

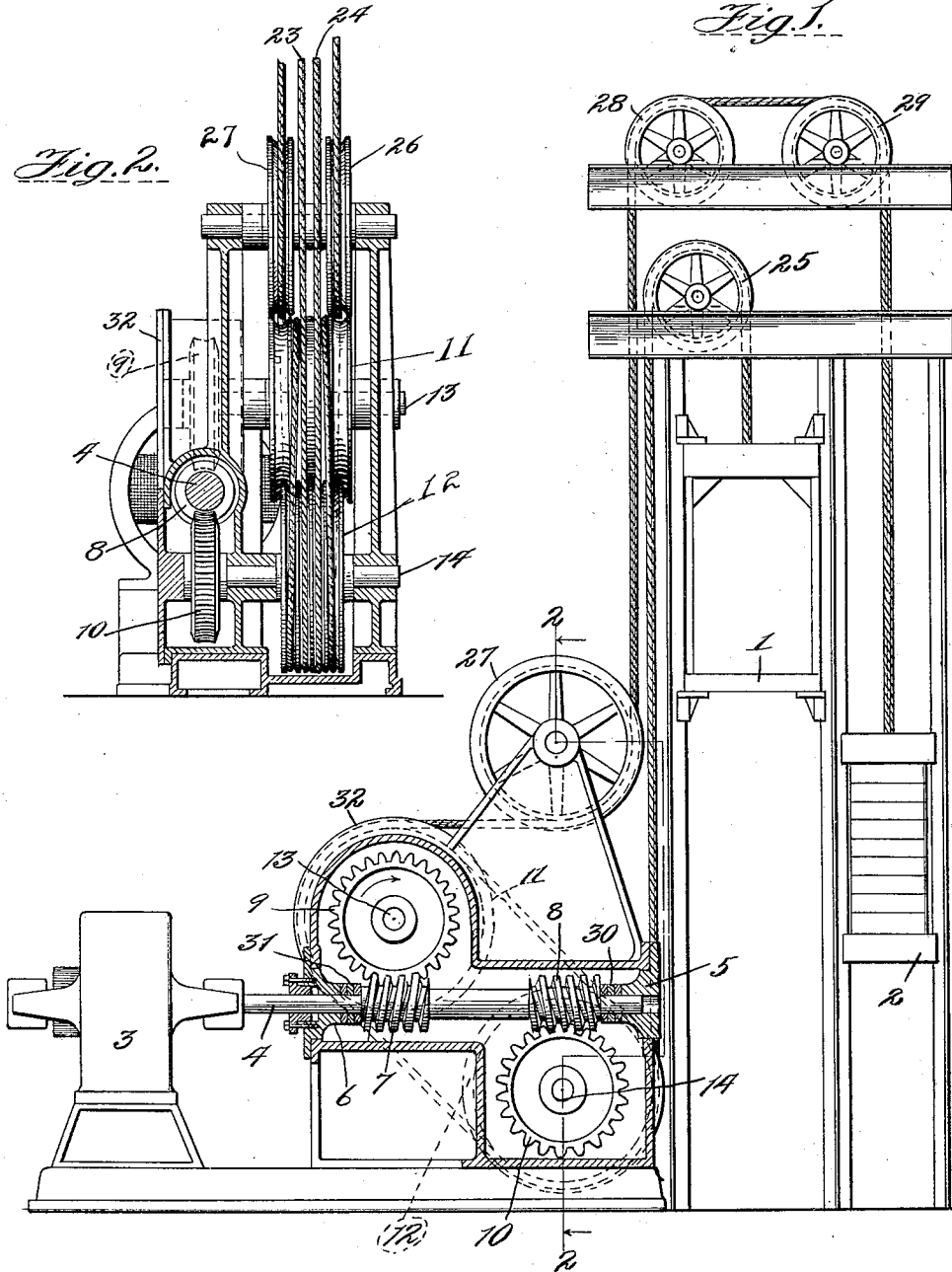
H. W. FORSLUND & J. RICE.
ELEVATOR.

