

PROCESS OF MANUFACTURING MIXED COAL GAS AND CARBURETED WATER GAS.

940,289.

Fig. 1.

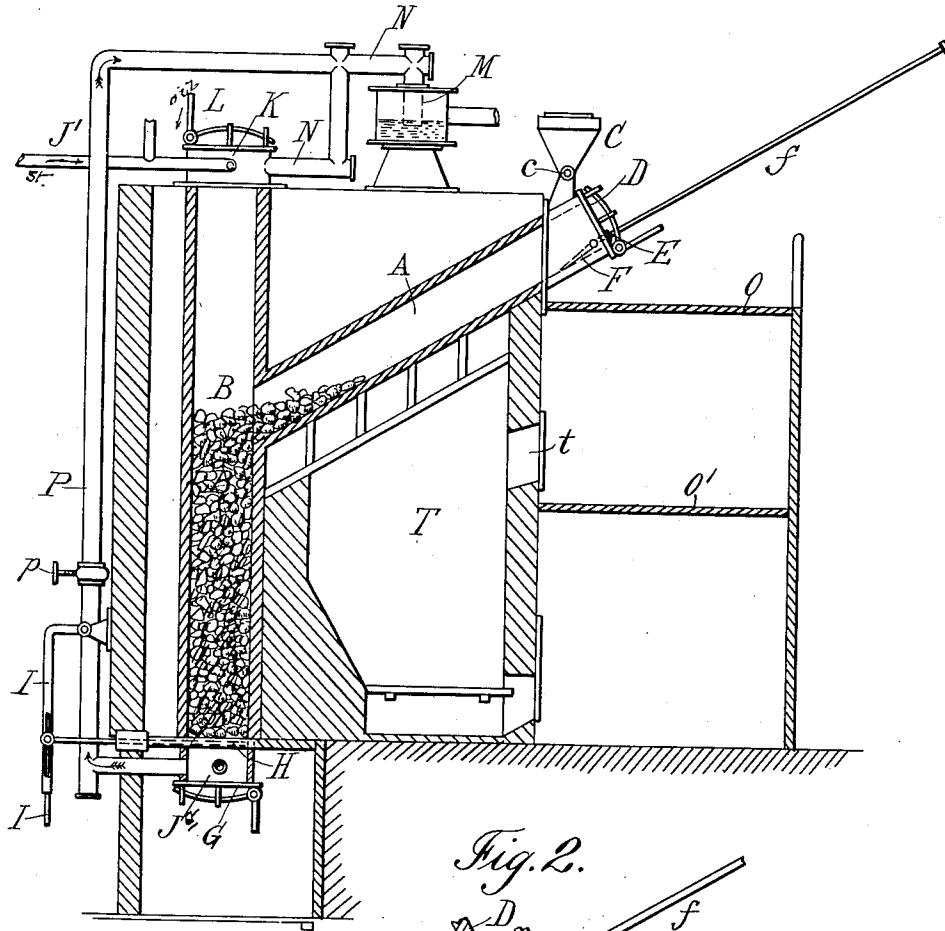
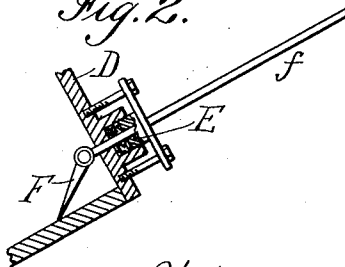


Fig. 2.



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PROCESS OF MANUFACTURING MIXED COAL-GAS AND CARBURETED WATER-GAS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER THOMAS, a subject of the King of Great Britain, residing at Vancouver, in the county of Vancouver, Province of British Columbia, Canada, have invented certain new and useful Improvements in Processes of Manufacturing Mixed Coal-Gas and Carbureted Water-Gas, of which the following is a specification.

This invention relates to the manufacture of gas, and particularly to the process of generating mixed coal-gas, and carbureted water gas and consists of improvements in that kind of process in which the coal is first partly distilled in a horizontal or inclined portion of a retort and is then transferred to a vertical portion thereof.

