Oct. 22, 1940. A. KOPPERS 2,218,916

MEANS FOR REMOVING SMOKE AND GAS AND OTHER EXHAUST PRODUCTS FROM COKE OVENS FOR THE PRODUCTION OF GAS AND COKE

Filed Dec. 24, 1938 2 Sheets-Sheet 1

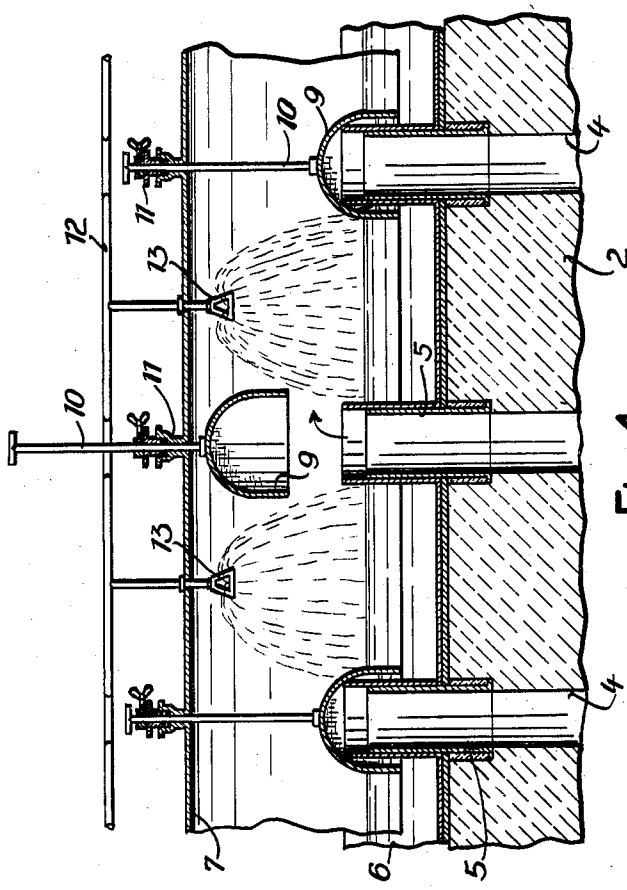


Fig. 1

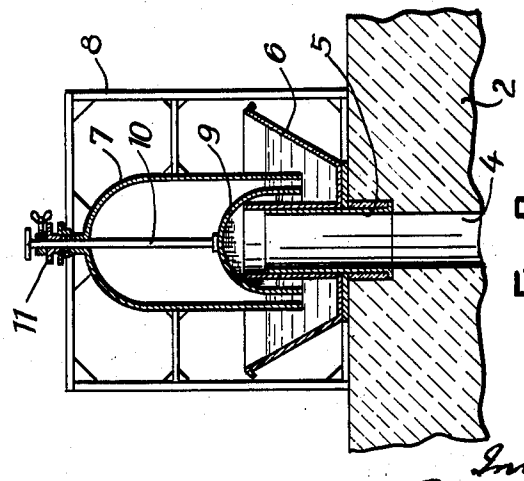


Fig. 2

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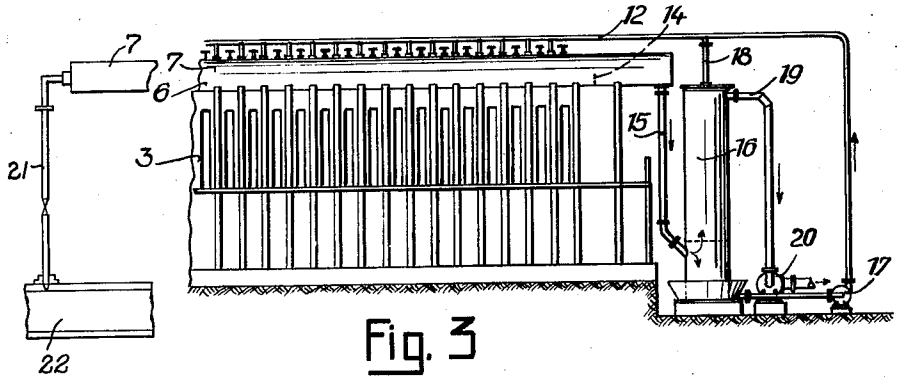


Fig. 3

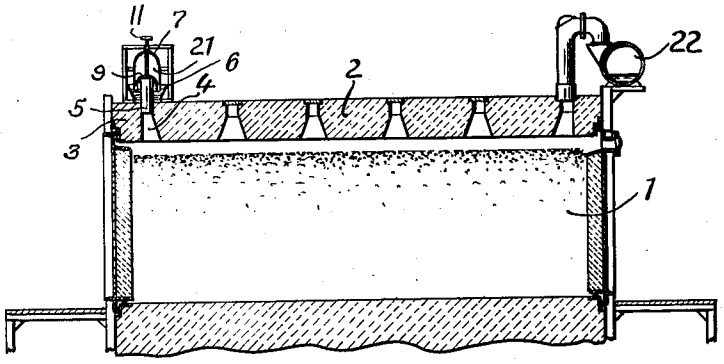


Fig. 4

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UNITED STATES PATENT OFFICE

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MEANS FOR REMOVING SMOKE AND GAS AND OTHER EXHAUST PRODUCTS FROM COKE OVENS FOR THE PRODUCTION OF GAS AND COKE

