

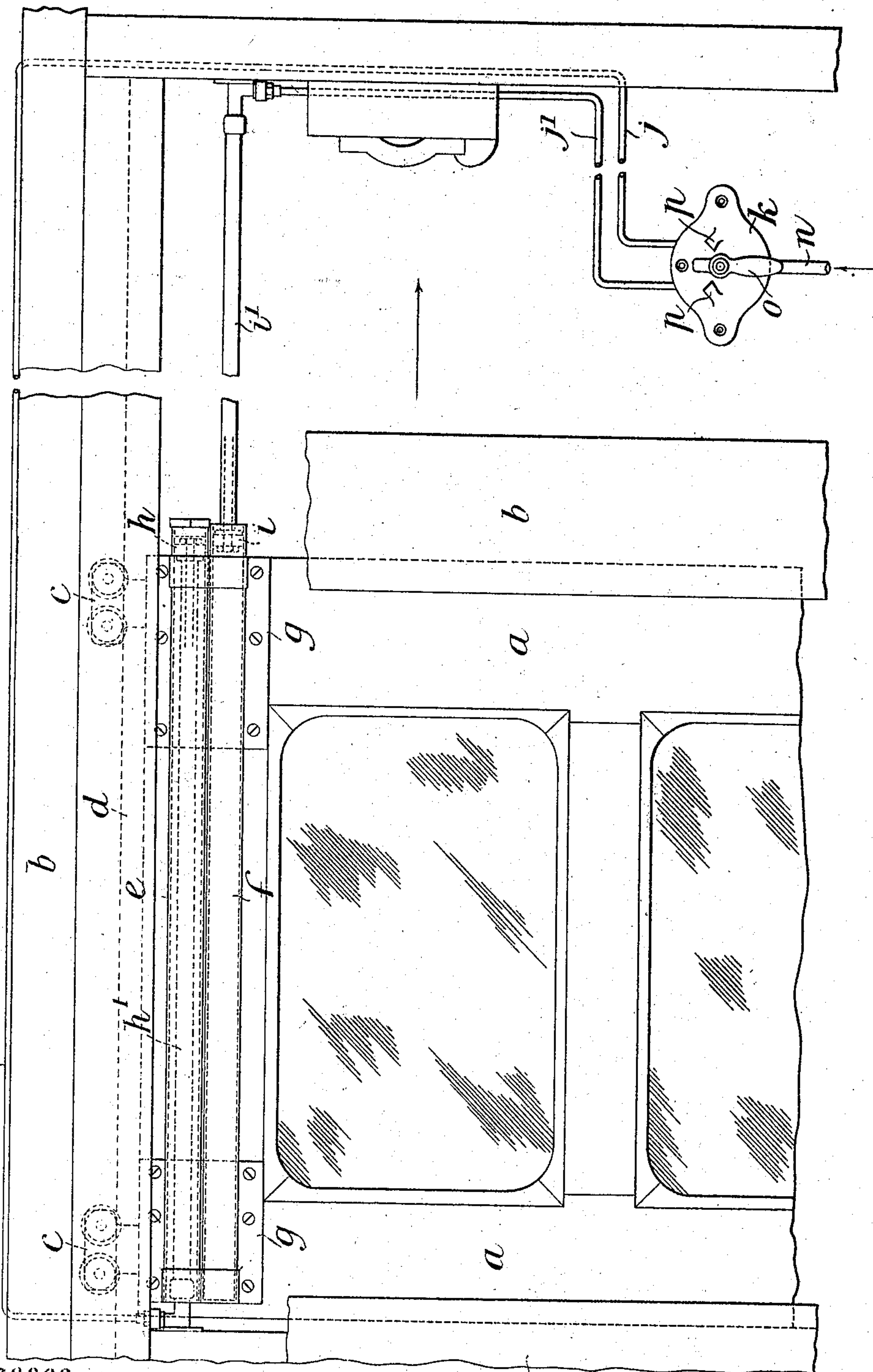
No. 806,220.

F. D. WARD.
OPERATING SLIDING DOORS.
APPLICATION FILED AUG. 6, 1904.

PATENTED DEC. 5, 1905.

