(No Model.) 2 Sheets—Sheet 1.

F. S. BRAID.

ELEVATOR.

No. 547,765. Patented Oct. 15, 1895.

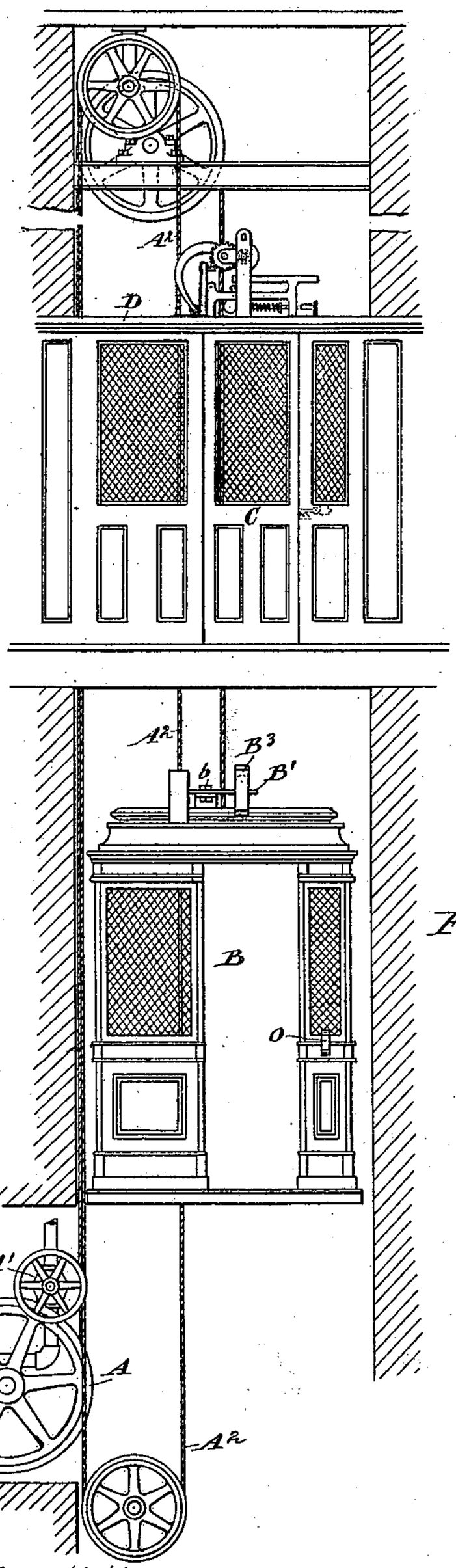


Fig: 1.

