

No. 714,962.

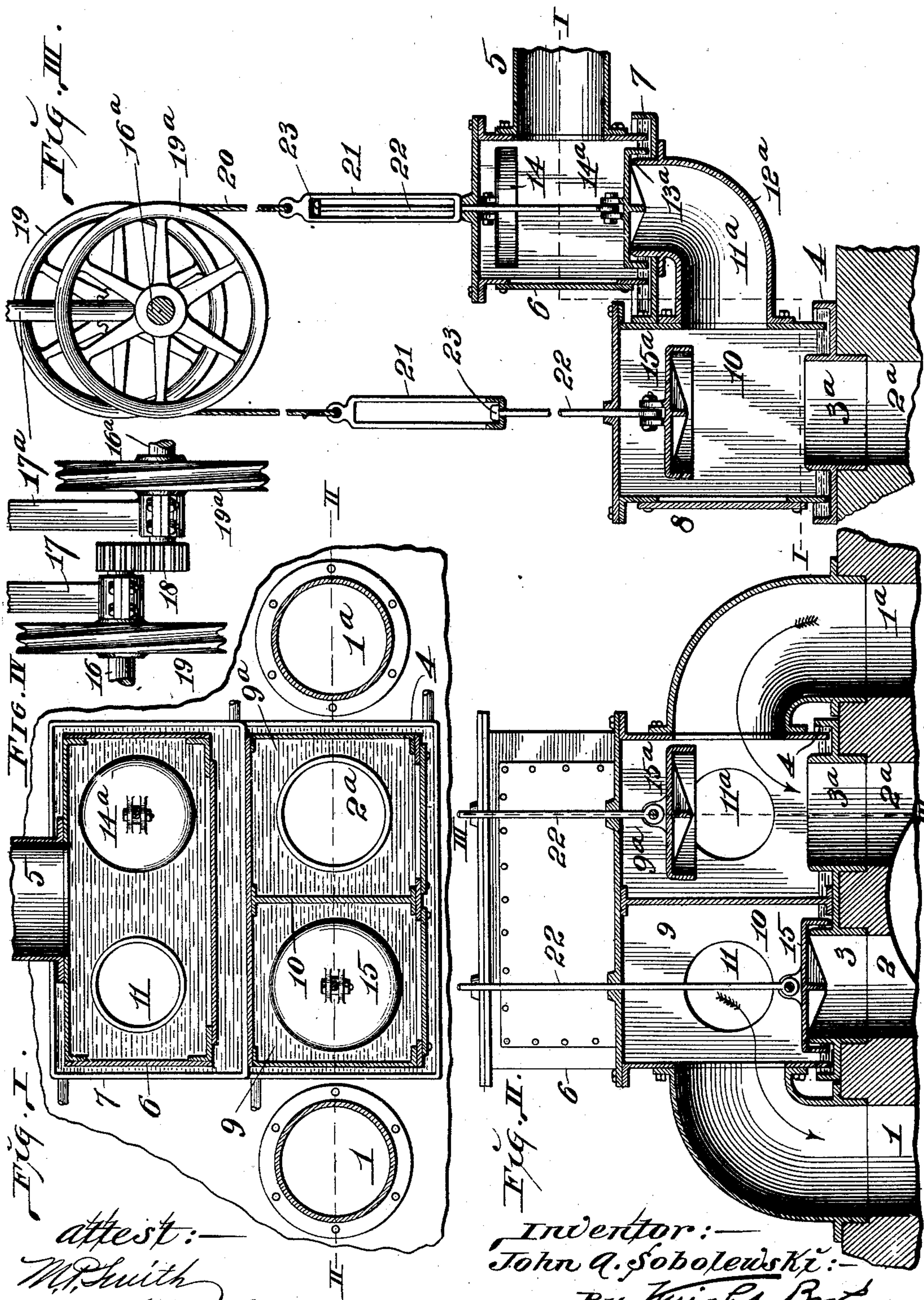
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GAS VALVE APPARATUS FOR OPEN HEARTH FURNACES.

(Application filed June 9, 1902.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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GAS-VALVE APPARATUS FOR OPEN-HEARTH FURNACES.

SPECIFICATION forming part of Letters Patent No. 714,962, dated December 2, 1902.

