April 20, 1926. A. McD. DUCKHAM 1,581,724

METHOD AND APPARATUS FOR THE EXTRACTION OF COKE FROM VERTICAL RETORTS

Filed Nov. 7, 1924 2 Sheets-Sheet 1

Fig. 2.

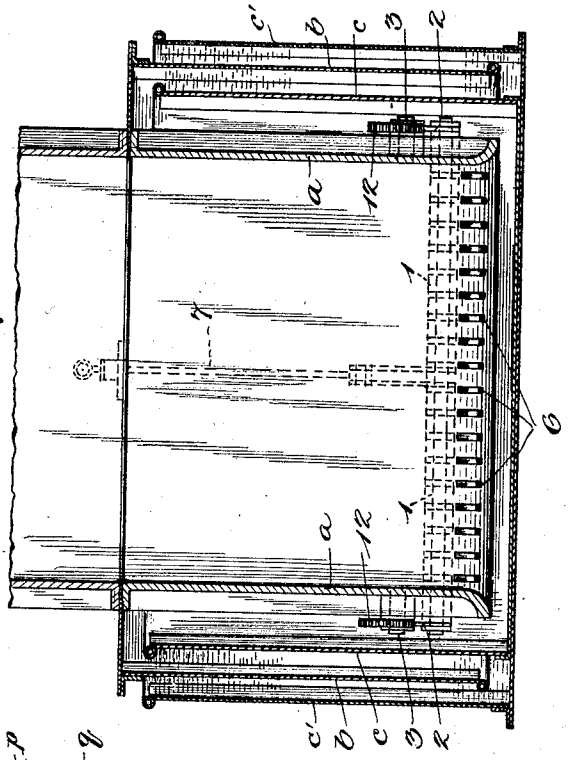
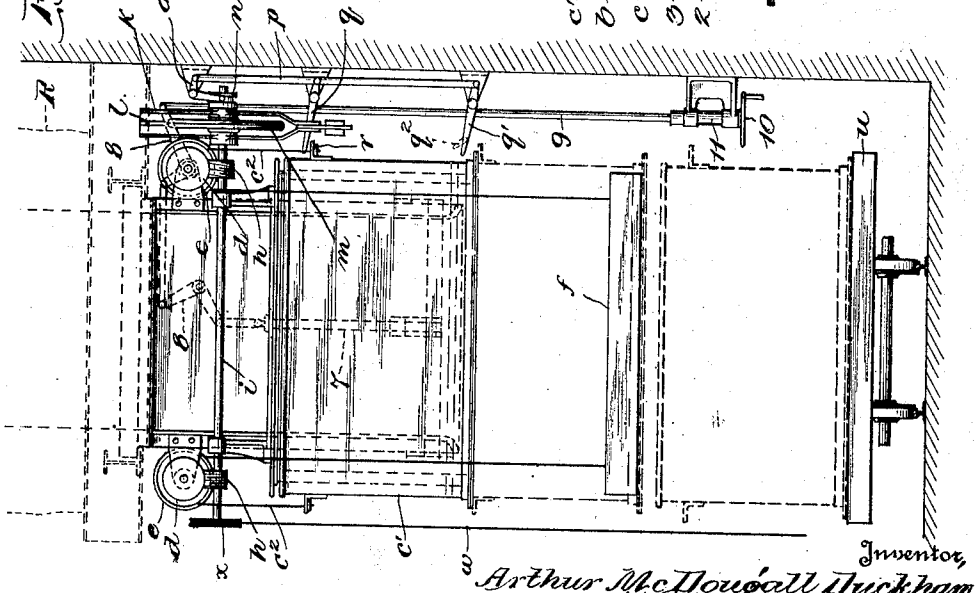


Fig. 1.



