

J. STEPHENSON.
Devices for Operating Street-Car Doors.
 No. 150,905. Patented May 12, 1874.

Fig. 1

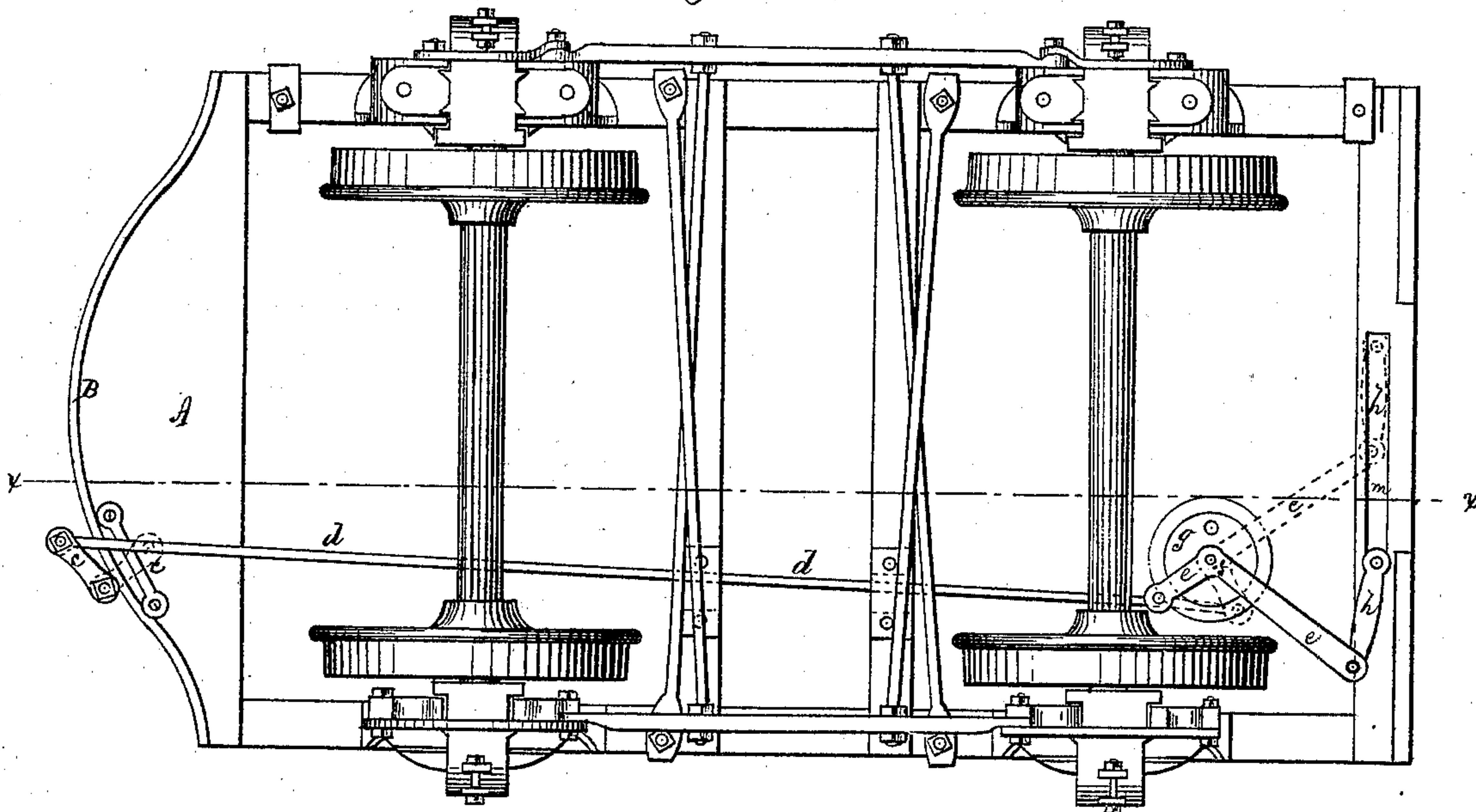
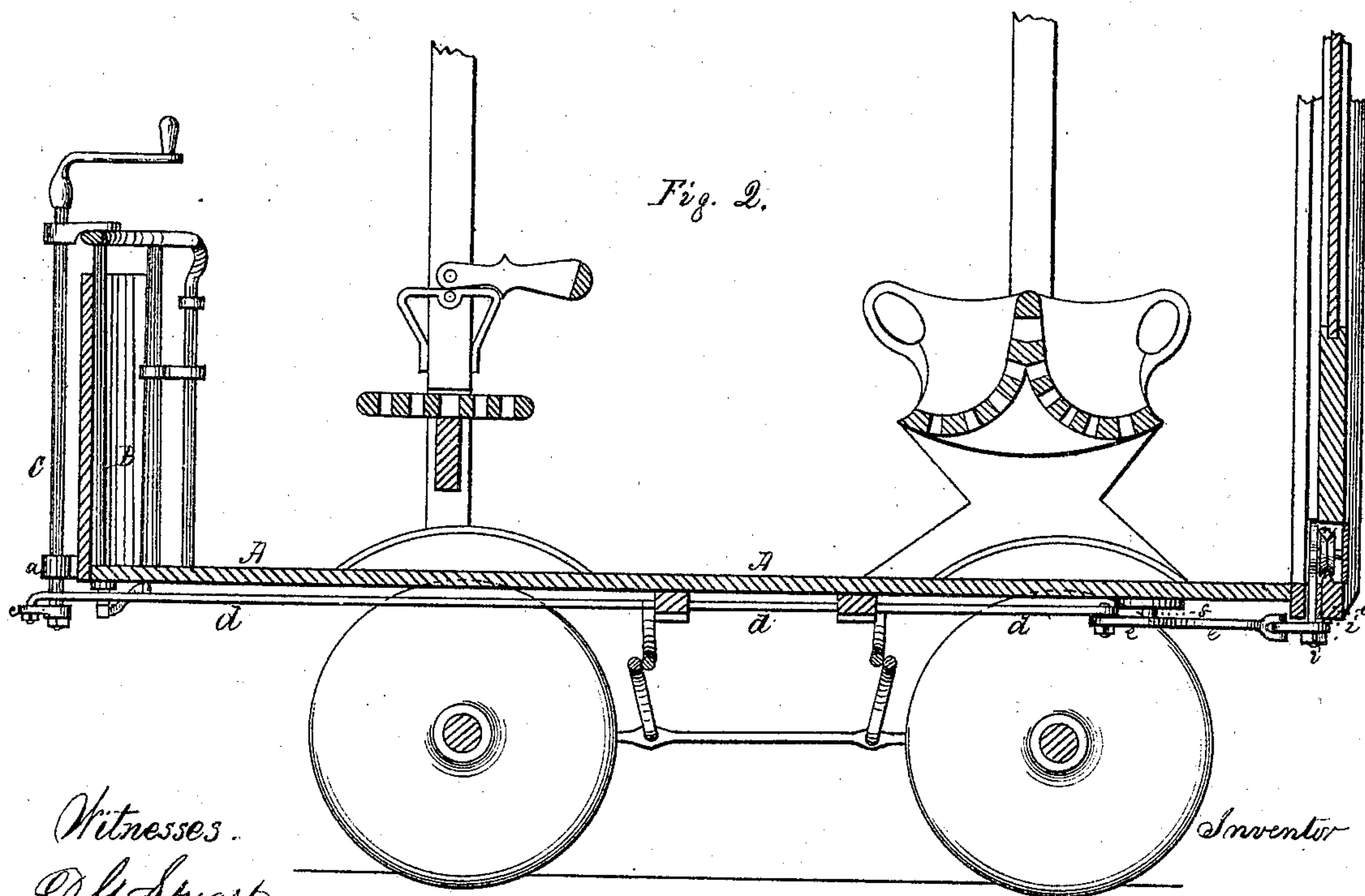


