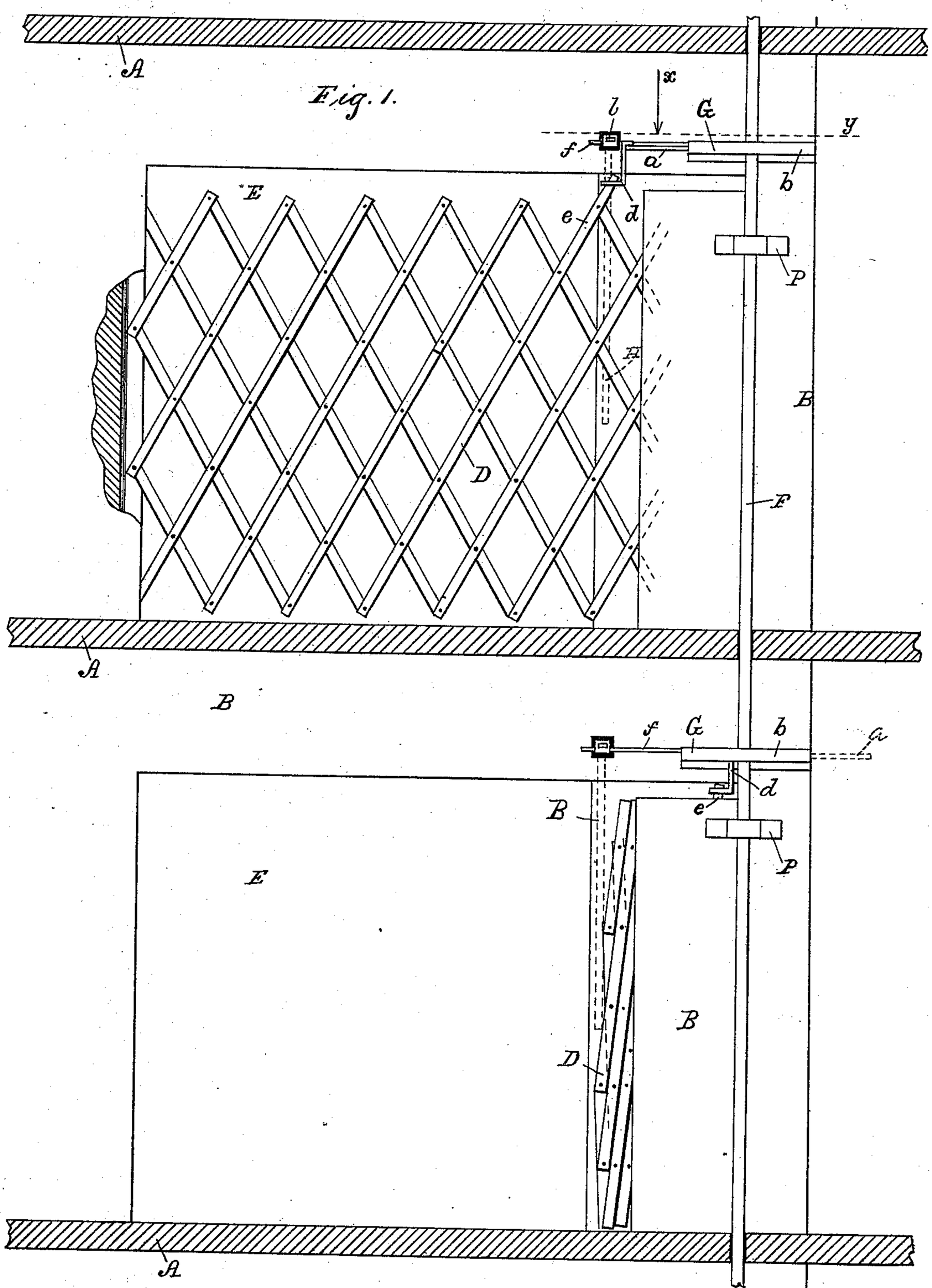
(No Model.) 4 Sheets—Sheet 1.

O. L. DAVIS.

MECHANISM FOR OPERATING THE GATES OR DOORS OF ELEVATOR WELLS.

No. 402,411. Patented Apr. 30, 1889.

Fig. 1.



