

(No Model.)

D. HOLOWAY.

STEAM OPERATED FIRE DOOR.

No. 535,138.

Patented Mar. 5, 1895.

Fig. 1.

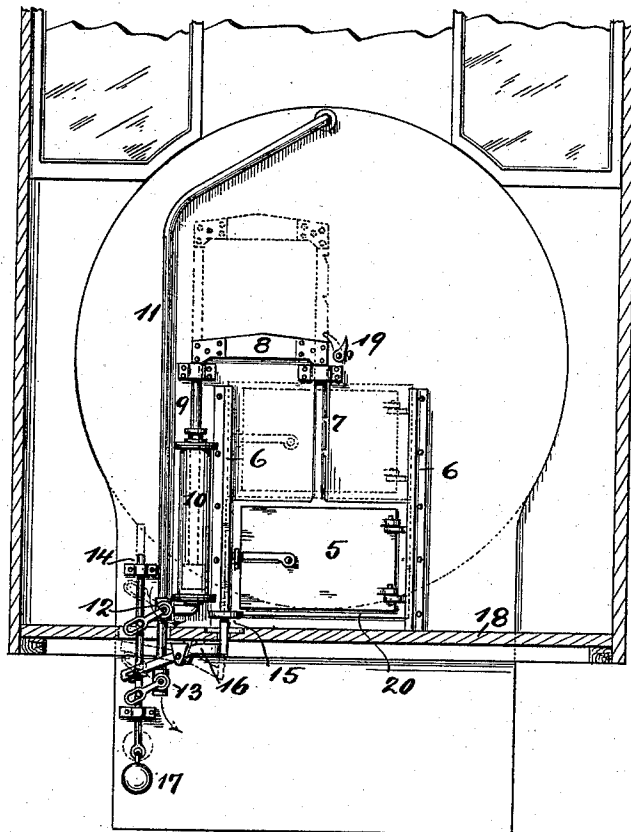
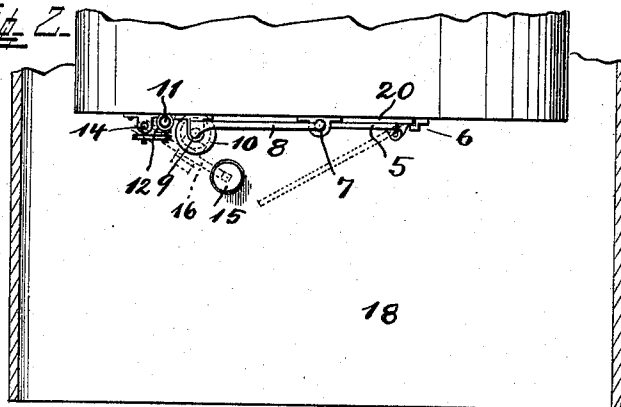


Fig. 2.



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STEAM-OPERATED FIRE-DOOR.

SPECIFICATION forming part of Letters Patent No. 535,138, dated March 5, 1895.

Application filed November 16, 1894. Serial No. 529,029. (No model.)

To all whom it may concern:

Be it known that I, DAVID HOLOWAY, a citizen of the United States, and a resident of Remington, Hamilton county, State of Ohio, have invented new and useful Improvements in Steam-Operated Fire-Doors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, attention being called to the accompanying drawings, with the reference-numerals marked thereon, which form a part of this specification.

This invention relates to improvements in fire-doors for furnaces and in the operating means to open them for admission of fuel when such doors are connected to and opened by a steam-operated piston. It is particularly intended for use on steam-boiler furnaces and among them especially on those of locomotives.

It is a well known fact, that the influx of cold air through the fire-door has quite an injurious effect on the steam-producing capacity of the boiler by chilling the upper exposed part and the draft flues of it. This influence makes itself mostly felt in locomotive boilers, where with their many draft-flues and forced draft, the cold air admitted by the incessant opening of the fire-door, due to an almost continuous firing, has the most serious consequences and often cools the boiler to such an extent, that it becomes unable to hold the necessary steam-pressure which the engine requires on certain occasions, as for instance when pulling heavy loads on up-grades. The object of this invention is therefore to counteract this undesirable effect as much as possible by lessening the time which the fire-doors have to remain open by providing a treadle and suitable connections to the inlet and exit valves of the steam-cylinder which operates the fire-door, which treadle the fireman, who is encumbered with his shovel, may operate with one of his feet without having to lay the shovel aside first.

Another feature of my invention is the capacity to open the fire-door in the ordinary way and independent from the steam-operated parts, the advantage of which is obvious.

In the following specification is found a full description of my invention, its operation,

parts and construction, which latter is also illustrated in the accompanying drawings, in which—

Figure 1, shows in an elevation, partly in section, a front-view of a locomotive boiler-furnace with its fire door and the means for opening it in position. Fig. 2, is a top-view, partly in section, of the parts shown in Fig. 1.

In the present mode of firing locomotive boiler-furnaces, the fireman stands between the fire-door in the furnace-front and the tender with the fuel, or coal-pile. To lessen as much as possible the time which the door has to remain open, he fills his shovel first and moving toward the furnace-front, he sets it down while he opens the former. Then he lifts up the shovel again and throws the fuel in, after which he closes the door, as soon as he is able and the withdrawal of the shovel permits him to do it. Thus it is seen that the door is open quite a time, considering the circumstances and by reason of the fact, that the fireman has to stop with the loaded shovel in his motion toward the door, until this latter is opened, while the otherwise unnecessary setting down of the shovel and its picking up again, is very fatiguing and practically doubles the labor.

