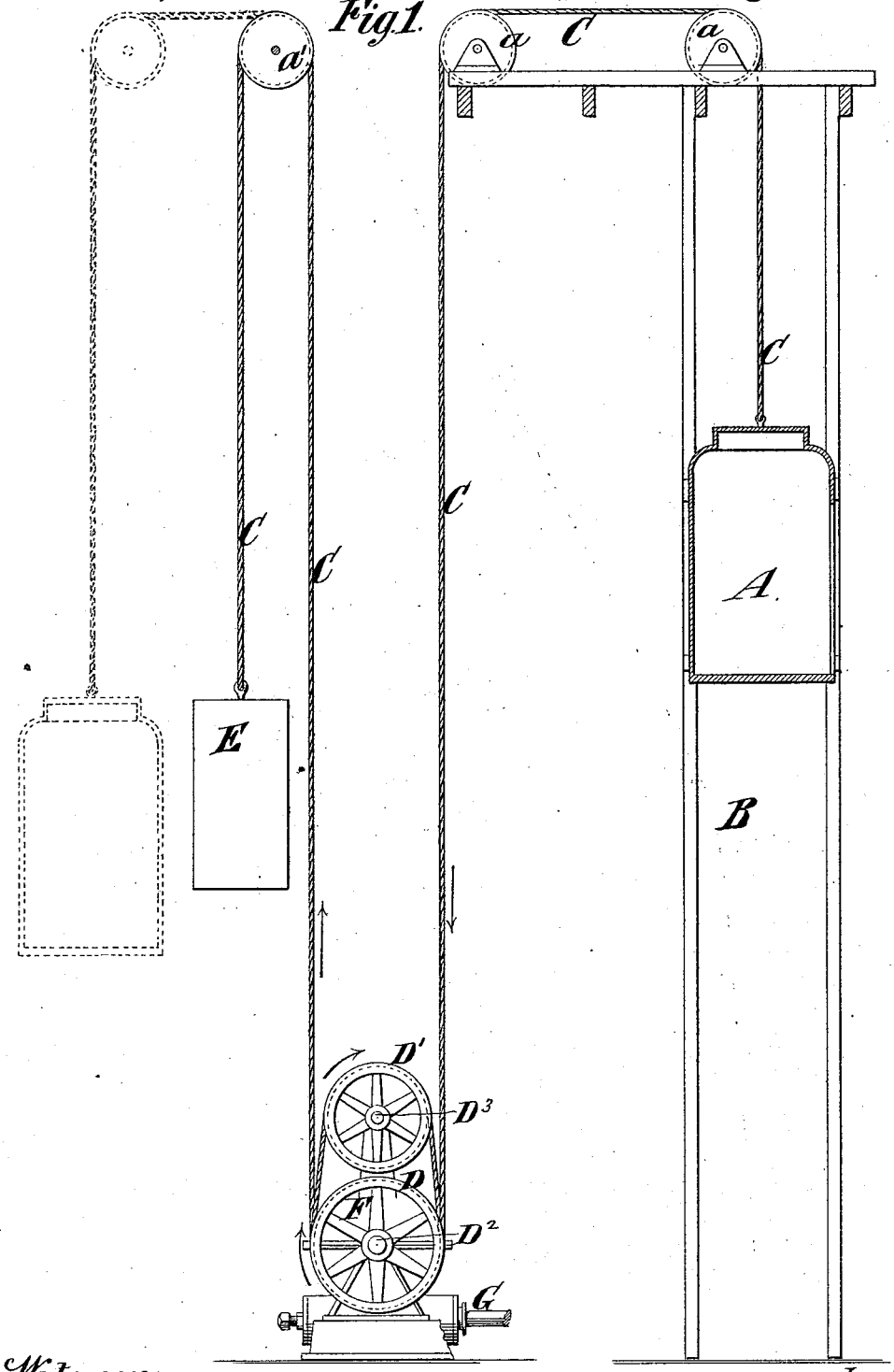
(No Model.) 3 Sheets—Sheet 1.

G. H. REYNOLDS.

MEANS FOR OPERATING ELEVATORS.

No. 348,056. Patented Aug. 24, 1886.

Fig. 1.



