C. T. SCHNITZER.

BALL AND SCREW ELEVATOR AND FIRE ESCAPE.

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1,161,255.

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Fig. 1.

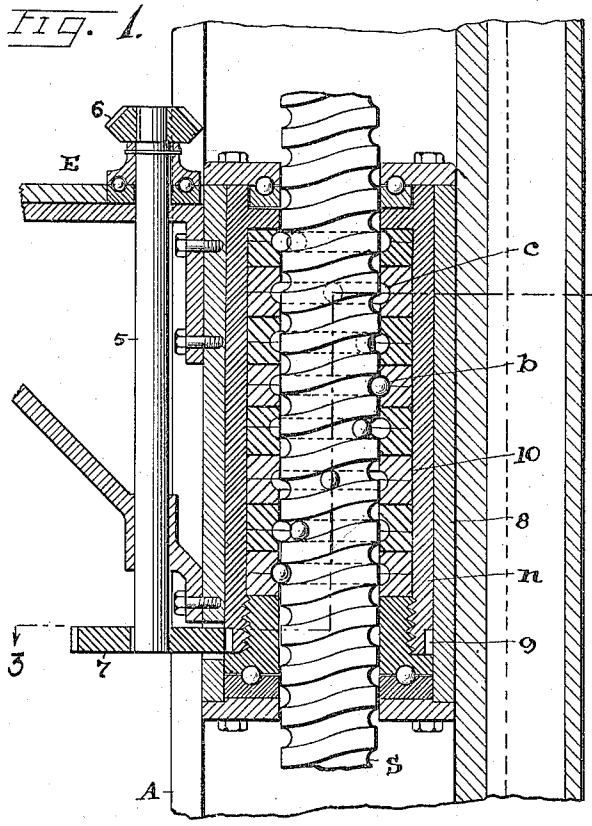


Fig. 2.

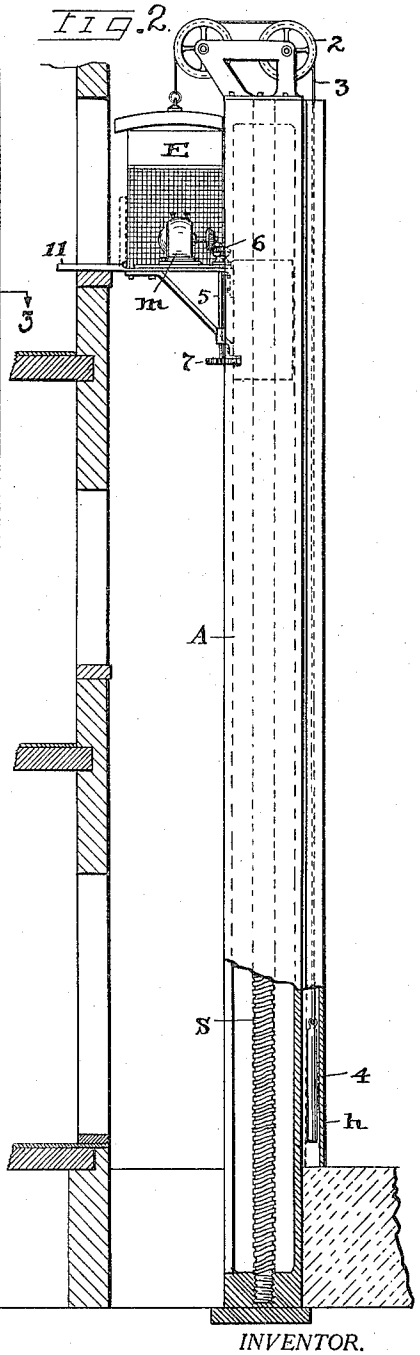
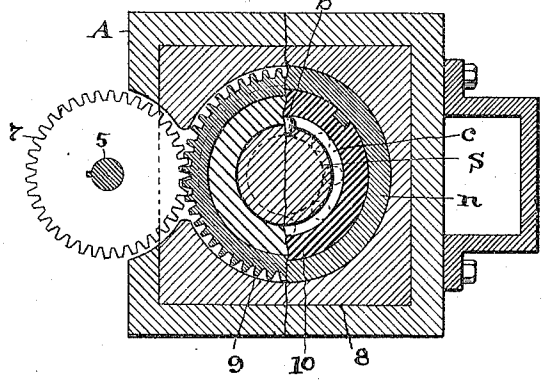


Fig. 3.



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BALL-AND-SCREW ELEVATOR AND FIRE-ESCAPE.

1,161,255. Specification of Letters Patent. Patented Nov. 23, 1915.

Application filed May 22, 1915. Serial No. 29,798.

To all whom it may concern:

Be it known that I, CARL TH. SCHNITZER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Ball-and-Screw Elevators and Fire-Escapes, of which the following is a specification.

This invention relates to a ball and screw elevator, and fire escape, and the invention consists in the construction and combination of parts substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical sectional elevation of the screw portion of the device, and Fig. 2 is an elevation partly in section of what may be regarded as the elevator shaft and elevator and operating mechanism therewith on a smaller scale than Fig. 1, and showing also a series of three landings at different elevations. Fig. 3 is a section of Fig. 1 on the line 3—3.

