 1895. Serial No. 550,448. (No model.)

To all whom it may concern:

Be it known that I, NORTON P. OTIS, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Elevators, of which the following is a specification.

This invention relates to elevating apparatus, and it has for its object to properly drive a series of hoisting-cables without slip and without exerting more tension upon one than another; and to this end I make use of the apparatus fully set forth hereinafter and illustrated in the accompanying drawings, in which—

Figure 1 is a view in diagram illustrating the arrangement of the hoisting-cables. Fig. 2 is a side view of the apparatus; Fig. 3, a plan view, and Fig. 4 a view illustrating the course of the series of elevator-cables.

The winding or driving engine may be of any suitable character. As illustrated, it is an electrical engine A with a screw-shaft (the screw not shown) engaging worm-wheels (not shown) geared together within a casing B in a manner which it is not necessary to more fully describe, as it is common in this class of elevator apparatus. The shaft *b* of one of the worm-wheels extends beyond the casing to an additional side bearing *c* and supports the driving-wheel C, having upon the surface any desired number of annular grooves for receiving the hoisting-cables. As shown, the hoisting-cables consist of a series of four cables *d*, which extend vertically through the well from the usual guide-pulley at the top thereof to the wheel C, one end being connected with the cage X.

Adjacent to the driving-wheel C is a pulley D, arranged upon a shaft *e*, supported at an angle in the bearings *c h*, the angle of the shaft *e* being such that the series of cables *d* passing to and beneath the driving-wheel C at one side may pass in a straight course to a point where they come into contact with the periphery of the wheel D, and then pass half round the latter to the upper side thereof, and leave the latter in a straight course, parallel to the course of the portion of the cables below the wheels, to another set of grooves of the wheel C, thence half round the latter, and, leaving the same at a point directly beneath the shaft *b* parallel to the former portions of the cables, pass to the lower portion of the pulley D, pass half round the latter to the top, and thence in a straight course to the top of the pulley C and again half round the latter. From the lower side of the pulley C the series of cables then pass to a guide-pulley E, the shaft of which is in a plane at right angles to the inclined line of cables passing from the bottom of the pulley C to the pulley E, so that the series of cables leave the pulley C in a horizontal plane and meet the pulley E in a vertical plane. From the pulley E the cables again pass to a guide-pulley F, which is loosely supported upon a shaft in line with or a continuation of the shaft *b*, the mass of cables leaving the guide-pulley E in a vertical plane and meeting the horizontal plane of the face of the pulley F at the under side, pass one-quarter round the latter, and then upward in the well to the guide-pulley, from which they descend to and are connected with the counterweight Y.

It will be seen that by the above-described arrangement the series of parallel cables is carried around the periphery of the driving-pulley C to such an extent as to secure all the desired frictional surface and adhesion, and that the pulley C need only be made of three times the width of the series of cables, while at the same time the said cables are carried in parallel lines without being twisted, and without any tendency to exert more strain upon one of the cables than upon the others; and it will also be seen that the mass of cables is properly carried from the driving-pulley C to the guide-pulley F in such manner as to avoid any greater strain upon one cable than upon any of the others of the series. While not absolutely necessary, it is preferable in many instances to subdivide the surfaces of the pulleys C and D into sections, each section having a sufficient number of grooves to correspond to the number of cables, the sections being separated by ribs *i*, as shown.

It will be evident that while I have shown four cables in the series, three, four, six, or any desired number may be arranged and combined with the guiding and driving pulleys, as above described, with like results.

It will also be seen that the arrangement which I have described is an exceedingly com-

pact one, enabling the cables to be properly laid upon the driving-pulley within a very small space, as is in very many instances absolutely necessary in apparatus of this class where the space is often contracted. It will be noted also that by this arrangement the strain upon the driving-pulley is exerted in one direction only instead of in two, as would be the case if the cables passed from the driving-pulley to the guide-pulley in a horizontal line, thence back to said driving-pulley and upward.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. In an elevator apparatus, the combination of a cage, a counterweight, a series of cables, to the ends of which the cage and counterweight are connected, a driving-pulley upon a horizontal shaft, a guide-pulley D upon a shaft arranged in a plane at an angle to that of the shaft of the driving-pulley, a guide-pulley F and an intermediate guide-pulley E upon a shaft substantially at right angles to the plane in which the cables leave the driving-pulley, substantially as set forth.

2. The combination of the driving-pulley C, the pulley D upon a shaft at an angle to that of the driving-pulley, a guide-pulley F turning upon an axis in line with that of the driving-pulley, and an intermediate guide-pulley E arranged in a plane lower than that occupied by the pulleys C, D, and turning upon a shaft at right angles to the plane of the cables between the pulleys C, F, and the pulley E, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NORTON P. OTIS.

Witnesses:
HENRY L. BRANT,
W. L. RICKARD.