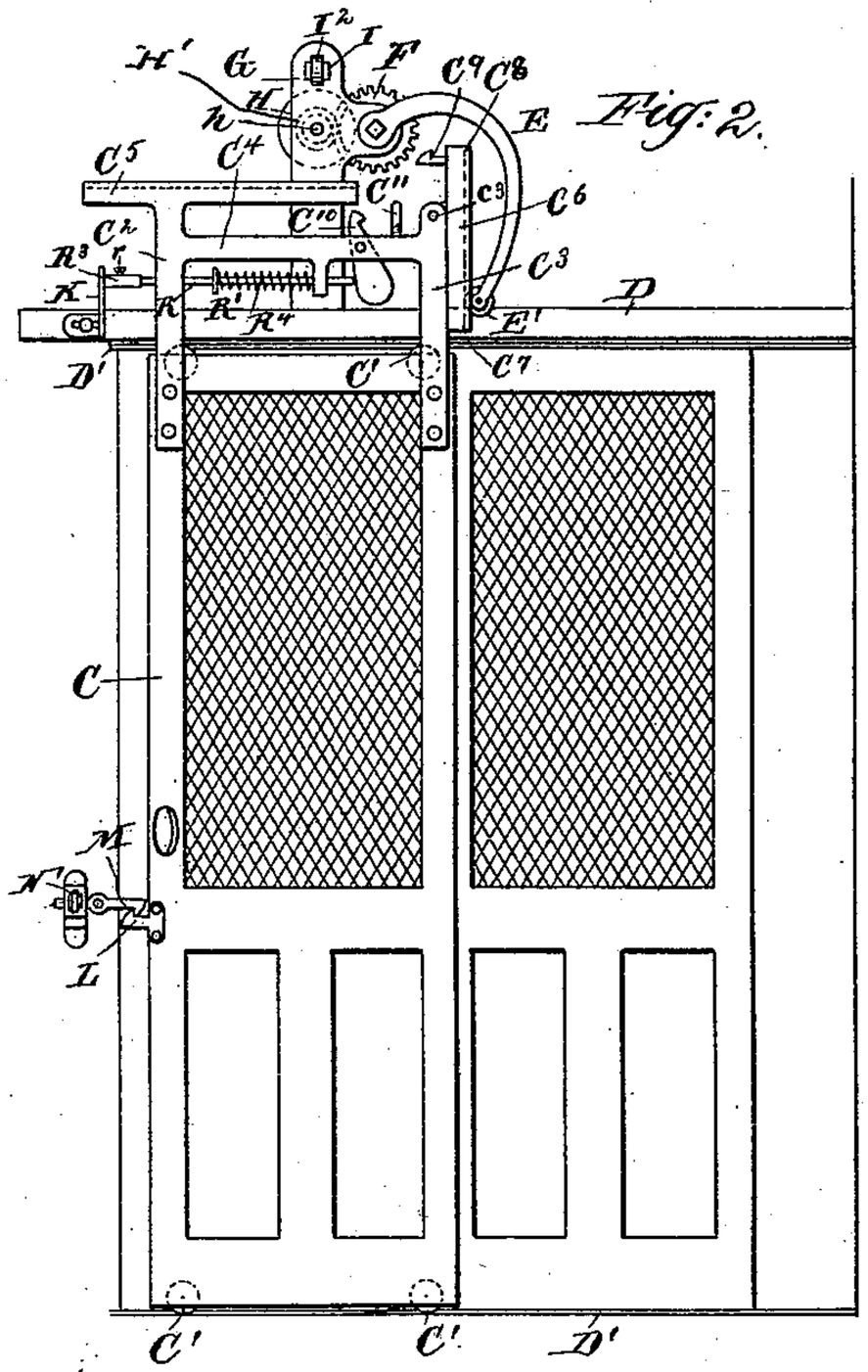


Fig: 2.

