

R. SMITH.
ELEVATOR.

No. 343,404.

Patented June 8, 1886.

Fig. 2.

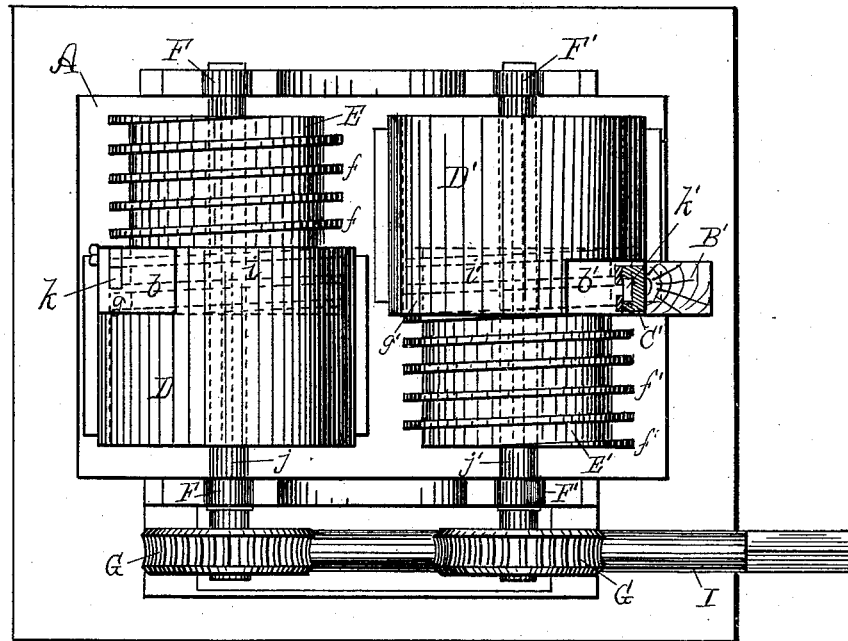
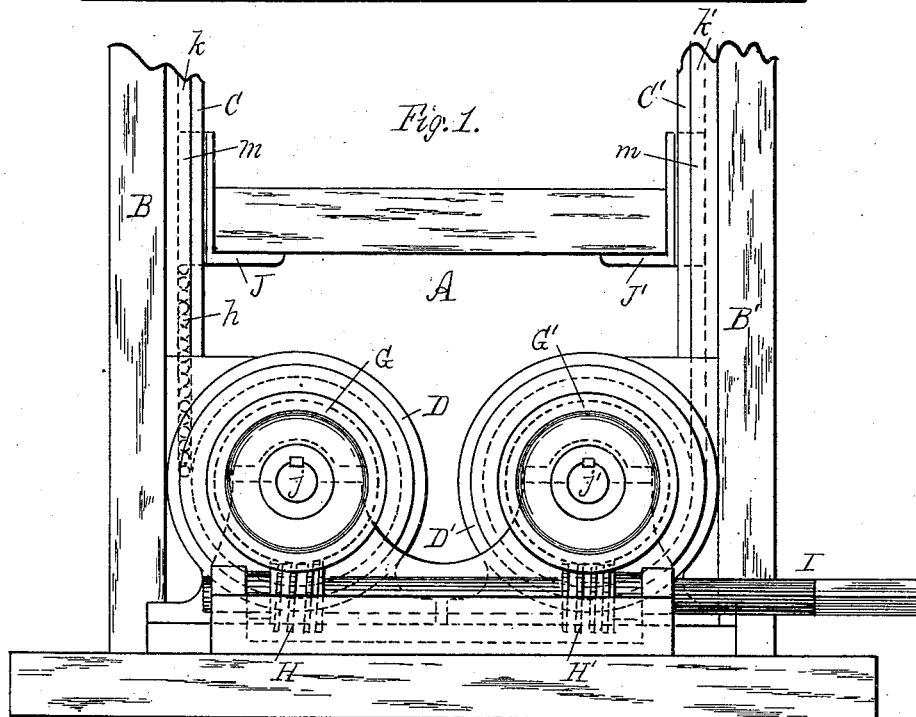


Fig. 1.



