

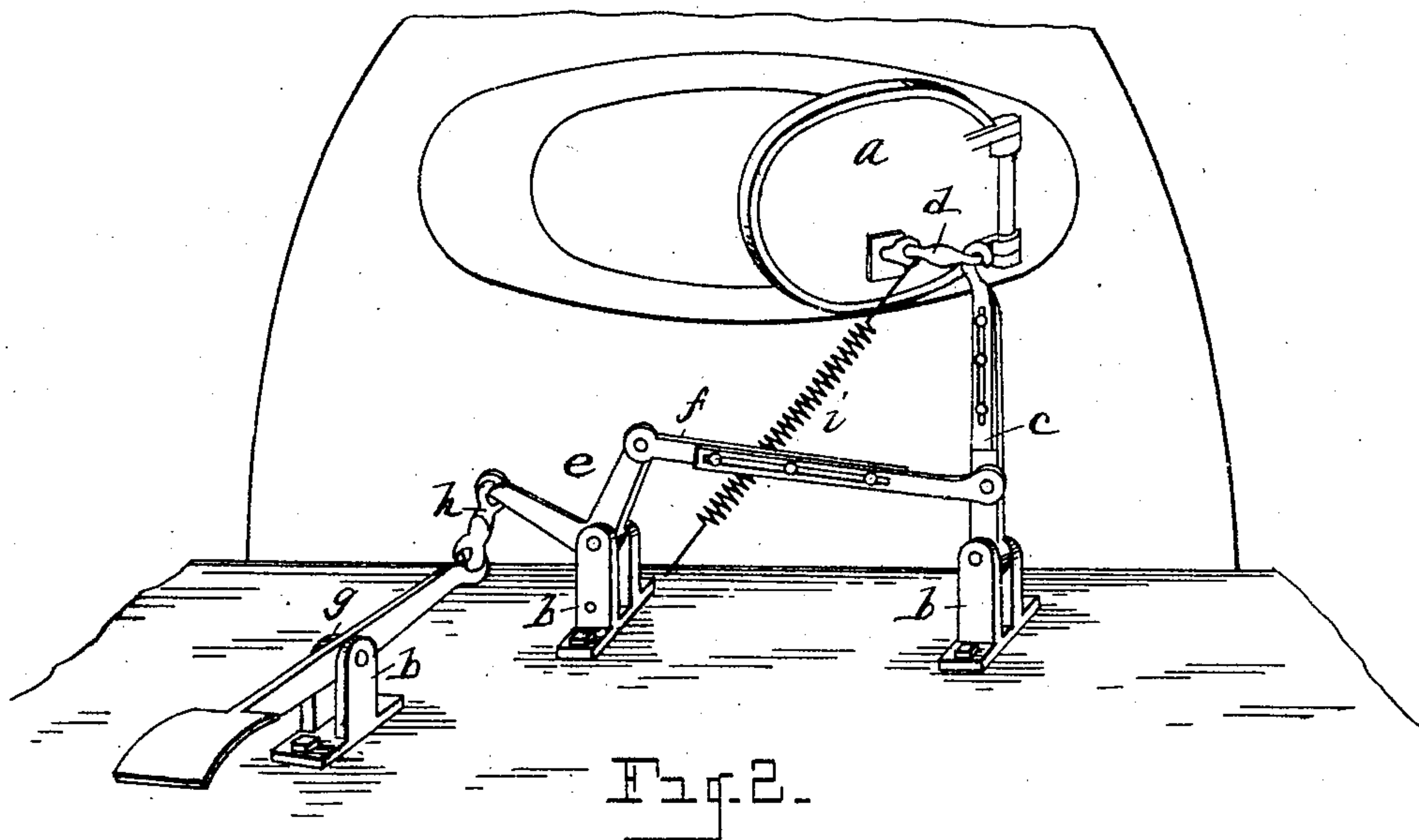