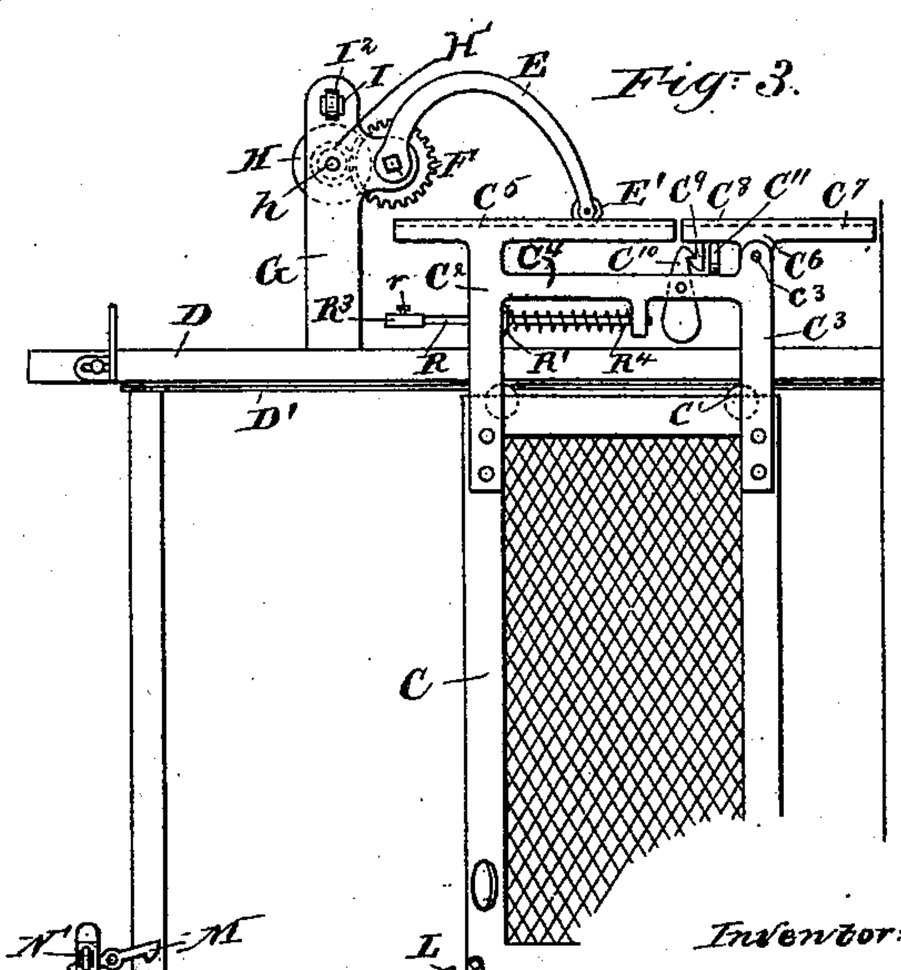


Fig: 3.

Witnesses:
Chas. E. Searle
Patrick McInerney

Inventor:
Fountain S. Braid,
by his attorney,
Charles R. Searle.

