

(No Model.)

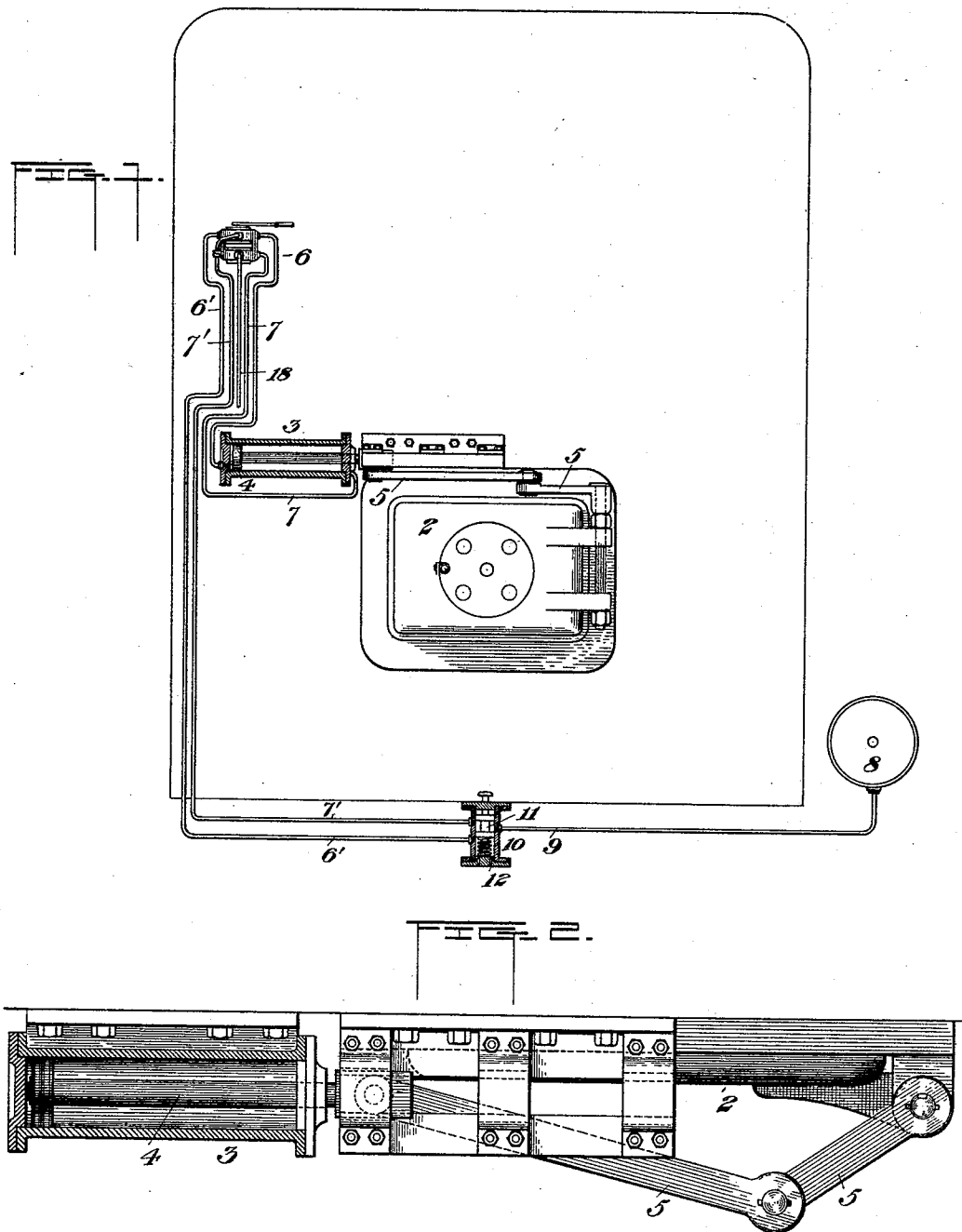
2 Sheets—Sheet 1.

O. H. CLARK.

APPARATUS FOR OPERATING FURNACE DOORS.

No. 498,507.

Patented May 30, 1893.



