

H. B. ROSE.
 REVERSING VALVE.
 APPLICATION FILED AUG. 10, 1912.

1,045,749.

Patented Nov. 26, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

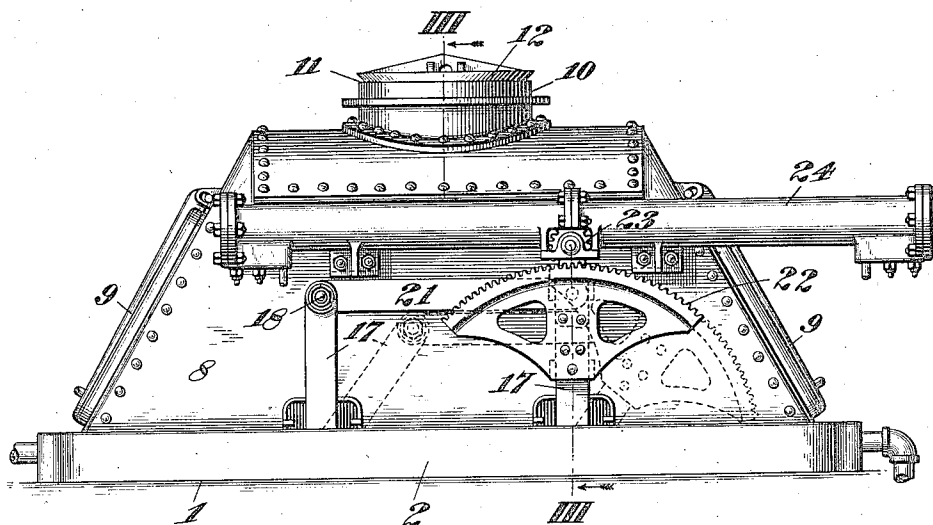
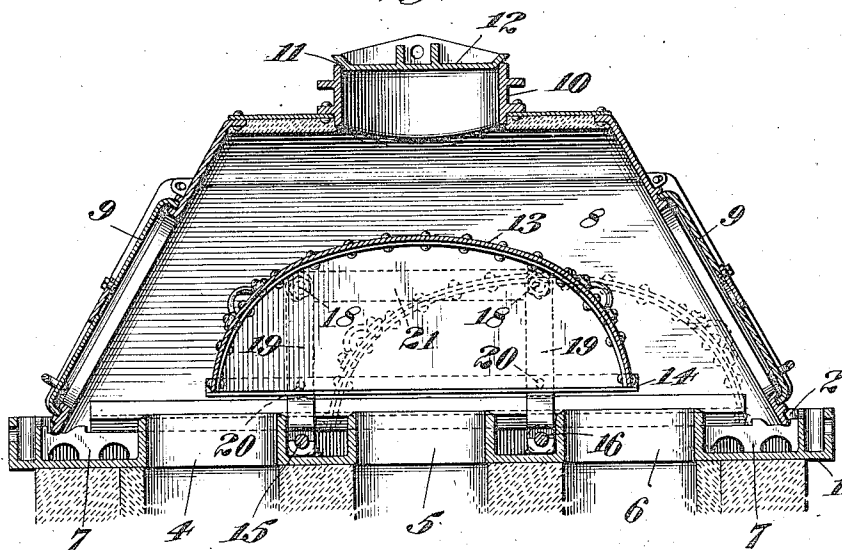


Fig. 2.