Witnesses.
Emil Horter
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by his Atty
Brown & Hall

(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

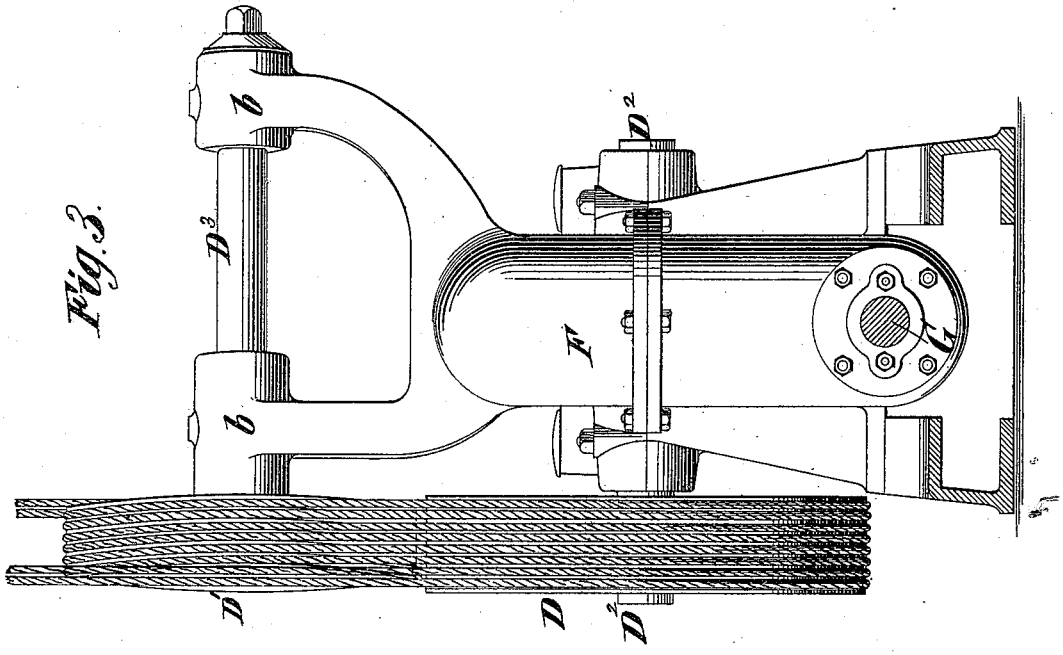
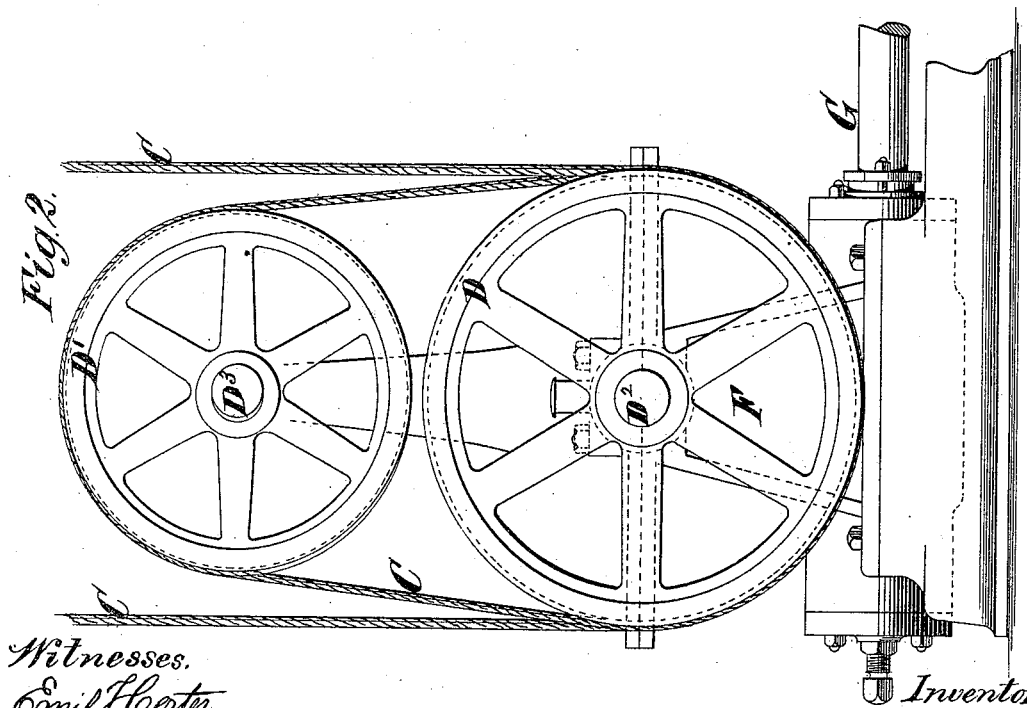


Fig. 2.



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(No Model.) 3 Sheets—Sheet 3.

