No. 689,832. Patented Dec. 24, 1901.

E. J. W. RICHARDS & R. MARSHALL.

GAS REVERSING VALVE.

(Application filed Aug. 13, 1901.)

(No Model.) 2 Sheets—Sheet 1.

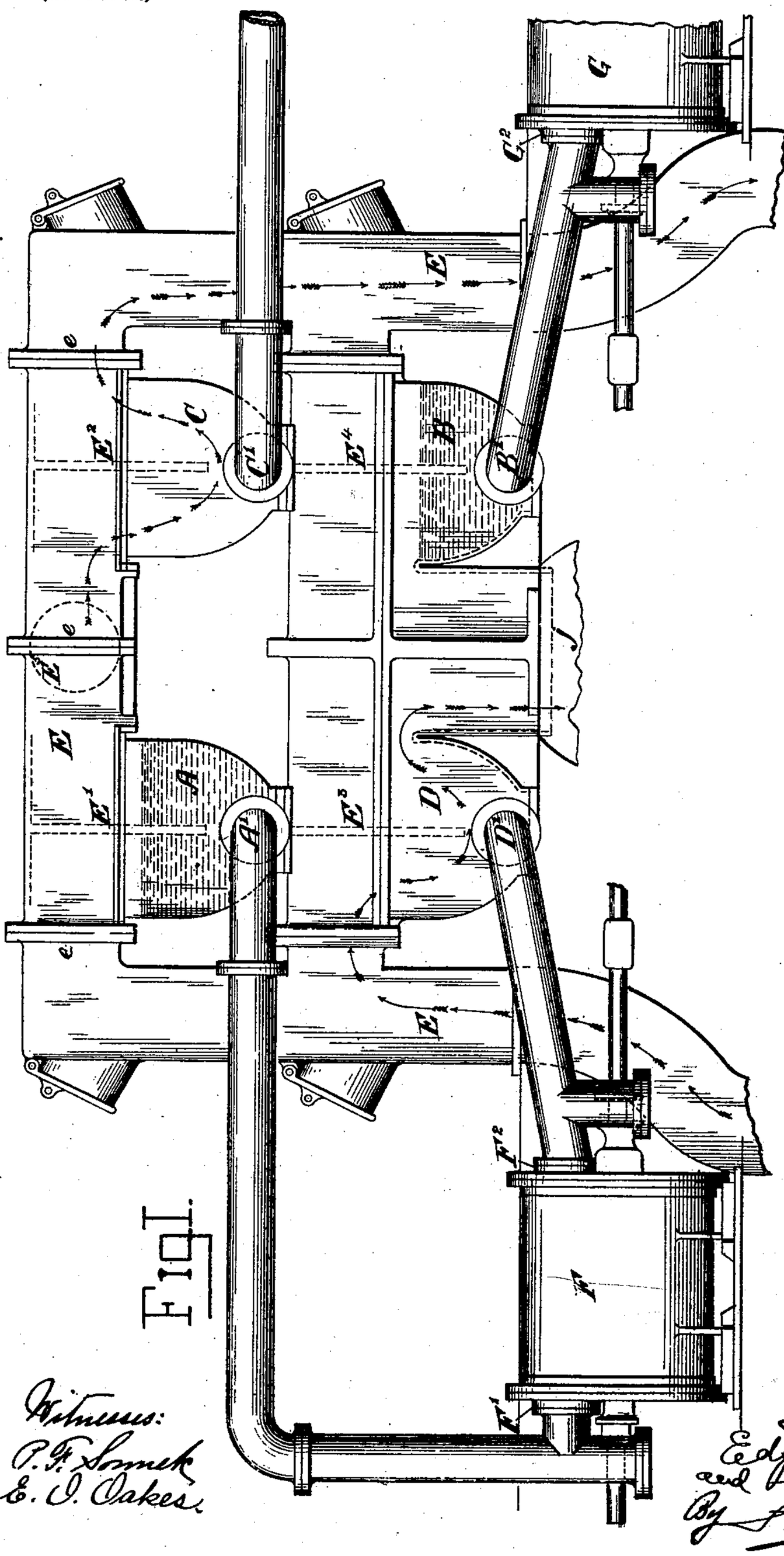

Fig. 1.

