May 15, 1923. 1,455,059

J. VAN ACKEREN

COOLING MEANS FOR EXHAUST MAINS

Filed Oct. 16, 1919 2 Sheets-Sheet 1

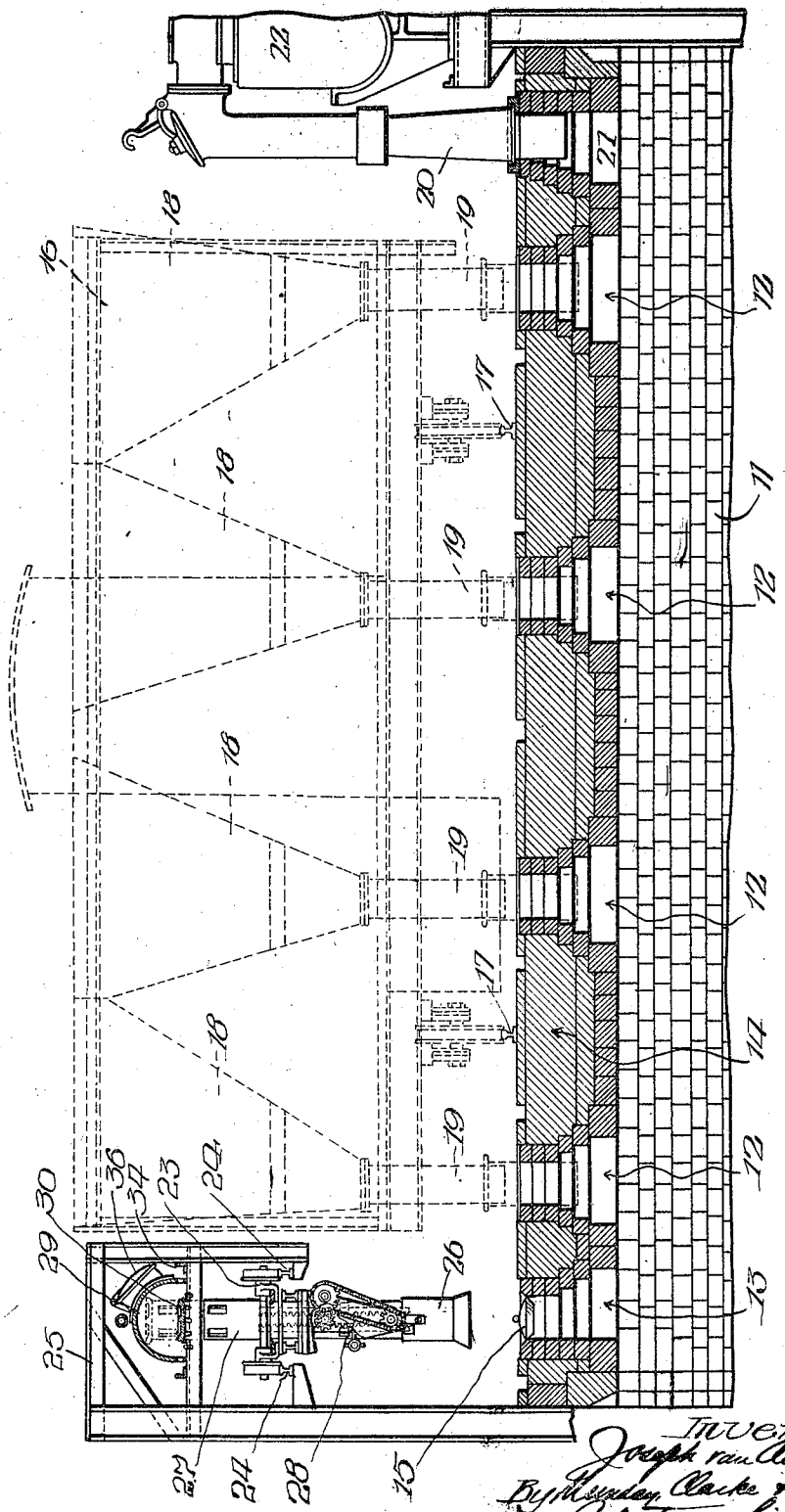


FIG. 1

Inventor
Joseph van Ackeren
By Hayden, Clarke & Hayden
Attorneys

May 15, 1923.