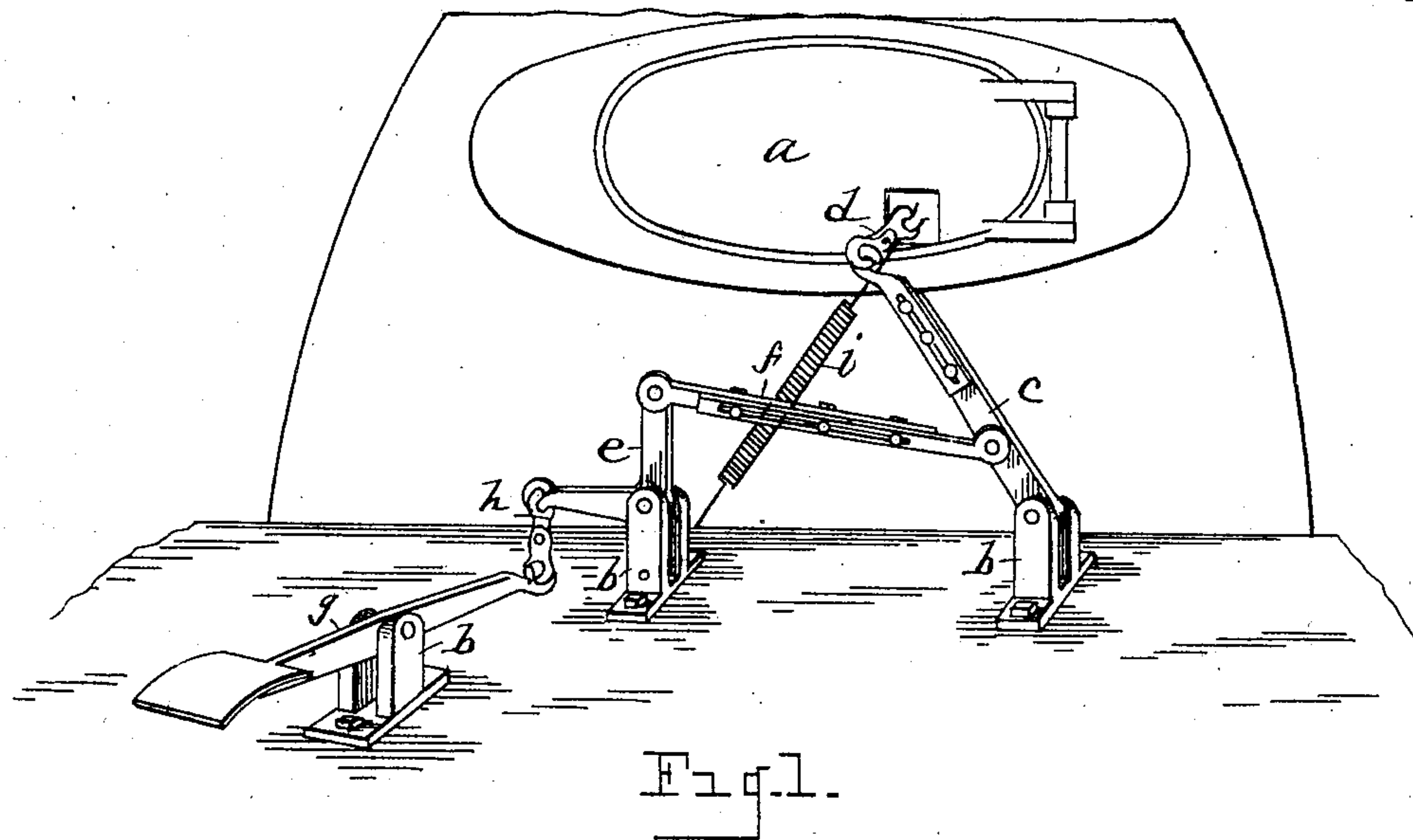
No. 786,360.

