

No. 771,681.

PATENTED OCT. 4, 1904.

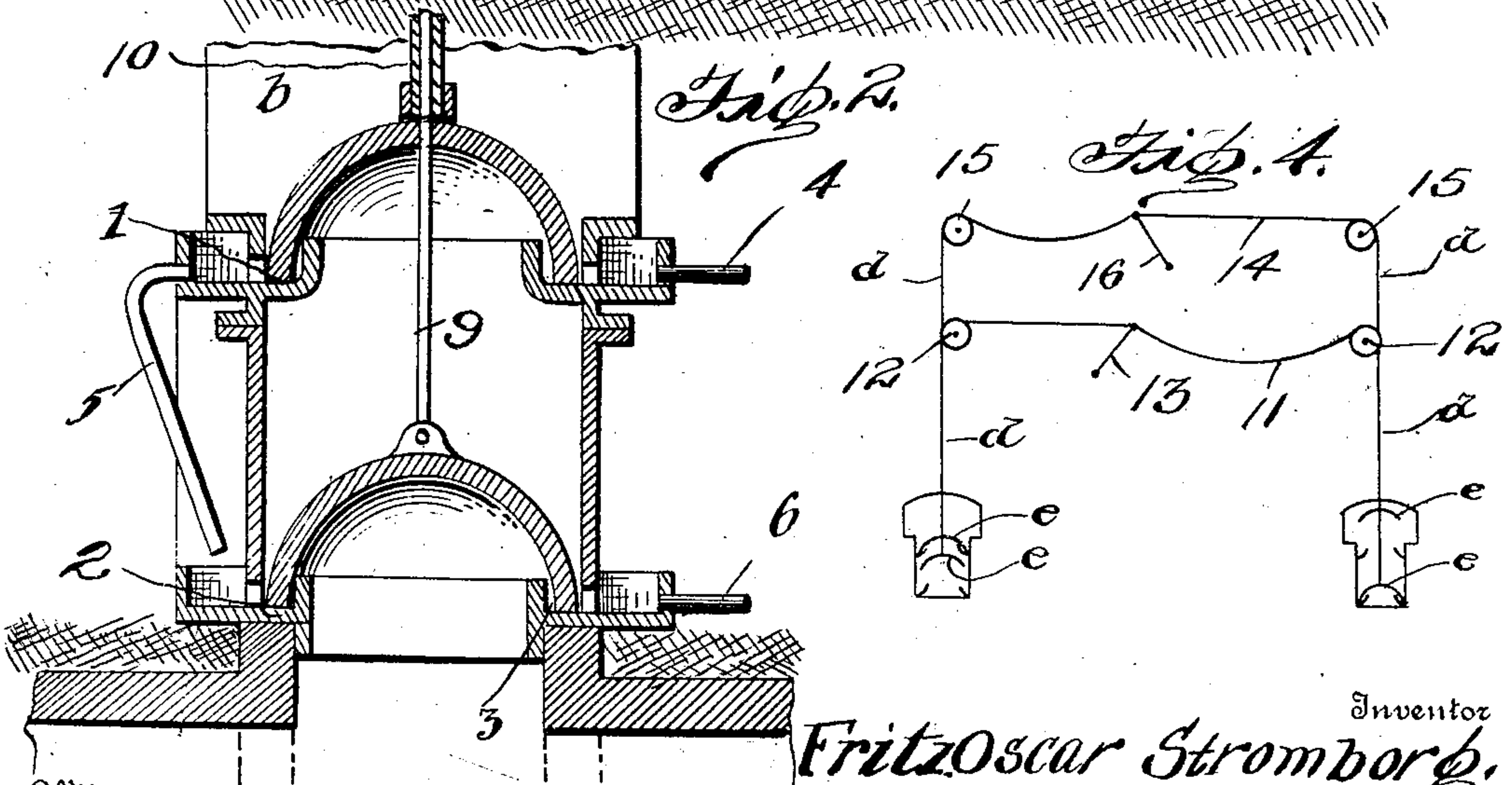
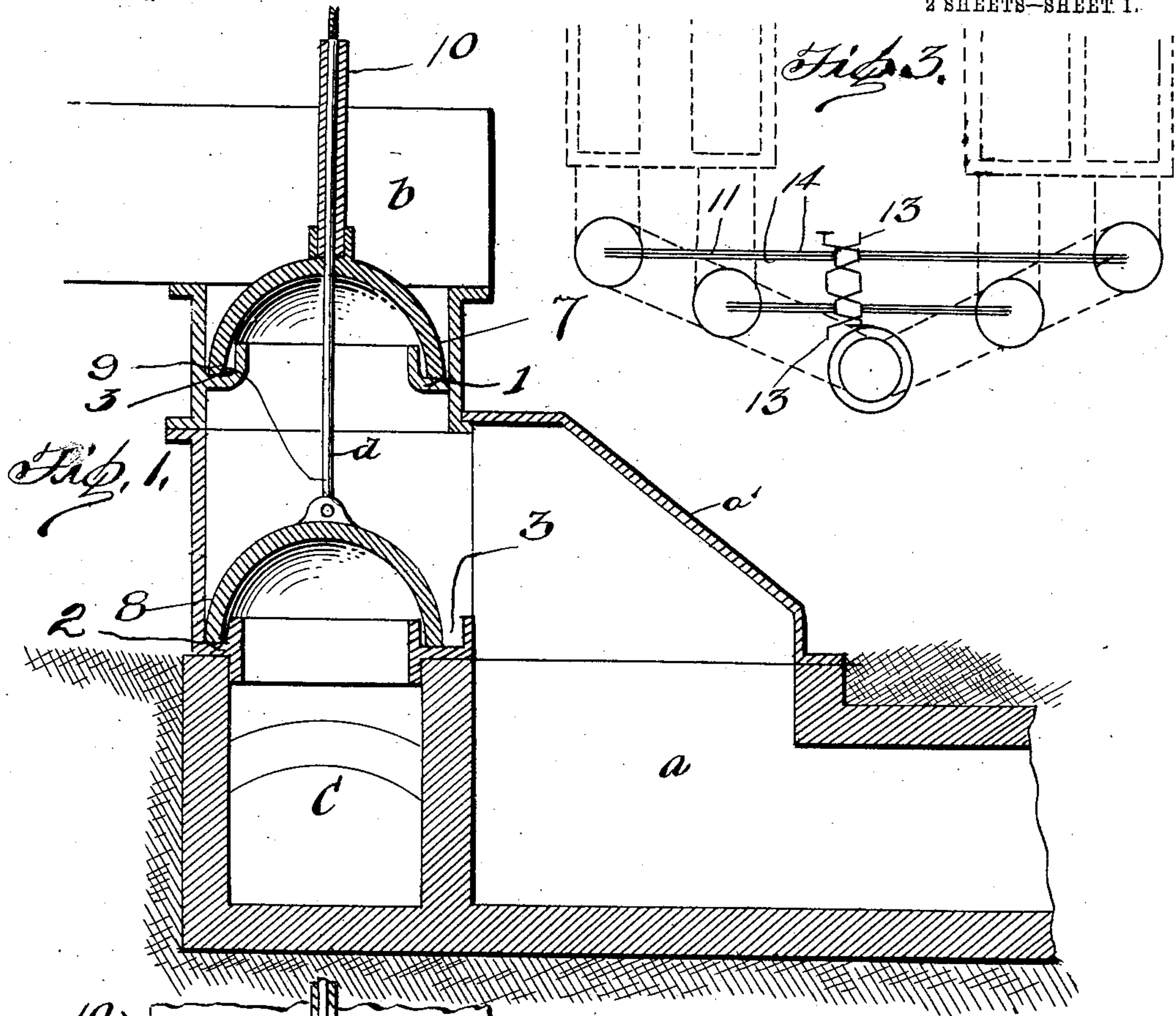
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WATER SEAL VALVE AND VALVE OPERATING APPARATUS  
FOR REGENERATIVE FURNACES.