The door 5, moving in guides 6, and having at its top an upwardly extending rod 7, is connected by means of a cross-piece 8, to the upper end of a piston-rod 9, which is properly guided and carries a piston reciprocating in an upright steam-cylinder 10. Thereby door and piston are caused to move together in their upward and downward motions. The steam-cylinder receives steam from the boiler through a steam-pipe 11, its admittance below the piston being controlled by a valve 12. This latter together with another, similar valve 13, is by means of keys operatively connected to a rod 14, the actuation of which causes the two valves to work simultaneously, but in opposite function, that is, the upper or inlet valve opens to admit steam below the piston, while the lower one closes. The actuation of rod 14, is obtained by means of a treadle 15 and suitable lever-connection 16. The treadle is so located as to be in the path the fireman traverses when approaching the fire-door, being thus brought within convenient reach. The operation of firing becomes

now very much simplified and will be readily understood.

The fireman, having filled his shovel, approaches the door, taking care to step with one foot upon the treadle, whereupon by reason of rod 14, opening valve 12, to permit the steam to raise the piston, the door is also raised and opens in an instant and is sufficiently open by the time the former is fully in position and able to throw the fuel. Immediately after the throw, by stepping back, the treadle is released, when rod 14, by means of a counter-weight 17, or an equivalent spring preferably below floor 18, of the locomotive cab, closes valve 12, and opens the outlet valve 13, whereupon the door descends by its own weight, the equally descending piston expelling the steam before it. These events follow each other so rapidly, that they continue with uninterrupted succession and no time is lost, nor is it required to set the filled shovel down first before the door is opened and the fireman with one continuous motion and swing raises up the filled shovel from the tender and turning throws it into the door. This latter does not remain open any time at all. Its closure follows immediately after the opening and the admission of cold and chilling drafts is reduced to the lowest unavoidable minimum.

The door may be held open when cooling is intended, to let the steam go down by means of a pawl 19, engaging with notches in rod 7. This pawl is thrown in at the proper time when the door descends.

In order to gain access when there is no steam, to raise the door, as for instance when starting the fire, the sliding door is practically in two parts, one being the door proper, the other being a frame 20, to which it is hinged like an ordinary fire-door. Except at the instance mentioned however, the two operate and move together.

As will be seen, the operation of firing is thus made very convenient and its time very much shortened whereby the injurious effects of cold drafts against the steam-producing capacity of the boiler are greatly lessened.

The means of construction and operation are very simple and the latter is practically without expense as far as use of steam is concerned, very little being needed to lift the weight of the door and requiring as to cylinder 10, only a pipe of small diameter.

Having described my invention, I claim as new—

1. In a steam-operated fire-door for furnaces, the combination of a sliding frame 20, guides therefor, a door hinged thereto, a steam-cylinder with a reciprocating piston, operative connection between the latter and the sliding frame and means to control the admission and exhaust of steam of the steam-cylinder.

2. In a steam-operated fire-door for furnaces, the combination of the sliding door 5, a steam-cylinder with a reciprocating piston, operative connection between the latter and the fire-door, valves to control the admission and exhaust of steam of the steam-cylinder, a treadle whereby these valves are actuated and operative connection between the former and the latter.

3. In a steam-operated fire-door for furnaces, the combination of the sliding fire-door, a steam-cylinder with a reciprocating piston, operative connection between the latter and the sliding door, valves to control the admission and exhaust of steam of the steam-cylinder and a rod 14 whereby they are connected to each other so as to operate simultaneously, but in opposite function.

4. In a steam-operated fire-door for furnaces, the combination of a sliding frame 20, a rod 7, thereon, a door carried thereby and guides 6, on which it moves, a steam-cylinder with a reciprocating piston and piston-rod, a cross-piece 8, connecting this latter with rod 7, of the sliding frame and means to control the admission and exhaust of steam of the steam-cylinder.

5. In a steam-operated fire-door for furnaces, the combination of the sliding fire-door, a steam-cylinder with a reciprocating piston and upwardly extended piston-rod, operative connection between the latter and the sliding door, a steam-pipe 11, to supply steam to the cylinder below the piston therein, connecting by a branch to the lower end of the cylinder and continued beyond said branch to form an open-ended exhaust pipe, valves 12 and 13, on the steam-pipe, to either side of its branch leading to the steam-cylinder, said valves normally so set, that when one is open the other is closed, a sliding rod 14, to which these valves are connected in the position as described and means to reciprocate the sliding rod 14.

6. In a steam-operated fire-door for furnaces, the combination of the sliding fire-door, a steam-cylinder with a reciprocating piston, operative connection between the latter and the fire-door, a steam-pipe 11 to supply steam to the cylinder below the piston thereof, an inlet valve 12 and an exhaust valve 13 in the steam-pipe, said valves normally so set, that when one is open, the other is closed, a sliding rod 14, to which these valves are connected in their normal position and a treadle-operated lever 16, connected to the lower end of rod 14, to reciprocate the latter for the purpose of actuating the valves.

In testimony whereof I hereunto set my signature in presence of two witnesses.

DAVID HOLOWAY.

Witnesses:

C. FINN,

C. SPENGEL.