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4 Claims. (Cl. 202—255)

The invention relates to means for removing the so-called charging gases evolved during the charging of coal into coke ovens for the production of gas and coke, said charging gases comprising smoke, dust, distillation gases or other gaseous products developed when the coal to be coked comes into contact with the highly heated walls of the coking chamber or retort.

When charging a coking chamber or retort of an oven for the production of gas and coke, charging gases are developed to such an extent that considerable troubles are caused with regard to the workmen supervising the coking plant and to the neighborhood thereof. The troubles may result from the fact that the charging gases contain often rather a high quantity of air so that explosive mixtures of gas and air are formed.

Many attempts have of course been made to remove and neutralize the dangerous charging gases of a coke oven and in this connection it was suggested to introduce the charging gases through ascension pipes connected with the oven chamber into a water-filled collecting main closed to the ascension pipe by means of a dip seal, the charging gases being forced to pass through the water seal of the collecting main and consequently to cool-down below their ignition temperature thus diminishing the danger of explosions. This contrivance has, however, offered great difficulties with regard to practical operation. For instance the suction of the charging gases through the water seal requires a considerably increased vacuum against the normal suction and consequently an expensive suction device necessitating a high steam consumption is required. Furthermore large quantities of water are always required for the known contrivance and the water level has constantly to be kept exactly at the same height. Since especially the charging gases evolved directly after the charging of coal into the oven chambers contain much tar and dust, which precipitate in the water-filled collecting main, it is necessary to remove them periodically or continuously from the collecting main.

Now, the present invention relates to a contrivance for the removal of charging gases on coke ovens in which the explosions caused by the explosive mixture of gas and air of the charging gases are made ineffective by the use of a simple design of the contrivance so that all damages and the disadvantages existing in the known contrivances are safely eliminated.

The contrivance according to the invention mainly comprises an auxiliary collecting main connected with auxiliary ascension pipes independent of the distillation gas collecting main. The auxiliary collecting main is preferably arranged at one end of the oven chamber opposite the distillation gas collecting main, on the oven roof of the battery, either on the side or directly above the auxiliary ascension pipe openings of the oven chambers. This auxiliary collecting main, designed according to the invention, has a trough-like water-filled channel which, is open at the top and into which similar to a cup-seal, dips a channel like gutter in a gas-tight way and which surrounds the auxiliary ascension pipes projecting preferably from below into the water-filled channel to a point above the water level. The ascension pipes are closed by sealing caps which may be lifted by rods. Cooling water is injected into the auxiliary collecting main from above. The cooling water removes the solid constituents from the gas and reaches a discharge device from where the liquor together with the evolved gases and vapours flow into the lower part of a scrubber in which the coarse solid constituents are separated and the cooled liquor is used again for spraying the auxiliary collecting main.

If an explosion of the charging gases takes place within the auxiliary collecting main it has no dangerous effect upon the casing of the collecting main but the explosion gases will find their way through the water-filled trough-like open channel from where perhaps only a part of the water is expelled. The open channel further offers the advantage that the solid constituents of the gas depositing on the bottom in large quantities as far as they have not yet been discharged through the condensate outlet may be removed from the channel during the operation from outside without causing any trouble.

With the above and other objects and features of my present invention in view, I will now describe a preferred embodiment of my invention on the lines of the accompanying drawings in which:

Fig. 1 is a partial longitudinal section through the auxiliary collecting main carried out according to the invention.

Fig. 2 is a cross-section through the collecting main according to Fig. 1.

Fig. 3 shows a view towards the oven battery together with the auxiliary collecting main.

Fig. 4 is a longitudinal section through an oven chamber.

In the oven roof 2 of the chambers 1 there are arranged at one side of the battery 3 the suction openings 4 which are provided with as-

cension pipes 5 extending gas-tightly into the openings 4 of each oven chamber. These ascension pipes 5 pass through a trough-like water-filled channel 6 extending along the whole battery. The ascension pipes 5 project far enough above the water level. The ascension pipes 5 are surrounded by a gutter 7 which is closed above and open below. The gutter projects (dips) into the water-filled channel so far that the gas developed in the oven chamber cannot escape into the open air. The gutter 7 is suspended from a supporting construction 8 which may be fixed to the channel 6 or also to the oven roof.