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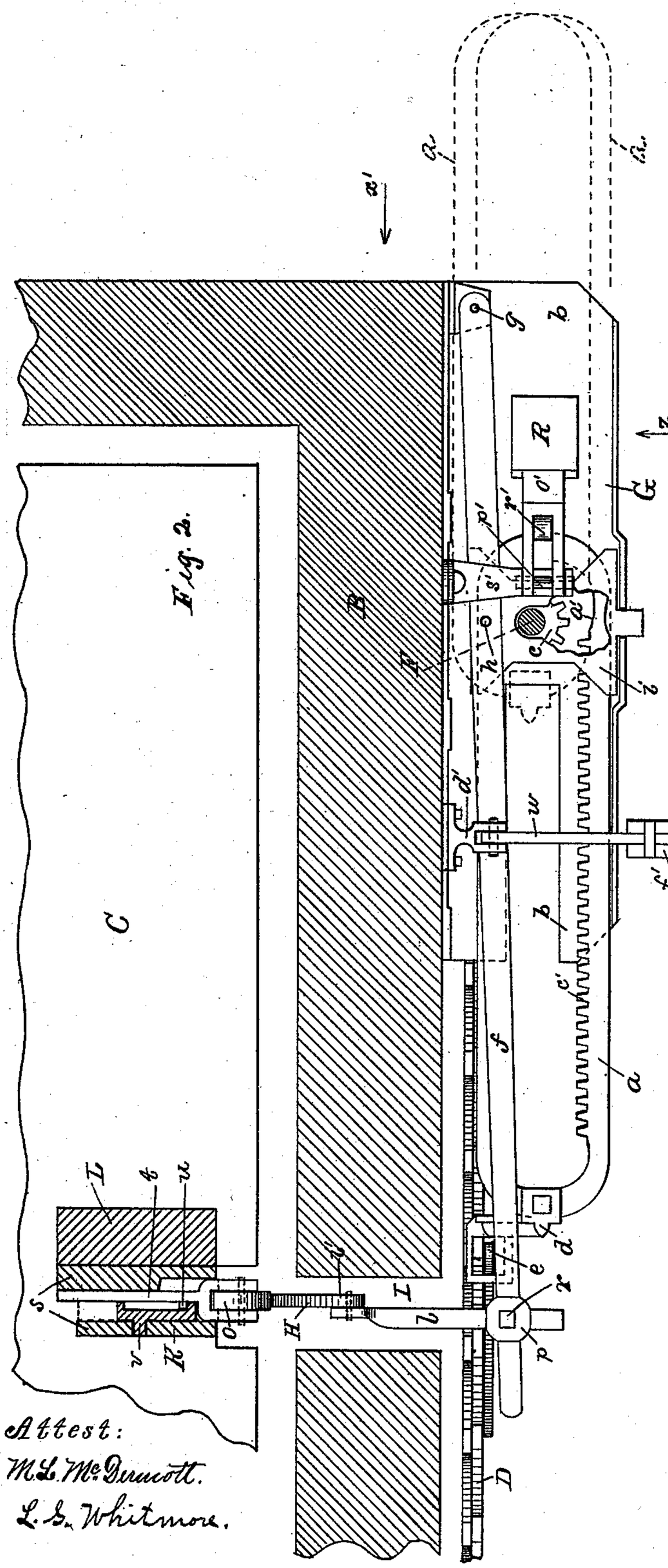