Fig. 2.



Witnesses.
D. G. Stuart
P. E. Wilson

Inventor
John Stephenson
 per *P. Hannay*
 atty.

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Fig. 3.

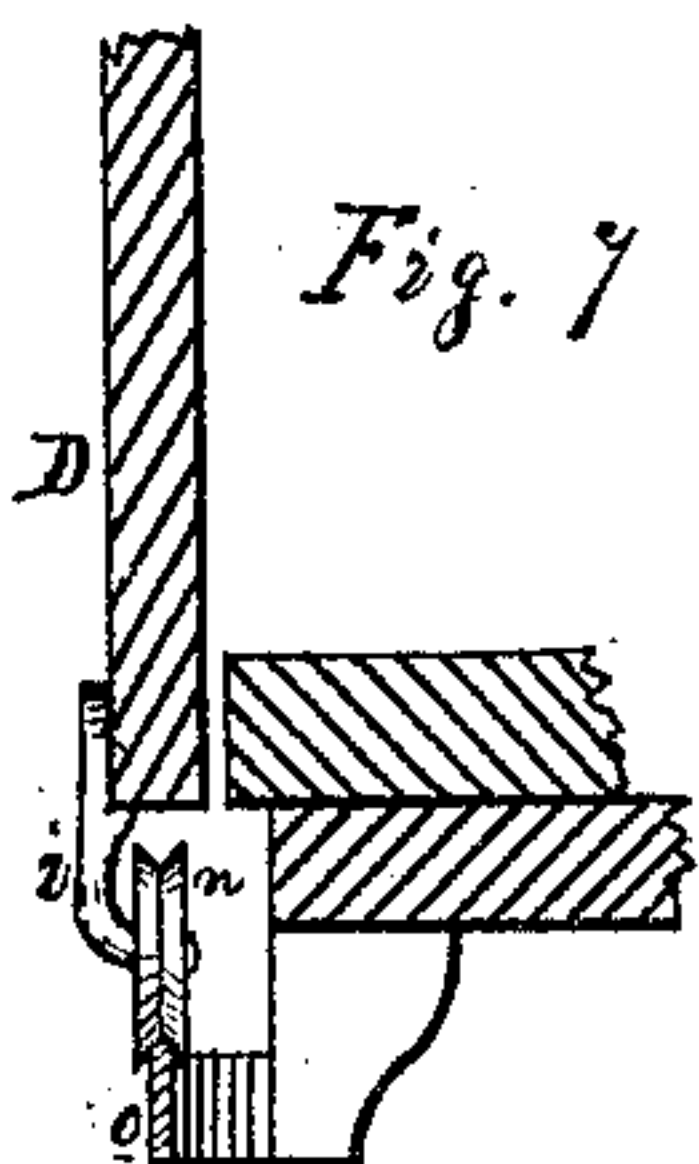
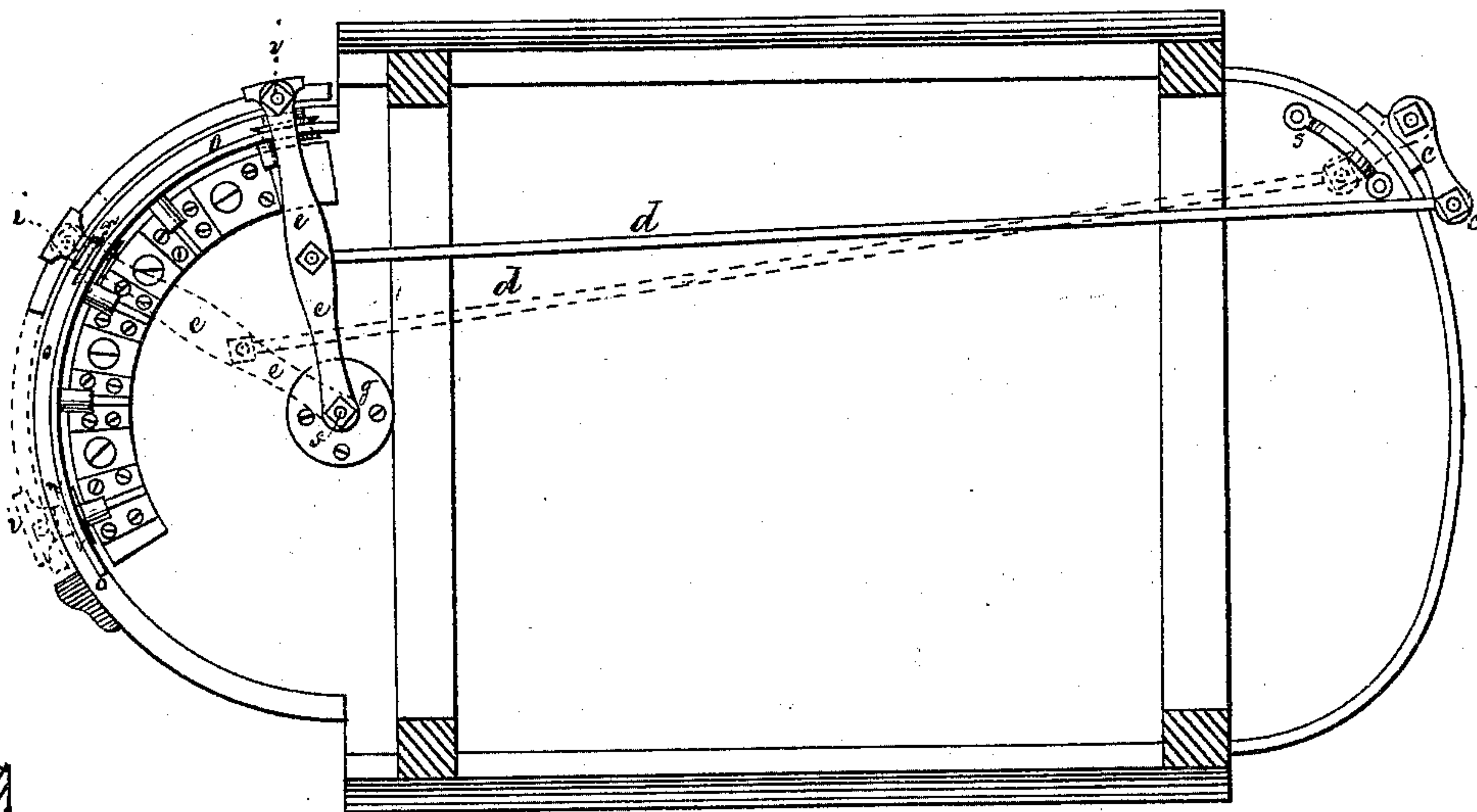
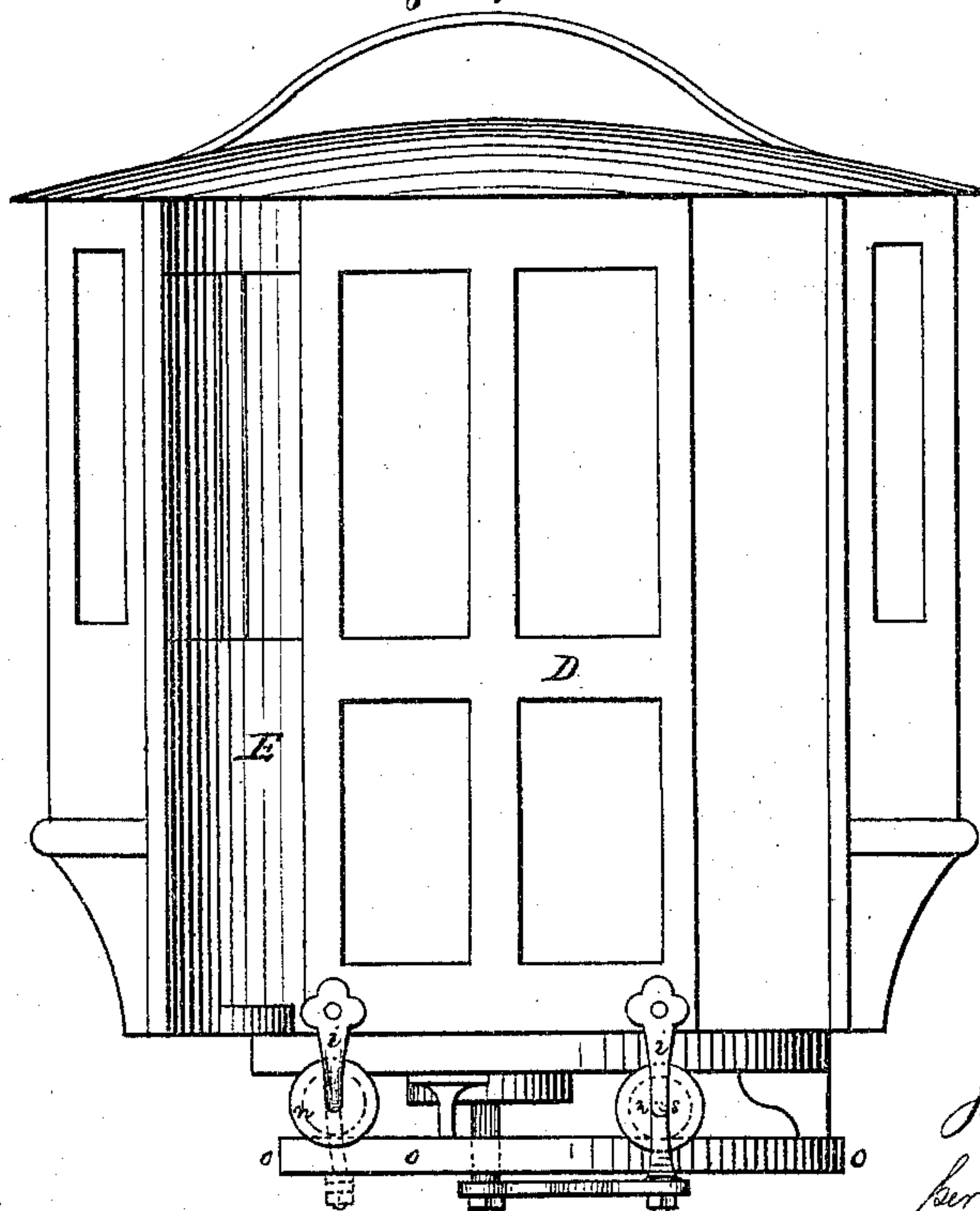


