Oct. 13, 1936. O. H. WILSON 2,057,125

COKE OVEN EQUIPMENT

Filed Sept. 29, 1931 2 Sheets-Sheet 1

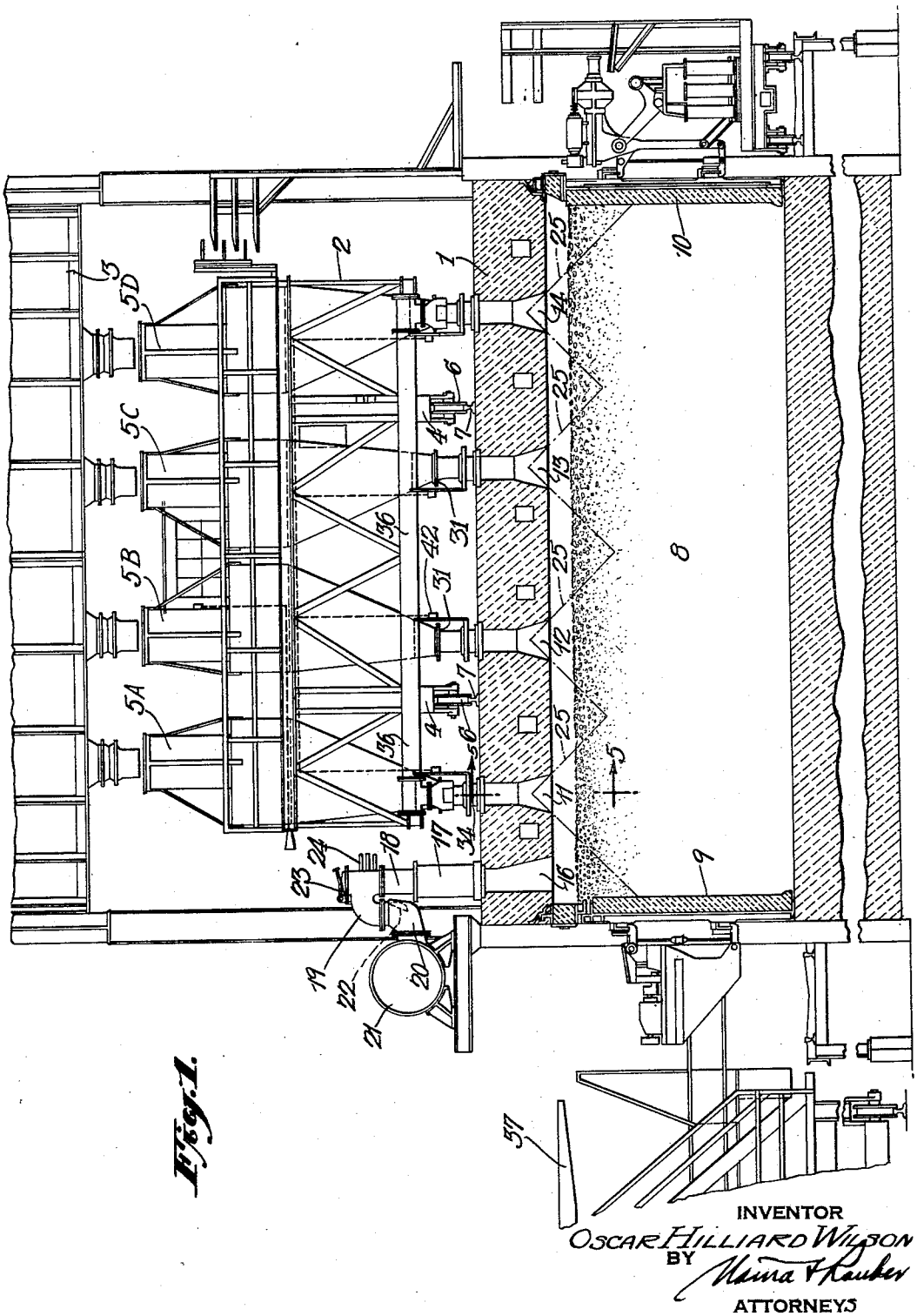


Fig. 1.