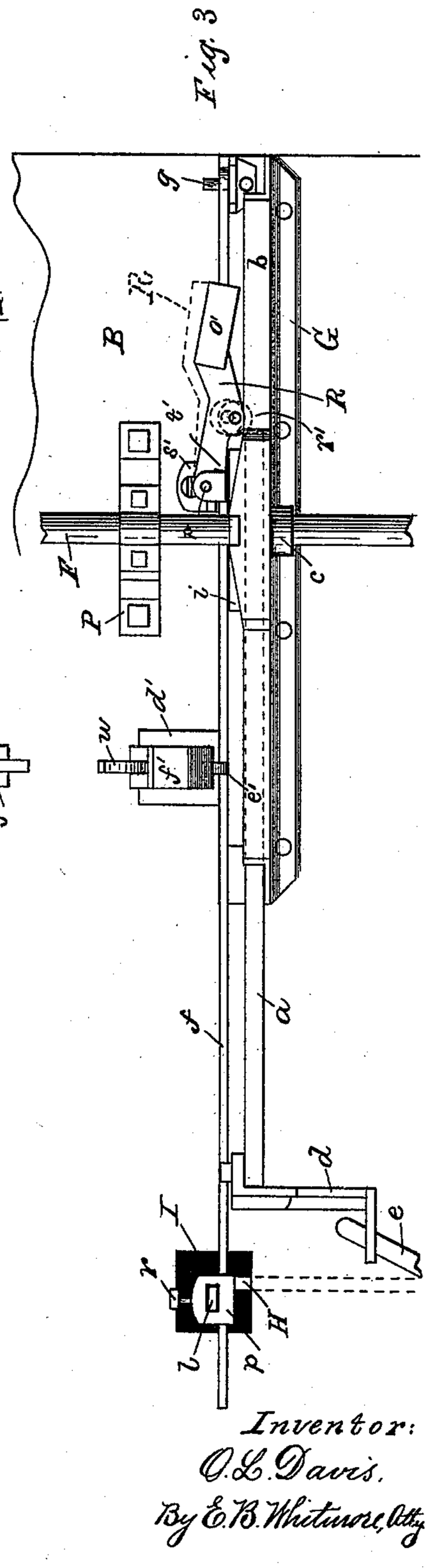

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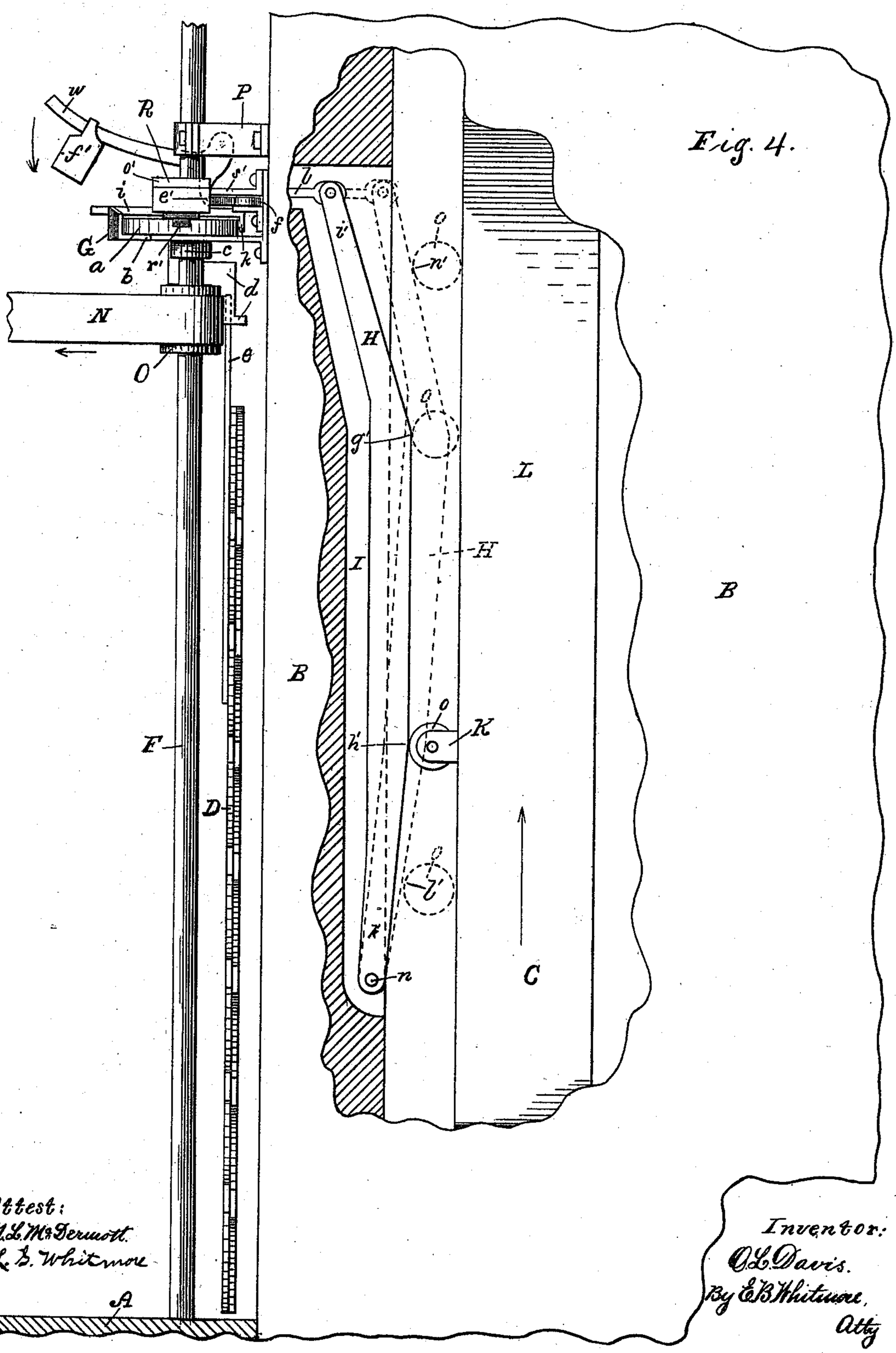

Fig. 4.