2 SHEETS—SHEET 1.

Fig. 1



Witnesses.
H. K. Boullin
J. K. Moore

Inventor.
F. D. Ward
By Whitaker & Frost Attys.

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2 SHEETS—SHEET 2.

Fig. 2.

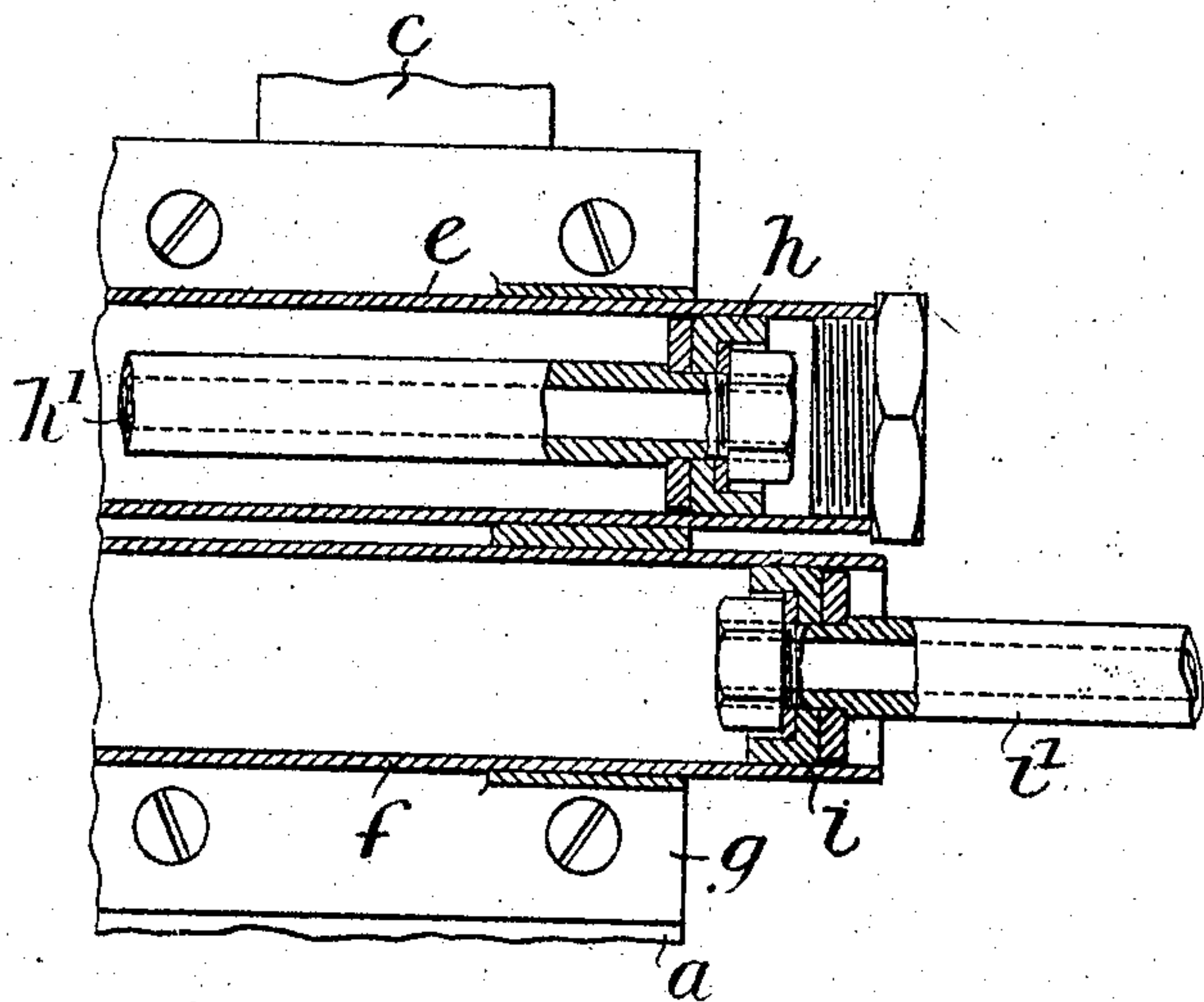


Fig. 3.