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Fig. 2.

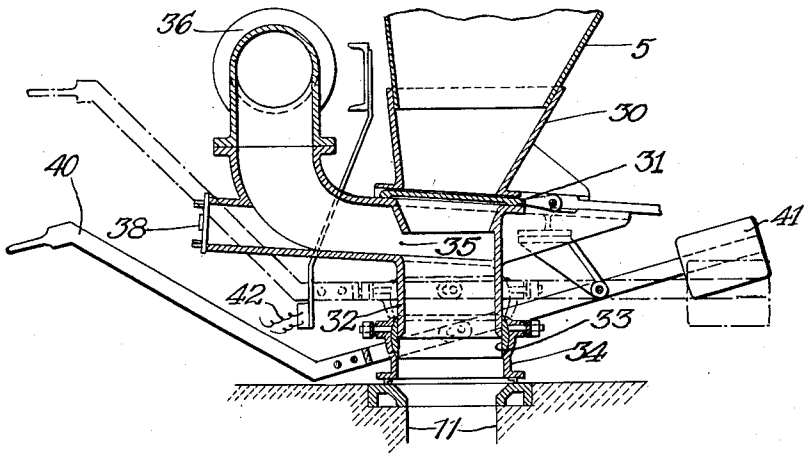


Fig. 3.

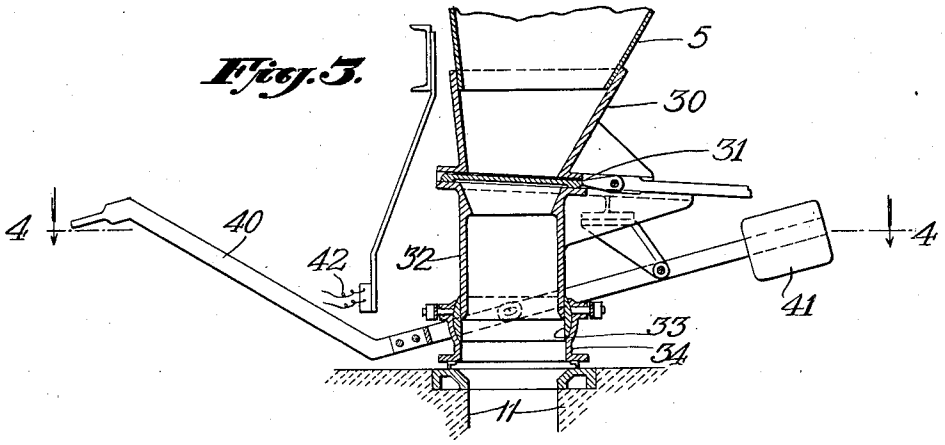


Fig. 4.

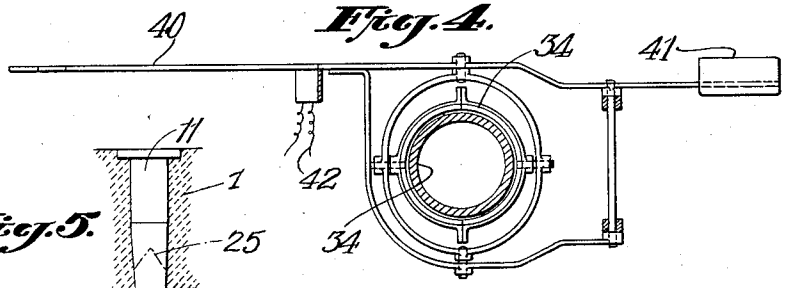


Fig. 5.

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UNITED STATES PATENT OFFICE

2,057,125

COKE OVEN EQUIPMENT

Oscar Hilliard Wilson, Fairfield, Ala.

Application September 29, 1931, Serial No. 565,854

3 Claims. (Cl. 202—263)

This invention relates to coke ovens and more particularly to gas pressure equalizing means utilized therewith.

The main object of this invention is to provide means to automatically equalize and continuously relieve the gas pressure in a coke oven during the charging of the oven with coal.