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Fig. 7.

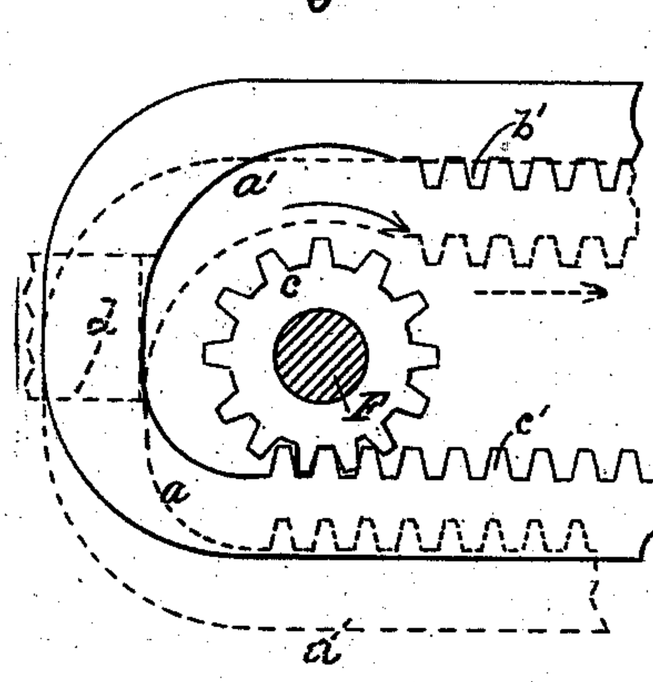


Fig. 8.

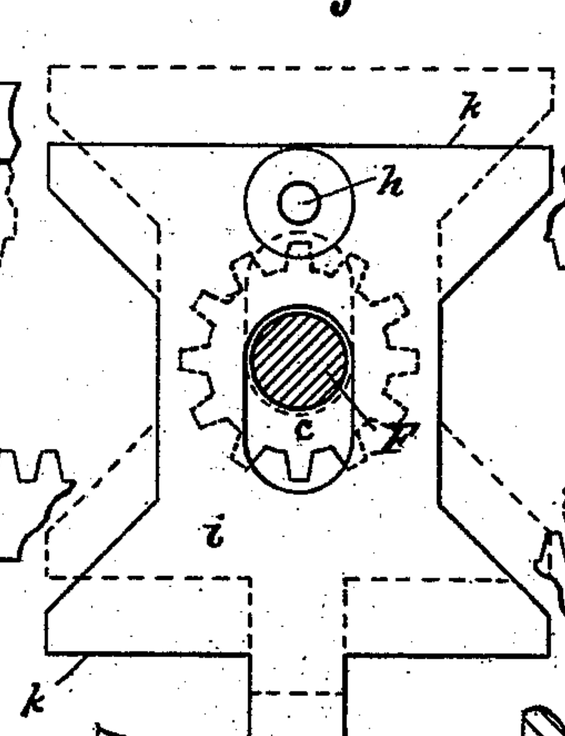
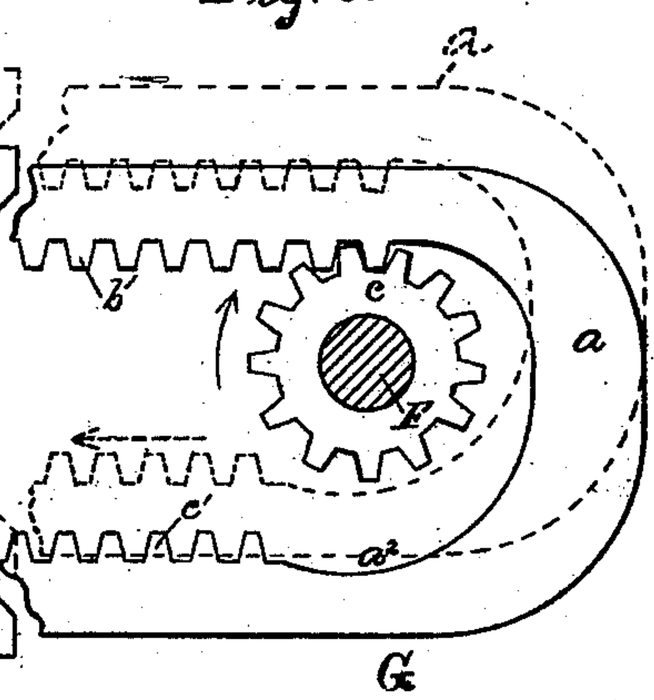


Fig. 6.