(No Model.) 2 Sheets—Sheet 2.

F. S. BRAID.

ELEVATOR.

No. 547,765. Patented Oct. 15, 1895.

Fig: 4.

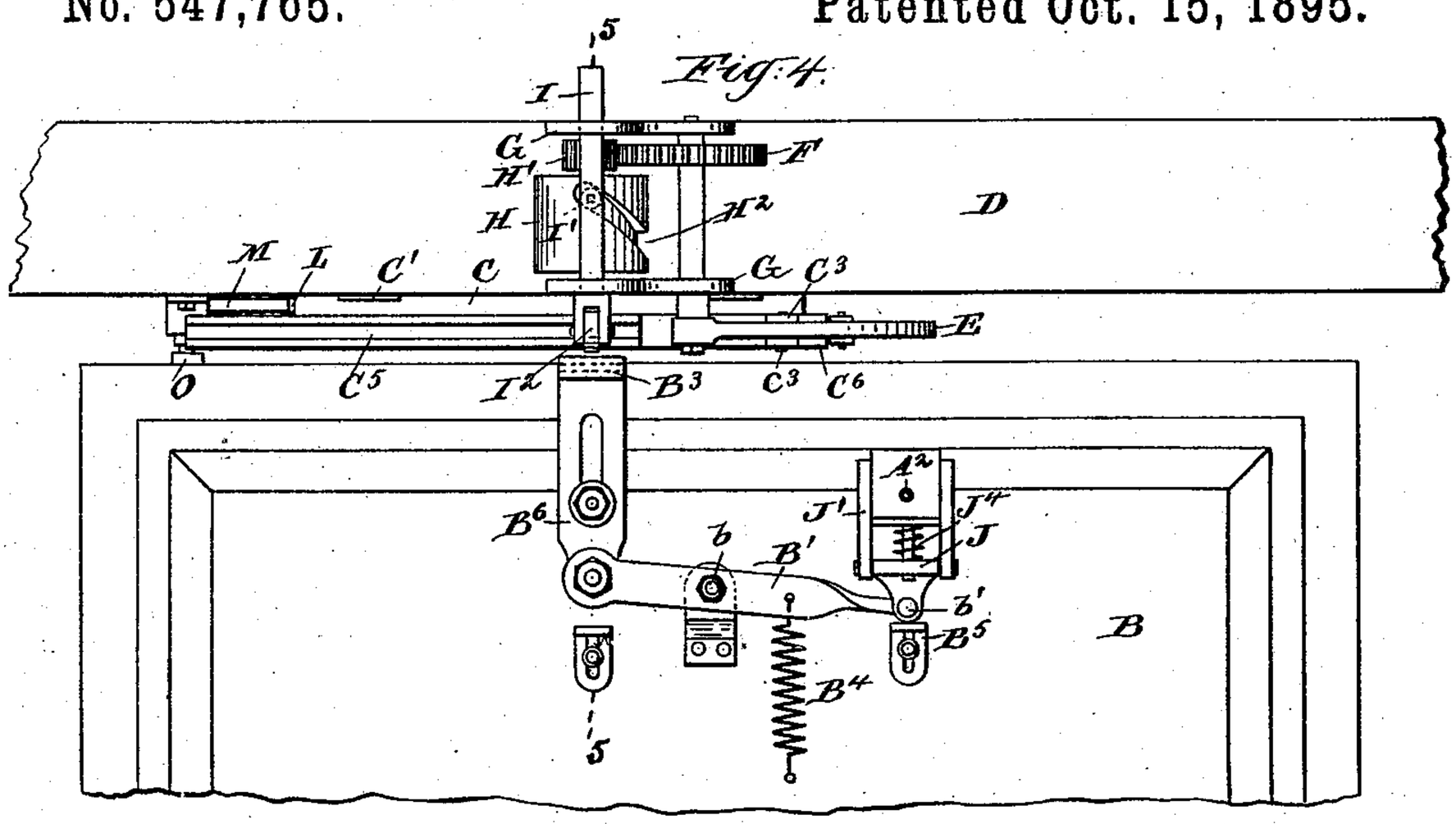
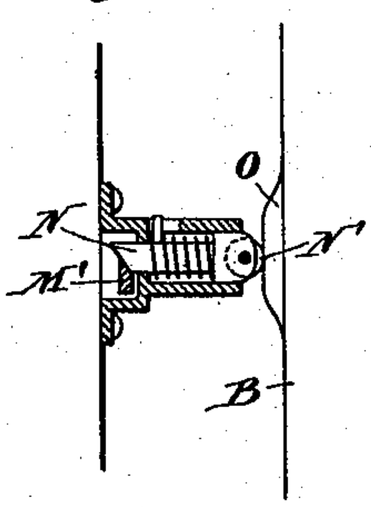