Another object of the device is to provide a means for entrapping and saving gases which would otherwise escape during the charging of a coke oven.

Other objects and advantages will be apparent as the invention is more fully disclosed.

In accordance with the objects of this invention, I have devised a novel means set forth herein whereby the accumulated gas pressure at the end of a coke oven chamber are equalized and relieved thereby preventing the destruction of freshly luted coke oven door seals, attendant gas leaks, burning of the gas from said leaks and consequent damage to oven iron works.

Before further disclosing the nature and scope of the present invention, reference should be had to the accompanying drawings, wherein:

Fig. 1 is a side elevation partly in section of a modern type of coke oven chamber with a coal charging larry shown in its discharging position, showing an adaptation of the present invention;

Fig. 2 is a sectional side elevation view of the end hopper chutes and gates of a coal charging larry showing the connection of the end hopper chutes to an equalizing conduit or pipe;

Fig. 3 is a sectional side elevation view of the intermediate hopper chutes and gates of a coal charging larry;

Fig. 4 is a part plan and part cross sectional view taken along plane 4—4 in Fig. 3;

Fig. 5 is a cross sectional end view of the coke oven taken along plane 5—5 in Fig. 1.

Referring now to the drawings, Fig. 1 illustrates a modern type of coke oven equipment including an oven, a coal charging larry and an overhead coal storage bin 3.

The coke oven shown comprises a top 1 through which charging holes 11, 12, 13 and 14 extend, which holes are normally closed by a suitable cast iron cover (not shown) when the larry car is removed from the position indicated. The oven also comprises side, end and bottom walls which need not be specifically identified. Doors 9 and 10 fit into the end walls and are hermetically sealed in any desired manner, but are usually sealed with prepared clay. Numeral 8 is employed to identify the coking chamber.

The coal charging larry shown is a conveyance by which the coal is transferred from the coal bins to the ovens for carbonizing. Its three essential elements comprise the trucks 4, the frame 2 and the plurality of hoppers 5A, 5B, 5C and 5D. The number of hoppers will vary according to the design and dimensions of the oven that the larry is designed to serve. In the drawings four hoppers are shown and serve to illustrate the present invention. These hoppers are preferably conical in shape and have suitable discharge gates 31 in the bottom thereof. Trucks 4, carrying frame 2 and hoppers 5A, 5B, 5C and 5D, are supported on wheels 6 adapted to run on tracks 7. Means are provided (not shown) to propel the larry along tracks 7 from the coal storage bin 3 to a position above the coke oven charging holes 11, 12, 13 and 14, said means also serving to return the larry to coal storage bin for reloading.

When the coal is deposited into the coking chamber 8 and comes into sudden contact with the red hot oven walls thereof, a large amount of gas is evolved. The means ordinarily provided to withdraw the gas that is generated within an oven comprises a conduit 16 extending through the top 1 to the interior of the oven and leading through suitable pipe connections 17, 18, 19 and 20 to a gas main 21. To control the admission of gas into the main 21, section 20 is equipped with a disc valve 22 and section 19 is equipped with a lid 23. Means such as steam jets 24 are provided in conduit 16 to overcome the pressure maintained in main 21 and to create a slight vacuum or suction which facilitates the withdrawal of gases from the oven.

In the charging of coke ovens the coal being charged therein forms mounds such as is indicated by dotted line 25 (Fig. 1 and Fig. 5), which obstruct the charging openings 11 to 14 inclusive as well as the direct passage of the coke oven gases to the conduit 16 to such an extent that the gases in between the mounds accumulate to a relatively high pressure and tend to bleed off through the charging openings 11 to 14, inclusive. This relative high pressure creates a condition, which is not only hazardous to the operator but also causes an appreciable loss in efficiency in the coke oven process. Moreover, the high gas pressure in the pocket of chamber 8 which is on the opposite end from conduit 16 often finds relief by destroying the seals around oven door 10. When the mounds are leveled off by means of arm 37 of a coke pusher mechanism that is indicated, but not shown, as it is no part of, and is not included within the scope of the

present invention, the gas pockets are eliminated, gas pressures are equalized within the oven chamber itself and the loss of oven gases by escape through the charging openings 11 to 14 inclusive then may be stopped by replacing the cast iron covers (not shown) one at a time over the charging openings.