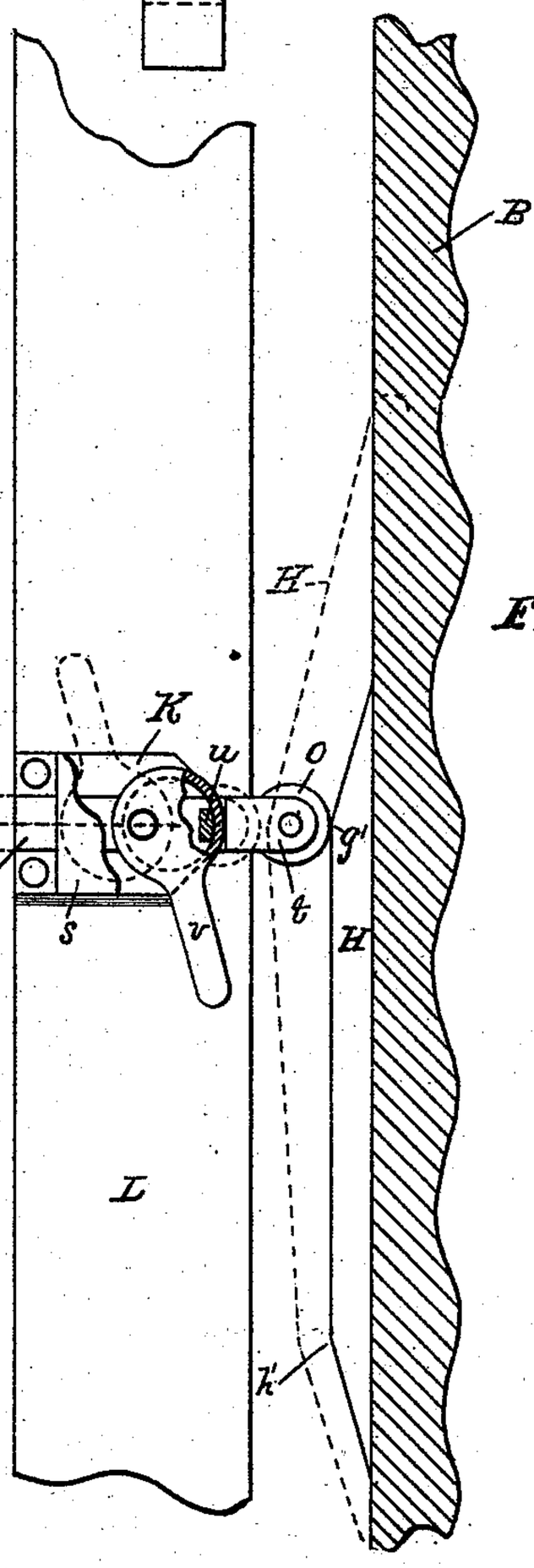


Fig. 5.

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UNITED STATES PATENT OFFICE.

ORION L. DAVIS, OF ROCHESTER, NEW YORK.

MECHANISM FOR OPERATING THE GATES OR DOORS OF ELEVATOR-WELLS.

SPECIFICATION forming part of Letters Patent No. 402,411, dated April 30, 1889.

Application filed June 7, 1888. Serial No. 276,327. (No model.)

To all whom it may concern:

Be it known that I, ORION L. DAVIS, of Rochester, in the county of Monroe and State of New York, have invented a new and useful Improvement in Mechanism for Operating the Gates or Doors of Elevator-Wells, which improvement is fully set forth in the following specification and shown in the accompanying drawings.

The object of my invention herein shown and described is to provide a new and improved mechanism for opening and closing gates or doors, more particularly for the doorways of freight-elevator wells, the same being hereinafter fully described, and more particularly pointed out in the claims. The gate or door operated by this mechanism may be extensible or folding; or it may be a rolling or sliding door, moving together or made in sections and parting at the middle, with the halves moving in opposite directions, as the case may be.