Application filed June 9, 1902. Serial No. 110,753. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. SOBOLEWSKI, a citizen of the United States, residing in the city of St. Louis, in the State of Missouri, have
5 invented certain new and useful Improvements in Gas-Valve Apparatus for Open-Hearth Furnaces, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings,
10 forming part of this specification.

My invention relates to a reversing-valve apparatus for controlling the flow of gas to the heating-chambers of open-hearth furnaces, to cause it to pass first into one of a
15 series of heating-chambers and then be cut off from said chamber to pass into another chamber, the products of combustion in each instance being returned to the valve apparatus to pass therefrom to the chimney of the
20 furnace.

The object of my invention is to construct a valve apparatus of the kind named wherein liability of warping of the parts is overcome and also wherein provision is made for
25 the absolute closure of the passage-ways through which gas has flowed previous to the opening of the passage-ways through which it is to flow after the valves of the apparatus have been reversed.

30 My invention consists in features of novelty hereinafter fully described, and pointed out in the claims.

Figure I is a horizontal section taken through my valve apparatus on the line I I, Fig. III, with the seated valves shown in plan. Fig. II is a vertical section taken on line II II, Fig. I. Fig. III is a vertical section taken on line III III, Fig. II, the valve-operating mechanism being shown in elevation. Fig. IV is a front or rear elevation of the valve-lifting mechanism.
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11^a designates the circulating-flues, through which the gas passes to and the products of combustion return from the heating-chambers of the well-known open-hearth type of furnaces, and 2 2^a are the escape-flues, through which the products of combustion pass to the chimney of the furnace. At the entrance to the escape-flues are valve-seats 3 3^a, that are
50 positioned in a water-seal well 4.

5 designates a gas-conducting pipe that leads to an inlet-box 6, the lower end of which

is positioned in a water-seal well 7, that is supported by an outlet-box 8. The outlet-box 8 is subdivided into two compartments 55 9 and 9^a by a vertical partition 10. Communication is established between the inlet-box 6 and the compartments of the outlet-box 8 by ducts 11 11^a, that may be obtained by any suitable connection, such as the elbow 12^a, 60 (see Fig. III,) which extends into the inlet-box to provide seats, as seen at 13^a.

14 and 14^a are valves that control the passage of gas from the inlet-box 6 into the ducts 11 and 11^a to enter, respectively, either the 65 compartment 9 or 9^a of the inlet-box, according to whichever valve is open. The valves are provided with depending rims that are adapted to extend into the water in the water-seal well 7 when the valves are closed, 70 thereby sealing the entrance into the ducts closed by the valves. The means for operating the valves 14 and 14^a will be hereinafter described.

15 and 15^a are valves of similar construction to those 14 and 14^a and which are respectively located in the compartments 9 and 9^a of the outlet-box and are operated by means to be hereinafter set forth. The valves 15 and 15^a are adapted to seat on the valve-seats 80 3 and 3^a to control the entrance to the escape-flues 2 and 2^a.

The valves 14 and 14^a and 15 and 15^a are so connected to their operating means that when one of the valves in the inlet-box and one of 85 the valves in the outlet-box are open the other valves in said box will be closed, and so that the open valve in the outlet-box will be at the opposite side of said outlet-box from that at which the valve is open in the inlet- 90 box, and vice versa. The valves are adapted to be alternately unseated and seated in the reversing action, so that the ducts and flues controlled by the valves will be opened and closed thereby alternately at opposite sides. 95 To illustrate, when the gas is to be delivered through a heating-chamber through the circulating-flue the valve 14 is raised from its seat to permit passage of gas from the inlet-box 6 through the duct 11 into the compartment 9 of the outlet-box 8 and the valve 15 in said compartment opposite the valve 14 is closed in order that the gas may not pass into the escape-flue 2, but must pass into the 100

circulating-flue 1 to the heating-chamber, from which the products of combustion return to the compartment 9^a through the circulating-flue 1^a and find egress through the escape-flue 2^a to the chimney, the passage-way to which is open by reason of the valve 15^a being elevated from its seat, while the valve 14^a, that controls the second duct 11^a, leading from the inlet-box, is closed. When the flow of gas is to be reversed to pass to the second heating-chamber, the outlet from the inlet-box through the duct 11 is closed by seating the valve 14 and the flue 2 is opened by unseating the valve 15. After the valves 14 and 15 have been so moved the valve 14^a is raised and the valve 15^a is seated, with the result that the gas may find egress from the inlet-box through the duct 11^a to the compartment 9^a and flow therefrom past the closed valves 15^a into the circulating-flue 1^a to the second heating-chamber, from which the products of combustion return through the circulating-flue 1 to the compartment 9 and escape to the chimney through the escape-flue 2.