WITNESSES,

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INVENTOR,

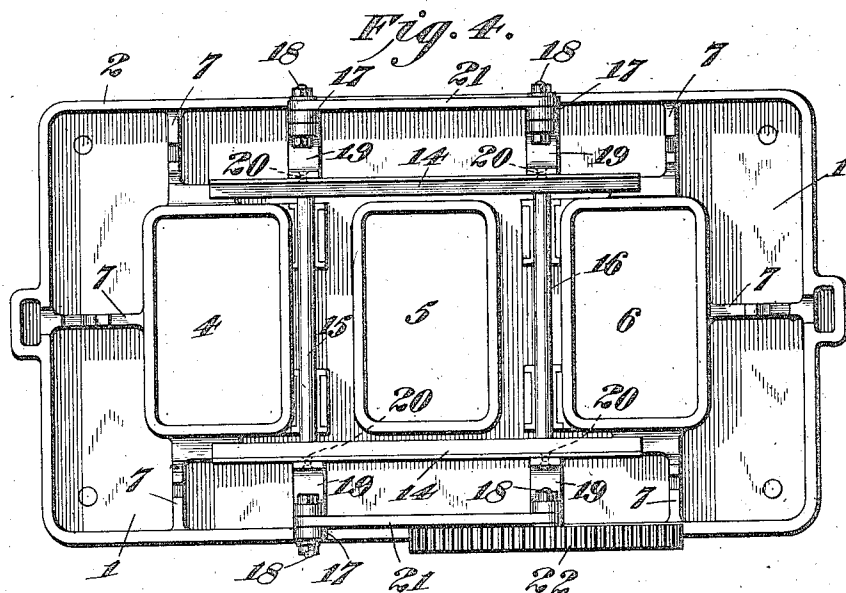
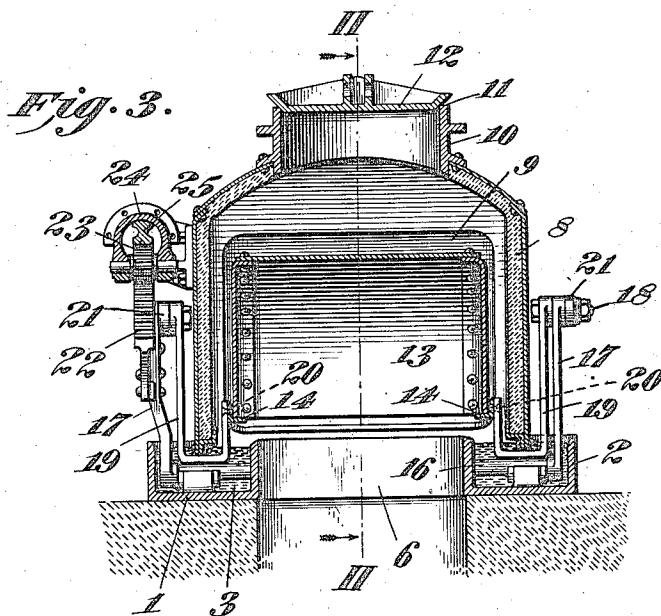
Harry Burnley Rose
 by Geo. E. Thackray
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UNITED STATES PATENT OFFICE.

HARRY BURNLEY ROSE, OF JOHNSTOWN, PENNSYLVANIA.

REVERSING-VALVE.

1,045,749.

Specification of Letters Patent.

Patented Nov. 26, 1912.

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To all whom it may concern:

Be it known that I, HARRY BURNLEY ROSE, a citizen of the United States, residing in the city of Johnstown, county of Cambria, and State of Pennsylvania, have invented certain new and useful Improvements in Reversing-Valves; and I do hereby 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 certain new and useful improvements in reversing valves such as are used in connection with regenerating steel melting furnaces, soaking pits, heating furnaces or similar apparatus, for directing the currents of air or gas alternately to one side or the other of the furnace, while at the same time controlling the flow of the products of combustion to the stack. This valve is of the swinging oscillating type and one of the objects of my invention is to provide means whereby the valve may rest and be shifted from one position to another by mechanism which will be submerged in the water-seal when the valve is seated thereby protecting the same, while the operating mechanism is entirely accessible and exposed to view on the outside of the hood thereby conducing to ease and economy of maintenance and operation.

Another object of my invention is to support the valve in such a way that it can be easily withdrawn from the hood and another valve substituted in its place, without delay. This is an important feature, as with other valves considerable time and labor is required to change the valve during which the workmen have to labor strenuously while subjected to intense heat and noxious gases. All of this is obviated by my construction.

Heretofore reversing valves of this type have had shafts attached to the upper part of the valve, said shafts having their ends projecting beyond the sides of the valve to form journals which extend into the forked ends of rocker arms inside the hood exposed to the heat, making this construction impossible to properly inspect and very difficult to repair.

As illustrated in the drawings of my invention, all the valve operating mechanisms within the casing, which might otherwise be exposed to the heat, are submerged when the valve is thrown to one side or the other and the edges of the valve rest in the water of the

water-seal. The advantage as shown over the existing devices of this kind now in use, is that all the moving parts are either outside of the hood-casing in the open air, or under water, and therefore are not subject to distortion by the heat. Keeping the moving parts outside of the hood, increases the clearance within, without increasing the size of the hood, or decreasing the size of the valve. To change a valve of my construction all that is necessary is to draw out the old one on the angle ways or supports and slide the new one in through either of the end doors of the hood.

With the old arrangement it is necessary, when changing a valve, to balance both rocker-arms inside the hood-casing, slide the valve in and drop the ends of the axles or journals over and into the forks of the rocker-arms. With the inside of the hood red or white hot, this requires men working from both ends with hooks to hold the rocker-arms in position and other men to push and pull the valve in, work it into position by long crow bars, and drop it into the forks. This is a slow, dangerous operation during which the men are subjected to heat and effort beyond endurance, while at this time a slight distortion or misfit of the valve and consequent shifting of the journals throws the journals out of the forks of the arms. On the other hand with my invention a warped and buckled valve can be used until it becomes burned or warped so that it can no longer be slid in between the angle ways.