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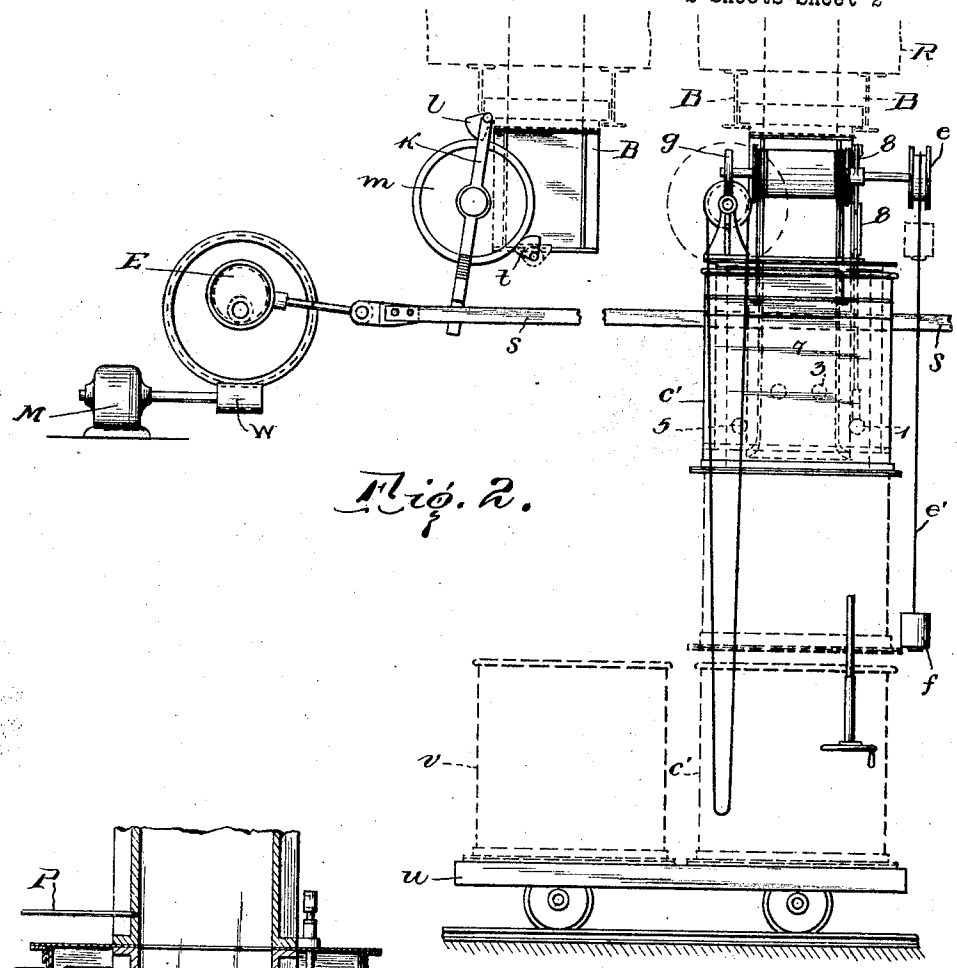


Fig. 2.

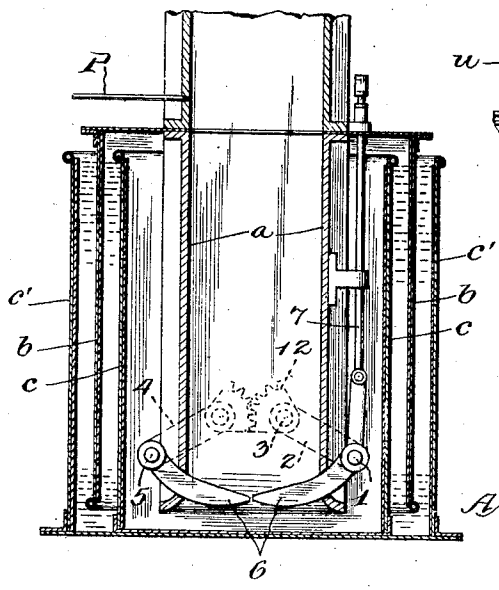


Fig. 3.

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UNITED STATES PATENT OFFICE.