Referring to the drawings, Figure 1 is a general view of the parts, showing a vertical section of the floors of a building with two doorways opening into an elevator-well, parts being broken away, and my improved operating mechanism for the gates being shown in place. Fig. 2 is a plan of the operating mechanism drawn to a much larger scale, and viewed as indicated by arrow *x* in Fig. 1, the wall of the well and other parts being horizontally sectioned, as on the dotted line *y*; Fig. 3, a view of the same, seen as indicated by arrow *z* in Fig. 2, or in the direction in which Fig. 1 is seen. Fig. 4 is a side elevation of the parts seen as indicated by arrow *x* in Fig. 2, a part of the wall of the well being broken out and vertically sectioned to show the shifting-arm. Fig. 5 is a view of some of the parts seen in the opposite direction from that in which Fig. 4 is seen, parts being broken away and vertically sectioned; and Figs. 6, 7, and 8 show different positions of the rack and some associated parts, drawn to a still larger scale to better show the form and operation of the rack.

Referring to the parts shown in the drawings, A are the floors of the building, and B the walls of an elevator-well of common kind extending through the various stories.

C, Figs. 2 and 4, is the car within the well, and D the gates for closing the doorways E, Fig. 1, opening from the various stories into the elevator-well.

G is the device or mechanism for operating a gate of one of the doorways, this mechanism being driven by a light vertical rotatory shaft, F, extending from bottom to top of the building at one side of the series of doorways, held in suitable bearings, P, secured to one of the walls of the well.

H, Figs. 2, 4, and 5, is a shifting-arm for the mechanism G for a gate. Said arm is placed vertically within the well, preferably in a cavity, I, in one of the walls thereof, in position to be acted upon by a device, K, secured to the car, the latter being moved in the well in the usual manner. The shaft F is intended to be constantly rotated, when the use of the elevator may be required, by a belt, N, Fig. 4, leading from some convenient driving-wheel, or by other gearing or motive power, as may be convenient, the means by which the shaft is rotated not being essential to my invention.

The actuating mechanism G has a horizontal frame, *b*, secured rigidly to a wall of the well above the door and at the right or left thereof, as may be convenient. This frame holds a double rack, *a*, having two rows, *b' c'*, of inwardly-projecting teeth along its sides, to be engaged alternately by a toothed gear or pinion, *c*, secured rigidly to the shaft F, by means of which the rack is moved one way or the other, as may be required. This rack is held to move forward or backward in a line parallel with the plane of the gate, and is connected with the gate by means of a link or connecting part, *d*, and an extended slat, *e*, of the gate, as shown. The rack is narrower than the frame, and it is also arranged to be moved or shifted sidewise therein, in order to bring one or the other row of teeth in engagement with the pinion, as may be required. This sidewise motion of the rack is effected by means of an alternating lever, *f*, pivoted to the frame at *g*, and connected by means of a pin, *h*, to a yoke, *i*, transversely spanning the rack, the yoke having flanges *k* extended down at either side of the rack to embrace the latter. The yoke rests directly upon the

rack, and the lever *f* plays above the yoke, said lever, yoke, and rack occupying horizontal planes.

The shifting-arm H is connected at its upper end with the alternating lever *f* by a connecting-bar, *l*, as shown, by means of which the rack is caused to move sidewise one way or the other to bring it into engagement with the pinion, as above stated. This arm H is by preference pivoted at *n* in the wall of the well, and is swelled or bowed to project toward the interior of the well to be acted upon by the passing car. The normal position of the arm H is that shown by dotted lines in Fig. 4, (the gate being closed or in the act of closing,) the corresponding positions of the rack and yoke being those shown in dotted lines in Figs. 6 and 8 as closed and in full lines in Fig. 7 as in the act of closing. The other position of the arm is shown in full lines in Figs. 4 and 2, the corresponding position of the yoke and rack being shown in Figs. 2 and 4 and in full lines in Fig. 6, the gate being open or in the act of opening. This arm is pushed from its normal position to its temporary position by an actuating device, K, secured to some convenient part of the car and projecting therefrom sufficient to encounter the arm as the car passes, the device K being hereinafter more fully described.