My invention also consists in the novel construction, combinations and arrangements of parts such as will be hereinafter more fully described and pointed out in the appended claims.

Having thus given a general description of my invention, I will now, in order to make the matter more clear, refer to the two sheets of drawings accompanying this specification, and in which like characters of reference indicate like parts.

Figure 1 is a side elevation of my improved device showing that side of the hood to which a fluid pressure operating cylinder is attached, with the pinion, sector, rocker-arms and link connections for operating the valve. Fig. 2 is a vertical longitudinal section taken on the line II-II of Fig. 3, showing, in full lines, the valve raised in its central or vertical position and one of its two

seated positions for connecting the two different sets of flues shown in dotted lines. Fig. 3 is a vertical transverse section taken on the broken line III—III of Fig. 1 with the valve in its raised position, showing the rocker-arms and link connections. Fig. 4 is a top plan view of the valve operating mechanism and the bed-plate which forms the valve seat the channels of which are normally filled with water.

Referring now to the various characters of reference on the drawings:—1 indicates the bed-plate having an upwardly projecting rim 2 extending around the outer edge, thereof and of a height sufficient to hold the desired depth of water 3 to form a seal for the valve and having at each end an inlet and outlet pipe for supplying and discharging the circulating water. The bed-plate 1 is provided with flue openings or ports 4, 5, and 6, each surrounded with upwardly projecting flanges the top edges of which are flush with the edge of the rim 2. The flue 4 leads to one end of the furnace and the flue 6 leads to the other end of the furnace, while the intermediate flue communicates with the chimney or stack. Between the flange 2 which surrounds the bed-plate and the upwardly projecting flanges of the flues 4 and 6 are longitudinal and transverse reinforcing ribs 7, of less height than the flanges, said ribs being entirely submerged when the channels of the bed-plate 1 are filled with water. Resting in notches on the upper face of these ribs 7 is the hood 8 made of steel plates or of cast iron which may be lined with brick or other fireproof material, and provided at each end with cleaning doors 9 and at the top with the gas or air connection 10, having the seat 11 for the mushroom inlet valve 12.

13 indicates the reversing valve being substantially D-shaped in longitudinal sections, the bottom open edges of which extend into the water-seal and rest on top of the ribs 7 when the valve is seated. The valve 13 also rests upon the ways 14 by the movement of which ways the valve may be raised reversed and seated in the water-seal as required. The ways 14 serve to support the valve 13 during its operation and reversal, and the valve is loosely mounted on said ways so that when it has to be removed and replaced this is easily done by sliding it longitudinally on said ways which then act as skids on which to withdraw the valve from the hood through one of the end doors, and it, or another valve, may then be placed in operative position within the hood by an operation the reverse of that just described.

Rocker shafts 15 and 16 are mounted in suitable bearings provided in the bed-plate, to the outer ends of each of which, beyond the outside of the hood 8 are keyed the crank-arms 17. To the upper end of each

of these crank-arms is pivoted, by means of a stub-shaft or bolt 18, the upper end of each of the longer legs of the swinging J-shaped arms 19. The J-shaped swinging arms 19 pass downwardly on the outside of the hood 8 into the water-seal and under the bottom edge of the hood; the shorter legs then extend upwardly on the inside of the hood, the ends being pivoted as at 20 to the vertical leg of the angular valve way 14. The upper ends of each set of swinging J-shaped arms 19 and crank-arms 17 on each side of the hood are connected together pivotally through the bolts 18 by the link connections 21. Attached to the upper end of one of the crank-arms 17 is a toothed sector 22 meshing with a pinion 23 journaled in bearings on the side of the fluid pressure operating cylinder 24. This fluid pressure operating cylinder is attached by means of brackets to the outside of the hood and has pipe connections at either end for supplying the fluid pressure for reciprocating a piston rod 25 having a rack on its lower surface which meshes with the pinion 23.

The operation of my improved reversing-valve is as follows:—Assuming that the valve 13 is seated and connecting the flues 5 and 6 with its edges submerged in the water-seal and resting on the ribs 7, the valve and the operating parts being in the position shown in dotted lines in Figs. 1 and 2:—fluid pressure is admitted into one end of the operating cylinder and the toothed piston rod 25 is reciprocated within the cylinder from left to right, thereby rotating the pinion 23 and the sector 22, which is pivoted to the swinging J-shaped arms 19 on the outside of the hood-casing 8, while the other ends of said arms 19 are pivoted to the valve ways 14 inside the hood-casing and upon which ways the valve 13 rests. As the piston rod 25 reciprocates, the valve 13 is first raised to the position shown in full lines in the drawings, and then, as the piston rod continues its reciprocating movement, the valve is seated over the flue ports 4 and 5 thus reversing the flow of gas to and from the opposite ends of the furnace. If it is desired to reverse the valve to its former position, the fluid pressure is admitted to the other end of the cylinder and the piston rod is reciprocated from right to left, otherwise the operation is similar, with the exception that the valve and operating mechanism are oscillated in the opposite direction.