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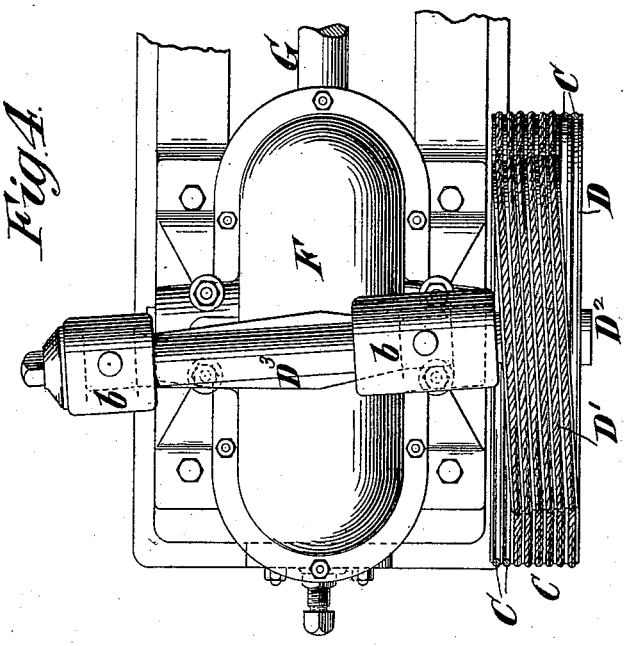
Fig. 4.



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UNITED STATES PATENT OFFICE.

GEORGE H. REYNOLDS, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO CRANE BROTHERS MANUFACTURING COMPANY, OF CHICAGO, ILL.

MEANS FOR OPERATING ELEVATORS.

SPECIFICATION forming part of Letters Patent No. 348,056, dated August 24, 1886.

Application filed February 13, 1886. Serial No. 191,799. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. REYNOLDS, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Means for Operating Elevators, of which the following is a specification.

My invention, although its advantages may be most apparent when employed in operating passenger and freight elevators in buildings, is also applicable to hoisting apparatus or elevators employed in mines, blast-furnaces, and other places.

The invention consists in the combination, with an elevator-cage and counter-weight, of drums and a driving-shaft, from which one of the drums is positively operated, and a cable or cables attached at opposite ends to the cage and weight, and which, between the cage and weight, embrace both drums by passing several times from one to the other of them and partly around each of them, without completely encircling either of them.

In the above combination two drums are preferably employed, arranged one above another, and the lower drum is usually the one to which the driving-shaft will communicate motion.

In passenger elevators particularly it is common to employ two, three, or four cables, and it will be obvious that if the drums around which the cables pass were arranged in parallel planes, the cables would have to be deflected considerably from a direct line in passing from one drum to the other. To obviate this difficulty or objection, I arrange one drum in a plane oblique to the plane of the other, so that the cables may pass in direct lines between the two drums, as will be more fully hereinafter explained, such arrangement of the drums also being included in my invention.

In the accompanying drawings, Figure 1 is a sectional elevation of an elevator and operating mechanism embodying my invention. Fig. 2 is a side elevation of the operating mechanism upon a much larger scale than Fig. 1. Fig. 3 is an elevation of such operating mechanism, looking at right angles to the plane of view of Fig. 2 and on the same scale as Fig. 2; and Fig. 4 is a plan of the operating mechanism, also upon the same scale as Figs. 2 and 3.

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

A designates an elevator cage or car, which is arranged to travel upward and downward in an elevator well or shaft, B, and which is operated by means of one or more cables, C. The mechanism for operating the cage comprises two drums or grooved sheaves, D D′, and the cable or cables which are attached to the cage A in any suitable manner are carried upward over sheaves *a* at the top of the elevator-shaft, thence downward to the lower drum, D, thence partly around the drum D and to the drum D′, thence partly around the drum D′ and to the drum D, and after thus being passed from one to the other of the drums and partly around them the cable or cables pass upward over a second sheave or pulley, *a*′, at the top of the shaft, and thence downward to a counterbalance-weight, E, to which the cable or cables are attached.

The mechanism for operating the elevator may be of any suitable character so long as it comprises drums and the cable or cables, which, between their points of attachment to the cage and counter-weight, are caused to embrace both drums by passing several times from one to the other of them and partly around each of them, without completely encircling either of the drums. The cable or cables should be passed a sufficient number of times around the drums and from one to the other of them in order to insure sufficient frictional contact between the drums and the cable or cables, to cause motion to be imparted to the cable or cables when the drum D is positively rotated.

The mechanism here shown for operating the cables is like that which forms the subject of my application for Letters Patent, Serial No. 191,797, filed February 13, 1885, and it comprises a casing, F, within which are arranged a worm-wheel upon the shaft D^2, and a worm or screw which is upon a shaft, G, as in my aforesaid application. The positive rotation of the screw-shaft G by means of a steam-engine or otherwise imparts rotary mo-

tion to the shaft D^4, and the drum D, being fixed upon this shaft, receives such rotary motion. The upper drum, D', which is here represented as somewhat smaller than the lower-drum, D, is fixed upon a shaft, D^3, which is mounted in suitable bearings, *b*, projecting upward from the casing F.