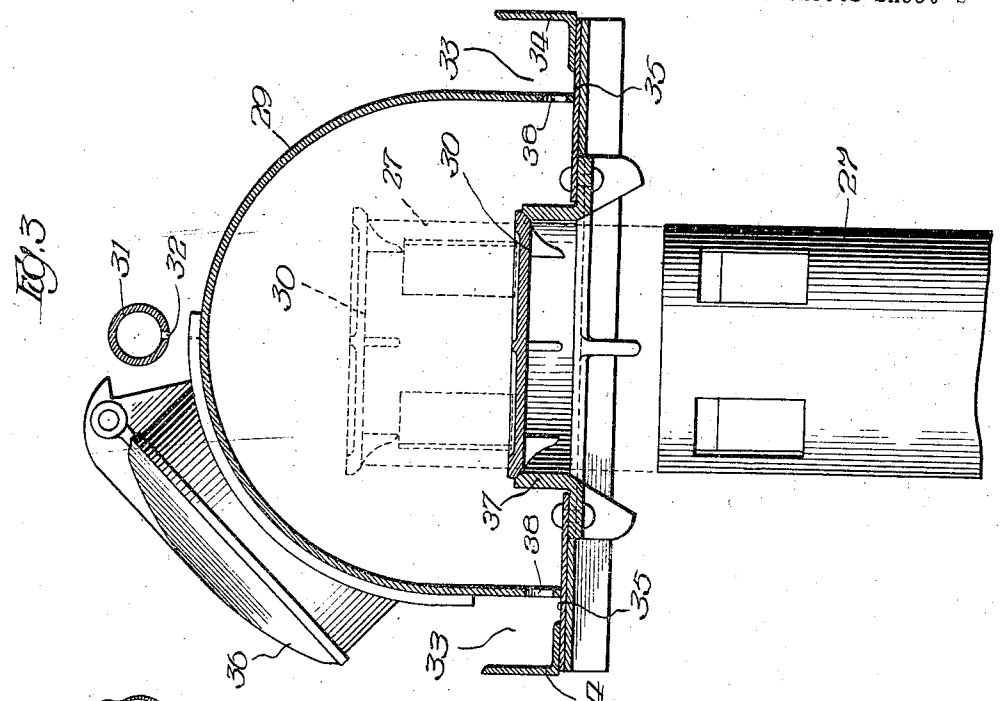
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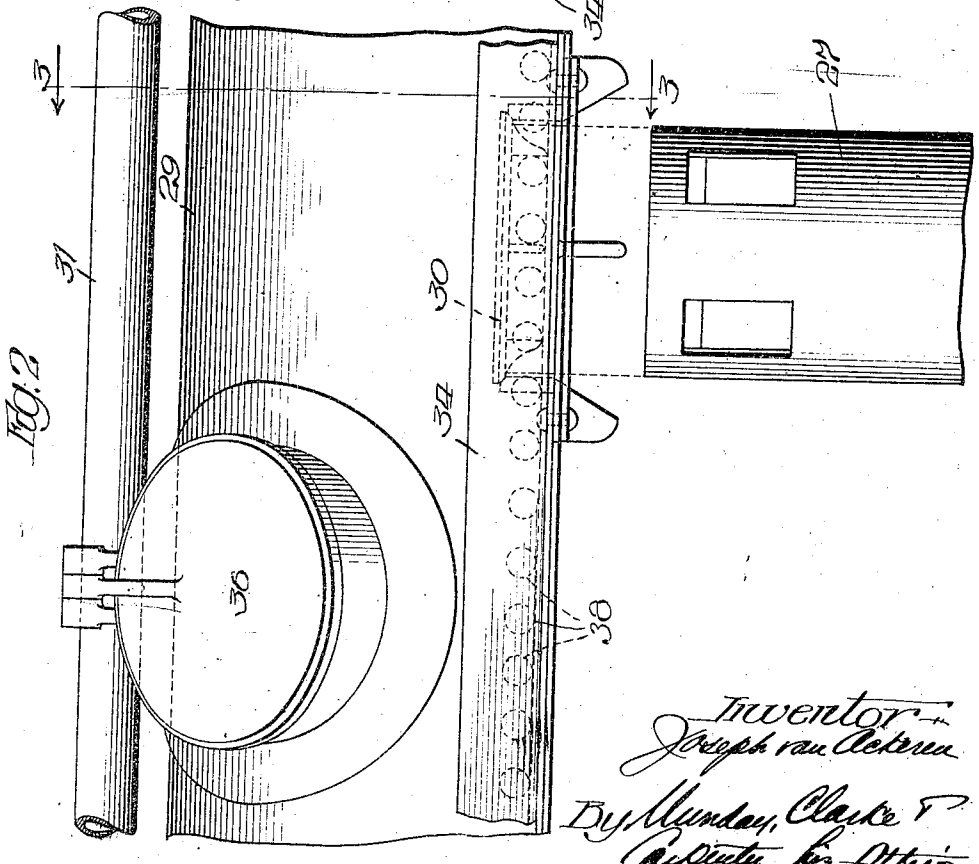
J. VAN ACKEREN

COOLING MEANS FOR EXHAUST MAINS

Filed Oct. 16, 1919

2 Sheets-Sheet 2





Inventor
Joseph van Ackeren
By Munday, Clarke & Carpenter his Attys

Patented May 15, 1923. 1,455,059

UNITED STATES PATENT OFFICE.