Although I have shown and described my improvements in considerable detail, I do not wish to be limited to the exact and specific details shown and described, but may use such substitutions, modifications or equivalents thereof, as are embraced within the scope of my invention, or as pointed out in the claims.

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

1. In a reversing valve of the class described, provided with a water-sealed bed-plate and a hood mounted thereon, a pair of longitudinal ways within said hood, a valve mounted on said ways and adapted to be removed by sliding thereon, and means for oscillating said ways, substantially as described.

2. In a reversing valve of the class described, provided with a water-sealed bed-plate and a hood mounted thereon, a pair of longitudinal ways within said hood, supporting means extending from the outside of said hood thereunder in said water-seal and connected to said ways, a valve mounted on said ways and adapted to be removed by sliding thereon, and means for oscillating said ways, substantially as described.

3. In a reversing valve of the class described, provided with a bed-plate and a hood mounted thereon, a pair of longitudinal ways oscillatingly mounted within said hood, and a valve supported on said ways and adapted to be removed by sliding thereon.

4. In a reversing valve, a bed-plate, a hood mounted thereon, one or more end doors in said hood, a pair of longitudinal ways oscillatingly mounted within said hood, a valve removably supported on said ways and adapted to slide thereon and through one of the doors aforesaid.

5. In a reversing-valve, comprising a bed-plate provided with a plurality of flue ports; a water-seal surrounding said ports, a hood seated in the water-seal and spaced apart from the bed-plate, a valve resting on ways immersed in the water-seal when the valve is seated, and swinging arms connecting the ways with operating mechanism on the outside of the hood, whereby the valve may be shifted from one set of flue ports to another and removed when desired by sliding on said ways.

6. In a reversing-valve, comprising a bed-plate provided with a plurality of flue ports; a water-seal surrounding said ports, provided with supporting ribs therein, a hood seated in the water-seal supported on said ribs and spaced apart from the bed-plate thereby, a valve resting on ways immersed in the water-seal when the valve is seated, swinging arms attached to the ways and extending under the lower edges of the hood and connected to operating mechanism on the outside of said hood, whereby the valve may be shifted from one position to another.

7. In a reversing valve, comprising a bed-

plate provided with a plurality of flue ports; a water-seal surrounding the said ports, projecting ribs extending upwardly from the bed-plate of less height than the water-seal, a hood inclosing the flue ports with its bottom edges resting on said ribs in the water-seal; longitudinal ways, oscillatingly supported within said hood and submerged in said water-seal when the valve is closed, swinging arms pivoted to the ways, extending under the lower edges of the hood and pivoted to operating mechanism on the outside of the said hood, adapted to raise, seat and shift the valve from one set of flue ports to another.

8. In a reversing-valve, comprising a bed-plate provided with a plurality of flue ports; a water-seal surrounding the said ports; ribs extending upwardly from the bed-plate of less height than the water-seal, a hood open at the bottom with its edges resting on said ribs in the water-seal, longitudinal ways within said hood, a valve resting on said ways, J-shaped swinging arms having their shorter ends attached to the ways aforesaid, the lower parts of said arms passing under the bottom edge of the hood in the water-seal, the longer legs thereof extending upwardly on the outside of the hood, and mechanism connected therewith whereby the valve is raised, seated and shifted from one set of flue ports to another.

9. In a reversing-valve, comprising a bed-plate provided with a plurality of flue ports; a water-seal surrounding said flue ports, ribs extending upwardly from the bed-plate of less height than the water seal, a hood open at the bottom with its edges resting on the ribs aforesaid, a valve within the hood on ways in the water-seal on which said valve is mounted, J-shaped swinging arms having their shorter ends attached to said ways, the intermediate portions of said arms passing under the bottom edge of the hood in the water-seal, the longer legs thereof extending upwardly on the outside of the hood and pivoted to crank-arms attached to the ends of rock-shafts having their journal bearings on the bed-plate, links connecting the crank-arms on each side of the hood, a sector attached to one of the crank-arms, and means for rotating the sector forward or backward, whereby the valve is raised, seated and shifted from one set of flue ports to another.

In testimony whereof, I hereto affix my signature in the presence of two witnesses.

HARRY BURNLEY ROSE.

Witnesses:

J. F. GROGAN,
ROBERT A. BEERS.