It is highly essential that the valves at each side of the apparatus be so moved that when they are alternately operated in reversing the flow of gas those previously unseated will be seated before the ones to be unseated are moved from their seats, and to obtain this result I make use of lost-movement mechanism that will now be described. 16 and 16^a are shafts journaled in hangers 17 and 17^a, either of which is adapted to be driven by suitable power connection. The shafts are connected by gearing 18, through the medium of which they are rotated in opposite directions. Fixed to the shaft 16 is a spirally-grooved pulley 19, and fixed to the shaft 16^a is a spirally-grooved pulley 19^a.

On each grooved pulley 19 and 19^a is a rope 20, (see Fig. III,) that is wrapped around the wheel and is adapted to travel in the spiral groove of the pulley. 21 represents yokes suspended from the ends of the ropes 20, and 22 represents lift-rods that are connected at their lower ends to the valves 14, 14^a, 15, and 15^a, each lift-rod being loosely and slidably positioned in the lower end of the corresponding yoke 21 and provided at its upper end with a head 23, this construction providing for vertical movement of the lift-rods in the yokes 21 to furnish a lost motion during period of the travel of the yokes.

In operating the valves connected in the manner stated to the ropes 20 the parts move as follows: On the rotation of the shafts 16 and 16^a the grooved pulley 19 is rotated in one direction and the grooved pulley 19^a is rotated in the opposite direction, owing to the driving connection by the gearing 18 between the shafts on which the pulleys are mounted, and as the valves 14 and 15^a are moved from their seats the valves 14^a and 15 are moved to their seats, and vice versa. As each valve is lowered to its seat while suspended from

the corresponding yoke 21, as seen at the left hand in Fig. III, the opposite valve, which is seated, remains as a closure over the passage-way it controls during the first part of the movement of its corresponding yoke 21, while the yoke travels upwardly a sufficient distance to cause it to engage the head 23 of the corresponding lift-rod 22. Thus lost motion during the first part of the travel of the yoke last referred to permits of the valve that is raised in the movement of said yoke remaining seated until the first-named valve has reached its seat and closed the passage-way controlled thereby, thus preventing a flow of gas in a reverse direction through the apparatus until the passages through which the gas previously flowed are closed by the seating of the valves that control them.

I claim as my invention—

1. In a valve apparatus, of the character named, the combination of an inlet-box and an outlet-box having communication with each other, circulating-flues and escape-flues having communication with said outlet-box, valves arranged to control communication between said inlet-box and outlet-box and said escape-flues, means for operating said valves, and means in said valve-operating means whereby lost motion is obtained during the period of the seating of one of said valves and the unseating of the other of said valves connected to the corresponding operating means, substantially as described.

2. In a valve apparatus of the character named, the combination of an inlet-box and an outlet-box having communication with each other, circulating-flues and escape-flues having communication with said outlet-box, valves arranged to control communication between said inlet-box and outlet-box and said escape-flues, and mechanism for operating said valves, said mechanism comprising a rope, means for operating said rope, yokes attached to the ends of said rope and lift-rods connected to said valves and slidably fitted to said yokes, substantially as described.

3. In a valve apparatus of the character named, the combination of an inlet-box and an outlet-box having communication with each other, circulating-flues and escape-flues having communication with said outlet-box, valves arranged to control communication between said inlet-box and outlet-box and said escape-flues, and mechanism for operating said valves, said mechanism comprising a pair of grooved pulleys geared together to rotate in opposite directions, ropes travelingly mounted on said pulleys, yokes connected to the ends of said ropes, and lift-rods connected to said valve and slidably fitted in said yokes, substantially as described.

In testimony whereof I have hereunto set my hand this 6th day of June, 1902.

JOHN A. SOBOLEWSKI.

In presence of—

E. S. KNIGHT,
M. P. SMITH.