

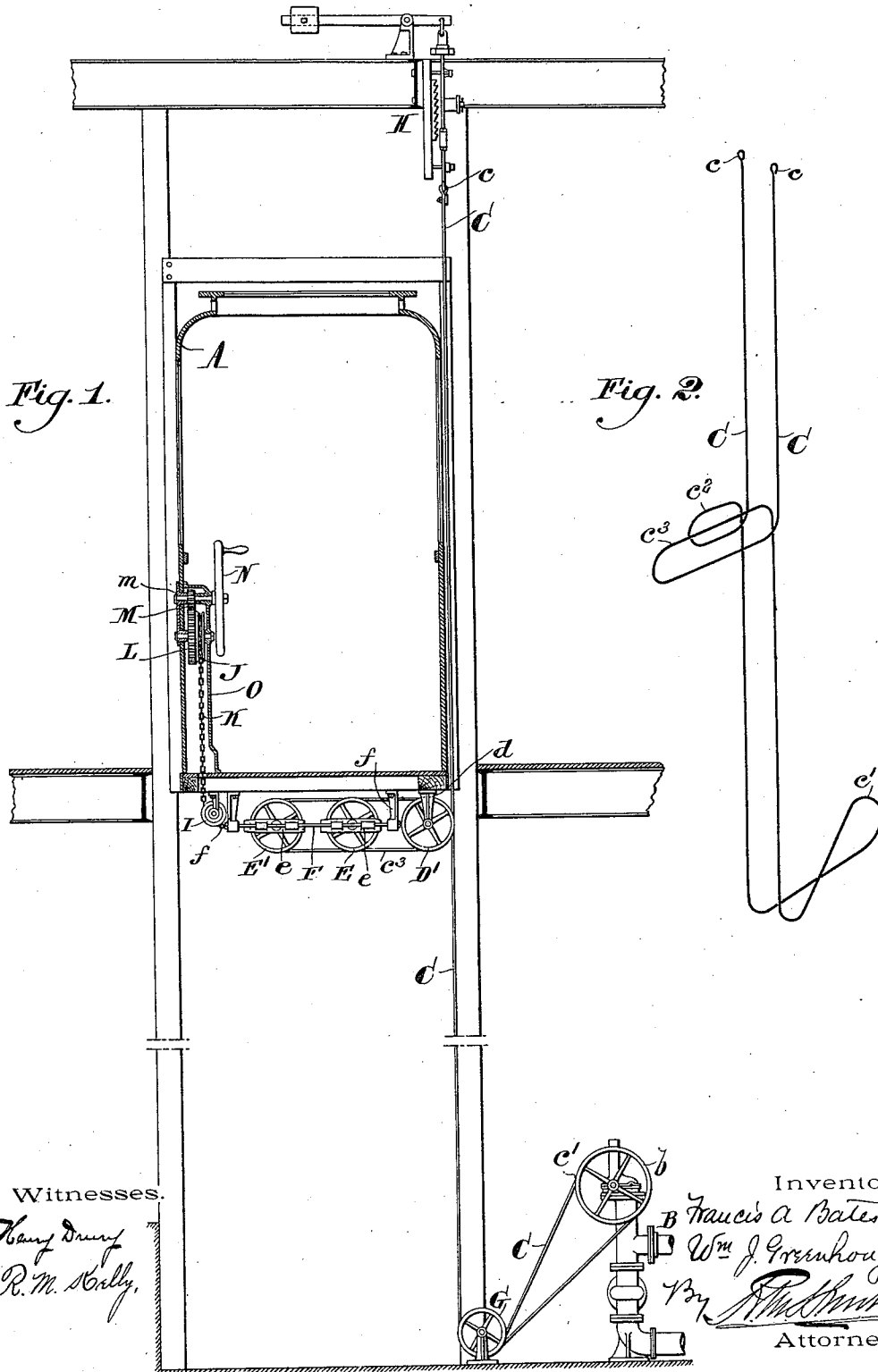
(No Model.)

2 Sheets—Sheet 1.

F. A. BATES & W. J. GREENHOUGH.
ELEVATOR.

No. 579,672.