Fig: 9.



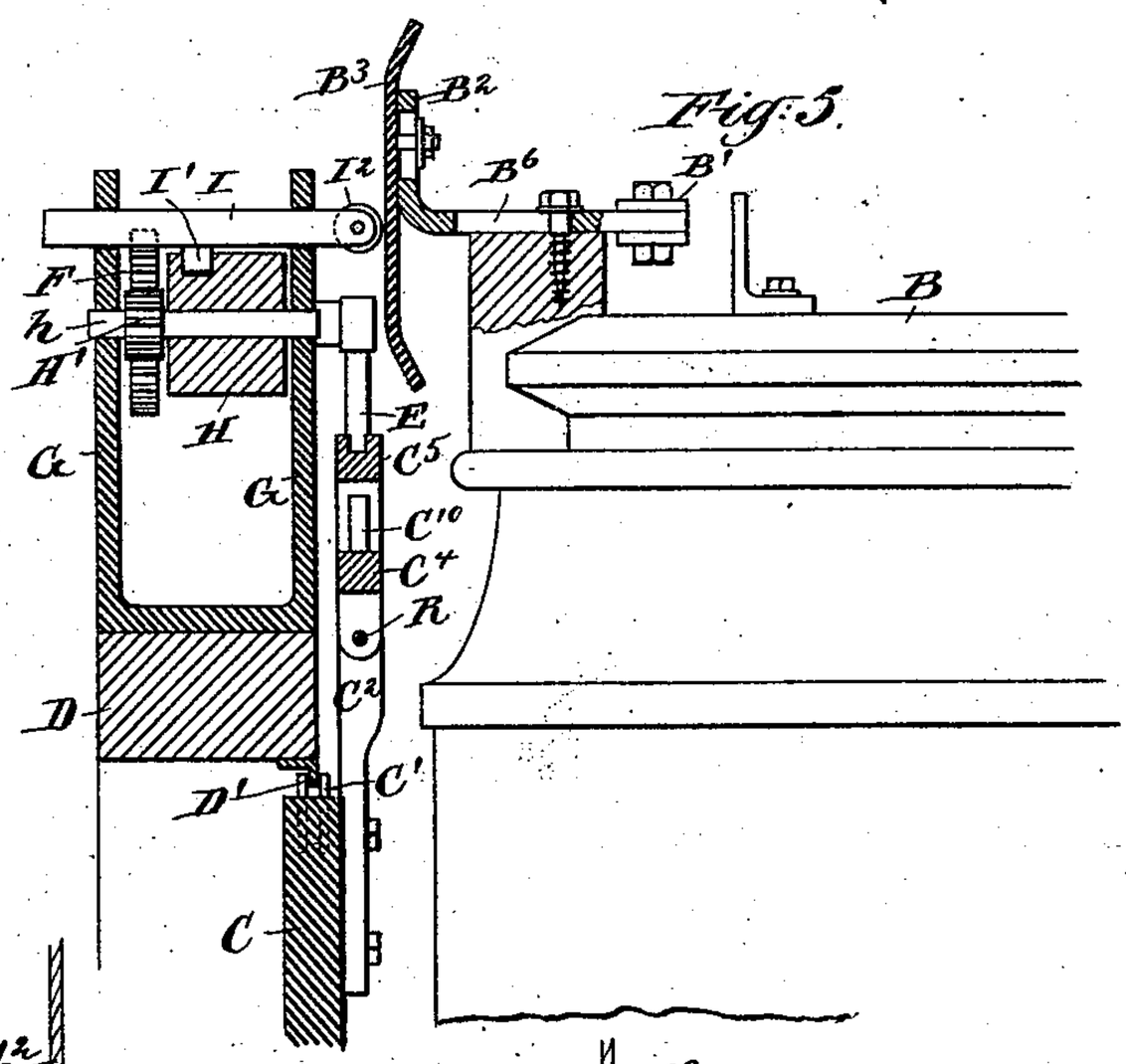


Fig: 5.

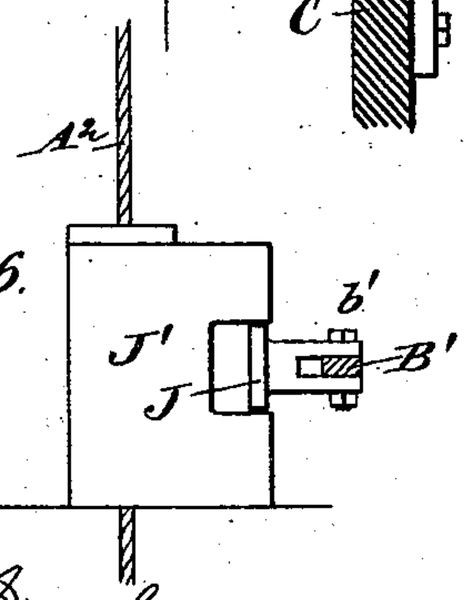


Fig: 6.

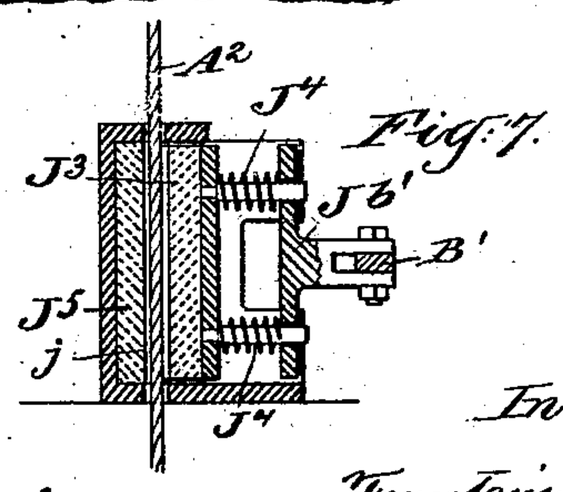


Fig: 7.

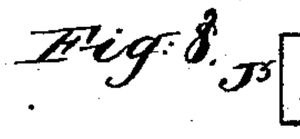


Fig: 8.

Witnesses:
Charles C. Deacle
Patrick McInerney

Inventor:
Fountain S. Braid,
by his attorney.
Charles R. Searle.

UNITED STATES PATENT OFFICE.

FOUNTAIN S. BRAID, OF BROOKLYN, NEW YORK.

ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 547,765, dated October 15, 1895.

Application filed January 7, 1895. Serial No. 534,007. (No model.)

To all whom it may concern:

Be it known that I, FOUNTAIN S. BRAID, a citizen of the United States, residing in Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Elevators, of which the following is a specification.

The accidents of most frequent occurence in the use of elevators are due to starting the elevator-car before closing the elevator-shaft door.

The object of my invention is to automatically hold the hoisting mechanism in a locked condition while the shaft-door is open, obliging the attendant to close the door and thus release the hoisting mechanism before he can start the car in either direction, and also to prevent the opening of such door before the elevator-platform is nearly or quite on the same level as the landing.