APPLICATION FILED AUG. 24, 1904.

1,065,308.

Patented June 17, 1913.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 5.

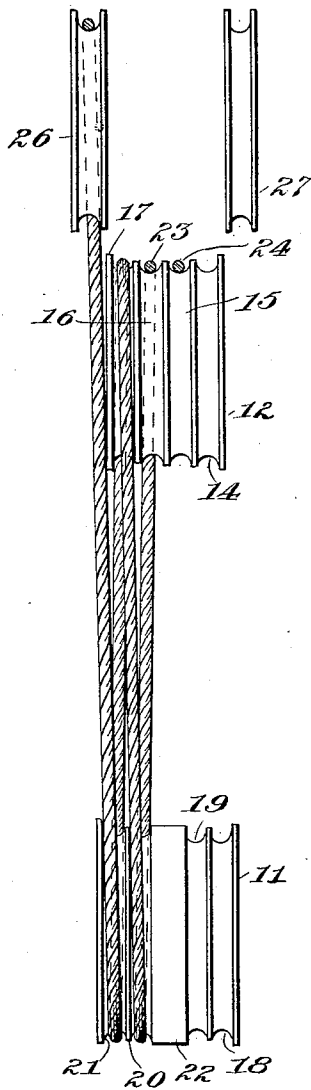
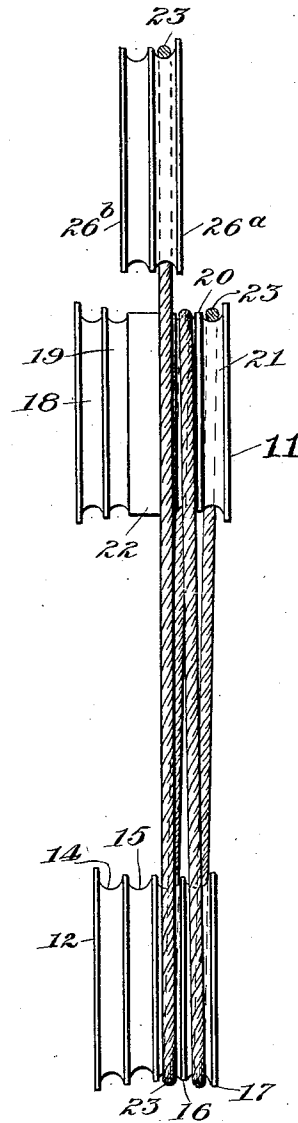


Fig. 4.



Witnesses:
E. C. Sample
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UNITED STATES PATENT OFFICE.

HUGO W. FORSLUND AND JOSEPH RICE, OF CHICAGO, ILLINOIS, ASSIGNORS TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ELEVATOR.

1,065,308.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed August 24, 1904. Serial No. 221,942.

To all whom it may concern:

Be it known that we, HUGO W. FORSLUND and JOSEPH RICE, citizens of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Elevators, of which the following is a full, clear, and exact specification.

This invention relates more particularly to that class of elevators known as tandem machines in which the power of the motor is transmitted to the cable drums by two worms arranged tandem on the same shaft and engaging two worm wheels, which are on the shafts of the drums around which the cable passes, and which drums must, of course, rotate in the same direction unless the cable be crossed, which is exceedingly objectionable.

It is not new to rotate the drums in the same direction, by means of two worms, without crossing the cable, but the object of this invention is to accomplish this and at the same time reduce the length of the machine and consequently reduce the floor space required.

Another objection to tandem machines of this character is the end thrust on the worm shaft, and while it is not new to make the worms oppose each other so that one counteracts the end thrust of the other, this invention has for its further object to make the worms thus oppose each other without crossing the cable and at the same time to have the weight of the car uniformly distributed on the worm wheels whereby the friction and wear on one worm will not be severely greater than on the other.