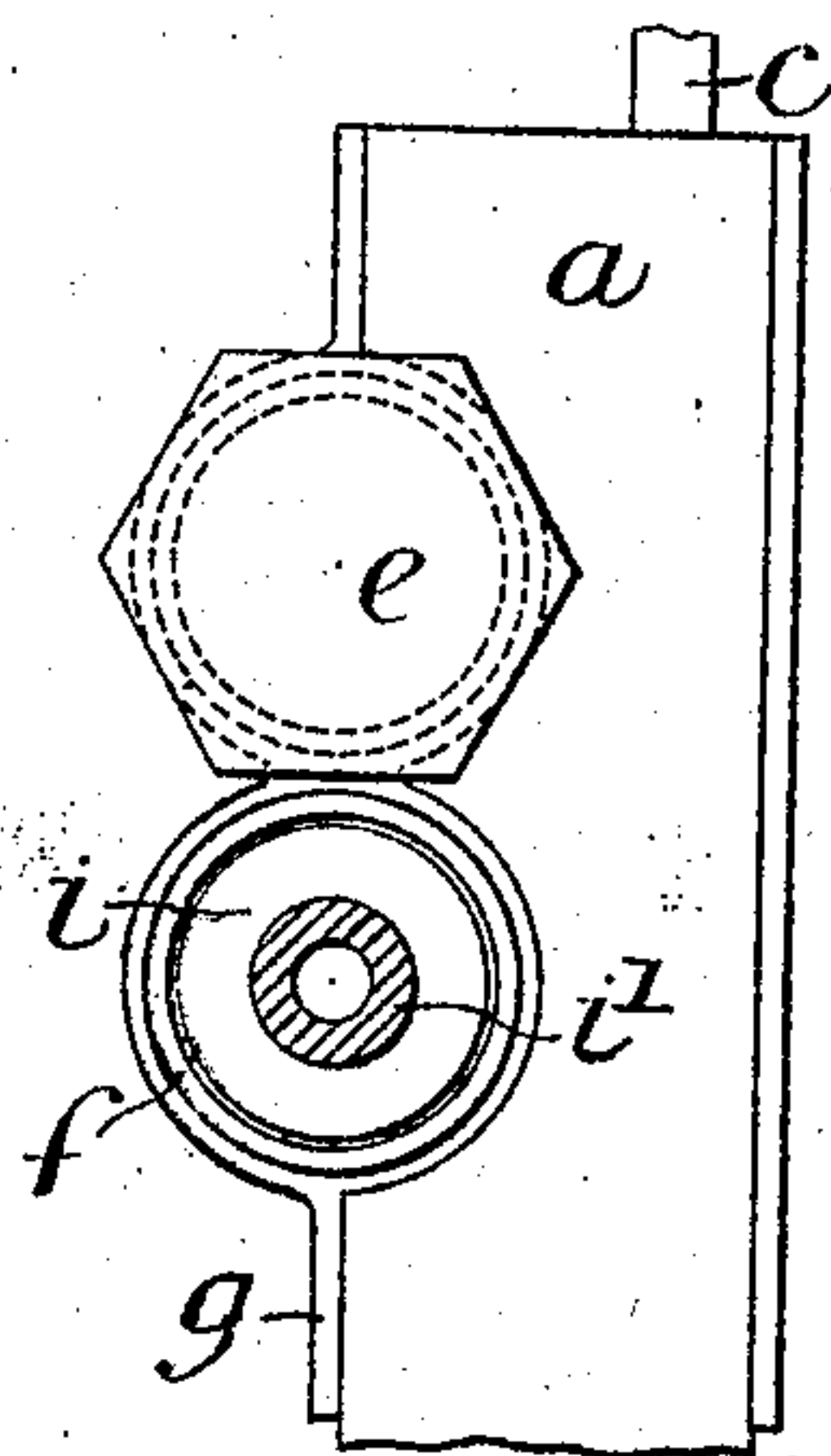


Fig. 4.