Witnesses

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H. M. Corwin

Inventor

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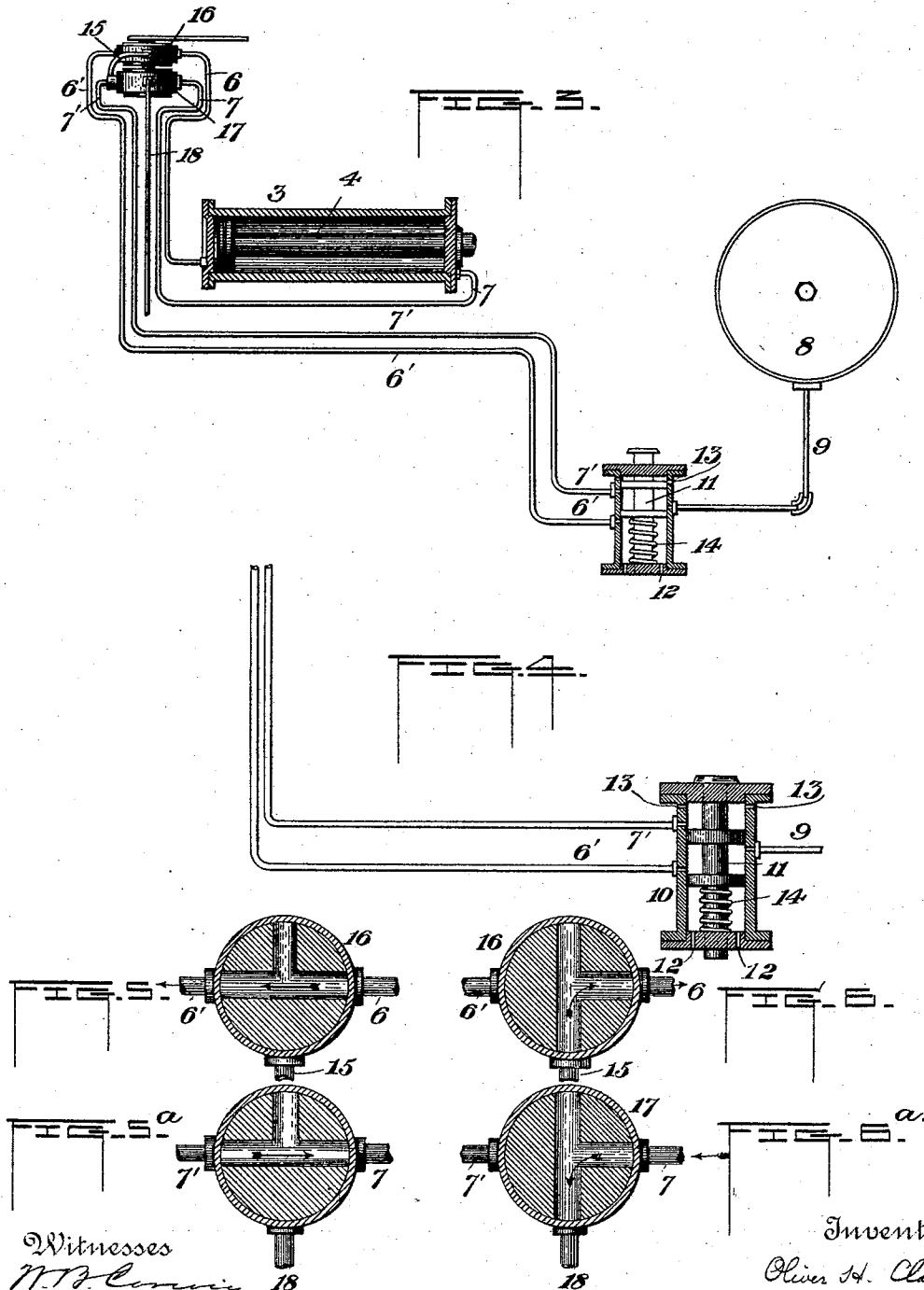
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UNITED STATES PATENT OFFICE.

OLIVER H. CLARK, OF SAGINAW, MICHIGAN.

APPARATUS FOR OPERATING FURNACE-DOORS.

SPECIFICATION forming part of Letters Patent No. 498,507, dated May 30, 1893.

Application filed November 25, 1892. Serial No. 452,968. (No model.)

To all whom it may concern:

Be it known that I, OLIVER H. CLARK, of Saginaw, in the county of Saginaw and State of Michigan, have invented a new and useful Improvement in Apparatus for Operating Furnace-Doors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a furnace-door provided with my improved actuating motor. Fig. 2 is a plan view of the door and motor on a larger scale. Fig. 3 is a diagram view, showing the valves. Fig. 4 is a sectional view, showing the valve in its second position. Figs. 5 and 5^a, and 6 and 6^a are horizontal sectional views, showing auxiliary valves. In Figs. 1, 2 and 3, the actuating motor is shown in longitudinal section.

When a locomotive engine is running at high speed, as is the case when drawing certain passenger trains, especially those making what are known as "through runs," or when the draft on the locomotive is great, as with long and heavily laden freight trains, the fireman, to prevent the chilling of the furnace and consequent lowering of steam-pressure, delivers each shovel of coal to the furnace and closes the door as quickly as possible. The opening and closing of the furnace-door with each shovel of coal are much of the labor of firing, and the tendency on the part of the fireman when a very high and constant pressure of steam is not required is to lessen this labor. The door is not closed after the delivery of each shovel of coal, nor is the work done so quickly. The constant admission of large volumes of cold air in this way not only reduces the temperature thus requiring a greater supply of fuel, but, by chilling and contracting of the furnace, boiler flues and entire heating surfaces, permanently injures them.