According to the present invention a charge of coal is spread on the bottom of the inclined or horizontal portion of the retort and, after partial distillation therein, pushed forward and allowed to fall into the lower end of the vertical part of the retort, where the distillation is rapidly completed, owing to the favorable conditions obtaining, these operations being continuously repeated, the coal-gas generated in the inclined or horizontal portion of the retort not passing through the contents of the vertical portion of the retort whereby the volatile illuminants will be saved and not be deteriorated by passage through a body of incandescent coke. I prefer to provide the retort used for the above described process with means for the enrichment of the coal-gas and for the production of water gas from the coke in the vertical portion of the retort and its enrichment.

The matter constituting my invention will be defined in the claims.

In order that my invention may be fully understood I will describe the details of construction and operation by reference to the accompanying drawings, in which—

Figure 1 represents a sectional elevation of a form of retort and setting for carrying out the process. Fig. 2 represents a sectional detail of construction thereof.

My retort is composed of a vertical portion B, and an inclined or horizontal portion A, opening into such vertical portion approximately at the middle of its height; and it is suitably set and supported in a furnace or bench which may be provided with a generator or producer T, for heating the same.

The inclined portion A is provided at its outer end with a feed-hopper C fitted with a worm *c* by means of which a suitable amount of coal may be fed into the retort. To the outer end of the part A is secured a self-sealing door or lid D through which coal may be introduced if desired, by hand. This lid D is preferably provided with a stuffing box E through which is passed the rod *f* of a pusher or slicer blade F, Fig. 2, by means of which the fresh coal can be distributed, the partly distilled coal pushed forward into different positions in the inclined portion of the retort and afterward be thrust into the vertical part of the retort. The lower end or mouth-piece of the vertical portion B projects into a pit or chamber and is closed by a self-sealing discharge door G. Near the lower end of the part B is fitted a casing and a slide damper or gate H to the rod of which is connected a pivoted lever I for operating the same. By means of this sliding gate the amount of coke discharged when door G is opened, may be controlled and the desired amount retained in the retort. A supply pipe J connects with the lower mouth-piece for admitting superheated steam. The upper end of the vertical part of the retort is also provided with a mouth-piece to which is connected a self-sealing lid K. With this mouth-piece also connects a steam supply pipe J¹ with which connects an oil inlet pipe L, through which may be admitted a spray of oil, such as distillate or other enricher. A gas take-off pipe N connects with the upper mouth-piece and with the hydraulic main M. A second gas take-off pipe P, having a valve *p*, connects with the lower end or mouth-piece of the vertical part B and with pipe N leading into the hydraulic main. A charging floor O is conveniently located at the outer end of the inclined part A of the retort, and a second floor O¹ is located below in convenient position near the opening and door *t* for feeding the generator or furnace T. It will be noted that the whole length of the vertical portion B of my retort is located within the furnace, so that the lower portion containing the partially distilled coal and coke will be continuously subjected to a sufficiently high temperature for completing distillation of the coal, and decomposing steam, and at suitable intervals generating oil gas from hydrocarbon oil or vapor.