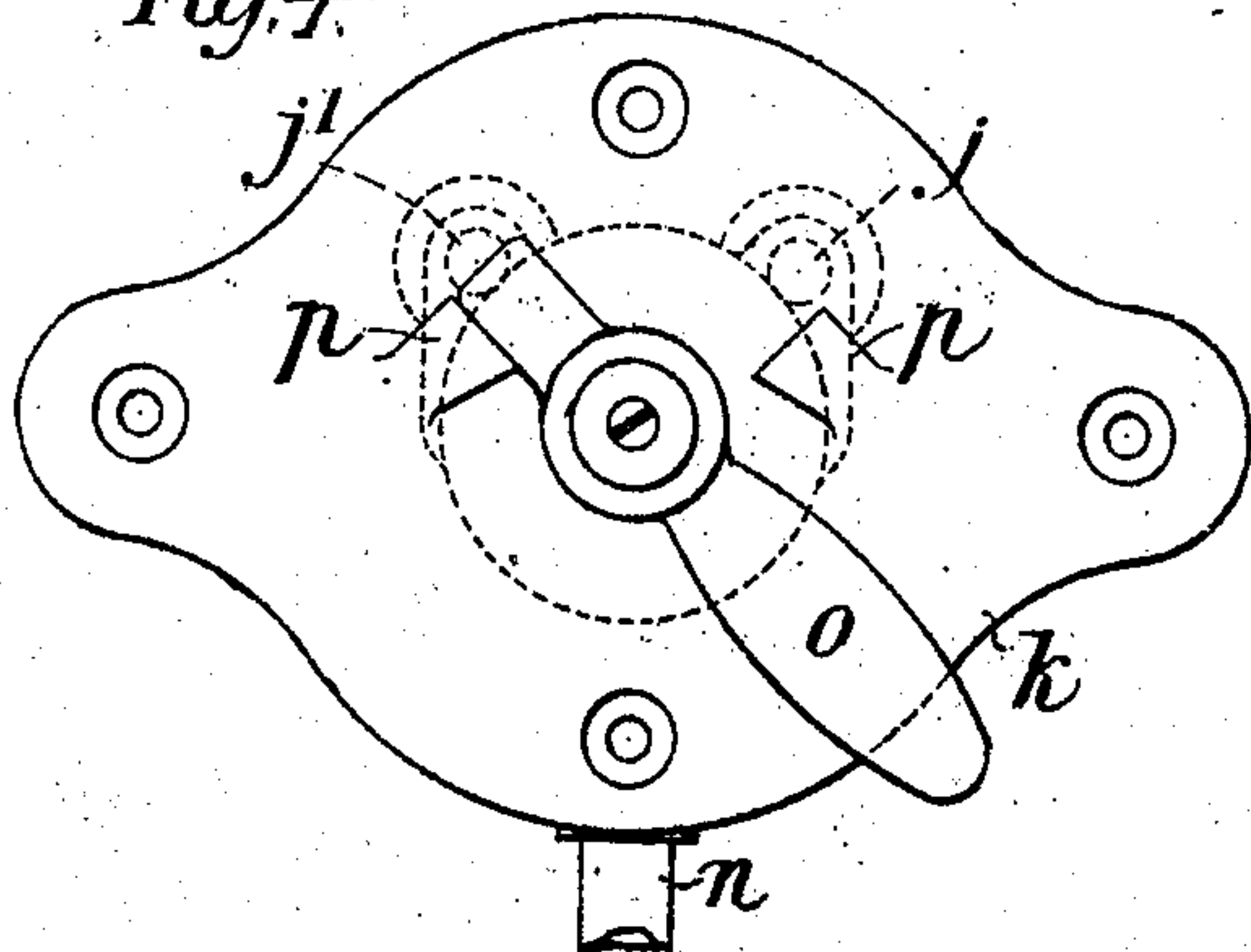


Fig. 5.

