(No Model.) 2 Sheets—Sheet 1.

N. BECKWITH.

ELEVATOR.

No. 372,107. Patented Oct. 25, 1887.

Fig. 1.

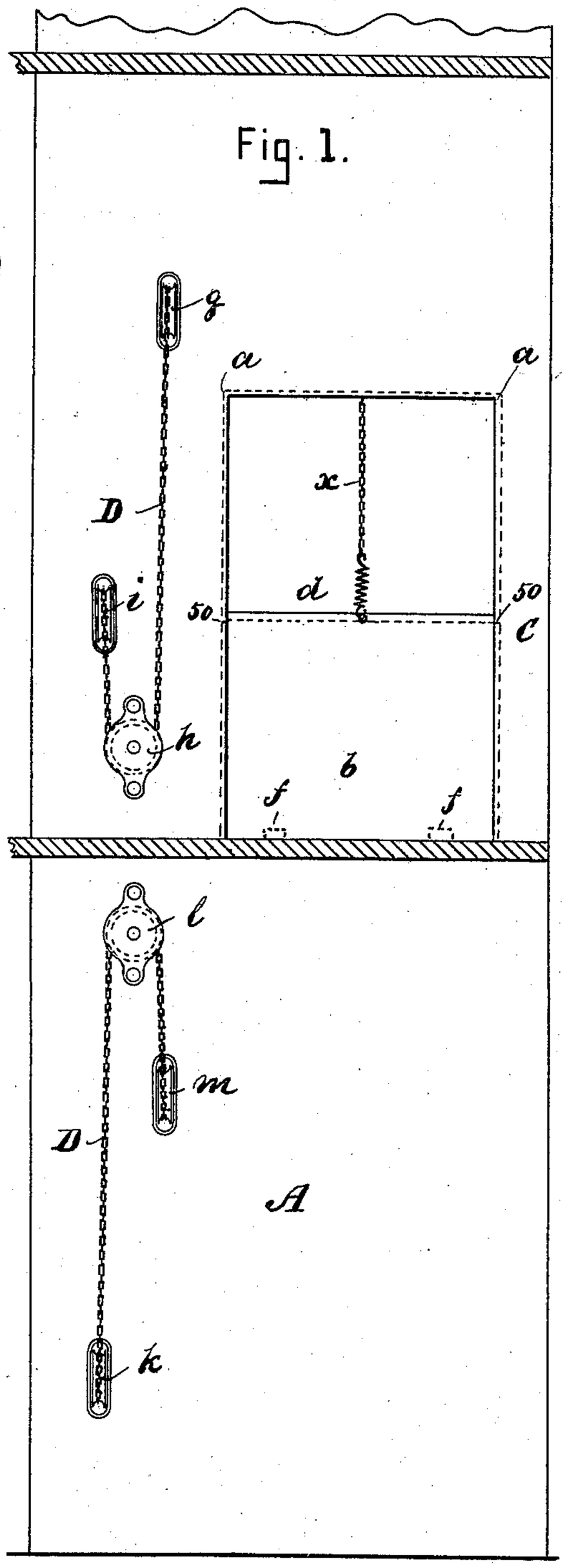
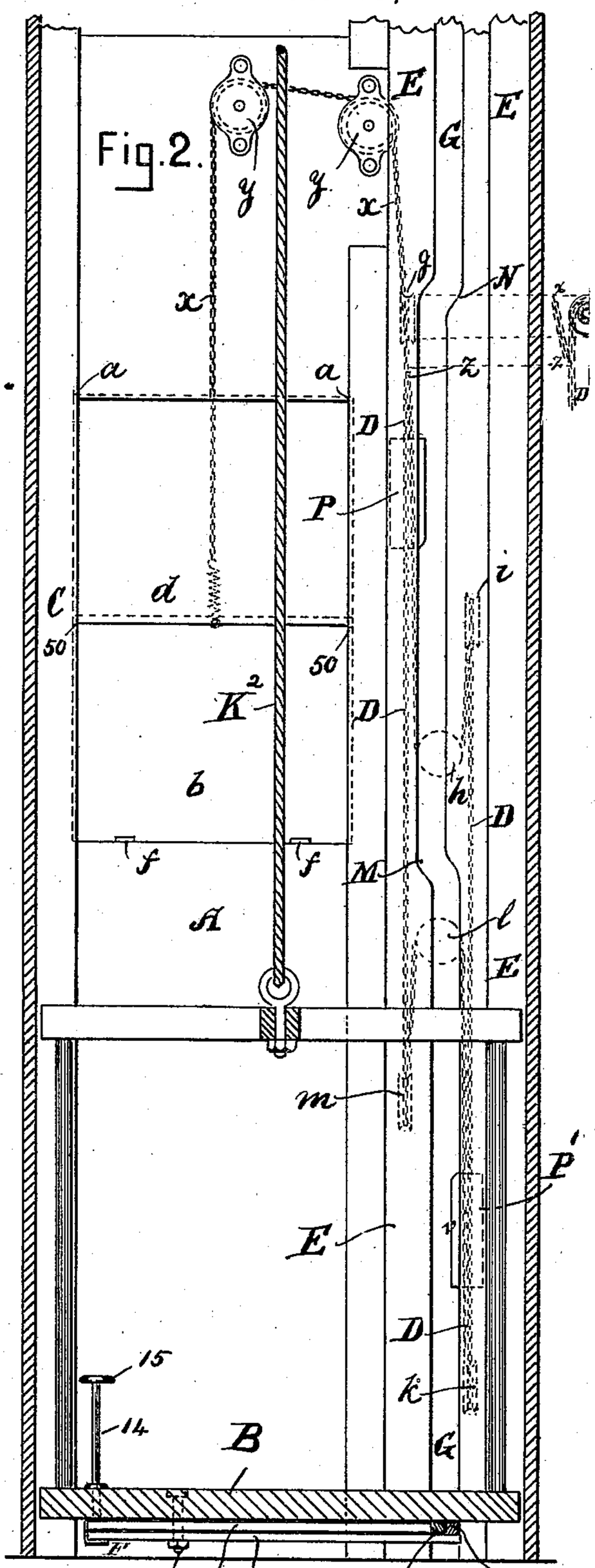