A further object of the invention is to so wind the drums of the tandem machine as to materially reduce the distance between the drum centers whereby the machine will be more compact.

With these ends in view the invention consists in certain features of novelty in the construction, combination and arrangement of parts by which the said objects and certain other objects hereinafter appearing are attained, all as fully described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings Figure 1 is a side elevation of an elevator embodying this invention, showing the same partly in vertical section. Fig. 2 is a detail vertical view

taken partly in section on the line 2—2 Fig. 1. Fig. 3 is an enlarged diagram showing the winding of the drums, and Fig. 4 is a modification thereof.

1 represents the elevator car, 2 the counterweight and 3 the motor which is here illustrated as an electric motor, but all of which parts may be of the usual or any suitable construction.

4 is a driving shaft, which is connected or coupled in any suitable way to the shaft of the motor and which is mounted in suitable bearings 5, 6 and between these bearings it is provided with two worms 7, 8 which are of opposite turn, that is, one is right hand and the other is left hand, and arranged above and engaging with the worm 7 is a worm wheel 9 and located below and engaging with the worm 8 is a worm wheel 10, whereby the two worm wheels are driven in the same direction.

11, 12 are the cable drums which are mounted on shafts 13, 14 secured to the worm wheels 9, 10 respectively whereby the drums will be positively driven in the same direction. Both drums 11, 12 are scored or grooved, and the grooves 14, 15, 16, 17 of the drum 11 are arranged close together or in the ordinary way, while the grooves 18, and 19 of the drum 12 are separated from the grooves 20 and 21 of said drum by a blank 22, or other suitable method, so that the total length of the drum 12 will be approximately the width of one groove greater than the total length of the drum 11, or in other words, the grooves 18, 19 are offset half the width of one groove with relation to one end of the drum 11 and the grooves 20, 21 are similarly offset a similar distance with relation to the other end of the drum 11. This offset relation of the grooves of the drum 12, it will be understood, is for the purpose of bringing the last fold of the cable into line with the idler or idlers under which the cable passes, where it turns from its vertical course to pass around the drums, but by offsetting the grooves of the drum 12 at both ends instead of entirely at one end and employing two cables, which divide at the midlength of the drum and leave the drum at the outer ends, the angle of the offset in each fold of the cable may be materially reduced and consequently the drums may be placed much closer together as will presently appear.

As shown in Figs. 2 and 3, two cables 23, 24 are employed and one end of each is attached to the car and the other end of each to the counterweight 2. These cables at one end pass upwardly from the car over the usual idlers or sheaves 25 at the top of the well and descend together side by side to the contiguous grooves 15, 16 of the drum 11 and then divide at the blank 22 of drum 12, the cable 23 passing into the groove 20 and the cable 24 into the groove 19, around the under side of drum 12, thence upwardly over drum 12 and into the grooves 17, 14 respectively of the drum 11, thence under the drum 11 and into the grooves 21, 18 respectively of drum 12, passing under the latter drum, thence over the drum 12 to the under side of idlers 26, 27 respectively, which are arranged in line or substantially in line with the grooves 21, 18 respectively of drum 12; thence upwardly over the usual idlers or sheaves 28, 29 at the top of the shaft. Thus it will be seen that each cable is deflected laterally where it passes from one drum to the other a distance equal to but one-half the width of a single groove, and consequently the centers of the drums may be located much closer together than if these deflections were equal in each cable to the width of the grooves because it is obvious that the deflection of the cable causes it to wear on the edges of the grooves, and hence the greater the deflection the farther apart the drums must be in order to reduce the angle of the cable with relation to the drum and to avoid this wear. Consequently the machine may be made very compact and by arranging the worm wheels above and below or on opposite sides of the worm shaft or driving shaft 4 one worm wheel may be placed partially over the other and consequently the floor space required is considerably reduced. It will also be seen that the worms oppose each other and consequently there is no end thrust on the shaft 4, but if desired, spacing washers or collars 30, 31 may be interposed between the ends of the worms and the bearings 5, 6 so as to provide for taking up the wear should any occur. It will also be seen that inasmuch as both drums contribute to the work of raising the car, the strain is proportioned between them and consequently the wear on the worms and worm wheels is distributed and the wear on one will not be severely greater than that on the other. If desired the worms and worm wheels may be inclosed by a suitable casing 32.