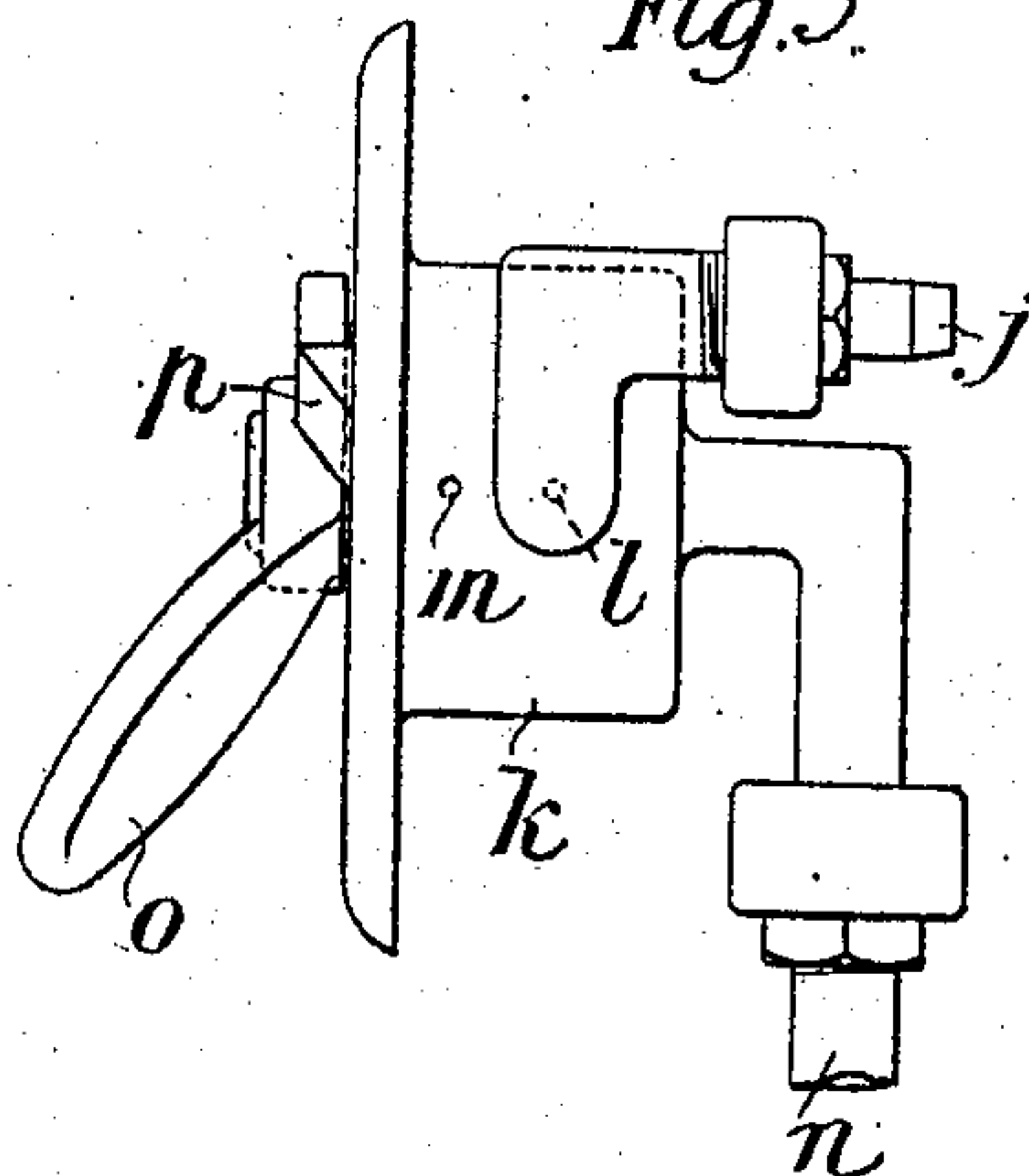