JOSEPH VAN ACKEREN, OF PITTSBURGH, PENNSYLVANIA, ASSIGNOR TO THE KOPPERS COMPANY, OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

COOLING MEANS FOR EXHAUST MAINS.

Application filed October 16, 1919. Serial No. 330,962.

To all whom it may concern:

Be it known that I, JOSEPH VAN ACKEREN, a citizen of the United States, residing in Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Cooling Means for Exhaust Mains, of which the following is a specification.

This invention relates in general to smoke or exhaust mains, such for example, as are utilized in coking plants for carrying off the smoke incidental to the charging operation of a heated coking oven or chamber. An essential object of the invention is the provision of an exceedingly simple, economical and efficient means for cooling both the outer wall and the inside and bottom of the main, thereby preventing overheating of the main by the hot smoke or other exhaust products passing therethrough and possible explosions caused by combustible products entering and mixing with air in an overheated main.

With the above and other objects in view, the invention consists in certain novel arrangements, constructions, and combinations of parts hereinafter described in a preferred form and particularly set forth in the claims at the end of the specification.

In the drawings:

Figure 1 is a longitudinal sectional elevation through the coking chamber of a coke-oven battery equipped with the present improvements.

Figure 2 is an enlarged detailed side elevation of the smoke or exhaust main and the cooling means.

Figure 3 is a section taken in a plane indicated by the line 3—3 of Figure 2.

In the illustrated embodiment of the invention, the cooling means is utilized in connection with a smoke main for a coking plant or battery, said main being employed for the purpose of carrying off the smoke incidental to the operation of charging an oven or coking chamber of said battery. For convenience, the present description of the cooling means will be confined to this use of the invention; features of construction of the cooling means are, however, readily susceptible of other valuable applications and, consequently, it is manifest that the scope of the invention is by no means confined to the specific use and specific embodiment herein described.

Referring to the drawings, there is indicated at 11 a fragmentary section taken longitudinally through an oven or coking chamber of a coke oven battery or plant of the by-product type. It will be understood that the coke oven battery may be of the usual construction, embodying a plurality of coking chambers arranged side by side and having the usual alternating heating chambers or flame flues intermediate adjacent coking chambers. Each coking chamber or oven is provided with a set of charging holes 12 and also, in the present instance, with a smoke outlet 13 independent of the charging holes. The charging holes 12 and the smoke outlet 13 extend through the top 14 of the coking chamber or oven and are each provided with the usual suitable closures, not shown, for closing the top of the oven during the coking operation, but which may be removed during the charging operation. For charging an oven or coking chamber, there is usually provided a lorry-car, indicated by dotted lines at 16 in Figure 1, and adapted to run on tracks 17 extending lengthwise across the top of the oven battery. The lorry-car is provided with a plurality of coal hoppers 18, having depending spouts 19, the latter being adapted to communicate with the set of charging holes 12 of a coking chamber, for charging said chamber with a supply of coal to be coked. The gases evolved from the coking of the charge of coal in each oven or chamber pass upwardly through an ascension pipe 20, communicating with an independent gas outlet 21 in the top of each coking chamber or oven, and from such ascension pipes the evolved gases are drawn through a collecting main 22, through which they pass to the by-product recovery apparatus.

In the present instance, the invention is applied in connection with a smoke main adapted to be connected with an independent smoke outlet 13 by means of a traveling smoke-flue carriage, such as is disclosed in the co-pending application of Joseph Becker, Serial No. 264,967, filed December 2, 1918. This smoke-flue carriage forms no part of the present invention, and it will be sufficient for present purposes to describe briefly the construction and operation of the carriage, as follows: The carriage 23 runs on tracks 24 extending lengthwise of the oven battery and supported thereabove in a frame

25; said carriage 23 is provided with vertically telescoping pipe-sections 26—27 operable by gearing connections 28 to make connection with the smoke outlet 13 of an oven or chamber, during the charging operation, and the longitudinally-extending smoke main 29 supported by the frame 25 above the carriage 26. The upper pipe section 27 is provided with side outlets and the lower pipe section 26 with a flaring flange. In operation the upper section is elevated through an inlet in the flat bottom of the smoke main 29, carrying with it the bottom closure plate 30 and concurrently the lower pipe section 26 is lowered down over the smoke outlet 13 of an oven or chamber, thereby forming a connection for permitting the smoke evolved during the charging operation of such chamber to pass from the latter into the smoke main. Normally the bottom closure plate 30 rests on a seat 37 formed by an annular vertical flange projecting upwardly from the bottom of the main.

