T. DOWNIE.

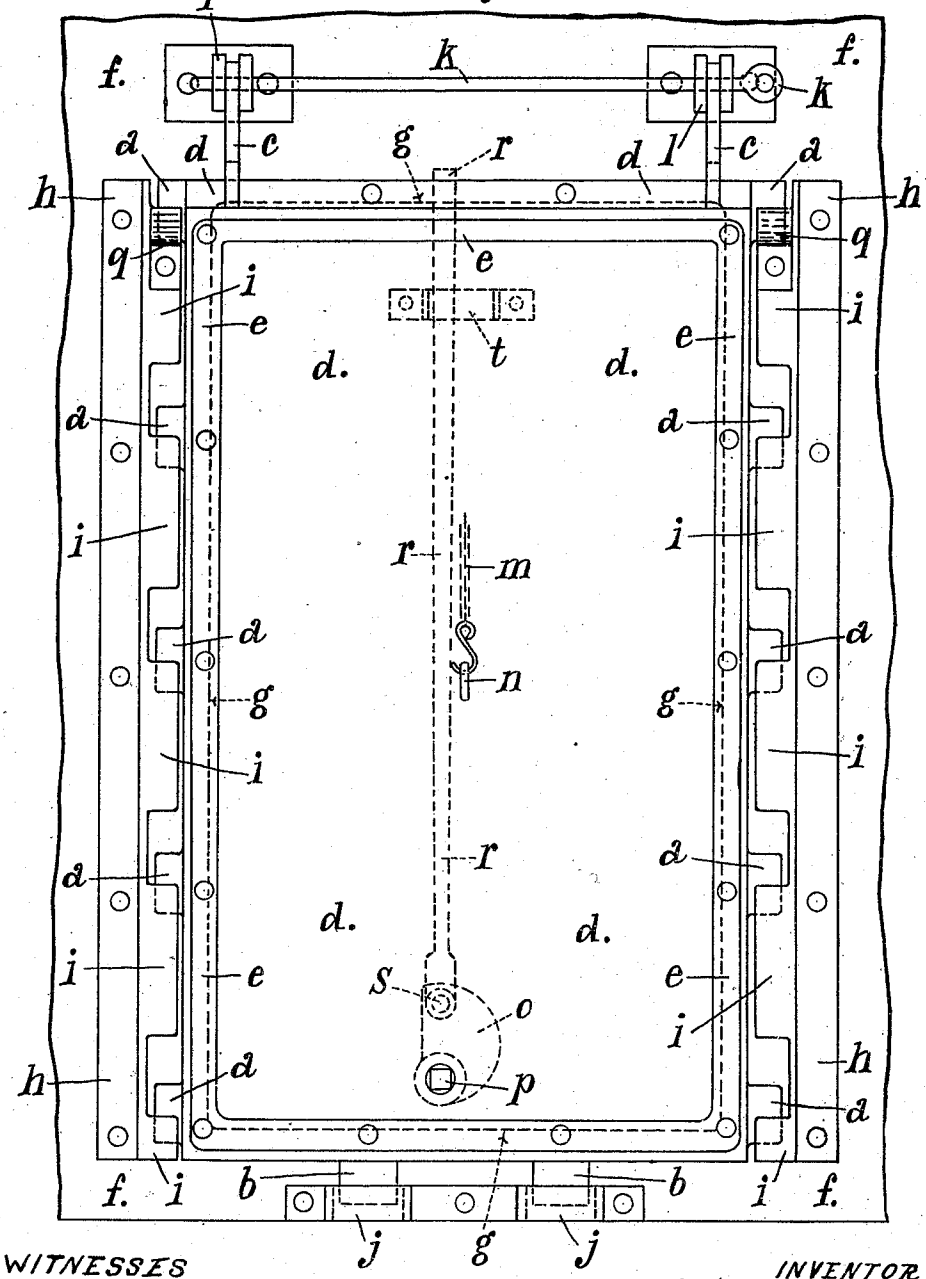
DOOR FOR STEAM GENERATORS, &c.