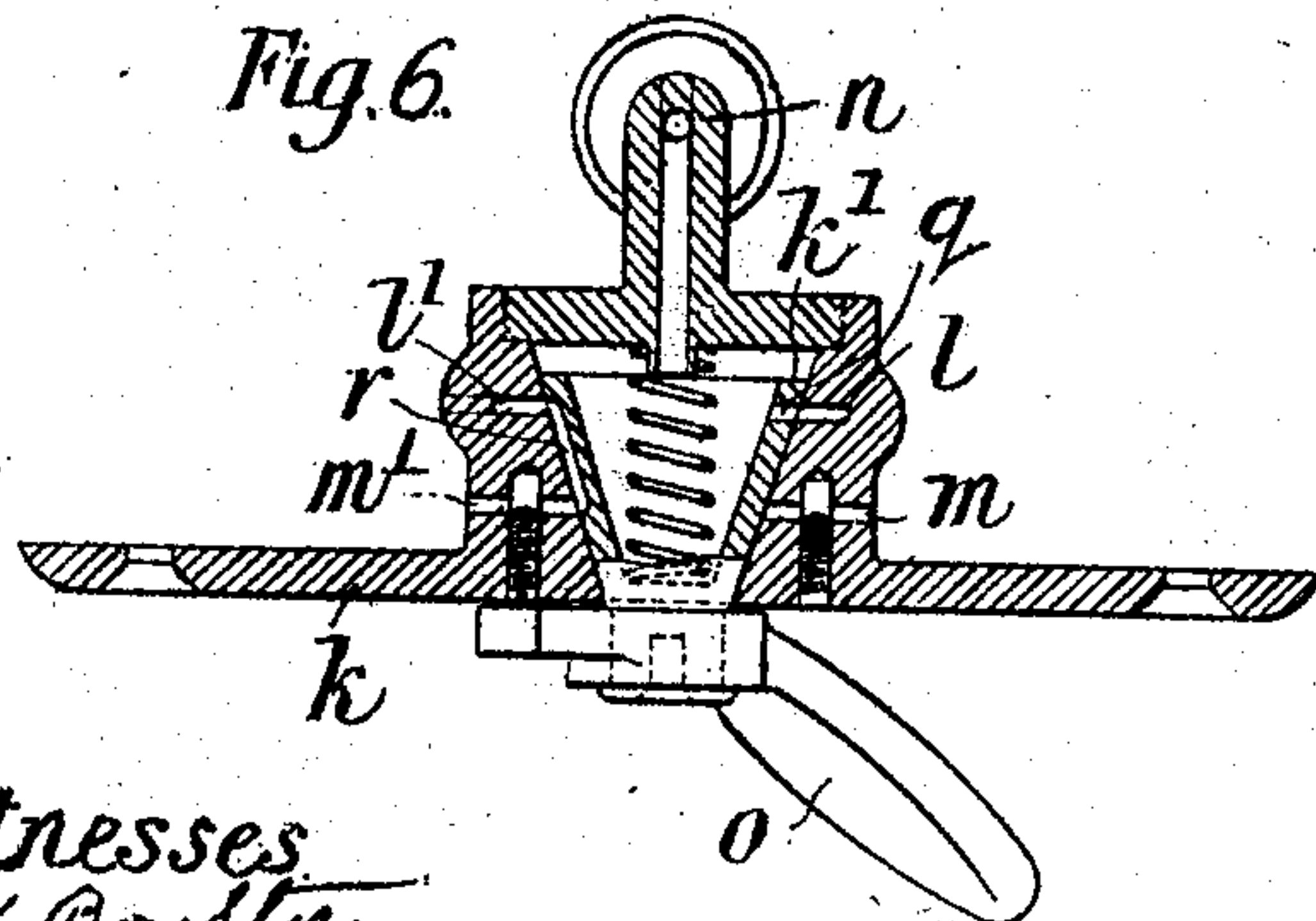