Fig. 2.



Witnesses.
E. Blanta
E. L. Sawyer.

Inventor.
Nelson Beckwith,
Per C. C. Shaw & Co.,
Attorney.

(No Model.)

2 Sheets—Sheet 2.

N. BECKWITH.

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Fig. 3.

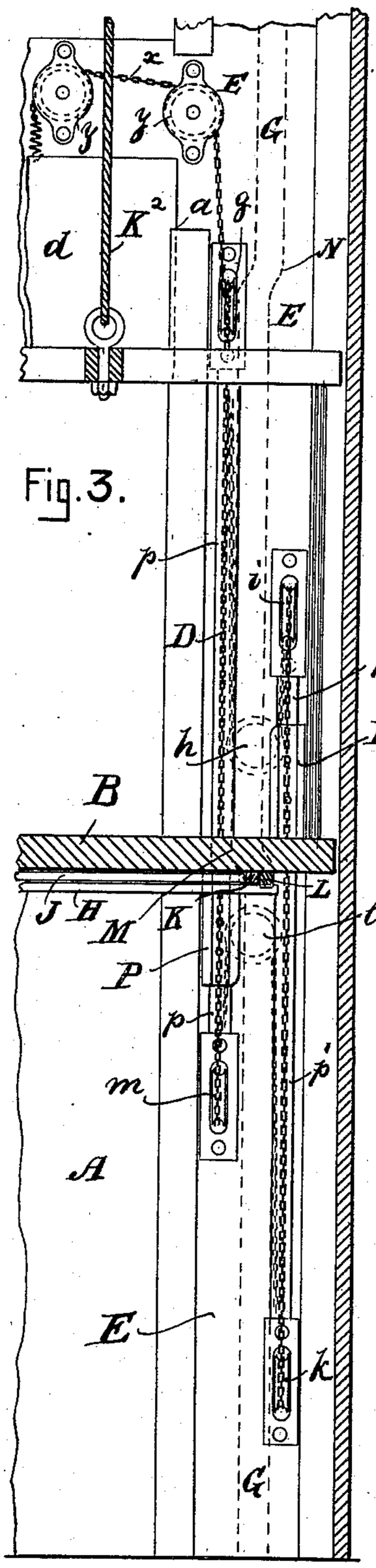


Fig. 8.