The rack *a* is formed with blank spaces *a'* a^2 at the ends and on opposite sides at the ends of the respective rows *b'* and *c'* of teeth, in which the pinion *c* may turn without touching the rack after it has driven the latter longitudinally to the full extent in one direction or the other. This is clearly shown by the dotted positions of the rack in Figs. 6 and 7. In Fig. 6, for instance, the pinion, having acted upon the teeth *c'*, has driven the rack to the left until the pinion has passed out of contact with said teeth and into the space a^2, when its further rotation effects nothing, the gate being now closed.

When the car shifts the rack to the position shown by full lines in Fig. 6 by the means above described, the pinion is caused to engage the teeth *b'* and move the rack toward the right (during which movement the gate is being opened) until said rack and pinion occupy the relative positions shown by dotted lines in Fig. 7, the pinion occupying the space *a'*. The rack being again shifted sidewise (by means hereinafter described) to the position shown by full lines in Fig. 7, the teeth *c'* are engaged by the pinion, as before, and the rack is urged toward the left to close the gate, the rack finally arriving at the position shown by dotted lines in Fig. 6 relative to the pinion, as previously described. An essential feature of novelty of this rack is that the opposing rows of teeth, *b'* and *c'*, extend at the respective ends of the rack longitudinally one beyond the other—to wit, the extreme teeth of either row being opposite the blank space *a'* or a^2 at the end of the other row. By this construction, when the rack is at rest in either of its extreme longitudinal positions, a simple sidewise motion of the rack throws it into gear with the pinion and sets it moving longitudinally.

The bar *l*, connecting the arm H with the alternating lever *f*, is connected with said lever by means of a coupling-block, *p*, through which said bar and lever pass at the point of intersection, the block being made rigid with the bar by a set-screw, *r*, or other simple means, while the lever rests freely in its cavity within the block.

The device K, Figs. 2, 4, and 5, serving as an actuator for the shifting-arm H, consists of a frame, *s*, secured to a post, L, or other convenient part of the car, said frame holding a horizontally-adjustable slide, *t*, bifurcated at its end to receive a roller, *o*, held in position to roll along the bowed or swelled edge of the shifting-arm. The slide *t* is formed with a rigid stud, *u*, and an eccentric circular adjuster, *v*, is provided to bear upon the stud *u* in a manner to move the slide *t* endwise toward or from the shifting-arm H, when the adjuster is turned, being clearly shown in Fig. 5. When the slide *t* is drawn or thrown back by the eccentric to the position shown in dotted lines, the roller *o* passes the arm H without touching it as the car passes up or down, in which case said arm remains in its normal position and the gate (which is closed) is not disturbed.

To throw the rack *a* toward the well, or in a direction opposite to that in which it is moved by the car, as hereinbefore described, I employ a simple weighted lever, *w*, Figs. 2, 3, and 4. This lever is fulcrumed to a rest, *d'*, secured to an extended part of the frame *b*, or some other convenient body, in position to have its lower downwardly-extended end, *e'*, bear against the outer edge of the alternating lever *f*. The lever *w*, with its adjustable weight *f'*, acts to hold the rack at its normal position, nearest the well, (referring now to its lateral movements,) in which position the gate is closed or in the act of closing. When the car shifts the rack in any case, it does so against the action of the weighted lever *w*, which latter serves as a returner for the rack, carrying it back to its normal position, after the arm H is released by the car.

The shifting-arm H may be of any form that will answer the purpose for which it is intended, I having shown it formed with a straight part, *g' h'*, Figs. 4 and 5, and inclined ends *i'* and *k'*. In case the car is ascending, the roller *o* first touches the arm at the point *l'*, and by the time it has reached the point *h'* the rack will be thrown over in contact with the pinion, which will cause the gate to open. The arm is preferably formed and hung so that when it is in its temporary position the part of its edge from *h'* to *g'* traversed by the roller will be vertical or neutral to the action of the roller *o*—to wit, no change of the position of the arm will take place while the roller is passing along said

surface. While the roller is moving from the point g' to the point n', where it leaves the arm, the returning lever w shifts the rack to its normal position and the gate becomes closed from the action of the shaft F, as before stated. This neutral part or dwell h' to g' of the arm is in each case made sufficiently long to give the gate time to be completely withdrawn or opened while the car is passing, and it may be made longer should it be desirable in any case to have the doorway kept wide open for a brief period while the car is passing. It is evident that a descent of the car past the arm will act upon the latter in the same manner.