By my invention I eliminate the hazardous and troublesome accumulation of gas pressure within the oven by providing a pipe or conduit 36 which is attached to and carried by the coal charging larry and which serves to by-pass gases from the end of chamber 8 farthest from conduit 16 to the end of chamber 8 nearest to conduit 16, around the obstructing mounds of coal, and back again into the oven, and from this end of the chamber 8 the gases are readily carried off by the regular conduit system 16 into the gas main 21. It is obvious with this by-pass conduit arrangement, that the pressure in pocket at end of chamber 8 farthest from conduit 16 is relieved and equalized with the pressure in the pocket at end of chamber nearest to conduit 16.

As a matter of convenience and in order to have as few openings through the oven top as possible, conduit 36 has been shown attached to discharge chutes of hoppers at each end of a charging larry and attached in such manner that the discharge chutes serve not only to discharge coal from the hoppers but also they become a part of the conduit 36 when the gate valves of the end hoppers are closed. Thus the end chutes are made to serve a two fold purpose.

In the specific embodiment illustrated, the construction of an equalizing conduit utilizing the discharge chutes of end hoppers as part thereof is shown and disclosed as a preferred design, but I do not wish to be limited thereby, for the reason that separate openings and connections for an equalizing conduit may be made at each end of an oven.

Referring to the drawings, Figs. 2 and 3 illustrate two types of larry discharge chutes both having gates therein. Fig. 2 shows a preferred arrangement for connecting conduit 36 to the discharge chutes of end hoppers while Fig. 3 shows an arrangement of hopper discharge chutes which have no connection with conduit 36, but which are otherwise operatively identical to the chute shown in Fig. 2.

In Figs. 2 and 3, the hopper 5 is supported upon base 30 at the bottom of which is located a valve gate 31 actuated from a platform on charging larry by a series of levers and rods (not shown). Attached to the bottom of base 30 is a discharging chute comprising a cylindrical sleeve member 32 which carries a slidable ring 33 in turn carrying a ring seal member 34 adapted to engage and seal the charging hole opening 11 from the atmosphere. Means 40 including suitable levers and rods (not enumerated specifically) and counter balance 41 are provided to raise and lower the ring seal 34.

In the wall of the sleeve member 32 of Fig. 2, I provide an opening 35, which is connected by suitable pipe connections to pressure equalizing conduit 36. Clean out means for pipe connections such as indicated at 38 are provided as may be necessary.

Before charging an oven, the doors 9 and 10 which have been removed in the operation of pushing coke from an oven are replaced in position and luted, lid 23 which has been opened is closed. The loaded coal charging larry having been brought to its discharging position over the charging holes in top of oven, the operator descends from his platform on the larry to the top of ovens and singly removes a charging hole cover following this action by lowering the discharge chute of the hopper over the uncovered hole by lever means 40. He thus removes covers and lowers discharge chutes for all hoppers. By doing this the hoppers are connected to charging holes and are ready to be discharged. At the same time the two ends of the oven chamber 8 are connected through the discharging chute for hopper 5A, the conduit 36, and the discharging chute for hopper 5D, thus providing a completed conduit for equalizing gas pressures within the oven chamber 8. Steam is now supplied to steam jets 24 and valve 22 which has been closed is opened.

It is not required that the discharging chutes of all hoppers be connected to equalizing conduit 36 for it has been found in actual practice quite sufficient for the purposes intended to connect only the two discharging chutes at the ends of chamber 8 as is herein illustrated and described. This arrangement relieves at once any high pressure of gas in the pocket at end of chamber 8 furthest from conduit 16, whether said pressure is caused by expanding gases from the coal or by combustion of gases within the oven chamber.