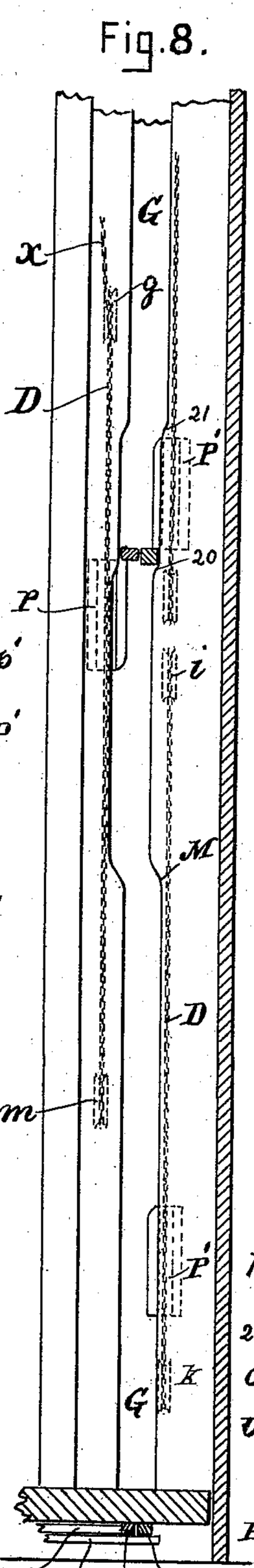


Fig. 4.

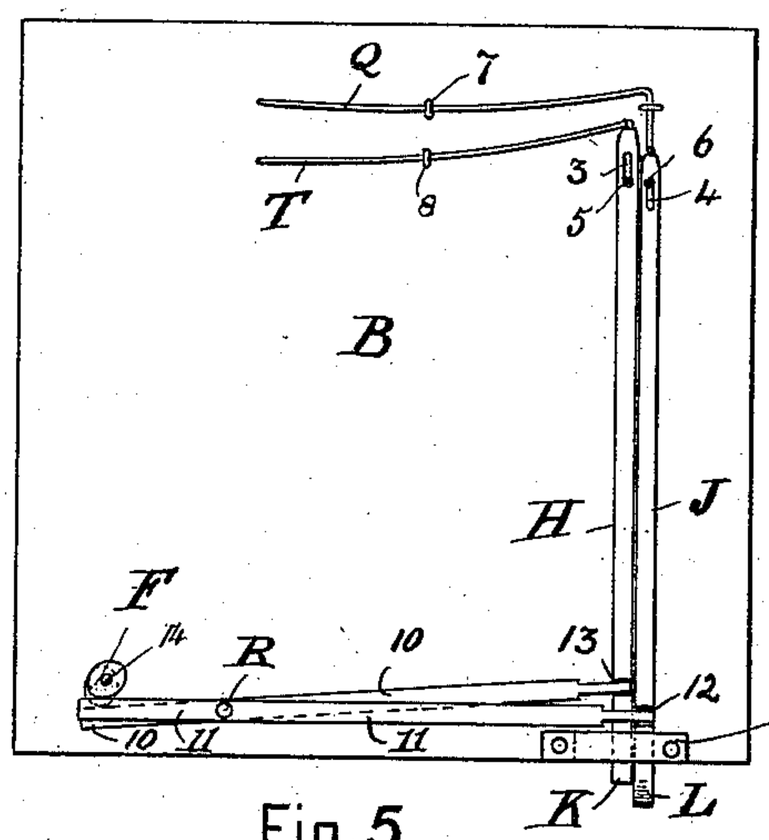


Fig. 5.