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METHOD AND APPARATUS FOR THE EXTRACTION OF COKE FROM VERTICAL RETORTS.

Application filed November 7, 1924. Serial No. 748,365.

To all whom it may concern:

Be it known that I, ARTHUR McDOUGALL DUCKHAM, a subject of the King of Great Britain and Ireland, residing at London, England, have invented new and useful Improvements in Methods and Apparatus for the Extraction of Coke from Vertical Retorts, of which the following is a specification.

This invention relates to a method and apparatus for running coke from vertical retorts, and has for its object to provide a method and apparatus which will be continuous and automatic in its operation and without subjecting the coke within the carbonizing retort and in the act of being withdrawn therefrom to undue oxidation and broken up into fine particles.

The method of continuously extracting coke from the base of the column of fuel in a vertical carbonizing retort has generally consisted in governing the issue of the coke from the lower end of the retort by means of a moving device having a fixed position at the said end or at a short distance below the end.

According to the present invention the governing device moves downwards, so that its distance from the lower end of the retort is increased to a maximum. One advantage of this improvement is that the construction may be simplified as compared with known constructions; another is that the breakage of the coke is considerably reduced.

One method of operating consists in supporting the column of fuel in the retort on a bottom which is moved downwards at a suitable speed until a quantity of coke has issued from the retort, whereupon a temporary bottom for the retort is provided until the coke has been removed from, or together with, the first-named bottom and the latter, or another like it, has been brought into position for repeating the operation.

Suitable apparatus comprises a fixed depending mouthpiece or extension of the retort surrounded by a container, the bottom of which constitutes the bottom of the retort thus extended. The container may be lowered in any suitable manner, for instance, it may be supported on a ram. Conveniently, however, it is kept in its highest position by means of a counterweight or the like which suffices to support the weight of the column of coal in the retort.

The container may also form the necessary seal for the bottom of the retort. For instance the vertical walls of the container are double so as to hold water into which dips a metal curtain fixed at the bottom of the retort.

The container is lowered continuously by suitable gear, and when it has come into its lowest position it rests upon a wheeled trolley or the like to be conveyed away with its charge of coke. Another similar but empty container immediately takes the place of that just removed.

Obviously, there is a short interval during which the column of fuel in the retort must be supported until the empty container has been brought into position. For this purpose there may be a slide or slides adapted to enter the coke and extend across the bottom of the extended retort when the charged container has arrived at its lowest position. The slides are horizontally moving forks operated by hand at the desired moment, or automatically through mechanical gear or electrically when the charged container is in the appropriate lowered position.

In order to prevent the entrance of atmospheric air into the retort, steam jets are provided in the extended portion of the retort, the jets of steam producing a slight pressure which prevents the ingress of air into the retort during the period between the removal of one full container and the placing in position of another empty one.

The invention consists of steps, and structural features and relation of elements which will be hereinafter more fully described and particularly pointed out in the appended claims.

In the accompanying drawings which illustrate the invention, and in which similar reference characters indicate the same parts in the several figures:

Figure 1 is a front elevation.

Figure 2 is a side elevation of the governing device described above in general terms.

Figures 3 and 4 are vertical sections in planes at right angles to each other through the device from which the governing gear

has been removed, and are drawn to an enlarged scale.

In the drawings, the extension *a* of the lower end of a vertical retort R is suitably supported by a rigid frame-work of iron beams B, B, and carries a curtain *b* closed at the top and adapted to enter a water-space formed between an inner container *c* and an outer container *c'*. The latter is suspended by chains c^2 which wind on drums *d* rotatably and properly supported by said frame-work B. The shaft of each drum carries at one end a second drum *e* on which winds a chain *e'* attached to a counterweight *f*, and at the other end a worm wheel *g* in gear with a worm *h* on a shaft *i*. There is mounted free to rock on this shaft a lever *k* carrying a pawl *l* adapted to engage a wheel *m* free to turn on the shaft. A clutch *n* sliding on the shaft and adapted to make wheel *m* fast to the shaft, is connected by bell crank *o* with a rod *p* adapted to be moved up and down by tappet levers *q*, *q'* which extend into the path of a bracket *r* on the container *c'*, the end q^2 of lever *q'* being pivoted to turn in upward direction only, as indicated by dotted lines. The lever *k* is continuously oscillated by a reciprocating rod *s* actuated by an electric motor M, worm W and eccentric E, as will be readily understood.