In winding the cables upon the drums, it will be seen by reference to Fig. 1 that both the ascending and descending cables, where they are tangent to the drums, form the same angle with the fold of cable between the drums, or in other words, the ends approaching the drum form the same angle

with the straight fold of the cable extending between the drums, as does the end of the cable that leaves the drums. The advantage of this is that both drums have the same extent of contact with the cable and consequently the friction of the cable upon one drum is precisely the same as on the other with a resulting equality of wear or friction on the worms.

With the modification shown in Fig. 4 the drum 11 is arranged to be mounted on the shaft 14 and the drum 12 to be mounted on the shaft 13, and it will be seen that the two sheaves 26, 27, which are arranged at the ends of the drum 11 in Fig. 3, are substituted by a double sheave or two sheaves 26^a 26^b located close together at the mid length of drum 11, thus involving the difference of having the cables run to and from the sheaves from the mid length of the drum instead of from the outer ends, but the arrangement and winding of the cables otherwise is substantially the same. In both of these diagrams the cable on one side is omitted for the sake of clearness, but it will be understood nevertheless that the sheave and outer ends of the drums on which no cable appears in the drawing in Figs. 3 and 4 will be wound in the same manner as the sheave and ends which are illustrated in these figures with the cable thereon.

Having thus described our invention what we claim as new therein and desire to secure by Letters Patent, is:

1. The combination of two scored or grooved drums arranged on noncoincident axes, some of the grooves of one drum being offset with respect to grooves in the other drum a distance of one half of the width of a groove in one direction along the axis and other grooves of the former drum being offset one half the width of a groove in the other direction and the end grooves of said former drum being disposed beyond the end grooves of the other drum, two cables wound on said drums from the outer ends of both drums inwardly toward their mid lengths, and means for rotating said drums.

2. The combination of two scored or grooved drums arranged on noncoincident axes, the grooves of one drum being offset in both directions under the axis with relation to the grooves of the other drum a distance less than the width of a groove, and having the end grooves offset beyond the end grooves of the other drum, two cables wound on said drums from the outer ends of both drums inwardly toward their mid lengths, and means for rotating said drums.

3. In an elevator, the combination of two drums arranged one above the other with their axes in an inclined plane, the elevator shaft or hatchway and car therein and two sheaves arranged over the lower one of said

drums with their peripheries in a vertical plane lying between the elevator shaft and the periphery of the upper one of said drums, two cables counterweighted at one
5 end and descending substantially parallel with the elevator shaft and passing under said sheaves respectively and thence over the upper drum and under the lower drum, and from the side of the lower drum which
10 is adjacent to the elevator shaft upwardly substantially parallel with the shaft and supporting the car at their extremities, both of said drums having peripheral grooves receiving said cables, and some of the
15 grooves of the lower drum being off-set in one direction along its axis, with respect to the grooves of the upper drum, while others of the grooves of the lower drum are offset in the opposite direction.
20 4. The combination of two scored or grooved drums arranged on non-coincident axes, the grooves of one drum being offset

in both directions from a medial point in the length of its axis, with respect to the grooves in the other drum, the end grooves extending 25 a distance equal to one-half the width of a groove beyond each of the end grooves of the other drum, cables wound on said drums from the outer ends of both drums inwardly toward their medial points, and means for 30 rotating the drums.

5. The combination of two scored or grooved drums, one of said drums extending beyond the outer grooves of the other drum a distance at each end equal to one- 35 half of a groove, cables wound upon said drums from their outer edges toward their centers, and means for rotating the drums.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."