PATENTED APR. 4, 1905,

L. IVES.
DOOR OPENING OR CLOSING APPARATUS.

APPLICATION FILED MAY 31, 1904.

3 SHEETS—SHEET 1.



Witnesses:
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M. C. Simmons.

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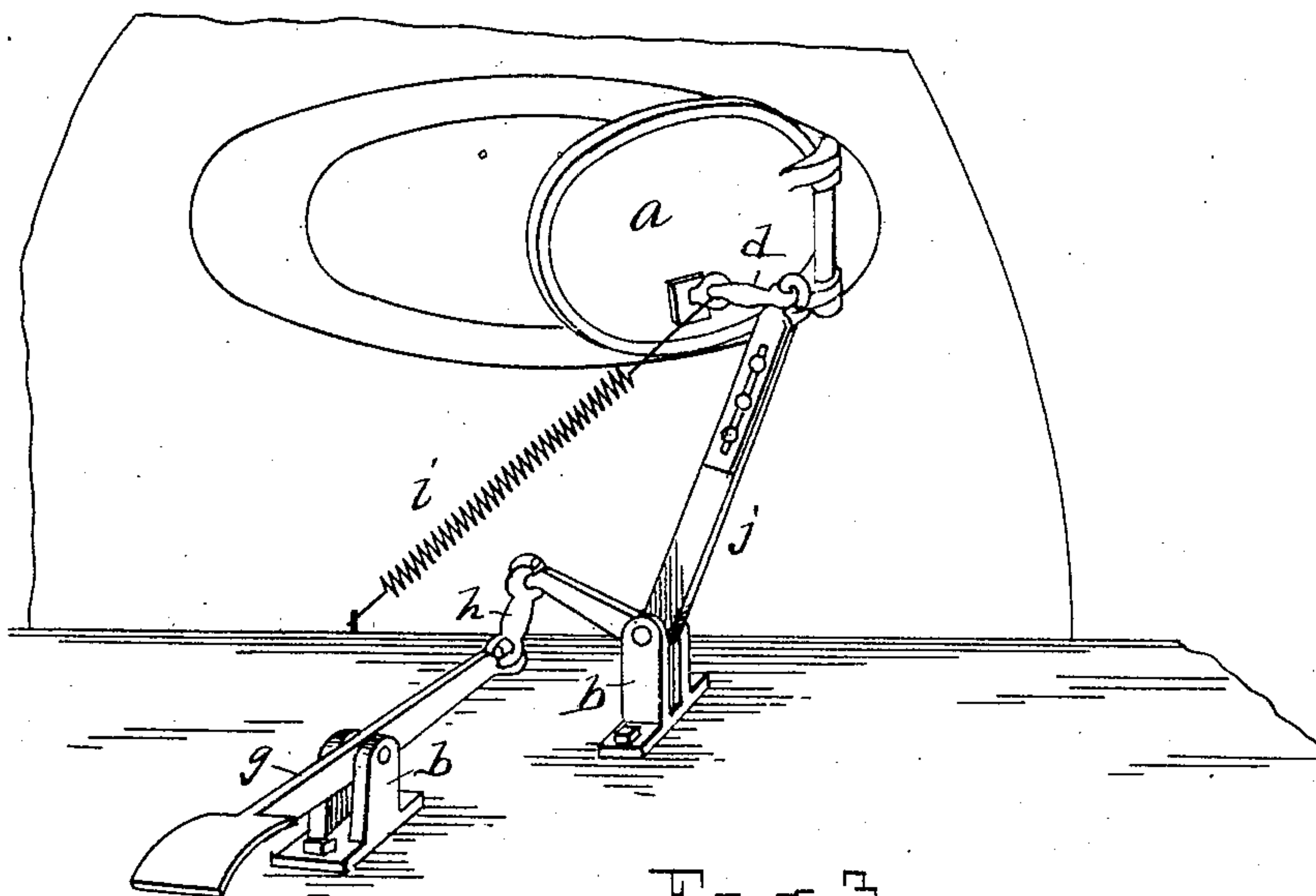


Fig. 3.