I have practically carried out the invention by employing a lever operated by the motion of the door to turn a drum carrying a cam-groove, in which is engaged one end of a slide. These parts are mounted on the door-casing or other fixed framing. The opposite end projects slightly into the elevator-shaft, and when the drum is turned moves inward and strikes the upturned end of a lever mounted on the car. The motion thus transmitted is communicated to a clamp, which grips the rope controlling the hoisting mechanism and holds it reliably until the door is closed and the rope released. A lock is provided which secures the door in the closed condition until the car-platform is about flush with the landing, when it is automatically released by a projection on the car striking one end of a slide, which disengages the catch.

The advantages of the invention are obvious, but may be briefly stated as follows: The shaft-door cannot be opened until it is released by the arrival of the car at the landing. The act of opening the door locks the hoisting mechanism against moving in either direction. The door must be closed before the car can be again started. The mechanism is entirely automatic and requires no more labor or skill to operate than is usually employed in opening and closing the ordinary elevator-doors. Thus equipped, elevator accidents in which the person is crushed between the car and the landing, caused by attempting to board the car while it is in motion and the door still open, will be entirely avoided.

The accompanying drawings form a part of this specification and represent the means I have employed in carrying out the invention.

Figure 1 is an elevation, partly in vertical section. Fig. 2 is an elevation showing the door and the connected mechanism in the closed condition as seen from the interior of the elevator-shaft. Fig. 3 is a similar view showing the open condition. Figs. 2 and 3 are on a larger scale than Fig. 1. The remaining figures are on a still larger scale. Fig. 4 is a plan view showing the door mechanism and a portion of the elevator-car with the connections carried thereon. Fig. 5 is a vertical section on the line 5 5 in Fig. 4. Fig. 6 is an elevation of the clamp. Fig. 7 is a vertical section of the same. Fig. 8 is plan view of the clamping-blocks detached, and Fig. 9 is a vertical section of a portion.

Similar letters of reference indicate the same parts in all the figures.

A is the hoisting-drum, A′ a valve controlling the engine or other motor, and A^2 is the controlling-rope extending the whole height of the elevator-shaft, running over suitable pulleys and through the car B, operating the valve when pulled upon in one direction or the other by the attendant on the car. All these parts may be of any ordinary or suitable construction.

The mechanism operated by the door on each landing is the same for each, and a description of one will suffice.

C is the door mounted on grooved rollers C′ C′, arranged to slide horizontally on ways D′ D′, fixed to the floor and to the framework D above.

C^2 C^3 are uprights connected by a crosspiece C^4, the whole forming a light framework of metal secured to the inside of the door at the top and extending upward. The upright C^2 has fixed at its upper end a grooved track C^5, extending laterally in both directions in the plane of the door and forms with a hinged portion C^6 a continuous way for a roller E′, mounted on the end of a lever E, to be presently described. The portion C^6 of the track is T-shaped, the lateral arms being of unequal length. It is mounted on a cen-

ter c^3, carried in the upper end of the upright C^3, and by reason of the excess of length and weight in the arm C^7 it tends to stand vertically against the upright. The arm C^8 is provided on the under side with a downwardly-projecting hook C^9, which engages a correspondingly-hooked dog C^{10}, pivoted on the cross-piece C^4, when the arms C^7 and C^8 are in the horizontal position and in line with the part C^5 of the track.

C^{11} is an adjustable stop set in the cross-piece C^4 to prevent the part C^6 turning past the horizontal position.

E is a lever, curved as shown, carrying a roller E′ at one end, traveling in the groove on the track C^6. The other end is fast to the shaft of a spur gear-wheel F, mounted in a frame G, fixed on a horizontal portion of the door-frame above the door. The gear-wheel F meshes into the pinion H′, fixed on a shaft *h*, which also carries a small drum H, having a quick spiral cam-groove H^2. A slide I, mounted above and guided in the framing G, lies parallel with the shaft and is provided with a downwardly-projecting pin I′, engaged in the groove H^2. The slide carries a vertically-mounted roller I^2, projecting inward toward the interior of the elevator-shaft, but not so far as to be struck by any portion of the elevator-car in its upward and downward movements past the door mechanism so long as the door is closed.