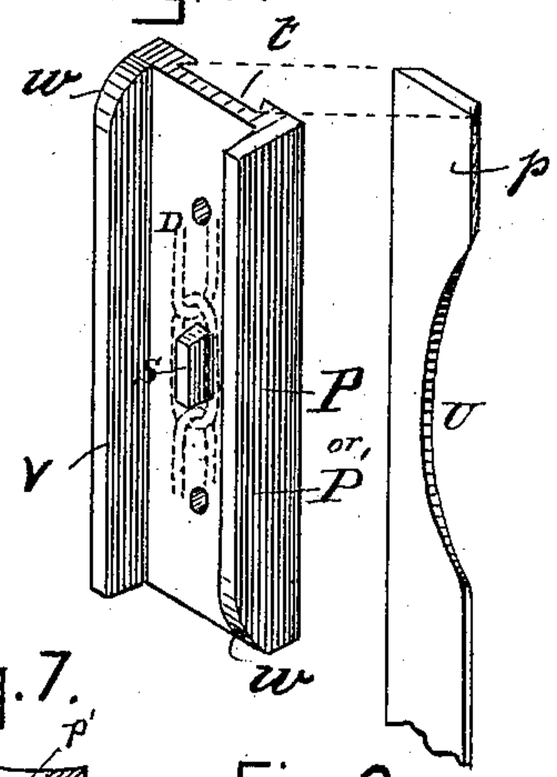


Fig. 7.

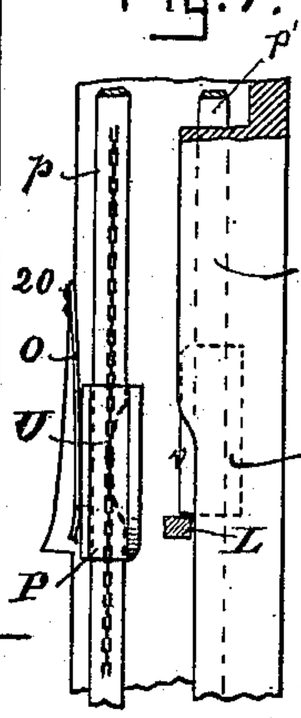
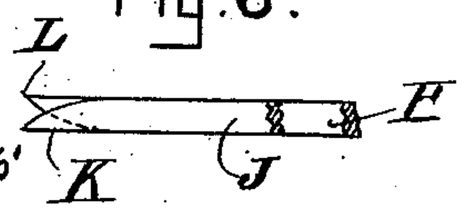


Fig. 6.



Witnesses.
E. Bianta.
C. L. Sawyer.

Inventor.
Nelson Beckwith,
Per C. C. Shaw & Co.
Attorney.

UNITED STATES PATENT OFFICE.

NELSON BECKWITH, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CAPITOLA PILLSBURY BECKWITH, OF SAME PLACE.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 372,107, dated October 25, 1887.

Application filed November 15, 1886. Serial No. 218,926. (No model.)

To all whom it may concern:

Be it known that I, NELSON BECKWITH, of Cambridge, in the county of Middlesex, State of Massachusetts, have invented a certain new and useful Improvement in Elevators, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a front elevation of the well, the gates being represented as closed; Fig. 2, a rear elevation of the same and of the switch-board, some of the parts being shown in vertical section, and the carriage being represented as lowered; Fig. 3, a like view showing the carriage raised, the gates open, and the switch-board removed; Fig. 4, a bottom plan view of the carriage; Fig. 5, an enlarged perspective view of a chain plate or block; Fig. 6, an enlarged side elevation showing the ends of the bolts; Fig. 7, a diagram showing the track for the chain plates or blocks, and Fig. 8 a diagram showing the switch-board as constructed when the stories of the building are unequal in height.

Like letters of reference indicate corresponding parts in the different figures of the drawings.