APPLICATION FILED JULY 16, 1907.

923,156. Patented June 1, 1909.

2 SHEETS--SHEET 1.

Fig. 1.



WITNESSES

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Fig. 2.

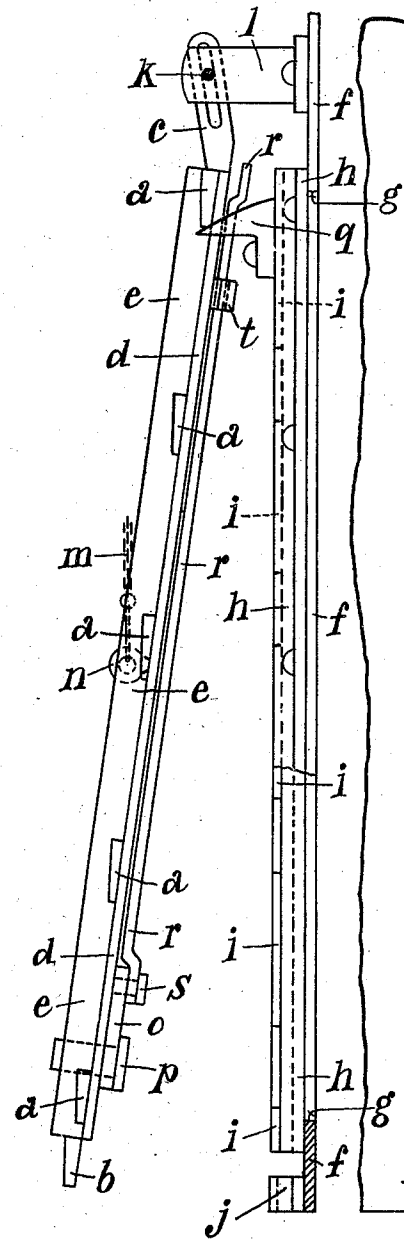
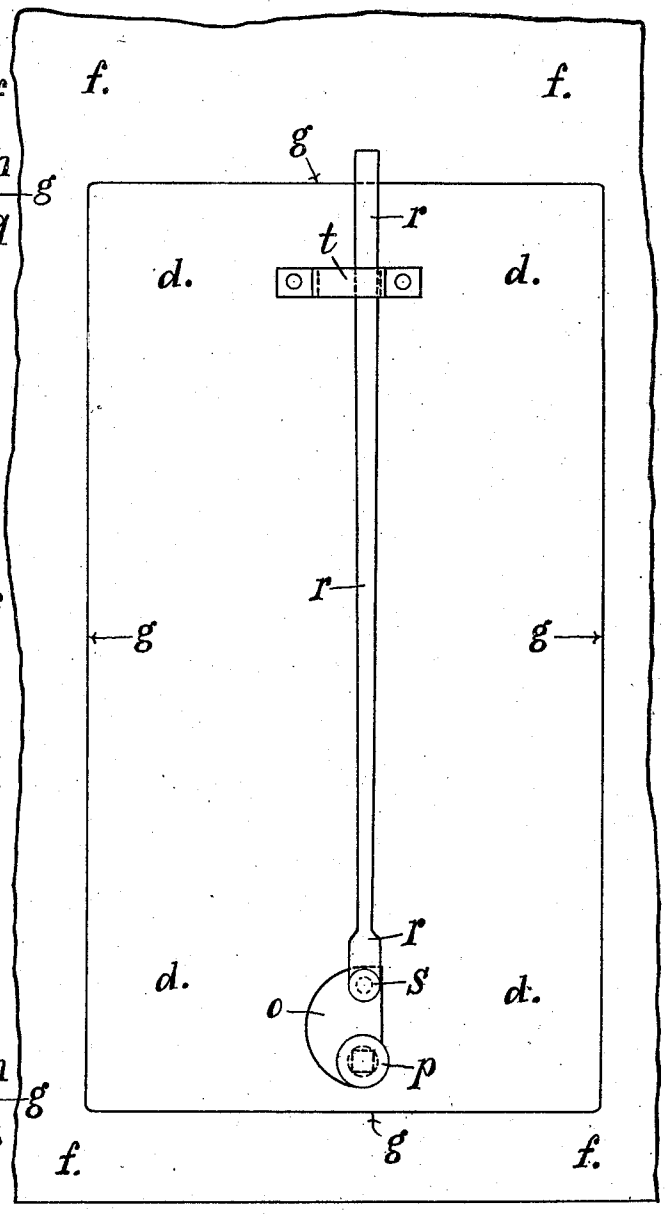


Fig. 3.