Patented Mar. 30, 1897.



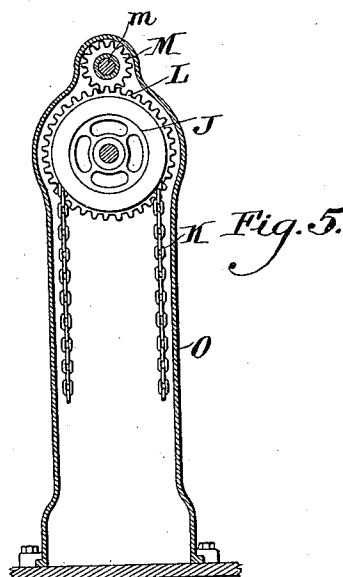
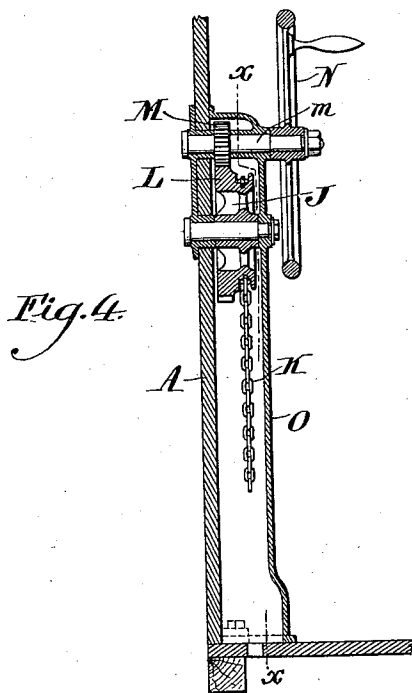
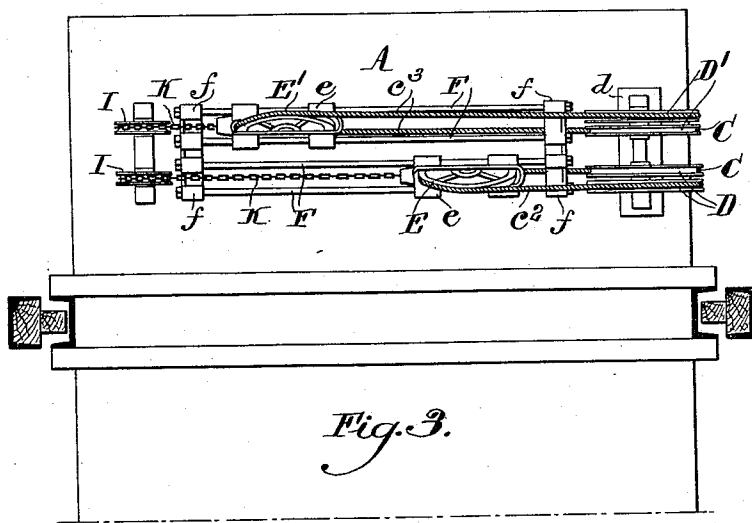
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2 Sheets—Sheet 2.

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Witnesses.

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UNITED STATES PATENT OFFICE.

FRANCIS A. BATES AND WILLIAM J. GREENHOUGH, OF PHILADELPHIA,
PENNSYLVANIA, ASSIGNORS TO THE MORSE WILLIAMS & COMPANY,
OF PENNSYLVANIA.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 579,672, dated March 30, 1897.

Application filed October 8, 1896. Serial No. 608,236. (No model.)

To all whom it may concern:

Be it known that we, FRANCIS A. BATES and WILLIAM J. GREENHOUGH, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Elevators, of which the following is a specification.

Our invention relates to elevators; and it consists of the improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

More particularly our invention relates to the so-called "controlling devices" for controlling the operation of the hoisting mechanism from the moving car or cage.

It is the object of our invention to provide a controlling device for elevators which shall be certain and quick in its action, easy to operate, not liable to get out of order, and neat and compact in construction and appearance. In carrying out this part of our invention we employ a "standing cable," or one which is anchored at its ends, passing in loops about pulleys carried in horizontally-sliding bearings located on a horizontal portion of the framework outside of the car, by the reciprocal movement of which through suitable hand-operated devices on the car the loops of the cable may be varied and the cable moved to operate the valve or reversing mechanism of the hoisting-engine.