The apparatus being constructed and ar-

ranged substantially as above described may be operated as follows: The inclined and vertical portions A and B, having been heated to the required temperature, the vertical part is filled with coke to a suitable height, say three feet or so. A charge of coal is then introduced into the inclined portion A either automatically by means of the hopper feeder C or by hand through the door D. The coal is then heated in the inclined portion A for two hours or so, during which period its position in said inclined portion may be shifted, and is then thrust by the pusher or slicer F into the vertical portion, where it gives off large quantities of gas and is rapidly distilled. When the active distillation has somewhat subsided a second charge of coal is fed into the inclined portion of the retort and when this second charge has been in the inclined portion for sixty minutes or so the first charge, which was pushed into the vertical portion, will have become fully carbonized and incandescent, and by reason of the preliminary distillation that the coal has undergone in the inclined portion, the resulting coke will be in such condition that if steam be admitted through pipe J the latter will be capable of readily penetrating the mass of incandescent coke without waterlogging of the coke taking place. During this distilling and coking operation valve *p* is closed and the coal gas is passed off freely through the open upper part of the vertical portion B of the retort and pipe N to the hydraulic main, thereby preventing overheating and destructive decomposition of the volatile illuminants in the coal gas. I secure improved results by partially distilling coal in the inclined portion of the retort and completing the distillation in the vertical portion. The incandescent coke in the vertical portion can be effectively used for decomposing steam for the production of water-gas, and for vaporizing oil and converting the vapor into fixed gas without interfering with distillation of the fresh coal in the inclined portion of the retort. A deep body of incandescent coke having been formed in the vertical portion B of the retort, at the end of about three hours after beginning of the distilling operation water-gas may be generated by admitting superheated steam through pipe J for a period of about six minutes, more or less, according to the heat, and the steam then shut off till the coke has recovered its incandescence, after which another run for the production of water-gas may be made. The water-gas may be passed off through pipe N into the hydraulic main and allowed to mix with the coal gas that is being generated in the inclined portion of the retort, or the coal gas may be conducted off separately from such inclined portion. Subsequently, while distillation of a fresher charge of coal

is proceeding in the inclined portion A of the retort, and when the body of partially distilled coal and coke is incandescent in the vertical part B of the retort, steam will be admitted at suitable intervals and decomposed by passage up through the body of incandescent fuel, the water gas mixing with the coal gas and passing off therewith through the hydraulic main.

In order to carburet the water-gas or enrich the coal-gas, as may be desired, a distillate oil or other enricher may be admitted from time to time in a fine spray through pipe L, at which time the valve *p* will be open, and the oil vapor passed down through the hot coke where it is converted into fixed carbureted hydrogen which is passed off through pipe P into the hydraulic main. At a time when the vertical part B of the retort is filled with incandescent coke, the distillation of the coal therein having been nearly completed, the valve *p* will be opened and oil or hydrocarbon vapor will be admitted at the top through pipe L and passed down into the body of incandescent coke where it is converted into a fixed hydrocarbon gas which is passed down through the body of coke and off through the lower mouthpiece G and outlet pipe P and thence through the hydraulic main to be subsequently mixed with the coal gas and water gas in a holder. The generation of hydrocarbon gas in the body of incandescent coke preferably takes place after the body of coal in the inclined portion A has been undergoing distillation for about two hours, so that the richer illuminants from the coal have been passed off up through the vertical part of the retort and pipe N into the hydraulic main, the object being to avoid destructive decomposition of the illuminants liberated from the coal.

The first portion of the retort may be horizontal instead of inclined, but the latter is preferable inasmuch as it allows the coal on being introduced to gravitate to its proper position in said portion of the retort and thus minimize the amount of labor required for its manipulation.

Several retorts of the form described herein may be combined in one bench, the vertical portion of each retort being connected only to its own inclined or horizontal portion.

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

1. The process of manufacturing gas, which consists in partly distilling coal in an inclined or horizontal body and freely conducting off the resulting gas without passage through coke for retaining volatile illuminants, pushing the partly distilled coal into a vertical body and completing the distillation, at suitable intervals spraying hy-

drocarbon, oil into the distilling retort and passing the resulting vapor and gas down through the incandescent coke for converting them into fixed enriching gas, and passing such gas off at the base, and mixing it with the coal gas.

2. The process of manufacturing gas, which consists in partly distilling coal in an inclined or horizontal body and freely conducting off the resulting gas without passage through incandescent coke, whereby the volatile illuminants will be retained, pushing the partly distilled coal into a vertical body and therein completing distillation and heating the coke to incandescence, at suitable intervals decomposing steam by passage up

through the incandescent coke and mixing the resulting water gas with the coal gas, then when a vertical body of incandescent coke has been formed, passing hydrocarbon oil down into the same and therein generating fixed hydrocarbon gas and passing the same off at the base of the coke and mixing it with the coal gas and water gas for enriching the same.

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

WALTER THOMAS.

Witnesses:

P. M. FERRIS,
W. H. CROSFIELD.