Fig. 6.



Witnesses
W. K. Boulton
J. K. Moore

Inventor
Frank D. Ward
By White & Knott atty.

UNITED STATES PATENT OFFICE.

FRANK DIETRICH WARD, OF HANWELL, ENGLAND, ASSIGNOR OF ONE-HALF TO HENRY PERCY BRADFORD, OF LONDON, ENGLAND.

OPERATING SLIDING DOORS.

No. 806,220.

Specification of Letters Patent.

Patented Dec. 5, 1905.

Application filed August 6, 1904. Serial No. 219,756.

To all whom it may concern:

Be it known that I, FRANK DIETRICH WARD, a subject of the King of Great Britain, residing at 7 Holly Park Terrace, Church Road, Hanwell, county of Middlesex, England, have invented new and useful Improvements in Operating Sliding Doors, of which the following is a specification.

This invention has for its object to provide means whereby sliding doors can be operated by pneumatic pressure, the invention being chiefly intended for operating the sliding doors used upon railway-carriages. According to the said invention each door has arranged in conjunction with it two single-acting cylinders and pistons, means being provided for introducing compressed air alternately into the two cylinders.

In carrying out the invention it is preferable to employ two single-acting cylinders, which are fixed to the upper part of the door and in each of which is a piston carried by a rod secured to a suitable support and held rigidly, the pistons being arranged in such relation to one another that when one piston is at the outer end of its cylinder the other piston is at the inner end of its cylinder. For introducing air into the respective cylinders the piston-rods are advantageously made tubular and are connected with a suitable air-supply controlled by a four-way valve or tap in such a manner that when air is being introduced into one cylinder the air from the other cylinder will be allowed to exhaust. The door is mounted upon runners to relieve the cylinders and pistons from any strain.

To enable the invention to be fully understood, reference is made to the accompanying drawings, in which—

Figure 1 is an elevation of a portion of a sliding door and frame having two single-acting cylinders and pistons applied to it. Fig. 2 is a sectional elevation, drawn to an enlarged scale, illustrating the arrangement shown in Fig. 1. Fig. 3 is a sectional end view of the same. Figs. 4 and 5 are respectively a front and side elevation of a controlling-valve which is advantageously used in connection with the invention, and Fig. 6 is a sectional plan of the same.

a is a sliding door, and *b* is the frame of the opening to be closed by the said door, the lat-

ter, as shown, being suspended from two trolleys *c c*, running upon a rail *d*.

e f are two single-acting cylinders secured to the upper part of the door *a*—for instance, by means of brackets, such as *g g*—and *h i* are the pistons in the cylinders *e f*, respectively. *h' i'* are the respective rods of the said pistons, which rods are made tubular, the passages therein extending into the cylinders, as indicated in Fig. 2. These rods *h' i'* have air-pipes *j j'* connected to them and extend to a four-way valve, such as *k*. This valve, which is shown drawn to an enlarged scale in Figs. 4, 5, and 6, has in it ports *l l'* in connection with the pipes *j j'*, respectively, and other ports *m m'*, through which the air is exhausted, as hereinafter described. The plug *k'* of the cock is made hollow and has a pipe *n* communicating with it and with the compressed-air supply. The plug itself, as shown, is adapted to be moved by a lever *o* through an angle of ninety degrees, stops *p p* serving to limit the movement of the plug. In the plug are formed two ports *q* in connection with the ports *l l'* and two channels *r* for connecting the ports *l m* and *l' m'*. With this arrangement when the plug *k'* is, say, in the position shown in Fig. 7 the air entering the valve through the pipe *n* will pass through the corresponding port *q* in the plug to the port *l* and thence through the pipe *j* to the cylinder *e*, the result being that the door will be moved in the direction of the arrow, Fig. 1, while the air from the cylinder *f* will flow through the pipe *j'* to the port *l'* and thence through one of the passages *r* to the exhaust-port *m'*. Upon the alteration of the position of the plug of the cock through ninety degrees the reverse action would take place—that is to say, air will be admitted through the port *l'* into the cylinder *f* and escape from the cylinder *e* through the exhaust-port *m*.

Although in the foregoing description I have represented only a single door, it will be obvious that a pair of doors or a series of single doors or pairs of doors can be controlled simultaneously by the operation of a single valve if the mechanism of all the doors is operated from the same air-pipes.

By employing two cylinders, as shown in the drawings, all glands or stuffing-boxes surrounding the piston-rods are dispensed with,

and the only packing necessary is that around the pistons. This effects a considerable saving in expense and increases the durability and effectiveness of the apparatus, as will be readily seen.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

10 1. Mechanism for operating sliding doors, comprising among its members, two separate reversely-disposed cylinders, each provided with a piston and means for admitting a motive fluid in rear thereof, said pistons and cylinders being connected the one to a movable door and the other to a stationary part whereby the use of stuffing-boxes for the piston-rods may be obviated, substantially as described.

20 2. The combination with a sliding door, of a pair of separate reversely-disposed cylinders

secured thereto, pistons in said cylinders, connections from said pistons extending in opposite directions and connected to stationary parts, and means for supplying motor fluid to said cylinders separately, substantially as described.

3. The combination with a sliding door, of a pair of separate reversely-disposed cylinders secured thereto, pistons in said cylinders, hollow piston-rods extending through said pistons, extending in opposite directions and secured to stationary parts, and means for separately admitting motor fluid to said cylinders through said hollow piston-rods, whereby the use of stuffing-boxes for said piston-rods is obviated, substantially as described.

FRANK DIETRICH WARD.

Witnesses:

H. D. JAMESON,
F. L. RAND.