The ascension pipes 5 are closed by dip caps 9 which are provided with carrying rods 10 passing gas tightly through the gutter 7 in stuffing boxes 11. The dipping caps 9 may, however, also be lifted or lowered by means of a screw stem. Cooling water for precipitating the coarse solid constituents of the charging gas is sprayed into the collecting main by means of the sprays 13 through a water pipe 12 arranged above the collecting main. The solid constituents collecting on the bottom such as thick tar, or the like may likewise be removed easily from the channel 6 through open top. The liquor of the collecting main containing condensate and other solid constituents flows over a sealing wall 14 arranged in the channel 6 at the end of the battery into a pipe 15 leading to the bottom of a scrubber 16. The solid constituents precipitate on the bottom of the scrubber. The reclarified liquor is returned to the pipe 12 by means of a pump 17 and used for spraying purposes. A part of the reclarified liquor can be branched-off from the pipe 12 and led through the pipe 18 to the scrubber 16. The charging gases leave the top of the scrubber through a pipe 19 and by means of a blower 20 they are discharged into a vapour stack not shown on the drawing.

As may be seen from Fig 4, the auxiliary collecting main 21 is preferably arranged on the side of the battery opposite the distillation gas collecting main 22.

The collecting main 22 may also be arranged at the side of the charging gas suction main 6, 7, traversing the oven roof, in which case the whole collecting main is placed higher. Such an arrangement offers the special advantage that the openings of the oven roof may be cleaned from one cleaning hole arranged in a knee-piece of the ascension pipe.

According to the invention it is further suggested to introduce flue gas into the auxiliary collecting main 7 at the end of the collecting main 7 opposite the suction end (15, 16, 19, 20) in order to avoid explosions in the auxiliary collecting main 7 when sucking off the charging gases. By this means the charging gases are diluted and no explosions can take place. For this reason a pipe 21 connecting the collecting main 7 with the waste heat flue 22 of the coking plant is arranged at the other end of the collecting main. This provision only necessitates a somewhat higher vacuum in the collecting main 7 which must be somewhat above the vacuum of the flue gas channel 22.

I have now above described my present invention on the lines of a preferred embodiment thereof but my invention is not limited in all its aspects to the mode of carrying it out as described and shown, since the invention may be variously embodied within the scope of the following claims.

I claim:

1. Means for removing charging gases from coke ovens for the production of gas and coke comprising: an auxiliary collecting main arranged separately from a distillation gas collecting main for the ovens, said auxiliary collecting main comprising a trough-like water-filled channel upwardly open to the atmosphere; ascension pipes projecting from the oven chambers through the channel to discharge above the water level in the main; sealing caps for said ascension pipes to shut-off the oven chambers from the auxiliary collecting main by dipping in the water in the auxiliary-main channel, said sealing caps being adjustable to permit flow of gas into the auxiliary main from the ascension pipes; and a gas-off-flow gutter closed gas-tightly from the outer air and dipping into the water-filled channel so as to surround the ascension pipes and their sealing caps, said gutter being spaced from the sides and bottom of the channel to leave a part of the water level open to the atmosphere and also to afford access to the bottom of the channel through the sides of the auxiliary main from outside the same without leakage of gas from the auxiliary main.

2. Means as claimed in claim 1 and also comprising spraying nozzles situated above the channel within the gutter for spraying the off-flow gas therein; suction means for drawing off the condensate and the gas-steam mixture at one end of the auxiliary collecting main; a separating tank therefor; and means for returning the extracted water for use again for spraying purposes to the spray nozzles.

3. Means as claimed in claim 1 and also comprising spraying nozzles situated above the channel within the gutter for spraying the off-flow gas therein; suction means for drawing off the condensate and the gas-steam mixture at one end of the auxiliary collecting main; a separating tank therefor; and means for returning the extract water for use again for spraying purposes to the spray nozzles; a pipe connected with the waste heat flue of the oven plant and fixed to the end of the auxiliary collecting main opposite the suction end where the suction means draws off the gas-steam mixture, for introducing inert diluting gas to the same during flow of the gas-steam mixture through the auxiliary collecting main.

4. Means for removing gases from coke ovens for the production of gas and coke comprising: a collecting main comprising a trough-like water-filled channel upwardly open to the atmosphere; ascension pipes projecting from the oven chambers through the channel to discharge gas from the oven chambers into the collecting main above the water level in the collecting main; sealing caps for said ascension pipes for shutting-off the oven chambers from the collecting main by dipping in the water in the collecting main, said sealing caps being adjustable to permit flow of gas into the auxiliary main from the ascension pipes; and a gas off-flow gutter closed gas tightly from the outer air and dipping into the water-filled channel so as to surround the ascension pipes and their sealing caps, said gutter being spaced from the sides and bottom of the channel to leave a part of the water level open to the atmosphere and also to afford access to the bottom of the channel through the sides of the auxiliary main from outside the same without leakage of gas from the auxiliary main.

AUGUST KOPPERS.