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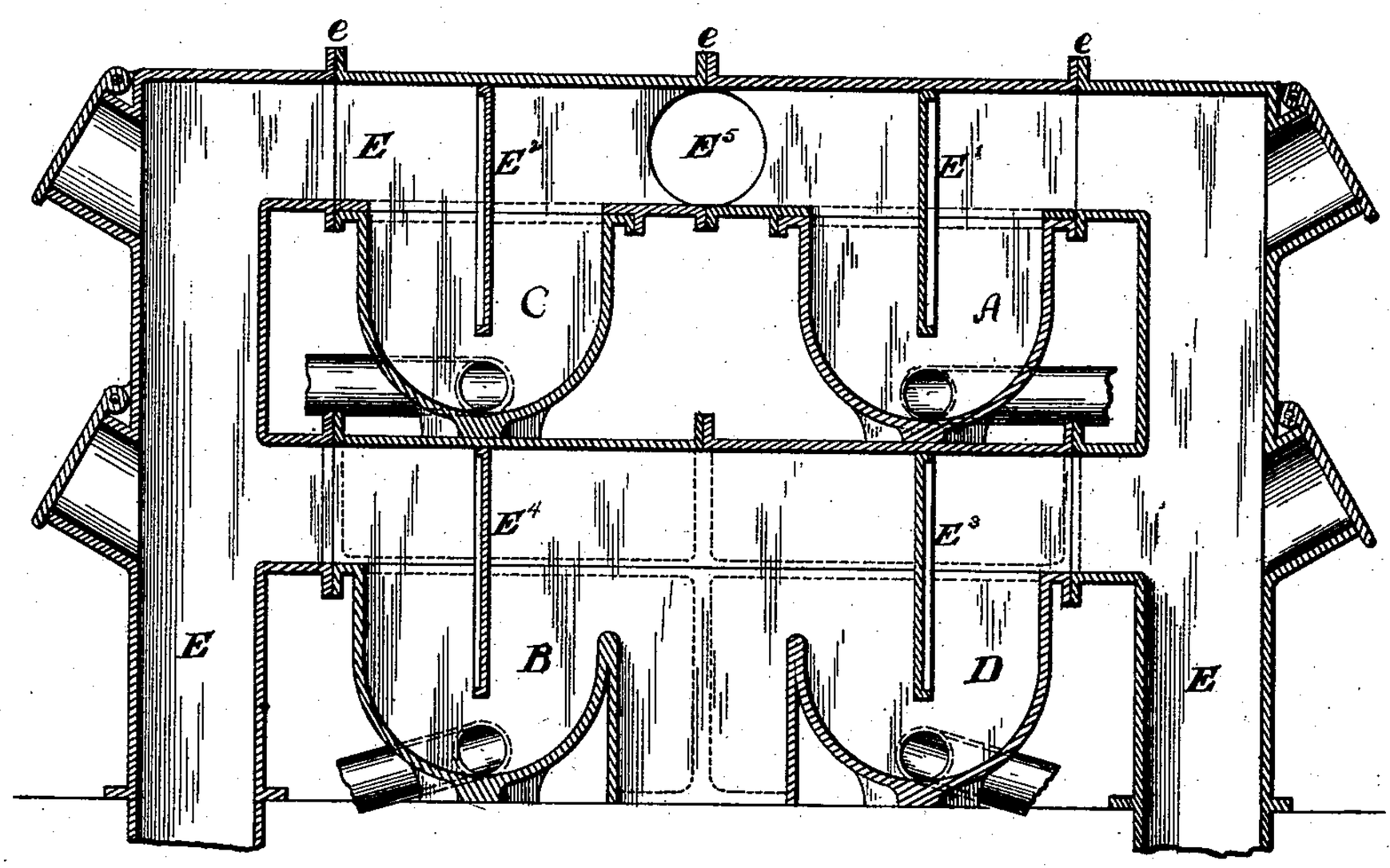
Fig. II.



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UNITED STATES PATENT OFFICE.

EDGAR JOSIAH WINDSOR RICHARDS, OF GLENGARNOCK, AND ROBERT MARSHALL, OF KILBIRNIE, SCOTLAND.

GAS-REVERSING VALVE.

SPECIFICATION forming part of Letters Patent No. 689,832, dated December 24, 1901.

Application filed August 13, 1901. Serial No. 71,912. (No model.)

To all whom it may concern:

Be it known that we, EDGAR JOSIAH WINDSOR RICHARDS, a resident of "Cottage," Glengarnock, and ROBERT MARSHALL, a resident of Ellangowan Cottage, Kilbirnie, Scotland, subjects of the King of the United Kingdom of Great Britain and Ireland, have invented an Improved Gas-Reversing Valve for Siemens Furnaces and the Like, of which the following is a specification.