Fig. 7.

Fig. 4.



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Fig. 5

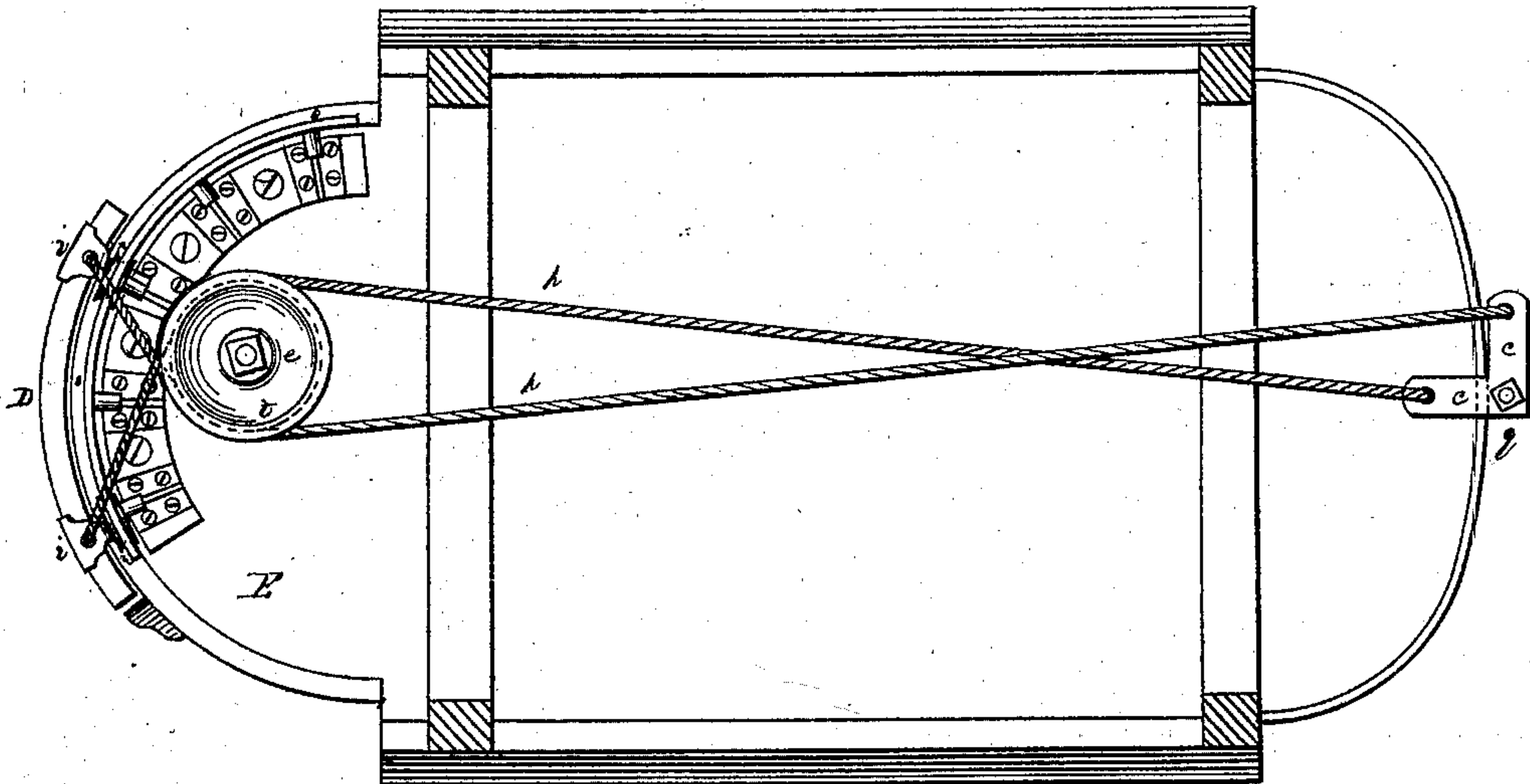


Fig. 6

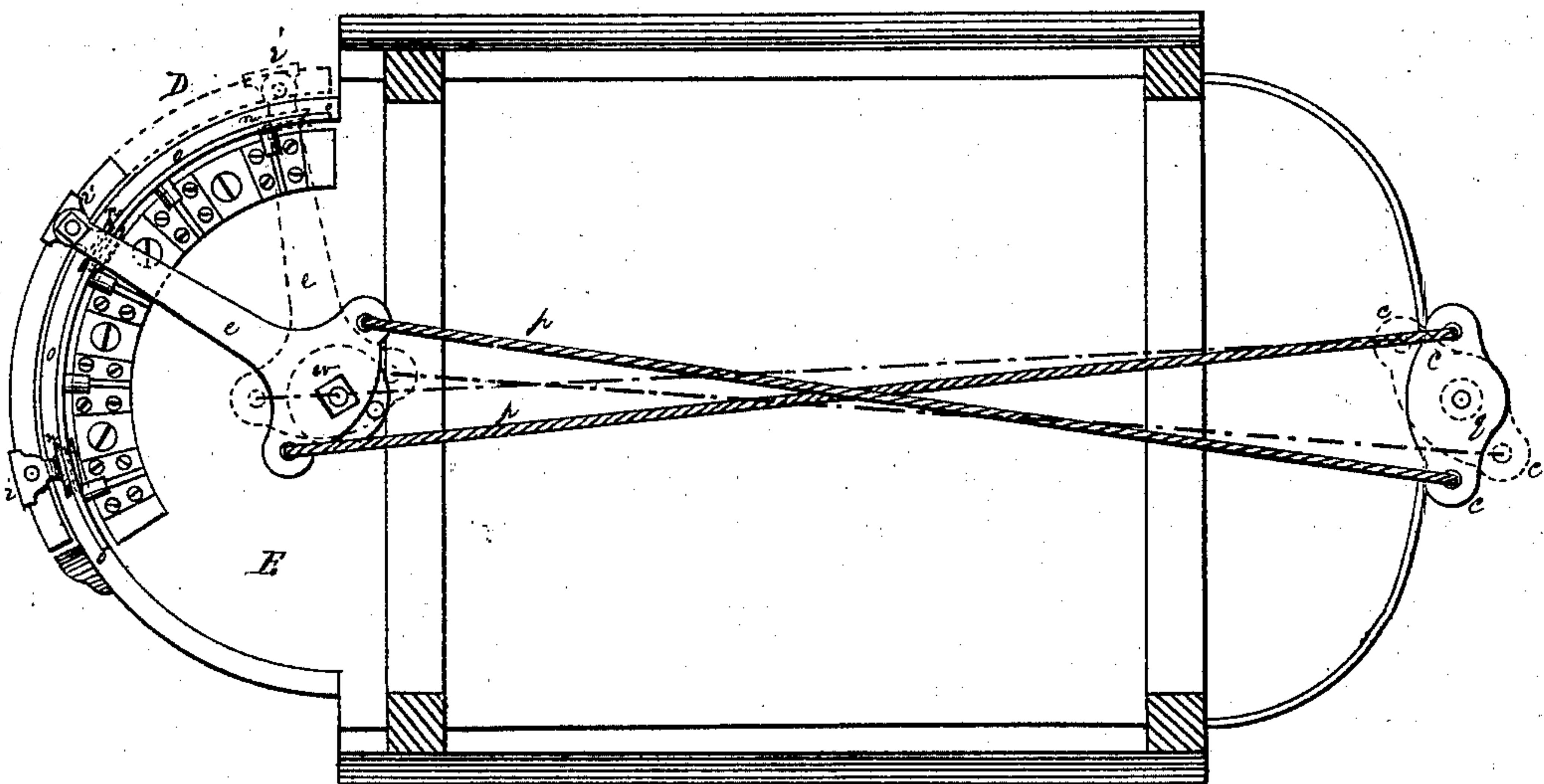


Fig. 8.



Witnesses:

D. G. Stuart
P. E. Wilson.

Inventor

John Stephenson
per P. Hannay
Atty.

UNITED STATES PATENT OFFICE

JOHN STEPHENSON, OF NEW YORK, N. Y.

IMPROVEMENT IN DEVICES FOR OPERATING STREET-CAR DOORS.

Specification forming part of Letters Patent No. **150,905**, dated May 12, 1874; application filed March 17, 1874.

CASE B¹ B¹.