My invention is designed to effect an economy of fuel, and to prevent the injurious chilling of the furnace by providing means by which the door can be operated rapidly and efficiently. In doing this, I also accomplish a great saving of labor on the part of the fireman.

In the drawings, 2 represents a furnace-door. 3 is a motor cylinder, adapted to be op-

erated by suitable motive fluid, under pressure—preferably compressed air—and having a piston 4, connected by suitable lever mechanism 5 with the door 2. Said lever mechanism 5 comprises a lever projecting from the door, and a pitman connecting said lever with the piston. By admitting motive fluid into the proper end of the cylinder, its piston is projected or retracted and the furnace-door 60 opened or closed correspondingly.

6 and 7 are pipes entering the opposite ends of the cylinder for the supply and exhaust of motive fluid.

8 is a reservoir of compressed air. As shown, 65 it is the regular auxiliary reservoir of the air-brake. It is provided with a pipe 9 leading therefrom to a valve-chamber 10, having pipes 6', 7', leading therefrom and having a valve 11, adapted to connect the pipe 9 with either one of the pipes 6', 7', and the other of the latter pipes with an exhaust-port 12 or 13. When in the position shown in Fig. 3, the pipe 9 is connected with the pipe 7' and the pipe 6' with exhaust ports 12, but in Fig. 4 the valve is shown in the position which it occupies when depressed by the foot of the fireman, when the pipe 9 is connected with the pipe 6', and the pipe 7' connected with the exhaust-ports 13. When in the position shown 80 in Fig. 3, compressed air from the reservoir 8 passes through the pipes 9, 7' and 7 to the end of the cylinder 3, forcing the piston to the other end, and holding the furnace-door shut, while the air exhausted from the other end 85 of the cylinder passes through the pipes 6, 6', to the exhaust-ports 12. If the valve be shifted to the position shown in Fig. 4, the compressed air passes through the pipes 6' and 6 to the cylinder, moving the piston back and swinging open the furnace-door.

In practice I set the valve 10 at a place where the fireman can operate it with his foot when he is about to charge coal into the furnace, and provide it with a spring 14, which 95 keeps it in the position of Fig. 3, as its normal position, thus holding the door shut until the valve is depressed. When so constructed, the fireman, before delivering each shovelful of coal, depresses the valve, whereupon the door 100 at once flies open; then, after delivering the coal, he releases the valve, thus causing the

door to shut; the operations being performed rapidly and without exertion on his part.

It is desirable that there should also be means by which the fireman may operate the door without leaving his seat to depress the foot-valve. For this purpose, I provide a branch connection 15 between the pipes 7' and 6' (or 6' and 7), and valves 16 and 17, by which the pipe 7' may be connected with the pipe 6, and the pipe 7 connected with an exhaust port or pipe 18. These valves, shown in detail in Figs. 5, 5^a, 6, and 6^a, are operated by a single lever or stem, and may, if desired, be comprised in one case or structure. Normally, they stand in the position shown in Figs. 5 and 5^a, in which the pipes 6' and 7' are connected with the pipes 6 and 7 respectively. If, however, they be turned into the position shown in Figs. 6 and 6^a, the pipe-connections are crossed, the pipe 7' is put into communication through the pipe 15 with the pipe 6, and the pipe 7 connected with the exhaust-pipe 18, whereupon the air, which before passed through the pipe 7 and held the furnace-door closed, now passes through the pipe 6 and opens the door. By restoring these valves to their original position, the door will be at once reclosed.

The advantages of my invention will be appreciated by those skilled in the art. The apparatus is simple and effective, and the means of not only economizing fuel and reducing materially the wear and tear of the furnace, but of saving labor. It may be applied to the doors of furnaces other than locomotives.

Without limiting myself with strictness to the precise form of apparatus shown in the drawings, which in some respects may be modified within the scope of my invention as defined in the claims, I claim—

1. The combination with a furnace-door, of a motor connected therewith and adapted to operate the same, a fluid-supply for the motor, connected with the motor, and a foot-valve and a hand-valve controlling the connections of the motor with the fluid-supply, and each adapted to reverse said connections; substantially as described.

2. The combination with a furnace door, of a motor connected therewith and adapted to operate the same, pipes 6, 7, 6', 7', leading therefrom, an interposed valve 16, 17, controlling the same, a fluid-supply, and a second valve controlling communication of the fluid-supply with said pipes; substantially as described.

3. The combination with a furnace-door, of a motor comprising a cylinder and plunger connected therewith, a valve situate in position to be operated by the foot, and controlling pipes leading to different parts of the motor, and a second hand-valve constructed to cross the connection of said pipes with the motor; substantially as described.

In testimony whereof I have hereunto set my hand this 7th day of October, A. D. 1892.

OLIVER H. CLARK.

Witnesses:

E. M. JOSLIN,

MARY C. FOWLER.