On the top of the elevator-car B, near the front, is mounted a horizontally-turning lever B′, pivoted at a point *b* near its mid-length. One end is attached to a sliding piece B^6, carrying an upright arm B^2, on which is adjustably secured a plate B^3, the path of which as the elevator-car moves up and down is in line with and nearly touches the roller I^2 on the projecting end of the slide I. The other end of the lever B′ is knuckled at *b*′ to a slide J, inclosed in a casing J′, secured to the roof of the car, and also inclosing the starting-rope A^2. The slide J carries a vertical block J^3, of lignum-vitæ or other suitable material, matching against a similar block J^5, fixed in the casing J′, the two forming a clamp to grip the rope A^2 when the lever B′ is turned. The blocks are each provided with a groove *j*, which guides the rope and keeps it in place between the blocks.

J^4 J^4 are springs set between the blocks J^3 and the slide J′ to take up any excess of motion given to the lever B′ and avoid the danger of breaking.

B^4 is a spring attached to the lever B′, tending to keep the clamp open, and B^5 is an adjustable stop which limits the normal space between the blocks.

L is a hooked catch mounted on the side of the door, and engaging under the correspondingly hooked end of a tilting latch M on the door-frame, locking the door when the latter is closed. The arm M′ of the latch is beveled, and lies against the beveled under face of a spring-slide N, which carries a roller N′ struck by a cam-surface O on the front of the car at each passage of the latter. The cam-surface O is of such length and so placed on the car that the slide N will be struck and the door unlocked when the car-platform is a few inches above or below the level of the landing, and will continue in that condition until the cam-surface has passed out of contact with the slide.

The unlocking just described does not open the door, but so conditions it that it may be opened upon releasing the ordinary door-catch as usual.

R is a rod mounted in guide-holes, drilled one through the upright C^2 and the other in an arm from the cross-piece C^4, forming an abutment for a helical spring R^4, acting against a collar R′ on the rod to urge it away from the depending weighted end of the dog C^{10}.

R^3 is a sleeve mounted on the rod and secured adjustably by a set-screw *r*. When the door is open the rod is forced back by the spring, allowing the dog to hang vertically and engage the hook C^7 on the track C^6, and hold the latter in the horizontal position until the door is nearly or quite closed. Then the sleeve R^3 on the end of the rod R comes in contact with an adjustable stop K on the door-framing, and the further movement of the door to engage the catch L pushes the rod forward against the weighted lower end of the dog C^{10}, turning it sufficiently to release the hook C^9 and allow the track C^6 to turn by gravity into the vertical position.

The projecting cam-surface O joins the adjacent surface of the car front by an easy curve at each end, so that it strikes and leaves the roller N′ without shock. If the door should be opened by any means from the outside, the slide I will be struck by the plate B^3 on the next passage of the car, and the latter will be stopped at that landing. To avoid the liability of breaking when so conditioned, the upper and lower ends of the plate are bent backward, as shown, so that the contact shall not be too abrupt.

The operation is as follows: Assuming that the elevator-car is ascending and is to stop at the next floor above to receive a passenger, as the car-floor approaches the level of the landing the cam-surface O on the front of the car strikes the roller N′, forces the beveled face of the slide N over the end of the latch M, raising the hook free from the catch L, and automatically releasing the door. At the same time the attendant grasps the controlling rope, and holding it fast, stops the car in the usual manner. He next releases the ordinary door-catch, if such is provided, and slides the door open. During the first part of the opening movement the roller E′ travels upward in the groove in the track C^6, turning the lever E and connected gear-wheel F, which, meshing into the pinion H′, rotates the latter and also the drum H. This motion is imparted to the slide I by means of the cam-

groove H^2 and pin I′ forcing the slide toward the car. Its roller strikes the plate B^3 carried on the car, turning the lever B′ against the action of the spring B^4 and forcing the block J^3 toward the block J^5, firmly gripping the controlling-rope between them, thus effectually locking the hoisting mechanism. No effort exerted by the attendant on the rope can start the car. The roller E′ has now risen above the center c^3 and the track C^6 tilts into the horizontal position with the roller still engaged and forms with the track C^5 a practically continuous way for the roller, keeping the lever E at the same high level and insuring that grip on the starting-rope is retained. When the track C^6 tilts, its hook C^9 engages with the dog C^{10}, holding the track C^6 against falling back into the original position when it passes from under the roller and the latter is engaged in the track C^5. The attendant slides the door wide open and admits the passenger without changing the locked condition of the hoisting mechanism. He next proceeds to close the door, the locked-condition continuing during the whole period of the travel of the roller E′ past the center c^3 and out on the overhung end of the track C^6 until the door is nearly or quite closed, and the rod R, coming in contact with the stop K, turns the dog C^{10}, releasing the hook C^9, and thus allows the track C^6 and the lever E to drop by gravity. This movement turns back the drum and withdraws the slide I, allowing the spring B^4 to assert itself and release the grip on the rope controlling the hoisting mechanism, which may then be operated as usual by the attendant to raise or lower the car. The plate B^3 is made long enough to allow for a considerable range in the position of the car level relatively to the landing and still be struck by the slide I. The plate may be adjusted up or down, as desired, carrying the whole range higher or lower, as may be preferred for any reason.