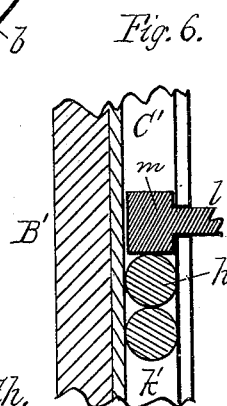
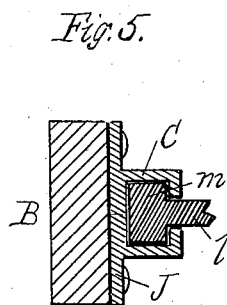
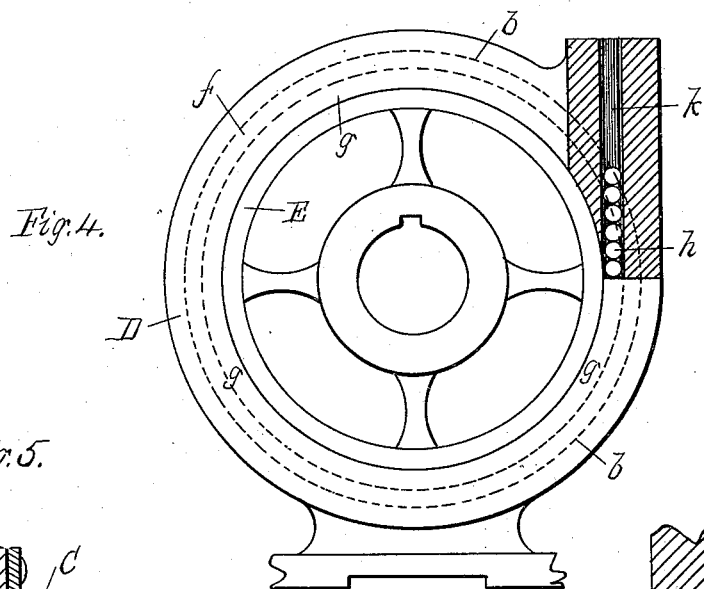
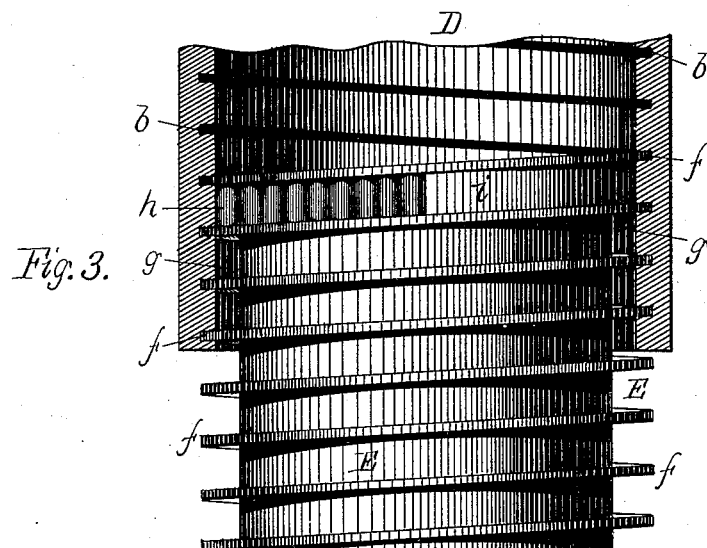
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UNITED STATES PATENT OFFICE.

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ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 343,404, dated June 8, 1886.

Application filed November 17, 1885. Serial No. 183,080. (No model.)

To all whom it may concern:

Be it known that I, RICHARD SMITH, a citizen of the Dominion of Canada, residing at Sherbrooke, in the county of Sherbrooke and Province of Quebec, Canada, have invented certain new and useful Improvements in Elevators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in elevators; and it consists of means whereby a positive lift is directed by a series of rolls contained between a screw-threaded shaft and its inclosing-nut upon the elevator-car. The periphery of the screw upon which the rolls revolve and by means of which they are advanced or withdrawn is equal to the vertical rise or maximum height ever attained by said car. By this mechanical arrangement of parts there is no danger of the car ever dropping, since two columns of rolls are employed, and thus, in case one part of the elevating mechanism breaks, the elevator-car still has the other to support it, and the car to all intents and purposes is as securely supported at any elevation as if it were resting upon a fixed supporting structure.

In the drawings accompanying this specification I have shown at Figure 1 a side elevation of an elevator containing my invention, while Fig. 2 represents a plan of the same in which the elevator is supposed to be at the top of the building; Fig. 3, a horizontal section of the screw and its inclosing-nut, while Fig. 4 is a vertical section showing the manner of directing the rolls upward against the car in order to lift the latter. Figs. 5 and 6 are respectively horizontal and vertical cross-sections of the operative parts by which the rolls are made to actuate the car.

In said drawings, A is the frame or well-way of an elevator composed of the uprights B B', constituting the ordinary guide-rails. To these latter are attached metal boxes C C',

secured upon each side of the uprights B B', and in which the rolls to be hereinafter described are designed to travel.