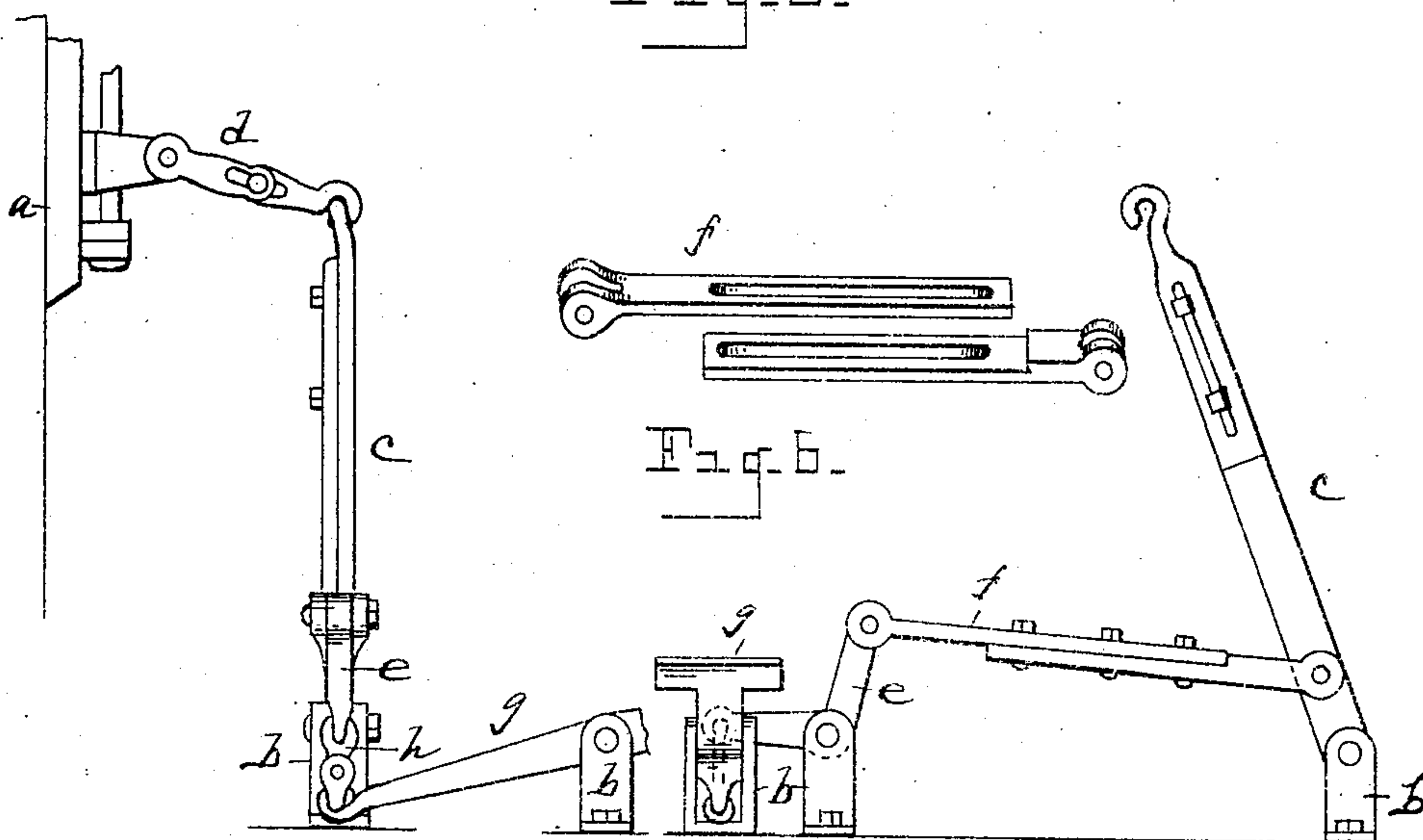


Fig. 4.

Fig. 5.