NO MODEL.

APPLICATION FILED MAR. 9, 1903.

2 SHEETS—SHEET 1.



Witnesses  
Jas A. G. Koehl.  
H. R. Wilson

Inventor  
Fritz Oscar Stromborg.

H. R. Wilson

Attorney

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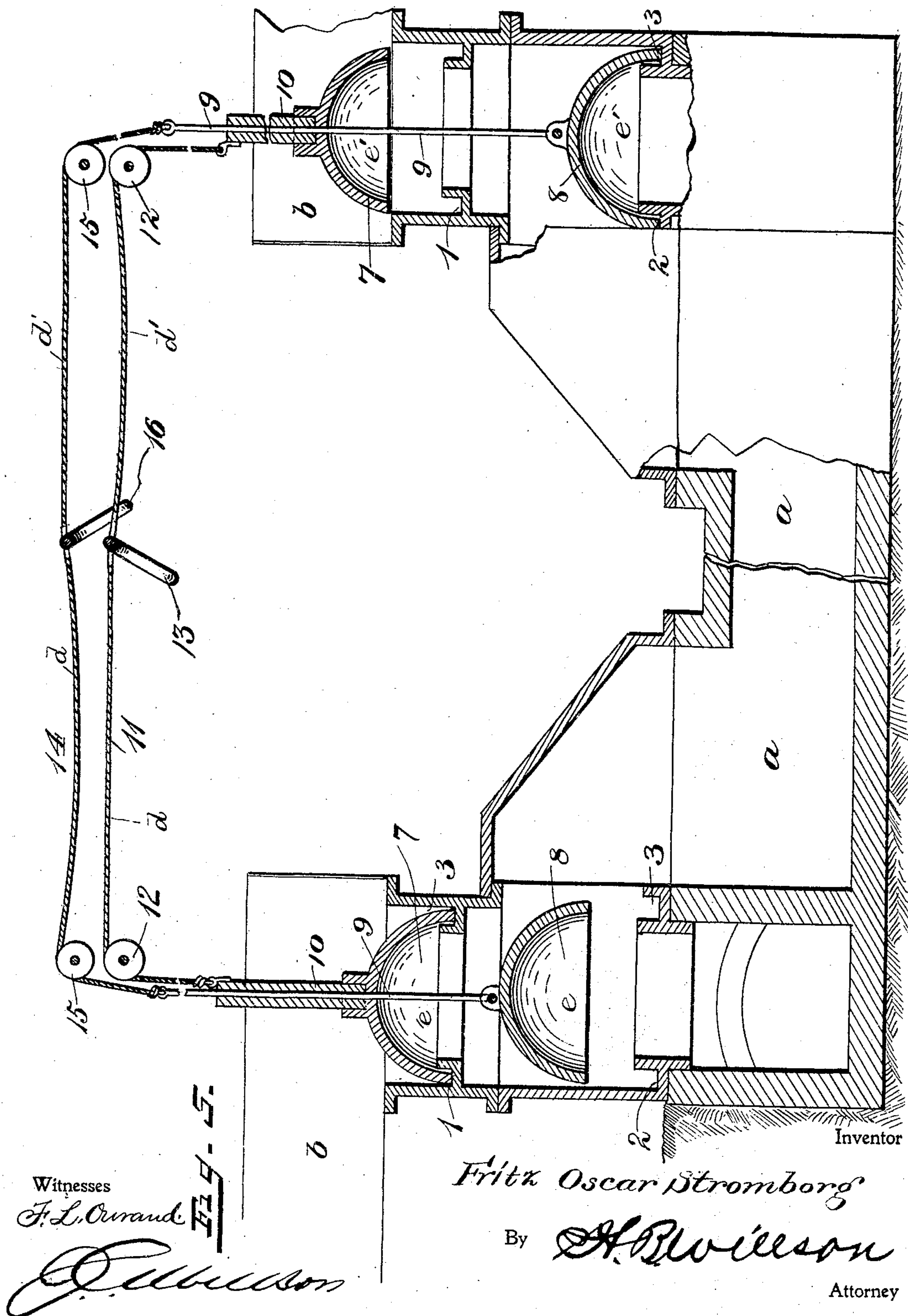
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# UNITED STATES PATENT OFFICE.

FRITZ OSCAR STROMBORG, OF CLEVELAND, OHIO.

WATER-SEAL VALVE AND VALVE-OPERATING APPARATUS FOR REGENERATIVE FURNACES.

SPECIFICATION forming part of Letters Patent No. 771,681, dated October 4, 1904.

Application filed March 9, 1903. Serial No. 146,998. (No model.)

*To all whom it may concern:*

Be it known that I, FRITZ OSCAR STROMBORG, a subject of the King of Sweden and Norway, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Water-Seal Valves and Valve-Operating Apparatus for Regenerative Furnaces; 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.

My invention relates to improvements in valves for regenerative furnaces; and it consists in the peculiar construction and combination of devices hereinafter fully described and claimed.

The object of my invention is to effect improvements in the construction of the valves and the valve-seats, whereby effectual water seals may be effected thereby to close communication between the furnace and stack flues when the the same is desired.

A further object of my invention is to provide improved means for independently reversely operating the valves.

In the accompanying drawings, Figure 1 is a vertical sectional view of communicating furnace and stack flues provided with controlling-valves embodying my improvements. Fig. 2 is a similar view showing a modification. Fig. 3 is a diagrammatic top plan view showing my improved valves arranged to control air and gas passages to the stack of a furnace. Fig. 4 is a diagrammatic cross-sectional view of the same, taken on a plane intersecting the valves. Fig. 5 is a similar view, on a larger scale, showing the connections between the flexible connecting elements and the valves which they operate.

In the embodiment of my invention here shown I provide seats 1 2, the former above the latter, said seat 1 being at the port or point of communication between the furnace-flue *a* and the gas-box *b* and the seat 2 being at the port or point of communication between the flues *a* and the flue *c*, that leads to the stack. Each of these seats is made of metal of cylindrical or other suitable form, and they are provided each with a suitably-

shaped water-trap or seal-chamber 3, the upper side of which is open. Water is supplied to each of these traps or seal-chambers. In the form of my invention shown in Fig. 1 each is separately supplied. In the form shown in Fig. 2 water enters the upper seal-chamber through a pipe 4, overflows therefrom at a suitable level, is conducted through a pipe or spout 5 to the lower seal-chamber to also supply the latter, and overflows from the lower seal-chamber through a pipe 6. Hence the water may by this means be kept in continuous circulation through the seal-chambers and maintained at a suitable depth in each of them.