Our invention embraces certain improvements in the devices for shifting the movable pulleys by the hand-operated device on the car, whereby more certain action may be obtained and the mechanism will be more durable.

Our invention also includes certain improvements in the devices for operating the movable pulley or parts which act upon the control-cable, whereby they may be arranged compactly within the car, thus giving more shaft-space for the car, and may be protected from contact and concealed from view.

We shall now refer to the accompanying drawings for the purpose of more particularly describing our invention.

Figure 1 is a vertical side elevation of an elevator embodying our invention. Fig. 2 is a perspective view of the control-cable, show-

ing the loops thereof. Fig. 3 is an inverted plan view of the car, showing a portion of the control mechanism. Fig. 4 is a transverse vertical sectional view of the control mechanism within the car, and Fig. 5 is a vertical sectional view of the same on the line *xx* of Fig. 4.

A is the elevator-cage, which is raised and lowered in the shaft by any suitable hoisting devices. (Not shown.)

B is the valve mechanism, by which the operation of the hoisting apparatus is controlled in the usual manner. We have shown the valve device of a hydraulic engine operated by a pulley *b*, but it is to be understood that our invention may be applied to any form of hoisting apparatus.

C is the control-cable, by which the valve mechanism is operated through the pulley *b*.

D D and D' D' are pairs of pulleys carried in stationary bearings, such as the brackets *d* upon the car A, and are arranged on a horizontal portion of the framework outside of the car, preferably under the platform, as shown.

E E' are pulleys carried in movable bearings arranged adjacent to the pairs of pulleys D D and D' D'. These pulleys E E' are preferably journaled in slide-frames *e*, carried on slides F, carried by brackets *f*. Each pulley-frame *e* is free to slide on its guide F to and from the corresponding fixed pulleys D D and D' D'.

The control-cable C is anchored at its two ends *c* at one end of the elevator-shaft and passes about guide-pulleys G G at the other end of the shaft and forms a loop *c'* about the valve-operating pulley *b*. Each strand of the cable C passes in a loop about one pair of the pulleys D D' and E E'. As shown in the drawings, the cable C is attached at one end to the top of the shaft at *c*, passes down and under one fixed pulley D, then about the movable pulley E, over the other fixed pulley D, and down to one guide-pulley G, whence it passes in a loop *c'* about the pulley *b*. From there it passes up over the fixed pulley D', around the movable pulley E', under the other fixed pulley D', and up to the top of the shaft, where it is fixed at *c*. The cable C thus has

two loops $c^2 c^3$, one about the pulleys D D E and the other about the pulleys D' D' E'.

It is apparent that by the reciprocal movement of the pulleys E and E' the loops $c^2 c^3$ may be relatively shortened and lengthened, thus moving the cable C about the pulley *b* in either direction and operating the valve B or mechanism for controlling the hoisting devices.

We have shown the ends of the cable C attached at the top of the shaft to the usual tension take-up or compensating device H to hold the cable taut and compensate for variations in length due to atmospheric and other causes.

We shall now describe the devices for operating the movable pulleys E E'.

It has been usual to arrange the sprocket-wheel or other power-transmitting connections between the hand wheel or lever in the car and the pulleys or levers which move the control-cable on the outside of the car, but this is objectionable, because it occupies more or less shaft-space, and in cases where the shaft-space is limited necessitates the use of a smaller car, and because it leaves these parts exposed to injury or disarrangement. We arrange these devices entirely within the car, and inclose them within a casing which hides them from contact. By arranging the pulleys which operate the cable outside of the framework and locating the power-transmitting connections between them and the hand-lever within the car all of these operative parts are hidden from view and are well protected. The inclosing casing may be easily removed to permit access to the power-transmitting connections for the purpose of cleaning or making repairs or adjustments.

I I are two guide-pulleys in fixed bearings in line with the movable pulleys E E'.