To all whom it may concern:

Be it known that I, JOHN STEPHENSON, of New York, in the county of New York and State of New York, have invented certain Improvements in the Method of Operating Car-Doors, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a bottom view or plan of a square-ended car, having my improved method of operating the door applied thereto; and Fig. 2 a vertical section of the same as taken through the line *xx* of Fig. 1. Fig. 3 represents a plan or bottom view of a car having a semicircular extension at the rear, and door moving in a circular way, having my improved method of operating the door applied thereto, the running-gear of the car being removed; and Fig. 4 a rear elevation of the same. Figs. 5 and 6 represent bottom views of modifications of my improved method as applied to Fig. 3 or the car with the semicircular extension; Fig. 7, a detached view of the door-leg and roller; and Fig. 8 a modified form of the operating-lever.

The extensive use of street-cars managed without the aid of a conductor has created a demand for improved methods of operating the rear or entrance door of the car by the driver while on his stand in front. My present invention relates solely to an improved method of effecting this object, and is especially adapted to cars having an inclosed extension beyond the rear of the car-body, although it works equally well on cars of ordinary form.

This branch of my improvement, and which originally formed part of Case B B, consists in a new and improved combination of devices, with a rock-shaft arranged in the front of the car, and an entrance-door in the rear, whereby the driver, by simply turning the rock-shaft, through the instrumentality of a crank-handle or lever arranged on one of its ends, and within convenient reach of his hand, can open or shut the door, according to the direction in which he turns it, by reason of an arm or arms secured to its other end, and of

a suitable connection or connections made between it or them and the door.

To enable others skilled in the art to make, construct, and use my improvement, I will now proceed to describe its parts in detail, omitting a particular description of such parts of a car as are non-essential to a full understanding of my present invention.

In Figs. 1 and 2 the car is represented as being of the ordinary form—that is to say, of an oblong form—and having the door, on being opened and shut, sliding in a right line across the end of the car. Immediately at the front end, and slightly at one side of the driver's platform A, in suitable bearings *a* secured to the frame of the dash-board B, is mounted a rock-shaft, C, having a crank-handle or lever, *b*, secured to or otherwise formed on one end, for the use of the driver, and an arm or lever, *c*, at its other end, through which, and a suitable device or devices, to open or shut the passenger-door at the rear of the car. The device represented in Figs. 1 and 2 consists of a stout rod, *d*, pivoted at one end to the outer end of the arm *c*, and at the other to one end of the operating-lever *e*, (in this case of angular form,) and having its fulcrum at or near the apex of its angle on a pivotal pin, *f*, fastened, by means of a plate, *g*, to the bottom of the car. To the other end of the angle-lever *e* is pivoted one end of another arm or lever, *h*, the other end of which is pivoted to the end of an arm, *i*, suitably attached to the door D. In this case the arm *i* is secured to one of the plates which support the axle of the ordinary grooved rollers or sheaves *n* that support the door D, and of which there are two, and run on a way, *o*, secured to the upper side of the end rail of the car; but the car may have its door hung to run or roll by any of the known methods, in either of which cases, however, a guide-slot, *m*, is used, through which the leg *i* passes or extends, and is then secured to the arm *h*, as before described. The door thus connected with the rock-shaft C can be instantly opened or closed by simply turning the crank *b* in the required direction. In Figs. 3 and 4 the same device

is represented as being applied to the door of a car with a curved extension, *E*, in rear, the door in this case being correspondingly curved, and, when opened or shut, traveling in a correspondingly-curved way. The device in this case simply differs in the construction or shape of the operating-lever *e*. In the former case it was made crooked or angular, and pivoted at the angle. In this it is straight, and pivoted at one end to the bottom of the car, and radial to the curve of the extension, its outer end being attached or rather mounted directly upon the lower end of the door-leg *i*, as on a pivot, and on which it is kept in place by a screw-nut or other suitable device. The connecting-rod *d* in this case is pivoted to the lever *e* at or near its middle, according to the length of throw of the arm *c* on the end of the rock-shaft *C*, so that it shall be able fully to open or close the door, and no more. A stop-piece, *s*, in both cases, is arranged at the side of the arm *c* to arrest its course when the door has been fully opened or closed, to prevent unnecessary jar and shattering of the glass. This car, with its inclosed extension like the ordinary car, may have its rear door to roll or run by any of the known methods, although it is deemed better to have the rail or way *o* external of the car, and the door supported by two legs, *i*, the foot of one being bent around to form an axis for one of the supporting sheaves or rollers, *n*, and the foot of the other leg, *i*, resting in the end of the lever *e*, which operates the door. A spur, *s*, secured to the inner side of this leg, forms the axis of the other or second sheave or rollers. The door, as thus connected to the rock-shaft, is operated by the driver, through the medium of the handle *b*, by a pull-and-push motion of the connecting-rod *d*, according as the door is intended to be opened or shut. The connection between the operating-lever *e* and the rock-shaft may be modified by using two smaller rods or their equivalents—two cords or chains, *p*, Fig. 6—in which case the power will be transmitted to the door both ways by a pull motion. To this end the operating-lever *e* should have its back end to extend beyond the fulcrum of the lever and fork, so as to receive the two pull-connections, and so as each shall be equidistant from the fulcrum. Or it may be desirable to give its back end the form shown at *w*, in Fig. 6; in either event the use of such will involve the use of two arms or a cross-head, *q*, on the lower end of the rock-shaft, as shown in Fig. 5 and 6. Or the pull-connections, when they consist of cords or chains, may be connected directly to the two legs of the door, and to the cross-head *q* at their other ends, as shown in Fig. 5, in which case one or two grooved friction-rolls, *t*, may be used with advantage as a fulcrum for the flexible levers (the cords or chains) whereby to open or close the door, or the rolls *t* may be dispensed with, and the cords or chains crossed