My invention relates more especially to that class of elevators which are provided with apparatus for automatically opening and closing the gates of the elevator-well; and it consists in a novel construction and arrangement of parts, as hereinafter more fully set forth and claimed, the object being to produce a simpler, cheaper, and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation:

In the drawings, A represents the front side of the elevator-well, B the carriage, and C the gates. The carriage is disposed in the elevator-well in the usual manner, and is of the ordinary form and construction excepting as hereinafter described. The gates or doors C are preferably made to slide vertically in grooves or ways *a*, and consist of one or more sections or leaves, *b d*, the number of sections varying according to the height of the room.

At the bottom of the lower section, *b*, are disposed laterally-projecting flanges *f*, adapted to engage and raise the upper section, *d*, when the apparatus is in use. One end of a chain, *x*, is secured centrally to the top of the section *b*, the other end being passed over pulleys *y y* (see Fig. 2) on the inner side of the front wall of the well A above the gates and is secured at *z* to an endless chain, D, as shown by supplemental sketch on the right side of Fig. 2. The endless chain passes over a pulley, *g*, disposed in the side of the well A at right angles thereto and a short distance to the right of said gate, (see Fig. 2) thence downward over a pulley, *h*, (see Fig. 1,) disposed on the outer side of the front wall of the well opposite section *b* of the gate; thence upward over a pulley, *i*, disposed in said front wall and at right angles thereto; thence downward again on the inner side of said wall over a pulley, *k*, disposed near the bottom of the well beneath the pulley *i;* thence upwardly again on the outer side of the well and over a pulley, *l*, (see Fig. 1,) immediately beneath the pulley *h;* thence downwardly over a pulley, *m*, beneath the pulley *g;* and thence upward again on the inner side of the wall to the pulley *g* at the point of beginning.

Vertically-arranged dovetail ways or tracks *p p'* (see Figs. 3 and 7) are respectively secured to the inner side of the front wall of the well between the pulleys *g* and *m* and *i* and *k*, and on these tracks are disposed traveling blocks or plates P P', (see Fig. 5,) provided on one side with a vertical dovetail groove, *t*, adapted to receive said tracks, and on the opposite side with vertical flanges *v*, the lower end of one and the upper end of the other of said flanges being beveled, as shown at *w w*. A short lug, S, projects centrally from the body of said block between the flanges *v*, adapted to be inserted in a link of the endless chain D, which is secured to said block thereby. The track *p* is cut out on one edge to form the depression U, (see Figs. 5 and 7,) the track *p'* being provided with a corresponding depression at the switch for the story above. (Not

shown.) A flat metallic spring, O, is secured at 20 to the casing, its free end extending into the path of the block P, thereby preventing said block from accidentally falling into the depression U, a like spring (not shown) being provided for the corresponding depression in the track *p'*. A switch board, E, is secured to the front wall of the well A, which also forms a casing for the blocks P P' and chains D. A vertically-arranged groove, G, is formed in the board E, the blocks P P' projecting laterally into the same, as shown in Fig. 2, the lower corner of the block P on the left and the upper corner of the block P' on the right of the groove being beveled at *w*, as above described. The course of the groove G is turned or diverged to the left to form the offsets or cams M N, the object of which is hereinafter specified.

Disposed on the bottom of the carriage B and fitted to work in the clasp 45 and on screws 5 and 6 there are two bolts, H J, having slots 3 and 4, which permit lateral movement of the bolts on the screws, the ends K L of said bolts being adapted to run in the groove G of the switch-board E, the end L being beveled on its under side and the end K on its upper side, as shown in Fig. 6, said bolts being provided with springs T Q, supported in eyes 7 and 8, which act to force them outwardly into the groove G.

Pivoted at R on the bottom of the carriage B there are two levers, 10 and 11, the end of the long arm of the lever 11 working in a lateral slot, 12, in the bolt J, and the end of the long arm of the lever 10 in a corresponding slot, 13, in the bolt H. A double cam, F, so situated as to engage the short arms of said levers, is mounted on a shaft, 14, (see Figs. 2 and 4,) which passes through the bottom of the carriage B, and is provided with a wheel, 15, (see Fig. 2,) on its upper end, by which the cam is manipulated.