As thus shown the invention comprises an elevator and fire escape having a screw shaft and a rotatable ball carrier to facilitate ascent and descent as occasion may require. The ascent may be obtained by motor power, electric or otherwise, and the descent by gravity under motor or brake control, all as will now appear. Thus, I provide a tubular shaft or column A, preferably square in cross section, which is placed perpendicular at the side of a building opposite the windows or exits therein, and this column extends the full height of the service from top to bottom and has a stationary heavy screw S fixed at its opposite ends centrally the full length of said shaft.

An elevator, crib, or cage E is supported by a cable 3 running over sheaves 2 at the top of shaft A, and a heavy counterweight 4 at the end of the cable runs free in a boxing or housing *h* along the rear of column or tube A. The said counterweight is designed to be substantially equal to the weight of the elevator E and the operating parts carried thereby so an approximate counterbalance will exist. Then if a person or persons step into the elevator it will descend by gravity subject to control by the motor *m* or other turning device for the ball carrier *n* which affords the mechanical connection between the elevator and the screw shaft S. This motor and device will prevent undue or dangerous speed of descent, even if no other mechanical checks or brakes be employed.

The connections between motor *m* and the screw S comprise certain parts rigid with the elevator frame work, a portion of which appears enlarged in Fig. 1, and has the motor actuated shaft 5 mounted therein and provided with a bevel gear 6 at its top in mesh with the motor shaft and a gear 7 at its bottom. A rectangular casing 8, proportioned about as seen in dotted lines Fig. 2 and full lines Fig. 1, is bolted to the elevator frame and serves as the primary support therefor on the screw S. This casing has closed ends with roller bearings therein, and a ball carrier *n* consisting of a cylindrical member is rotatably confined in said casing between said end bearings and has gear teeth 9 about its bottom in mesh with the gear 7 on shaft 5 from the motor.

Rotatable member *n* contains a series of superposed rings 10 which have annular channels *c* about their inside edges of substantially semicircular cross section and balls *b* are free to ride in these channels, in part, one-half of the balls however being also confined in the spiral groove of the screw shaft S so that rotation of the member *n* is essential to produce longitudinal movement thereof in either direction along the screw shaft S. Rotation of the carrier in either direction causes the balls *b* to ride up or down the spiral incline or groove in shaft S, and the elevator and its load will be lifted or caused to descend correspondingly. The speed of rotation of the carrier *n* is controlled by motor *m* which may also be used as a magnetic brake. It will be noticed also as a feature peculiar to this construction of nut that a single ball is used in each annular channel *c* between each pair of adjacent rings 10, and that the balls are arranged at equal distances apart in the single screw groove or channel in the shaft S so that the carrier is supported uniformly at different radial points upon the shaft.

As shown, there are eight balls placed in an equal number of annular channels *c* and the distance between successive balls is equal to one-eighth the circumference of the shaft, and this order and position of the balls is constantly maintained in view of the fact that each annular channel *c* bisects the spiral

groove at only one point, thereby forming a pocket for the ball. Obviously, the ball cannct escape out of either the annular groove or the spiral channel, and moreover, cannot travel up or down the spiral channel unless the carrier and its bearing rings 10 are rotated. This rotation is produced by the motor *m* or any other suitable power device, thereby giving absolute control of the ascent and descent of the elevator car. This car has a hinged platform 11 adapted to bridge the space between the car and building at the different landings and when the car is making its ascent or descent this platform is folded inwardly as a gate, see dotted lines, Fig. 1.

What I claim is:

1. In a ball and screw elevator adapted to be used as a fire escape, a tubular column and a screw shaft therein, a rotatable carrier having balls engaged with said screw shaft, and means to control the movement of said carrier.

2. In a ball and screw elevator, a tubular column and a screw shaft therein, an elevator frame slidably supported upon said column having a rotatable carrier and balls engaged with said screw shaft, and means to rotate said carrier.

3. In a ball and screw elevator, a tubular column and a stationary screw shaft therein, a slidable support and rotatable carrier having annular channels and balls therein engaged with said shaft, and means to rotate said carrier.

4. In a ball and screw elevator, a screw shaft and a movable support having a series of superimposed carrier rings having annular channels and balls therein engaged with said screw shaft.

5. In a ball and screw elevator, a screw shaft and a slidable supporting member having a rotatable carrier mounted therein, a series of channeled rings removably mounted within said carrier in sleeved relations with said shaft, and balls in said channels engaged with said screw shaft, in combination with means to rotate said carrier.

6. In a ball and screw elevator, a screw shaft, a tubular column inclosing said shaft, a casing slidably confined within said column, a carrier rotatably mounted within said casing having channeled rings and balls therein engaged with said shaft, and means to rotate said carrier.

7. In a ball and screw elevator, a screw shaft and a tubular column therefor, an elevator frame having a supporting member slidably confined within said column, a rotatable carrier having balls therein engaged with said screw shaft, and means to rotate said carrier, in combination with a counterweight and cable connected with said elevator frame and supported in running engagement with said column.

8. In a ball and screw elevator, in combination, a screw shaft, and an inclosing column therefor having a longitudinal compartment for a counter weight, an elevator frame and a supporting member therefor mounted within said column in screw engagement with said shaft, operating means to raise and lower said member by means of said screw shaft, and a counterweight in said compartment having cable connections with said elevator frame.

In testimony whereof I affix my signature in presence of a witness.

CARL TH. SCHNITZER.

Witness:

R. B. MOSER.