With all of the discharging chutes lowered into position over charging holes it is obvious that air is largely prevented from entering the oven chamber. After the operator has lowered all the discharging chutes, he ascends to his platform on the larry and by means of levers and rods attached to valve gates 31 opens said gates one at a time and the coal in each hopper is allowed to flow from the hopper into the oven chamber. When the coal is all out of a particular hopper the valve gate is closed in order to prevent escape of gases through the hopper. It has been found in actual practice desirable to discharge the hoppers 5A, 5D, 5B and 5C in the order named. After all of the hoppers are emptied in the manner described, the coal in the oven chamber is leveled by arm 37 and the pressure equalizing conduit 36 is no longer necessary. When the coal in oven chamber has been leveled, the operator then proceeds to singly raise the discharging chutes for each hopper, and to place cast iron covers over the charging holes. The charging larry is then moved from over the charging holes, operator seals the lids of charging holes and turns off steam from jets 24.

Electrical connections, indicated at 42 on drawings are such that the charging larry cannot be moved until all of the discharge chutes have been raised, but when they are raised the larry may be moved along its track as may be desired.

By the above description it is intended to show that my invention directly equalizes and relieves gas pressures in an oven chamber, and incidently saves gases that have been wasted in coke oven practice heretofore which saving of gases also eliminates the smoke nuisance.

I am aware that somewhat similar arrangements have heretofore been used to carry smoke away from the charging holes of a coke oven chamber, but so far as I know in all such arrangements the gases are wasted, and move only in one direction out from the oven chamber into a smoke main. In striking contrast the gases and smoke from an oven chamber equipped with a pressure equalizing conduit as described and illustrated herein are free to move out from the oven chamber into said equalizing conduit

through a certain charging hole and back again into the oven chamber through a certain other charging hole in response to varying pressures within the oven chamber at the charging holes where the equalizing conduit is connected to the oven chamber.

An especial advantage in cost of construction of the equalizing conduit of this invention over the somewhat similar arrangements heretofore used for carrying smoke away from an oven chamber is that no apparatus other than the simple conduit attached to a charging larry is required.

An especial advantage in cost of operation of the equalizing conduit of this invention over the somewhat similar arrangements heretofore used for carrying smoke away from an oven chamber, is that no special connections to a smoke main or other mains have to be made and broken.

It is to be understood that modifications and departures may be made in the specific embodiment disclosed herein which do not essentially depart from the nature and scope thereof and which are encompassed within the following claims:

What I claim is:

1. A coke oven having a gas main and an off-take pipe connecting said oven near one end to said gas main and means to create a suction from said oven into said off-take pipe, said oven having a number of charging openings spaced lengthwise thereof, and a larry car having a number of coal charging hoppers and discharge passages, one for each of said charging openings, and having a conduit connected at one point to a discharge passage remote from said off-take pipe and at another point to a discharge passage near said off-take pipe and forming a closed circuit between said discharge passages, whereby gases evolved in said oven at a distance from said gas main are conducted to a portion of said oven adjacent said main.

2. A coke oven having a gas main, an off-take pipe connecting said oven near one end thereof to said gas main, and means to create a suction from said oven into said off-take pipe, said oven having a number of charging openings spaced lengthwise thereof, and a larry car having a number of coal charging hoppers and discharge passages, one for each of said charging openings and having a conduit connected at one end to a discharge passage distant from said off-take pipe and at its opposite end to a discharge passage near said off-take pipe and forming a closed circuit between said discharge passages whereby gases evolved in said oven at a distance from said main are conducted to a portion of said oven adjacent said main.

3. A coke oven having a gas main and an off-take pipe connecting said oven near one end to said gas main and means to create a suction from said oven into said off-take pipe, said oven having a number of charging openings spaced lengthwise thereof, and a larry car having a number of coal charging hoppers and discharge passages, one for each of said charging openings and having a conduit connected at one end to the discharge passage most remote from said off-take pipe and at its opposite end to a discharge passage nearest said off-take pipe and forming a closed circuit between said discharge passages whereby gases evolved in said oven at a distance from said gas main are conducted to a portion of said oven adjacent said main.

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