Directly beneath the elevator and at the bottom of the wellway I have disposed two cylindrical nuts, D D', interiorly screw-threaded, as shown at *b b' b' b'*, and adapted to inclose and receive similarly-exteriorly screw-threaded cylinders E E'. The pitch of said screw-thread may be more or less, according as the elevator-car is desired to travel more or less rapidly and would vary, if desired, with each individual elevator, though generally the speed is to be obtained by the speed of the prime motor. Furthermore, I have so cut the depth of the male screw-threads *f f' f' f'* that after engagement with the female screw-threads *b b' b' b'* in the nuts, annular screw-threaded grooves *g g'* shall exist between the exterior periphery of the screws and the interior periphery of their inclosing-nuts. These grooves are to coincide with the diameter of the rolls, *h h*, &c., which in the present case are shown to be short metal cylinders of hardened steel or other analogous suitable material. In lieu of the rolls I find that metal balls or spheres can be employed with equally good results. It will be observed that the distance between the screw-threads is considerable, and is made to conform to and vary with the length of the rolls, which move upon each other between them, as the screws are rotated by the action of the prime motor within the inclosing fixed nuts. These screw-threaded cylinders E E' are each provided with a shoulder or abutment, *i i'*, against which the entire pressure from the rolls is brought, and which results from the weight of the car; hence these abutments form a point of leverage by which the entire series of rolls is actuated through the movement of the prime motor. The nuts D D' are shown as sections of hollow cylinders, open at both ends, interiorly screw-threaded to correspond with their co-operating screws E E', and are firmly attached to some fixed portion of the frame upon which the apparatus rests.

To actuate the rolls and force them to operate the elevator-car, I have secured the screws

E E' upon similarly-arranged shafts or arbors *j j'*, which are provided with a feather or spline and groove connection, to compel rotation of said screws in unison with them. At the same time this permits of longitudinal or endwise movement upon said shafts, which is consequent upon the action of the fixed nuts with said screws in the operation of raising or lowering the car. These shafts *j j'* are mounted in suitable bearings, F F', and upon their extremities are affixed similar worm-gears, G G', which mesh and engage with worms H H', firmly attached to the main driving-shaft I, to be actuated by any suitable prime motor.

In the section shown in Fig. 4 it will be observed that the channels *k k'* in the metal boxes are arranged tangentially with respect to the outer peripheries of the screw-threaded cylinders E E', so that as the latter are rotated by the movement of their shafts the series of rolls *h h'*, &c., shall pass easily in advance or retreat movement from the screws into the boxes C C', or vice versa.

In Figs. 5 and 6 I have shown a stout iron casting, J, bolted to the under frame of the car, and with a neck, *l*, terminating in a rectangular head, *m*, similar in cross-section to that of the channels *k k'*, formed in the boxes C C', in which it slides, and thus when the rolls are forced upward the uppermost one shall bear against it, and being prevented from passing thereby consequently tends to raise and lift the elevator-car.

The operation of this elevator is as follows: It being understood that the car is in a position upon the basement and the rolls are then all contained about the periphery of the screws E E' and between the latter and their inclosing-nuts D D'. The prime motor is now started, which rotates the driving-shaft I, carrying the worms H H', which actuate their gears G G'. Thus rotation is conveyed by the shafts *j j'* to the screws E E', which operate in similar paths of movement. Immediately thereupon pressure is brought to bear upon the rolls by and through the abutments *i i'*, which are located upon the rear portion of the screws. Consequently the only mode of advance for the rolls is to pass tangentially off from the screw at that time containing them, and they advance up the vertical channels or ways provided in the boxes C C' and press against the heads *m* of the castings J J, which secure the elevator-car in place. This action advances the car upward, the rolls gradually passing off from the periphery of their screws into the boxes C C', while the empty portions of the

screws advance outwardly, as shown in Fig. 2 of the drawings. By this means the car always has a solid support beneath it, and since I intend to provide each elevator with two series of rolls, the car will never be likely to fall, since it is very improbable that the co-operating parts of each of the elevating-machines would break at the same time; hence there will always be one firm support to the car. Moreover, the two columns of rolls will enable the force to be more evenly distributed and the car will move with greater freedom and ease than if only one of such columns was employed. To lower the car, the prime motor is simply reversed, and the car by its own gravity and that of the series of rolls will compel the latter to retreat from their channels in the boxes C C', and again rearrange themselves upon the exterior periphery of their screws E E', as heretofore explained. By this contrivance I obviate the dangers now existing by the employment of wire ropes and safety-catches, and thus reduce the danger to a minimum by having a permanent positive continuous support always beneath the car.

My invention is very simple, not liable to become deranged or broken, and can be made very compact and built at a small expense.

I claim—

1. In combination with an elevator, a solid extensible support on which it rests, and mechanism for forcing said support upward to raise said elevator, said support consisting of a series of separate rolls, substantially as set forth.

2. The combination of the rotary cylinders and stationary nuts having screw-threaded connection therewith, the threads of the former having abutments *i*, with the rolls *h h'* interposed between said cylinders and nuts, the boxes C C', into which said rolls pass tangentially, and the elevator provided with rigid parts *m*, which extend into said boxes and rest on said rolls, in order that they and said elevator may be raised and lowered by the latter, substantially as set forth.

3. A solid support for an elevator, said support consisting of a column of unconnected parts, and a box or guideway within which they may rise and descend, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD SMITH.

Witnesses:

H. E. LODGE,
F. CURTIS.