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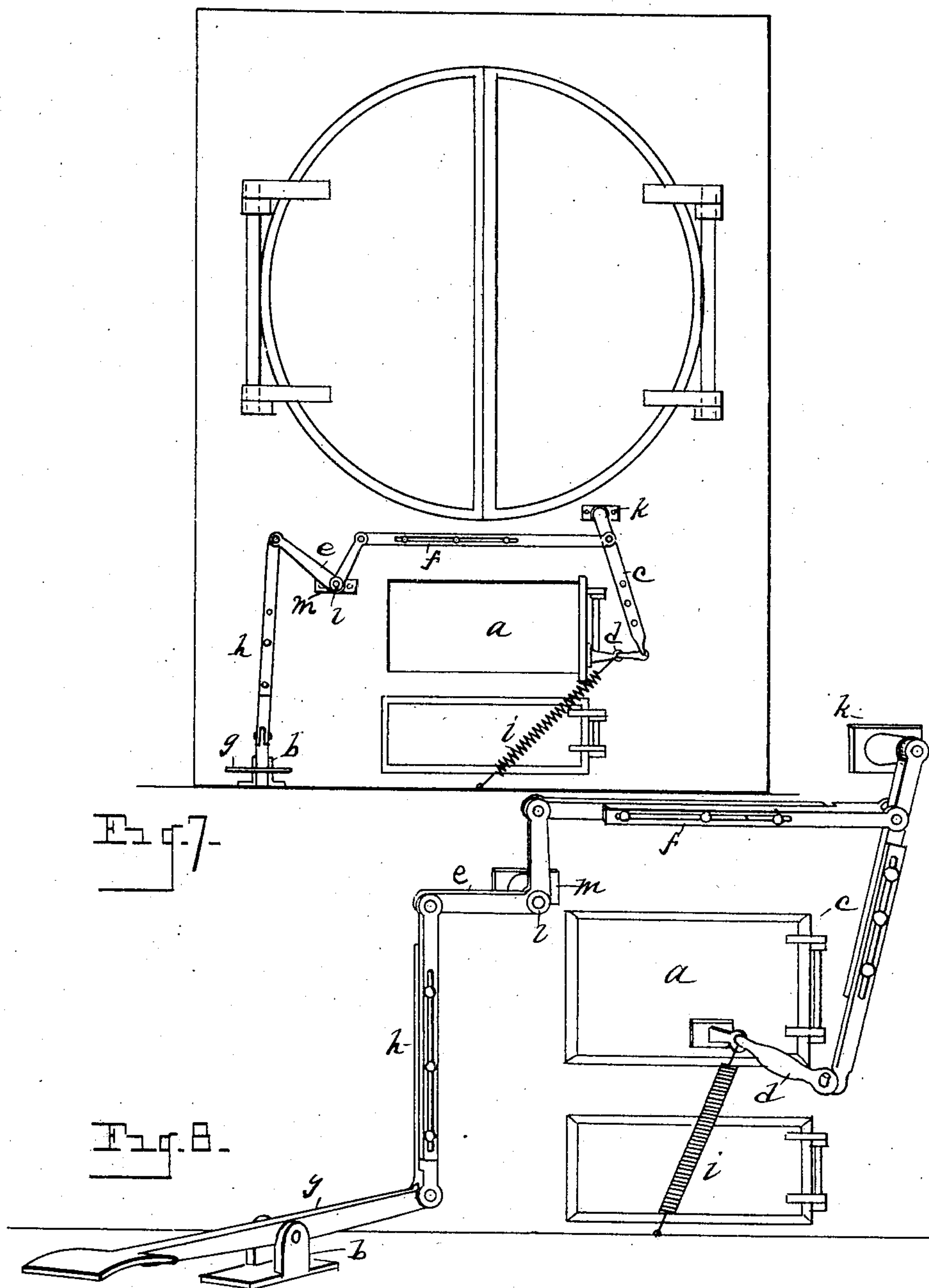
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Witnesses:
O. B. Paenziger.
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UNITED STATES PATENT OFFICE.

LOUIS IVES, OF DEARBORN, MICHIGAN.

DOOR OPENING OR CLOSING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 786,360, dated April 4, 1905.

Application filed May 31, 1904. Serial No. 210,332.

To all whom it may concern:

Be it known that I, LOUIS IVES, a citizen of the United States, residing at Dearborn, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Door Opening or Closing Apparatus, of which the following is a specification, reference being had to the accompanying drawings, which form a part of this specification.