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DOOR FOR STEAM-GENERATORS, &c.

No. 923,156. Specification of Letters Patent. Patented June 1, 1909.

Application filed July 16, 1907. Serial No. 384,089.

To all whom it may concern:

Be it known that I, THOMAS DOWNIE, a subject of the King of England, residing at 11 Regent road, Wallasey, in the county of Chester, England, have invented new and useful Improvements in Doors for Steam-Generators, &c., of which the following is a specification.

This invention has reference primarily to the smoke doors of steam generators, that is to say, doors used in connection with chambers of steam generators where access has to be obtained occasionally, or more or less often, for cleaning, and other purposes. Generally, such doors of steam generators are used for the purpose of gaining access to chambers disposed at the discharge end of tubes—as in the case of "fire-tube" steam generators—for the purpose of getting at the tubes, and enabling them to be swept or cleaned, and in the case of damage, easily renewed; while in the case of water-tube boilers, such doors would be employed at the headers, or similar chambers or spaces, and in the casings or walls of the generators, for gaining access to the space between the tubes. But, as above stated, it may be applied as an air-tight or water-tight door, for closing the openings or ways through partitions, bulkheads, walls, and the like, where it is desired to make a practically fluid-tight door, and which can be readily opened or closed and manipulated. For convenience, however, the invention will be described as a door for use as a smoke door or the like on steam generators.

The invention will be described with the aid of the accompanying drawings which illustrate it.

In these drawings, Figure 1 is a front elevation of the door; Fig. 2 is a side elevation, partly in section showing it partly opened; and Fig. 3 is a back view of the door.

A door according to this invention, comprises along each side a plurality of projecting inclined or curved catches *a;* and at the lower edge similar inclined catches *b*. At the upper part it is provided with hinge bars *c*.

The body of the door consists of a plate *d*, and in the case shown, this plate has a stiffening angle bar frame *e*, riveted or fastened to it all around; and at the outside of the vertical side members of this frame the catches *a*, come, they being on the frame, or secured to the plate *d*, or both.

f is the plate or partition in connection with which the door operates; and the hole in the plate over which the door is adapted to fit when closed, is represented by the dotted line marked *g* in Fig. 1. Along each side of this hole there is a frame or bar *h*, comprising or containing a plurality of projecting holding parts *i*, under which the catches *a* of the door are adapted to slide in the locking or closing action, and by means of which the door is pressed toward the door frame or surface in connection with which it fits and works, when lowered down by gravity. At the lower edge of the doorway, holders *j* are provided for the lower projecting catches *b* to engage with.

The hinge bars *c* at the upper part of the door are so made as to incline or lie obliquely to the plane of the door, so that when the door is lifted, the upper part of it can and will move outward, and vice-versa. These hinges in the case shown, consist of the inclined bars *c*, having correspondingly inclined slots in them, a hinge pin *k*, and supported by projecting carriers or brackets *l*.

The door is adapted to be lifted and released by means of a chain or rope or the like *m*, secured to it at *n*, and operated by an overhead pulley, or tackle in any suitable known way. Or, it can be lifted and released by a cam *o*, mounted on and operated by a spindle *p* on the inside of the door, the cam *o* when operated, being adapted to press on the edge of the plate *f*, forming the threshold of the door opening in it. When the door has been released, as hereinafter described, it can then be raised about the hinge pin *k*, by the chain or rope *m* in the usual way.