The smoke main 29 extends longitudinally, preferably clear across the top of the coke-oven battery and, in the present instance, may be provided with a curved top and a flat bottom. The present invention is particularly concerned with the provision of an exceedingly simple, economical and efficient means for cooling the outer wall and the interior of the smoke main 29, thereby preventing overheating of and possible explosions within said main by the heat containing smoke combustible products, and flame which enter the main in large quantities. These products are not only liable to cause buckling of the main whenever a charge of coal is introduced into one of the superheated coking chambers or outlets, but as they contain combustible matter, including coal dust in large quantities explosions are likely to occur within the main, if it is allowed to become overheated and the combustible products are allowed to mix with the air in the main. In its present embodiment, the cooling means conveniently consists of a water pipe 31 extending substantially all the way along the smoke main 29. This water pipe is furnished with a continuous supply of cooling water and is preferably supported in a position centrally above the curved top of the smoke main 29. Formed in the bottom of said pipe 31 is a series of discharging holes 32 which permits the water from the pipe 31 to discharge onto the curved top of the smoke main and flow substantially equally down the opposite sides of the latter, thereby maintaining a continuous flow of cooling water over the wall of the smoke main and effectually preventing overheating. The discharged water is collected in gutters, or troughs, 33, respectively located on opposite sides of the smoke main and preferably co-extensive therewith. These gutters 33 may be formed of angle bars 34 mounted on laterally extending portions 35 of the flat bottom of the main. From the gutters 33, the water flows through holes 38 in the opposite sides of the main and entering the main floods the bottom, keeping the interior cool. By reason of the said flanges 37 the water within the main is kept from flowing into the pipe of the smoke-flue carriage. In practice, however, it will be found convenient to keep the water within the main at a constant level, by providing a dam of any preferred form at one end of the main. As the main is constantly flooded with cooling water, any coal dust carried by the discharging smoke is precipitated in the water, and the danger of explosion is to a great extent eliminated. If desired the main may be provided with an inspection hole adapted to be closed by a suitable pivoted cover 36.

The invention as hereinabove set forth is embodied in a particular form of construction but may be variously embodied within the scope of the claims hereinafter made.

What is claimed is:

1. In a coking plant, in combination: an exhaust main provided with water inlets along its opposite sides; gutters respectively located on opposite sides of and substantially co-extensive with said exhaust main and discharging water through said inlets into the interior of the main; and a water pipe positioned above and substantially co-extensive with said main, and provided with a series of discharging holes for permitting cooling water to flow over the opposite sides of the aforesaid main into said gutters; substantially as specified.

2. In a coking plant, in combination: an exhaust main provided with water inlets along its opposite sides; gutters respectively located on opposite sides of said main and discharging water through said inlets into the interior of the main; and a water pipe positioned above the main and provided with a series of discharging holes for permitting cooling water to flow over the opposite sides of the main into said gutters; substantially as specified.

3. In a coking plant, in combination: an exhaust main provided with water inlets along its opposite sides; gutters respectively located on opposite sides of and substantially co-extensive with said main and discharging water through said inlets into the interior of the main; and means for discharging cooling water on top of said main; substantially as specified.

4. In a by-product coking plant, in combination: a smoke off-take main through which smoke discharged from the ovens of said plant is conveyed; means substantially co-extensive with said main, for discharging

cooling water on to the exterior wall face of said main; and means for concurrently discharging cooling water into the interior of the main; substantially as specified.

5. In a by-product coking plant, in combination: a horizontal smoke off-take main through which smoke discharged from the ovens of said plant is conveyed; means for discharging cooling water to flow substantially co-extensively over and down the exterior wall face of said main, and means for concurrently discharging cooling water into the interior of the main; substantially as specified.

6. In a by-product coking plant, a horizontal smoke off-take main through which smoke discharged from the ovens of said plant is conveyed, combined with means for effecting a simultaneous circulation of a cooling liquid through the interior of and over and down the exterior wall face of said main; substantially as specified.

7. In a by-product coking plant, the combination with a smoke off-take main through which smoke discharged from the ovens of said plant is conveyed, of means substantially co-extensive with said main, for effecting concurrent cooling of the interior and exterior of said main, substantially as specified.

In testimony whereof I have hereunto set my hand this 11th day of October, 1919.

JOSEPH VAN ACKEREN.