I attach importance to the fact that the drum and its connected mechanism is compact and is placed in the space above the shaft-door. This is particularly advantageous in applying the invention to buildings already equipped with elevators, as that space is usually available, and it can be put in without necessitating the cutting away of any portion of the walls of the shaft to make room for the parts, a point of great importance in buildings constructed of iron and steel, according to the methods now so generally adopted.

Modifications may be made in the forms and proportions without departing from the principle of the invention or sacrificing its advantages.

The term "door" in this specification is intended to include any form of gate, guard, or barrier which serves to protect the opening to the elevator-shaft on each of the several floors.

I claim as my invention—

1. In an elevator, the combination with the hoisting mechanism and the rope controlling the same, of locking means carried on the car, adapted to hold and release the said rope, and mechanism located in the space above the shaft-door, consisting of a drum having a cam-groove therein, a slide having a pin engaging the groove, and operated by the motion of the drum, and a lever and its connections for imparting motion to the drum by the movement of the said door in opening and closing, and mechanism consisting of a lever and its connections carried on the car and adapted to communicate the motion from the said slide to the said locking means, all substantially as herein specified.

2. In an elevator, the combination with the hoisting mechanism and the rope controlling the same of locking means carried on the car adapted to hold and release the said rope and means consisting of the drum H, cam-groove H^2, the slide I and pin I′ engaging said groove, and mechanism consisting of the lever E and its connections for imparting motion to the drum by the opening and closing of the door, and mechanism as the lever B′ and its connections carried on the car and adapted to communicate the motion from the door to the said locking means, all substantially as herein specified.

3. The drum H having the cam-groove H^2 in combination with the slide I and pin I′ engaging said groove and means as the lever E and connections between said lever and said drum for imparting motion to the drum by the opening and closing of the door, and the lever B′, sliding piece B^6, plate B^3, spring B^4, and clamp J^3, J^5 carried on the car and operated by the said slide to hold and release the rope controlling the hoisting mechanism, all substantially as herein specified.

4. The drum H having the cam-groove H^2 the slide I and the pin I′ engaging the groove, and the lever E and connections between said lever and said drum in combination with each other and with the fixed track C^5, tilting track C^6 carried on the door and means as the lever B′ sliding piece B^6, plate B^3, spring B^4 and clamp J^3, J^5 carried on the car and operated by the said slide to engage and release the rope controlling the hoisting mechanism as the door is opened and closed substantially as herein specified.

5. The drum H having the cam-groove H^2, the slide I and the pin I′ engaging the groove, the gear-wheels F and H′ and the lever E in combination with each other and with the fixed track C^5, tilting track C^6, hook C^9, dog C^{10}, rod R and stop K and with the lever B′, sliding piece B^6 adjustable plate B^3, spring B^4, slide J and blocks J^3, J^5 inclosing the controlling rope adapted to clamp the latter when the said plate is struck by the slide all substantially as herein specified.

6. In an elevator, the catch L mounted on the shaft door in combination with the latch M and beveled slide N mounted on the casing and with the car B and cam surface O thereon,

the said slide lying in the path of and adapted to be struck by the said cam-surface and release the door when the car has arrived at the proper level, all substantially as herein specified.

7. In an elevator, the sliding door C, fixed track C^5, tilting track C^6, hook C^9 and dog C^{10} in combination with each other and with the rod R, spring R^4 and stop K and with the lever E and mechanism operated thereby to hold and release the rope controlling the hoisting mechanism substantially as herein specified.

In testimony that I claim the invention above set forth I have affixed my signature in presence of two witnesses.

FOUNTAIN S. BRAID.

Witnesses:

CHAS. E. SEARLE,

PATRICK MCINERNEY.