This invention relates to an improved valve for use with Siemens furnaces, gas-fired heating-furnaces, and for use generally where it is desired to reverse the direction of flow of gas through mains or flues, and has for its object to provide a valve having no mechanically moving or operated parts exposed to the deleterious action of the gases, such as is the case with valves as hitherto constructed, whereby the valve is maintained perfectly tight in use and its life lengthened. To attain this end, our improved valve is provided with four chambers, each fitted with a bridge or diaphragm, so arranged that the said several chambers can be each water-sealed. In use only two of the said chambers are sealed, the path of the gas through the valve being then by way of the two unsealed chambers. To reverse the direction of flow of gas through the valve, the two formerly-sealed chambers are now unsealed and the formerly-unsealed chambers sealed, means for the sealing and unsealing of the chambers being hereinafter described.

As an example of the method of carrying our invention into effect, we may employ an outer casing of any convenient shape and arrange the four internal chambers in pairs one above the other, (but they may be otherwise arranged,) so that the diaphragm or bridge of each of the lower chambers may depend from the bottom of the upper chambers. The gas-inlet is preferably situated between the upper pair of chambers and the outlet between or below the lower pair, the space between the upper chambers being rendered gas-tight. When, therefore, one diagonal pair of chambers is sealed, the gas passes through the highermost of the other diagonal pair to (in this example) the heated regenerator, then through the regenerator to the furnace, where it is mixed with heated air from another regenerator and ignited. The waste gases after passing through a second pair of regenerators to heat same are led through the lowermost of the unsealed diagonal chambers and thence to the chimney. By unsealing this diagonal pair of chambers and sealing the other the gas is caused to take the opposite path.

The essential feature of our invention is the provision of the chambers and the sealing and unsealing of an alternate pair, the means for performing such sealing and unsealing being capable of attainment in various ways.

In order that our said invention may be more readily understood and easily carried into effect, we will proceed to describe the same with reference to the accompanying drawings, in which—

Figure 1 is a front elevation showing our improved gas-reversing valve applied to a Siemens furnace. Fig. 2 is a vertical longitudinal section through the apparatus.

In the carrying out of our invention we employ an arrangement of four water-sealed valves A, B, C, and D, which are carried on the casing E, which is preferably formed as a rectangular framing consisting of the rectangular-shaped hollow or tubular portion E, jointed together by the flanges *e*. Depending from the inside of the casing E into the said valves are diaphragms $E' E^2 E^3 E^4$, which cause the gases to pass under them when the valves A B are not water-sealed. Connected at the one side and near to the bottom of the said valves are the pipes $A' B' C' D'$, the other side of the said pipes being connected to the water-cylinders F and G at their ends $F' F^2 G^2$, so that the cylinder F governs the supply of water to the valves A and D, the other cylinder G governing the supply of water to the valves B C. One diagonal pair of valves are always actuated simultaneously, whether it be for sealing or for allowing the passage of the gases through the regenerators H to the furnace J and passing out at the flue *j*.

For operating the water-cylinders F and G we employ a hydraulic cylinder K and connecting-rod L, mounted on the stand M, (between the said water-cylinders.) The cou-

pled connecting-rod L is connected to the piston-blocks within the water-cylinders F and G. The action of the said hydraulic ram is to force the water out of the water-cylinder F into the valve A through the medium of the pipe A′, the water seal for the valve B being simultaneously actuated by the water-cylinder G. The same action is effected with regard to the valves C D only on the return stroke of the connecting-rod. We may employ a hand-lever for operating the hydraulic ram, or we may have same operated by a lever which may be coupled to a rocking shaft.

In order that the passage of the gases may be readily understood, the same is indicated by the arrows in Fig. 1, the gases coming into the casing E from the producer at E^5 and passing down the connections to the furnace J, as shown.

We claim—

1. In a gas-reversing valve, the combination with four chambers arranged in pairs, water-cylinders connected to said chambers in pairs, and means for withdrawing the water in one pair of chambers and discharging it into the other pair of chambers to reverse the direction of flow of gas through the valve, means for preventing the passage of gas through the chambers in which the water is present, openings for the admission of air or gas into the chambers and outlets therefrom to the stack-flue.

2. In a gas-reversing valve, the combination with four chambers, arranged in pairs diagonally disposed, water-cylinders connected to said chambers in pairs, means for withdrawing the water in one pair of chambers and discharging it into the other pairs of chambers to reverse the direction of flow of gas through the valve, means for preventing the passage of gas through the chambers in which the water is present, openings for the admission of air or gas into the chambers and outlets therefrom to the stack-flue.

3. In a gas-reversing valve, the combination with four chambers arranged in pairs diagonally disposed, diaphragms extending vertically into and above the chambers, water-cylinders connected to said chambers in pairs, means for withdrawing the water from one pair of chambers and discharging it into the other pair of chambers to reverse the direction of flow of gas through the valve, openings for the admission of air or gas into the chambers and outlets therefrom to the stack-flue.

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