The mechanism operates as follows:—The column of material in the retort rests upon the bottom of container *c*. When the containers are in their highest position, as shown in full lines, the clutch *n* is engaged with wheel *m* and at each oscillation of the lever *k* the wheel *g*, shaft *i* and drums *d* are turned through a small angle by pawl *l* and are then prevented from turning backwards by a detent *t* pivoted at a fixed point of the frame-work B.

This turning movement raises the weight *f* and lowers the containers, the speed of the descent of the latter being arranged to correspond with the rate at which the material is to pass through the retort. When the tops of the containers are nearly level with the mouth of the extension *a* the bracket *r* strikes lever *q'* and thus raises the rod *p* to disengage clutch *n*, whereupon the shaft *i* is free to turn independently of lever *k*. The material in the retort is now retained by providing a temporary gate at the mouth of the extension *a* by operating the mechanism presently to be described, and the lowering of the containers is continued by turning shaft *i* by manipulating the chain *w* which engages a sprocket wheel *x* on the shaft. The containers come to rest on the truck *u*.

The chains are now detached from the container *c'*, the truck is moved forward to bring fresh containers *v* into position, the chains are attached to the outer of these containers and the shaft *i* is rotated in reverse direction by means of chain *w* to bring them into their highest position. During this upward movement, bracket *r* passes end q^2 of lever *q'* without operating it but strikes lever *q* to lower rod *p* and engage clutch *n* and the downward movement is re-started, the temporary gate at the mouth of the extension *a* being removed, so that the material in the retort may rest on the bottom of the inner containers.

The gate mechanism (Figures 3 and 4) comprises a bar 1 carried at its ends in arms 2 which turn on pivots 3 on the extension *a*. The pivoted ends of these arms carry toothed sectors 12 which are in gear with similar sectors carried by the ends of arms 4 similar to arms 2 and like these carrying a bar 5. To bars 1 and 5 are fixed tines 6 and bar 1 is pivotally connected by a guided rod 7 and a system of bell crank levers 8 (Figure 1) with a screw threaded rod 9 which can be raised and lowered by turning it in a screw socket 11 by means of a hand wheel 10. In the position shown in Figure 3 the tines 6 are in their innermost position and the gate is closed; by turning wheel 10 to lower rod 9 bar 1 is raised and the tines are withdrawn to open the gate.

To prevent the entrance of atmospheric air into the bottom of the retort, pipes P, P supplying steam jets to the lower or extended portion of the retort are provided, said steam jets producing a slight pressure above the outside atmospheric pressure and prevents the ingress of air into the retort during the period between the removal of one full container and the placing in position of another empty container.

What I claim is:

1. The method of operating and governing the discharge of a vertical retort coke oven in connection with a separate and transportable container, which consists in sealing the space between the lower section of the retort and the container, simultaneously gravitating the coke from the interior and lower section of the retort into the container while maintaining the sealed relation between the retort and container and as the container gravitates, cutting off the feed of coke into the container at the breaking of the seal between said retort and container, and removing the charged container from the end of said retort.

2. The combination with a vertical coke retort having an open bottom, of a separate and transportable container having an imperforate bottom and its sides adapted to surround the bottom section of the vertical retort substantially the full depth of the container and its imperforate bottom placed in juxtaposition to the open bottom of the retort, means at the bottom of the retort for supporting and releasing a body of coke

within and at the bottom section of the retort, and means for raising said container to surround the bottom of the retort to deposit the coke into the container and lower said container to remove the charged container with its coke from the bottom of the retort.