in their passage to the reverse ends of the cross-head. Or the door of the curved extension may be closed by the use of a straight pivoted lever, *e*, having a single rearward extension, such as that shown in Fig. 8, to the extremity of which the outer end of the arm *c* of the rock-shaft may be pivoted by means of a slot, while its inner end would be pivoted to the leg or pendant *i*, secured to the lower part of the door.

In this application I do not claim broadly the application of a rock-shaft to a street-car for the purpose of opening and closing its entrance-door, as such forms the subject-matter of application B B, of which this forms a subdivision; but—

What I claim in street-cars is—

1. The combination of a rock-shaft, *C*, carrying a handle, *b*, and an arm, *c*, with a lever, *e*, and the entrance-door of a car, substantially as described.

2. The combination of a rock-shaft, *C*, carrying an arm, *c*, and connecting rod or lever *d*, with the car-door, substantially for the purpose set forth.

3. The combination of a rock-shaft, *C*, carrying an arm, *c*, and connecting-rod *d*, with a lever, *e*, and car-door, substantially as and for the purpose set forth.

4. The combination of a rock-shaft, *C*, carrying two arms, *c*, and two cords or chains, *p*, with a car-door, substantially as and for the purpose set forth.

5. The combination of a rock-shaft, *C*, carrying two arms, *c*, and two cords or two rods, *p*, with a lever, *e*, having two ends for the attachment of said cords or rods and a car-door, substantially as and for the purpose set forth.

6. In combination with a car and car-door, a lever, *e*, and rod *d*, to operate substantially as and for the purpose set forth.

7. The combination of a rock-shaft, *C*, carrying two arms, *c*, and two cords with a pulley or pulleys, and a car-door, substantially as and for the purpose set forth.

8. The combination of an operating-lever, *e*, having two ends for the attachment of two cords or rods, *p*, with the car-door, substantially as and for the purpose set forth.

9. The combination of an operating-lever, *e*, having a single arm or end for attachment to a single connecting-rod, *d*, with a car-door and with the rod *d* that operates it, said lever *e* being pivoted to the car at a point between the rod and the door, substantially as and for the purpose set forth.

10. The combination of a lever, *e*, pivoted at one end to the car, and at the other to the foot of the car-door, with said car-door and with a lever, *d*, for operating the same, said lever *d* being pivoted to the lever *e* between its two pivotal points, substantially as and for the purposes set forth.

11. The combination of the angle-lever *e*

with the link-lever *h* and car-door, substantially as and for the purpose set forth.

12. The combination of the rod *d*, angle-lever *e*, and link-lever *h*, with the car-door, substantially as and for the purpose set forth.

13. The combination of a rock-shaft, *C*, carrying an arm, *c*, rod *d*, angle-lever *e*, and link-lever *h*, with a car-door, substantially as and for the purpose set forth.

14. A car-door arm or leg, *i*, with its hand or foot forming an axis for the sheave or roller that supports or suspends the car-door, in combination with the leg *i'*, to which the operative mechanism is attached, substantially as set forth.

15. A car-door arm or leg, *i'*, forming a point

of attachment for the operative mechanism through which the driver opens and closes the door, substantially as set forth.

16. A car-door arm or leg, *i'*, having a spur, *s*, forming an axis for the sheave or roller that supports or suspends the car-door, and an end forming a point of connection for the attachment of the operating mechanism through which the driver opens and closes the door, substantially as set forth.

In testimony whereof I hereunto set my hand to this specification.

JOHN STEPHENSON.

Witnesses:

D. G. STUART,
P. HANNAY.