Another novel and important feature of this invention is set forth as follows: Should the person operating the car wish to stop at the third floor, for instance, of the building in making an excursion, and not know that the actuator K was adjusted so as to be inoperative, he could, upon arriving at said door and stopping his car, throw the roller o forward against the arm by means of the eccentric v, thus causing the gate to be drawn back wholly independent of any vertical motion of the car. This, so far as I know, has not been accomplished by other inventors of device for operating doors or gates.

At R, Figs. 2, 3, and 4, is shown a device for forcing or pushing the rack a a slight distance farther than the pinion would carry it when moving it toward the left to close the gate, so that the teeth of the pinion shall not continue to lightly touch the last tooth of the rack and make a clicking sound after the rack can be no farther forced along by the pinion. The pinion, when it has forced the rack along, sometimes does not leave it so as to completely clear it. This pusher consists of a weighted lever, o', attached by means of a pin, p', to a rigid holder, s', secured to the frame b, or other convenient part. This lever is provided with a roller, r', projecting below its lower surface in position to bear against the outer end of the rack, as shown. The lever o' is formed with a shoulder, t', in position to bear against the holder s', which forms a stop to prevent the lever dropping to a position too low. As the rack is being moved to the left by the pinion, the roller r' rolls over the upper surface of the end portion thereof and reaches the end of the rack just as the pinion has ceased acting upon it. The lever from its weight causes the roller to move a short distance downward at the end of the rack, which pushes the latter to the amount of a small fraction of an inch after the pinion has ceased acting. This places the last tooth of the rack out of reach of the points of the teeth of the pinion.

It is evident that the device might be constructed to have the shifting-arm H and the returning-lever w act directly upon the opposite outer edges of the yoke i, thus dispensing with the alternating lever f and the connecting-bar l with the coupling-block p.

I have shown in the drawings a contractible gate, D, of the lazy-tongs type, in which case the front edge (the under edge being held) travels much more rapidly than the slat e, with which the rack is connected. In this case the rack may be as much shorter than the distance traveled by the front edge of the gate, as said slat e moves more slowly than said front edge. In case the gate were a rigid body—like a sliding door, for instance—the rack would need to move as far as the door and have a length accordingly. It will be understood that the gate may be moved toward the left in the act of opening, instead of toward the right, as shown, by placing the shaft and mechanism G correspondingly at the left of the doorway, and by placing operating mechanism on both sides of the doorway the gate or door may be made in two parts, parting and closing at the middle.

What I claim as my invention is—

1. In combination with a gate, a shaft and gear secured thereto, a rack for the gear, and a connecting-link for the rack and gate, said shaft turning always in the same direction, and the rack being capable of moving independently of the gate, substantially as described.

2. In combination with a gate, a revolving shaft and gear thereon, a sidewise-shiftable rack having rows of teeth facing each other for the gear, and a connecting-link for the rack and gate, substantially as described.

3. In combination with a rotatory shaft and gear and a movable gate, a laterally-shiftable rack, a connecting-link for the rack and gate, an alternating lever for the rack, a shifting-arm for the alternating lever, a connecting-bar for said lever and arm, and an actuator for the shifting-arm carried by the car, substantially as shown and described.

4. In combination with a rotatory shaft and gear and a movable gate, a laterally-shiftable rack, a connecting-link for the rack and gate, an alternating lever for the rack, a shifting-arm for the alternating lever within the well, a connecting-bar for said lever and arm, and an adjustable actuator projecting from the car to act upon the shifting-arm, substantially as and for the purpose set forth.

5. In combination with a rotatory shaft and gear and a movable gate, a rack, a connecting-link for the rack and gate, an alternating lever for the rack, a shifting-arm for the alternating lever within the well, a connecting-bar for said lever and arm, and an actuator for the shifting-arm carried by the car, said shifting-arm adapted to have a part of its surface traversed by the actuator in a vertical plane, substantially as and for the purpose set forth.

6. In combination with a gate, a revolving shaft, and gear thereon, a shiftable rack having opposing rows of teeth, and a connecting-link for the rack and gate, said rows of teeth of the rack extending longitudinally one beyond the other, as and for the purpose set forth.

7. In combination with a gate, a revolving shaft, and gear secured thereto, a rack for the gear, a connecting-link for the rack and gate, and a pushing-lever to force the rack beyond the action of the gear, for the purpose set forth.

8. In combination with a revolving shaft and gear, a gate, a movable rack, a connecting-link for said rack and gate, a shifting-arm for the rack, and a returning-lever for the rack, substantially as shown and described.

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Witnesses:
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