3. The combination with a vertical coke retort having an open bottom and a curtain attached to a section above and separated from the lower end of the retort to form an annular chamber closed at its upper end and open at its lower end and surrounding the lower section of said retort, a container having an imperforate bottom and separated side walls forming a receptacle for a sealing fluid adapted to receive and surround said curtain and its imperforate bottom placed in juxtaposition to the open bottom of the retort, means at the bottom of the retort for supporting and releasing a body of coke within and at the bottom section of the retort, and means for raising said container to surround the curtain and bottom of the retort to deposit the coke into the container and lower said container to remove the charged container with its coke from the retort and curtain.

4. The combination with a vertical coke retort having an open bottom and a curtain attached to a section above and separated from the lower end of retort to form a chamber closed at its upper end and open at its lower end, of a separate and transportable container having an imperforate bottom and separated side walls adapted to surround said curtain of the vertical retort and its imperforate bottom placed in juxtaposition to the open bottom of the retort, means at the bottom of the retort for supporting and releasing a body of coke within and at the bottom section of the retort, and means for raising said container to surround the curtain and bottom of the retort to deposit the coke into the container and lower said container to remove the charged container with its coke from the retort and curtain.

5. The combination with a vertical coke retort having an extension with an open bottom, of a separate and transportable container having an imperforate bottom and its sides adapted to surround the bottom section of the retort extension substantially the full depth of the container and its imperforate bottom placed in juxtaposition to the open bottom of said extension, means at the bottom of the extension for supporting and releasing a body of coke within and at the bottom section of said extension, and means for raising said container to surround the bottom of the extension to deposit the coke into the container and lower said container to remove the charged container with its coke from the bottom of the extension.

6. The combination with a vertical coke retort having an extension with an open bottom, of a separate and transportable container having an imperforate bottom and its sides adapted to surround the bottom section of the vertical retort extension substantially the full depth of the container and its imperforate bottom placed in juxtaposition to the open bottom of said extension, means at the bottom of the extension for supporting and releasing a body of coke within and at the bottom section of said extension, and means for periodically raising said container to surround the bottom of the extension to deposit the coke into the container and automatically lower said container when said container has reached the upper limit of its travel to remove the charged container with its coke from the bottom of the extension.

7. The combination with a vertical coke retort having an extension with an open bottom, of a separate and transportable container having an imperforate bottom and a double wall forming a pocket adapted to receive therewithin the bottom section of the vertical retort extension substantially the full depth of the container and its imperforate bottom placed in juxtaposition to the open bottom of said extension, means at the bottom of the extension for supporting and releasing a body of coke within and at the bottom section of said extension, and means for raising said container to surround the bottom of the extension to deposit the coke into the container and lower said container to remove the charged container with its coke from the bottom of the extension.

8. The combination with a vertical coke retort having a cylindrical hollow extension with an open bottom, of a separate and transportable cylindrical container having an imperforate bottom and a double wall forming an annular pocket adapted to receive therewithin the bottom section of the vertical extension substantially the full depth of the container and form a seal between the interior of the extension and exterior of the container, and its imperforate bottom placed in juxtaposition to the open bottom of the extension, means at the bottom of the extension for supporting and releasing a body of coke within and at the bottom section of the extension, and means for raising said container to surround the bottom of the extension to deposit the coke into the container and lower said container to remove the charged container with its coke from the bottom of the extension.

9. The combination with a vertical coke retort having an extension with an open bottom, of a separate and transportable container having an imperforate bottom and its sides adapted to surround the bottom section of the vertical retort extension substantially the full depth of the container and its imperforate bottom placed in juxtaposition to

the open bottom of the extension, means at the bottom of the extension for supporting and releasing a body of coke within and at the bottom section of the extension, means for raising said container to surround the bottom of the extension to deposit the coke into the container and lower said container to remove the charged container with its coke from the bottom of the extension, and means constructed, arranged and adapted to actuate by the movement of the container the means for lowering the container.

In testimony whereof I affix my signature.

ARTHUR McDOUGALL DUCKHAM.