In the use of my improvement the carriage B, being at the bottom of the elevator-well, as shown in Fig. 2, if it is desired to open the gates as each floor is reached the operator, by means of the wheel 15, turns the cam F until the ends K L of the bolts H J are forced into the groove G in the switch-board E, the distance the wheel 15 is to be turned being indicated by a suitably-marked dial or index (not shown) in connection with said wheel. If the bolts are in the position shown in Fig. 4, the wheel should be turned one-quarter part of its circumference to the left, thus releasing the short arm of the lever 10 and permitting the spring T to throw the bolt H forward, so that the end K of said bolt will enter the groove G. The carriage is then started in the usual manner, and when the bolts H J reach the block P' the end L of the bolt J will engage the lower end of the flange *v* on said block, causing it to travel upward on the track *p'*, (see Figs. 2 and 3,) and draw the chain D up from the pulley *k*, down from pulley *l*, up from pulley *m*, and down from pulley *g*, the block P at the same time being caused to travel downward on its track *p* and draw the chain *x* down over the pulleys *y y*, thereby lifting section *b* of the gates C, to which said chain is attached, said gate being raised at the same speed the carriage B travels. When the bolts H J reach the switch or left-hand cam M in the groove G, they are thrown to the left, the slots 12 and 13 in said bolts permitting sufficient play to the levers 10 and 11 for this purpose, thereby disengaging the block P' and bolt J, the bolt H at the same time engaging the upper end of the block P on the left of the groove and preventing it from being drawn upward by the weight of the gate C. (See Fig. 3.) As it may happen that when the bolts H J are thrown over by the cam M they will strike the side of the block P, the depression U (see Figs. 5 and 7) is provided to permit said block to be moved laterally until it shall have descended sufficiently for the bolt H to pass onto it, thus preventing the bolts from being broken or disarranged. The spring O forces the block back into its normal position after the bolts have passed, and also prevents the blocks from falling into the depression U when the bolts are not in the groove G. The blocks P P' are so disposed on the chain D and the chain *x* constructed of such length that when the carriage reaches the cam M, as described, and is stopped in the usual manner, the gates C are open and held in that position by the bolt H, retaining the block P while the carriage is at rest. When the carriage is started for the floor above, the gates C fall of their own weight, drawing the chain *x* down over the pulleys *y y* and pulling up the chain D, attached to the block P, the rapidity with which the gates fall obviously being regulated by the speed with which the elevator permits the block P to ascend. When the ends K and L of the bolts H J reach the cam N in the groove G, the block P is released and stops, the gates being closed and said bolts thrown into the position they occupied when starting at the bottom of the well, or into position to engage another block, P', in the groove G for the next floor above, it being understood that the elevator at each floor or story is provided with a like system of chains and blocks for operating the gates. If it is desired to pass either of the floors without opening the gates, the operator turns the wheel 15 one-quarter part of its circumference to the right, thereby forcing the short arm of the lever 11 out and withdrawing the end L of the bolt J from the groove G, so that it will not engage the block P', connected with the chain for operating the gates of said floor. In the downward course of the carriage the gates are operated in substantially the same manner as described, the bolt H engaging the blocks P on the top and forcing them down, thereby causing the chains to move in the same directions they were moved by the bolt J engaging the blocks P' on the upward course of the carriage.

The object of beveling the end of the bolt

H on its upper side and of the bolt J on its lower side, as shown in Fig. 6, and the corresponding ends of the flanges *v* on the blocks P P′, as described, is to enable the bolt H to pass over the descending block P during the upward course of the carriage and the bolt J to pass over the ascending block P′ during the downward course of the carriage without engaging said blocks until they are passed.