It will be obvious that if the drums D D' were arranged in the same plane the cable C would be deflected from a straight line in passing from one to the other. Inasmuch as two, three, or four cables are commonly employed side by side, such deflection will be very considerable, and to avoid this I arrange the upper drum, D', in a plane oblique to the plane of the lower drum, as best shown in Fig. 4. As here shown the drums are arranged so as to adapt them for operating two cables side by side, and at the left hand of Fig. 4 the outermost grooves in the upper drum, D', are coincident with the two outermost grooves in the lower drum, D, while at the right hand of Fig. 4 the two outermost grooves in the drum D' are coincident with the third and fourth grooves from the outer side of the drum D; hence the cables which pass from the upper sheaves, *a*, downward to the drum D at the right hand of Fig. 4, and thence under said drum, pass in direct lines from the left hand of the drum D directly upward into the first two grooves of the upper drum, D', and the cables pass from the two innermost grooves of the drum D', at the right hand of Fig. 4, directly downward into the two innermost grooves of the drum D at the right-hand of Fig. 4. Of course, if three or four cables were employed side by side, the obliquity of the drum D' relatively to the drum D would have to be increased so that the outermost groove in the drum D' at the right hand of Fig. 4 would be coincident with the third or fourth groove from the outer side of the drum D at the right hand of Fig. 4. When the drums D D' turn in the direction of the arrows shown in Fig. 1, the cable C will be moved in the direction of the arrows there shown—that is to say, the portions of the cable leading to the cage will be drawn downward around the drum and the cage raised, while the portions of cable leading to the counterbalance-weight E will be paid out from the drums and the weight will descend. To lower the cage A the drums and cables will be operated in a reverse direction.

From the above description it will be obvious that when the drums are turned in a direction to lower the cage they act positively to raise the counterbalance-weight, and hence the cage will descend, even though it be empty, and even if it be counterbalanced considerably beyond its own weight.

The construction and arrangement above described is very desirable, for the very reason that it enables the cage to be counterbalanced beyond its own weight and to the extent of an average load. Suppose, for example, that the cage has a weight of two thousand pounds and the average load to be lifted is one thousand pounds. My construction and arrangement enables a counterbalance-weight of three thousand pounds to be employed, and then in raising the cage with a load of one thousand pounds dead weight only the friction of the machinery will have to be overcome.

Of course my construction and arrangement enables the counter-balance to be heavy enough to balance the cage with the heaviest load which it would ever be required to raise; but this would not be so economical as to counterbalance the cage with its average load, because in lowering a light load the surplus weight in the counter-balance would have to be lifted.

Where my invention is applied to two elevators which are desired to travel upward and downward simultaneously, always moving in reverse directions, the second cage may be attached to the ends of cable, in lieu of the counter-balance E, as is indicated by dotted lines in Fig. 1, and then the weight of one cage will counterbalance the other.

I do not claim, broadly, as of my invention the arrangement of the two drums in planes oblique to each other, so that the cable may pass directly and without deflection from the grooves of one drum to the grooves of the other drum.

The arrangement of the cables C, embracing both the drums D D', by passing several times from one to the other of them and partly around each of them, without completely encircling either of them, is important, as by it the drum D is enabled to transmit motion to the cable or cables, and the cables, in passing from the drum D to the car and to the counter-weight, are not traversed laterally, as is the case where a cable is simply wound upon and completely encircles a single drum.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with an elevator-cage and counter-weight, of drums and a driving-shaft from which one of them is positively operated, and a cable or cables attached at opposite ends to the cage and weight, and which, between the cage and weight, embrace both drums by passing several times from one to the other of them and partly around each of them without completely encircling either of them, substantially as herein described.

2. The combination, with an elevator-cage and a counter-weight, of two drums arranged one above another, and a driving-shaft from which the lower drum is positively operated, and a cable or cables attached at opposite ends to the cage and weight, and which, between the cage and weight, embrace both drums by passing several times from one to the other of them and partly around each of them without completely encircling either of them, substantially as herein described.

3. The combination, with an elevator-cage and a counter-weight, of two drums arranged

one above another in planes oblique to each other, and a driving-shaft from which one of the drums is positively operated, and a cable or cables attached at opposite ends to the cage and weight, and which, between the cage and weight, embrace both the drums by passing several times from one to the other of them and partly around each of them without completely encircling either of them, substantially as herein described.

GEO. H. REYNOLDS.

Witnesses:
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FREDK. HAYNES.