My invention has for its object certain new and useful improvements in door opening and closing mechanism and for analogous uses, my invention being specially applicable for opening and closing the doors of locomotive-furnaces and stationary furnaces, although I do not limit myself thereto. I have shown my invention, however, as applied to the opening and closing of furnace-doors, and in the accompanying specification I have described the same as applied to such particular uses. My invention, however, is applicable for a variety of uses, as for opening and closing other doors, gates, and similar constructions.

To these ends my invention consists of the construction, combination, and arrangement of devices hereinafter described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a view in perspective, illustrating my improved mechanism in position when the door is closed. Fig. 2 shows in perspective the mechanism in position when the door is opened. Fig. 3 illustrates a modification in the construction, the same being in perspective, showing the door in opened position. Fig. 4 is a side elevation of the mechanism. Fig. 5 is a detail view of the mechanism in front elevation, various parts being in position occupied when the door is closed. Fig. 6 represents the two parts of the connecting-arm. Fig. 7 is a view in front elevation, showing the mechanism applied to a stationary boiler, the door being in open position, various portions of the mechanism being correspondingly arranged. Fig. 8 shows still another modification of the device as applied to a stationery engine, the door being closed.

The mechanism shown in Figs. 1 to 5 is

illustrative of the application of my invention as applied to the doors of locomotive-furnaces.

Among the objects of my invention are the following: to enable the door to be opened and closed rapidly, so as not to cool off the fire-box by allowing the door to remain open unduly; to so arrange the mechanism that it may readily be operated by the fireman each time he wishes to throw a shovelful of coal into the fire-box; to provide means to automatically close the door whenever the mechanism is free to move; to so construct and arrange the mechanism that it will effectually lock the door in closed position against any and every liability of its being opened inadvertently or without the proper manipulation of the mechanism.

In the drawings, *a* represents a door to be opened to which my improved mechanism is applied.

As shown in Figs. 1, 2, 4, and 5, the floor of the cab is provided with any suitable supporting devices, as indicated at *b*, upon which various parts of the mechanism may be fulcrumed. Fulcrumed to one of said supports is a lever *c*, having any suitable jointed engagement at one end thereof with the door, preferably by a link *d*, jointedly connected at opposite extremities with a door and with the adjacent end of the lever *c*. Fulcrumed upon another of the supports *b* is a bell-crank lever *e*, connected at one end with a connecting-arm *f*, the arm connecting the bell-crank with the lever *c*. With the opposite end of the bell-crank lever *e* is connected a foot-lever mechanism, (indicated at *g*,) fulcrumed to another of said supports *b*, the connection of the lever mechanism *g* with the bell-crank being a jointed connection, as by a connecting-link *h*, jointedly connected at opposite ends with the bell-crank and with the foot-lever mechanism, respectively.

Various parts of the mechanism are made adjustable—as, for example, the link connections, the connecting-arm *f*, and the lever *c*, these parts being preferably constructed of two parts adjustably engaged the one with the other, respectively, as shown, the two parts

of the arm f being illustrated, for example, in Fig. 6. A spring (indicated at i) is arranged to automatically close the door, the spring being arranged in any suitable manner to accomplish this end. As applied to a locomotive furnace-door the parts are so arranged that the fireman after loading his shovel with coal and turned toward the fire-box may by simply putting his foot upon the lever mechanism g swing open the door quickly, throw in his shovelful of coal, and immediately upon lifting his foot from the lever mechanism the door will automatically swing to closed position. The fireman may thus easily and conveniently open the door each time he desires to throw in a shovelful of coal instead of leaving the door open for a successive number of shovelfuls of coal, the door automatically closing after each shovelful, and thereby preventing cold air rushing in and cooling the fire, thus enabling the fireman to do what is called "one-shovel firing." The upper end of the lever c is so located and arranged that an attempt to open the door without first manipulating the mechanism through the instrumentality of the foot mechanism would simply cause a lateral pressure upon the rocking lever or arm c in a direction at right angles to its path of movement, the strain of such an attempt being effectually resisted by the strength of said lever, so that the door could not be inadvertently opened either by explosive pressure within the fire-box or otherwise and so that when the door is in closed position it is effectually locked by my improved mechanism in such closed position. Instead, however, of employing all of these features above described the lever connected with the door may itself be constructed in the nature of a bell-crank, as shown at j in Fig. 3, said bell-crank fulcrumed to one of the supports b and the foot-lever mechanism being directly connected with one end of the bell-crank, as by intervening link connection h , as shown in Fig. 3. Where a connecting-lever f is employed to connect a bell-crank with an oscillatory lever c , the connecting-arm would be jointedly connected with the lever c above its fulcrum.