In the modification shown in Fig. 8 two cams, 20 and 21, are employed, each of which is one-half the size of the cam N, the object being to keep the top of the block P as the carriage rises engaged with the bolt H and still enable the bolt J to engage a block, P′, to operate the gate for the story above, to which the carriage is approaching, the double cams 20 and 21 being necessary only when said story is lower than the story which the carriage has passed; otherwise the block P on the left, being abandoned too soon by the bolt H, the gates to which said block is attached would fall without restraint.

The vertical distance between the cams 20 and 21 is of course regulated by the difference in the heights of the stories.

It will be obvious that the cams 20 and 21, being but half the size of the cam N, will not move the bolt H laterally far enough as the carriage rises to disengage it from the top of the block P, but that as the carriage continues on its upward course when said bolt reaches the cam 21 it will be again moved laterally in the same direction and disengaged from said block, the gate in the meantime on the floor below having fallen or closed.

It will also be obvious that when the carriage descends the cams 20 and 21 will operate the bolt J in connection with the block P′ in substantially the same manner as the bolt H is operated in connection with the block P on the upward course of the carriage.

It will be understood that the cams 20 and 21 are to be used only when the stories differ in height, as above described; also, that the different sections of the gates C run, respectively, each in its own groove *a*, the upper section, *d*, being provided with stops 50, to prevent said section from being lowered too far.

The carriage B is suspended in the well by a rope, K^2, and, as it may be raised and lowered by any well-known means for that purpose, it is not deemed essential to describe the same in order to illustrate my invention.

Having thus explained my invention, what I claim is—

1. In an elevator of the character described, the combination of the following instrumentalities: a well, a carriage adapted to traverse vertically therein, a door adapted to slide vertically and close the entrance to the carriage, a switch-board provided with a vertically-arranged cam-groove, six pulleys journaled on or in the well near said groove, an endless chain passing around said pulleys, a chain passing over or around a pulley or pulleys journaled on or in said well and having one of its ends secured to said door and the other to said endless chain, two blocks secured to said endless chain and respectively projecting into said groove from the opposite sides thereof, and two bolts or bars adapted to project into said groove and engage said blocks, substantially as described.

2. In an elevator, the pivoted levers 10 and 11, in combination with the bolts H J, springs T Q, cam F, shaft 14, wheel 15, carriage B, chain D, and blocks P P′, substantially as set forth.

3. In an elevator, the leaf *b*, provided with the flanges *f*, in combination with the leaf *d*, chain *x*, and mechanism for raising and lowering said leaves, substantially as described.

4. In an elevator, the block P, secured to the chain D and having the oppositely-inclined ends *w w*, in combination with the endless chain D, carriage B, and bolts H J, having the chamfered or inclined ends L K, and springs T Q, substantially as set forth.

5. In an elevator, the blocks P P′, respectively provided with the oppositely-inclined ends *w w*, projections S, and grooves *t*, in combination with the tracks or ways *p p′*, chain D, carriage B, and bolts H J, having the chamfered or inclined ends L K, and springs T Q, substantially as described.

6. In an elevator, the switch-board E, provided with the cams M and 20 and 21, the cams 20 and 21 having, respectively, half the rise of the cam M, and being arranged with respect to each other, substantially as set forth.

7. In an elevator, the switch-board E, provided with the groove G and cams M N, in combination with the chain D, provided with the blocks P P′, pulleys *m g k l h i*, chain *x*, pulleys *y*, door C, carriage B, and bolts H J, substantially as described.

8. In an elevator, a door consisting of two or more leaves adapted to engage each other successively and slide one over another as the lower one is raised, in combination with a well, a carriage and mechanism for automatically opening and closing the door as the carriage traverses the well, substantially as set forth.

9. In an elevator, the switch-board E, having the cam-groove G, and provided with the depressions U, substantially as and for the purpose set forth.

10. In an elevator, the switch-board E, having the groove G, spring O, and depression U, in combination with the chain D, blocks P P′, and pulleys for said chain, substantially as described.

NELSON BECKWITH.

Witnesses:
O. M. SHAW,
E. L. SAWYER.