J is a pulley, preferably in the form of a chain-wheel, carried by the car and operated by a suitable lever or handle.

K is a chain passing about the chain-wheel J and down about the guide-pulleys I I and having each end attached directly to one of the movable frames *e*.

It is apparent that when the chain-wheel J is turned and the chain moved the frames *e e* will be moved reciprocally upon the slides F and that the pulleys E E' will be moved to and from the fixed pulleys D and D', thus lengthening one of the loops $c^2 c^3$ of the cable and shortening the other, so that the movement of the pulley *b* will be effected.

L is a gear-wheel connected with the chain-wheel J.

M is a pinion engaging the gear-wheel L and mounted on a stud *m*, which carries the hand wheel or lever N. The chain-wheel J is operated from the hand wheel or lever N through the pinion M and gear-wheel L.

O is an upright hollow casing within the car in which the pinion M, gear-wheel L, and its chain-wheel L are journaled and within which the chain K, which passes down through openings in the framework, is contained.

A great advantage of using a pinion on the shaft of the hand-wheel operating a gear-wheel connected with the chain-wheel, instead of mounting the hand-wheel directly on the shaft of the chain-wheel, is that slower and more gradual movements will be imparted to the chain-wheel and controlling devices, and the sudden jarring movement of the control devices will be avoided. The car will not be jarred in stopping or starting.

The details of construction shown may be varied without departing from our invention.

What we claim as new, and desire to secure by Letters Patent, is as follows:

1. In an elevator, the combination of the car, a standing control-cable, fixed pulleys on the car about which the cable passes, pulleys about which the control-cable passes in loops located on the car on horizontally-movable bearings, a hand-operated device on the car, and power-transmitting connections between the hand-operated device and the movable bearings, whereby the said bearings may be moved horizontally to move the pulleys carried by them and operate the control-cable.

2. In an elevator, the combination of the car, the control-cable, devices located on a horizontal portion of the framework outside of the car for moving the control-cable, a hand-operated device within the car, power-transmitting connections between the hand-operated device and the devices located outside of the car for moving the control-cable, located within the car, and an inclosing case O covering said power-transmitting connections.

3. In an elevator the combination of the car, the control-cable, devices located on a horizontal portion of the framework outside of the car for moving the control-cable, a hollow casing O located within the car, a hand-operated device carried by the casing O, and power-transmitting connections between the hand-operated device and the devices located outside of the car, contained within the casing O and extending through the framework of the car.

4. In an elevator, the combination of the car, the control-cable, devices located on a horizontal portion of the framework outside of the car for moving the control-cable, a hollow casing O located within the car, a gear-wheel journaled within the casing O, a chain-wheel carried by the gear-wheel, a chain contained within the casing, passing about the chain-wheel extending through a horizontal portion of the framework of the car and connected directly with the devices on the outside thereof for moving the control-cable, a hand-operated device journaled in the casing O and a pinion within the casing carried by the hand-operating device and engaging the gear-wheel.

5. In an elevator, the combination of the car, the control-cable, pulleys D, D', carried by the car in stationary bearings about which the control-cable passes, horizontal guides F,

F, on the car, slide-frames *e, e*, carried by the guides F, F, pulleys E, E', carried by the slide-frames *e, e*, about which the cable passes in loops, a hand-operated device within the car and power-transmitting connections between the hand-operated device and the slides *e, e*, whereby the slides *e, e*, and their pulleys E, E', may be moved to effect the movement of the control-cable.

10 6. In an elevator, the combination of the car, the control-cable, pulleys D, D', carried by the car in stationary bearings about which the control-cable passes, horizontal guides F, F, on the car, slide-frames *e, e*, carried by
15 the guides F, F, pulleys E, E', carried by the

slide-frames *e, e*, about which the cable passes in loops, guides I, I, on the car, the chain-wheel J carried by the car, the chain K passing about the chain-wheel J and guides I, I, and connected directly with the slide-frames *e, e*, and means on the car for turning the chain-wheel J.

In testimony of which invention we have hereunto set our hands.

FRANCIS A. BATES.

WILLIAM J. GREENHOUGH.

Witnesses:

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