The valves 7 8 are bell-shaped or of concavo-convex form with the concave sides lowermost and are adapted to fit downwardly into the respective seal-chambers 1 2 and to have their lower portions submerged therein to effectually close communication between the flue *a* and the gas-box and stack-flue at will. A rod 9 is shown attached to the center of the lower valve 8 and extending upwardly through a tube 10, which is attached to and rises from the upper valve, and thereby each of the valves is adapted to be raised or lowered independently of the other, the rod 9 being slidable in the tube 10.

Where two pairs of my valves are used in connection with a furnace, as in the diagram, Figs. 3 and 4, the upper valves are connected to the ends of a rope or chain 11, which operates on direction-sheaves 12 and is operated by a crank-lever 13 or other suitable means, which arrangement enables said valves thus connected to be independently and reversely operated, as will be readily understood. The other pair of valves are similarly connected by a rope or chain 14, which passes over direction-sheaves 15 and is connected to a crank-shaft 16. In the operation of these connections the movement of the lever in one direction or the other will simultaneously close one valve and open the other valve, as will be readily understood. The length of the ropes or chains is such that when the valves are thus disposed said ropes or chains are slack, as shown in Figs. 4 and 5. The purpose of employing a slack rope or chain or like flexi-



ble connection between the valves for effecting their operation is to enable the closed valve of a pair to be opened without effecting the other valve of the same pair. This is accomplished by reason of the fact that the operating portions  $d$   $d'$  of the flexible connections 11 and 14 are independently adjustable or manipulatable, owing to their flexibility and slackness, so that in the event of the valve  $e$  of the pair of valves being opened and the other valve,  $e'$ , of the same pair being closed the latter-named valve may be opened independently of valve  $e$  by simply pulling upon the flexible connection  $d'$ . By this means the closed valves of the separate pairs of valves may be opened for a short period when occasion requires without in any way affecting the other valve.

My improved valves can be quickly closed at will to prevent dust from dolomite, lime, and the like from following the draft down ports and melting out the brickwork, to fill checkers, and at times when repairs are being made between charges. Furthermore, by the employment of my improved valves a furnace can be perfectly cut off from a stack and its cooling greatly retarded when the same is not in operation, as on Sundays and holidays.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a regenerative furnace, the combination with furnace-chambers, each having a stack and a gas-box, of a flue common to said chambers, a valve-casing in each chamber, each valve-casing communicating at its lower end with the stack and at its upper end with the gas-box, and provided intermediate the same with a port communicating with the flue, valve-seats in each valve-casing, one arranged between the said port and stack and the other between the port and gas-box, a pair of vertically-movable valves in each casing, one adapted to engage the lower seat and to control communication between the flue and

stack, and the other adapted to engage the upper seat and to control communication between the flue and gas-box, the upper valve having a tubular stem and the lower valve a rod sliding in said stem, sets of direction-sheaves above the pairs of valves, said sheaves being disposed in different planes, a flexible connection passing over the lower sheaves and connected to the tubular stems of the upper valves, a second flexible connection passing over the lower sheaves and connected to the rods of the upper valves, and operating elements disposed between the sets of sheaves for independently operating said flexible connections, whereby the upper valves of the pairs of valves may be reversely operated independently of the lower valves, and vice versa, the respective portions of each flexible connection between its direction-sheaves and its operating element being independently adjustable, whereby one valve of each pair may be manipulated independently of the other valve of the pair, substantially as described.

2. In a regenerative furnace, pairs of valves, the valves of each pair being disposed one above the other, the upper valve having a tubular stem and the lower valve a rod sliding through said stem, in combination with sets of direction-sheaves above the pairs of valves, said sheaves being disposed in different planes, a flexible connection passing over the lower sheaves and connected to the tubular stems of the upper valves, a second flexible connection passing over the lower sheaves and connected to the rods of the upper valves, and operating elements disposed between the sets of sheaves for independently operating said flexible connections, whereby the upper valves of the pairs of valves may be reversely operated independently of the lower valves, and vice versa, the respective portions of each flexible connection between its direction-sheaves and its operating element being independently adjustable, whereby one valve of each pair may be manipulated independently of the other valve of the pair, substantially as described.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FRITZ OSCAR STROMBORG.

Witnesses:

L. LOUIS MOHN,  
ROSE B. JÜNGLING.