To release the door, to enable it to open, the catches *a* and *b* must be lifted so that their lower edges will stand above the upper edges of the projecting holders *i* and *j*, respectively, in which position it will be free to swing forward upon the hinges; the catches *a*, in this action, passing through the spaces or gaps between the holders *i*. And, similarly, in closing the door, the catches and the holders must take this relative position.

In connection with the door frame, at each side and at the upper part, a stationary inclined device or cam *q* is provided, which projects out beyond the face of the door; they being fixed, in the case shown, on the outer surface of the uppermost holder *i*. And upon these, the uppermost catches *a* will slide or move in the operation of the door.

Namely, in closing the door, and pressing it inward at its lower part, these catches *a* will slide on the upper surface of the cams or inclines *q*, and will so raise the door, that the catches *a* will pass over, in this closing action, the upper edges of the holders *i* (and the catches *b* will also pass over the upper edges of the holders *j*); and so they—the cams or inclines *q*—guide the whole door into position for closing. And then, when it is pressed into the closed position, namely, so that the plate *d* will be close up to the plate *f*, the door will slide down, with the inclined catches *a* behind the holders *i*, and the catches *b* within the holders or latches *j*; and these parts being suitably inclined or curved on their engaging surfaces, they will press the door firmly into position, making a close fit of the door plate *d* all around its edges, on the edges or frame of the plate *f* around the doorway or aperture (*g*) therein.

The door is adapted to be raised and lowered by the cam *o* from outside by a handle or key fitted on to the spindle *p* and when it is lifting it, the edge of the cam acts on the edge of the lower part of the doorway plate *f*, and so by turning it—the spindle *p*—all the catches are raised out of the holders *i* and *j* as described, and the door, being released, can then swing by its own gravity, about its hinge pin *k*, which lying outside and away from the plane of the door, tends to make it swing outward. The door can then be opened to its full extent by the usual or any known suitable means.

In some cases, the door will rest when closed on the doorway plate *f*, metal to metal; while in others, a seating of a suitable fibrous soft material may be provided on the edge of the door, or the edge of the plate around the doorway, by which a close joint between the door and its frame or seat, is provided.

With regard to the action of the inclined projecting devices or cams *q*, as above stated, they serve to lift the door by the uppermost latches *a* riding upon them when the door is pressed toward the doorway plate, and when they have been pressed a certain distance, these upper wedges will move into the space within the upper holders or latches *i*, similarly as the other latches or wedges pass behind the other holders or catches. The converse arrangement of the devices may be employed, if desired.

In some cases, as in steam generators wherein "forced" draft is employed, and the heat acting on the door is great, the door is held to the plate *f* at the top edge as well as the bottom edge; and this is effected by employing a bolt *r* on the back of the door plate *d*, fastened by a pin joint *s* to the cam *o*, and guided by the guide *t*, whereby when the door is shut and the cam *o* in its upper position, the end of the bolt will be shot behind the plate *f* at the top of the doorway so that it—the door—cannot move away from the plate *f*, by warping tendencies due to heat, but is held rigidly in position, fitting closely against it.

What is claimed is:—

1. A door for steam generators comprising a door-way having vertical recesses in its side edges, a door having projections on its side edges adapted to engage with said recesses when the door is closed, a horizontal rod located above the door-way, and slotted hinges secured to the top of the door with the slots receiving said rod.

2. A door for steam generators comprising a doorway having vertical recesses in its edges and cam shaped projections near its upper end, a door having inclined projections on its edges adapted to engage with said recesses when the door is closed and the two upper projections engaging with the cam shaped projections on the doorway when the door is partially opened, plates secured to the upper end of the door having inclined slots therein, and a rod on the doorway adapted to engage in the said slots to form a hinge for the door.

3. The combination of a door having wedge shaped projections at its edges, and slotted hinge bars, a doorway frame having recesses in its edges adapted to engage with said projections on the door, hinge pins with which the hinge bars have sliding movement. cam shaped devices on the upper part of said frame adapted to engage with the uppermost projections on the door for enabling the door to be raised and lowered.

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

THOMAS DOWNIE.

Witnesses:

SOMERVILLE GOODALL,

GUY OKE.