Where the mechanism is to be employed for opening the door of a stationary boiler-furnace, it may be desirable, instead of fulcruming various parts to supports upon the floor, to fulcrum the parts above the floor—as shown, for example, in Figs. 7, 8—in which case only the foot-lever mechanism is fulcrumed upon the support upon the floor. The oscillatory lever c , connected with the door, as by a jointed link connection d , may simply be reversed in its arrangement and operation, the upper end thereof being fulcrumed in any suitable manner upon the support k above the door to be opened, while the bell-crank e may also be fulcrumed above the floor,

as shown at l , by any intervening support m . Instead of connecting the foot-lever mechanism with the bell-crank by means of a short link h the link in this instance would need to be elongated, as shown in Figs. 7 and 8.

It will be seen that the oscillatory lever c , whether fulcrumed at the one end or at the other, swings upon a circle in a direction parallel to the closed door, while the door itself swings upon a circle in a different direction, so that, as above observed, a strain upon a door to open it without actuating the foot-lever mechanism would tend to force the lever c in a direction at right angles to the normal line of its movement, so that the door would be effectually locked in closed position until it was desired to actuate it by means of the foot-lever.

I do not limit myself to the use of a spring to automatically close the door, as any means may be employed for this purpose within the scope of my invention. Thus the bell-crank might be so weighted or other suitable parts of the construction, so that the apparatus would be automatically restored to normal position when pressure was relieved from the foot-lever mechanism.

What I claim as my invention is—

1. In a door opening and closing device the combination with a swinging door of an oscillatory lever, an intervening link jointedly connecting said lever with the door, and means to actuate said lever, said lever arranged to oscillate essentially in a plane parallel to the closed door to lock the door in closed position.

2. In a door opening and closing device the combination with a swinging door of an oscillatory lever, an intervening link jointedly connecting said lever with the door, foot-lever mechanism, and means connecting said mechanism with the oscillatory lever, said oscillatory lever arranged to oscillate in a plane substantially parallel with the closed door, whereby a strain of the door upon the stationary lever would be lateral to its plane of oscillation.

3. In a door opening and closing device the combination with a swinging door of an oscillatory lever, an intervening link jointedly connecting said lever with the door, and means to actuate said lever, said lever oscillatory in a plane substantially parallel with the closed door, whereby the strain exerted upon said link connection without manipulating the oscillatory lever would be lateral to its plane of oscillation.

4. In a door opening and closing device the combination with a swinging door of an oscillatory lever jointedly connected with the door and arranged to oscillate in a plane essentially parallel with the closed door, and a foot-lever mechanism connected with the oscillatory lever to actuate said lever, said lever arranged to lock the door in closed position.

5. In a door opening and closing device the

combination with a swinging door of an oscillatory lever jointedly connected with the door and arranged to oscillate in a plane essentially parallel with the closed door, means to actuate
5 said lever, and means to automatically close said door, said lever arranged to lock the door in closed position.

6. In a door opening and closing device the combination with a swinging door of an oscillatory lever jointedly connected with the door
10 and arranged to oscillate in a plane essentially

parallel with the closed door, a foot-lever mechanism to actuate said lever, and means to automatically close the door when pressure is relieved from the foot-lever mechanism. 15

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

LOUIS IVES.

Witnesses:

N. S. WRIGHT,
M. L. SIMMONS.