W. S. SIMPSON.

METHOD OF MANUFACTURING AND PURIFYING COKE.

APPLICATION FILED JULY 1, 1910.

1,047,845.

Patented Dec. 17, 1912.

2 SHEETS—SHEET 1.

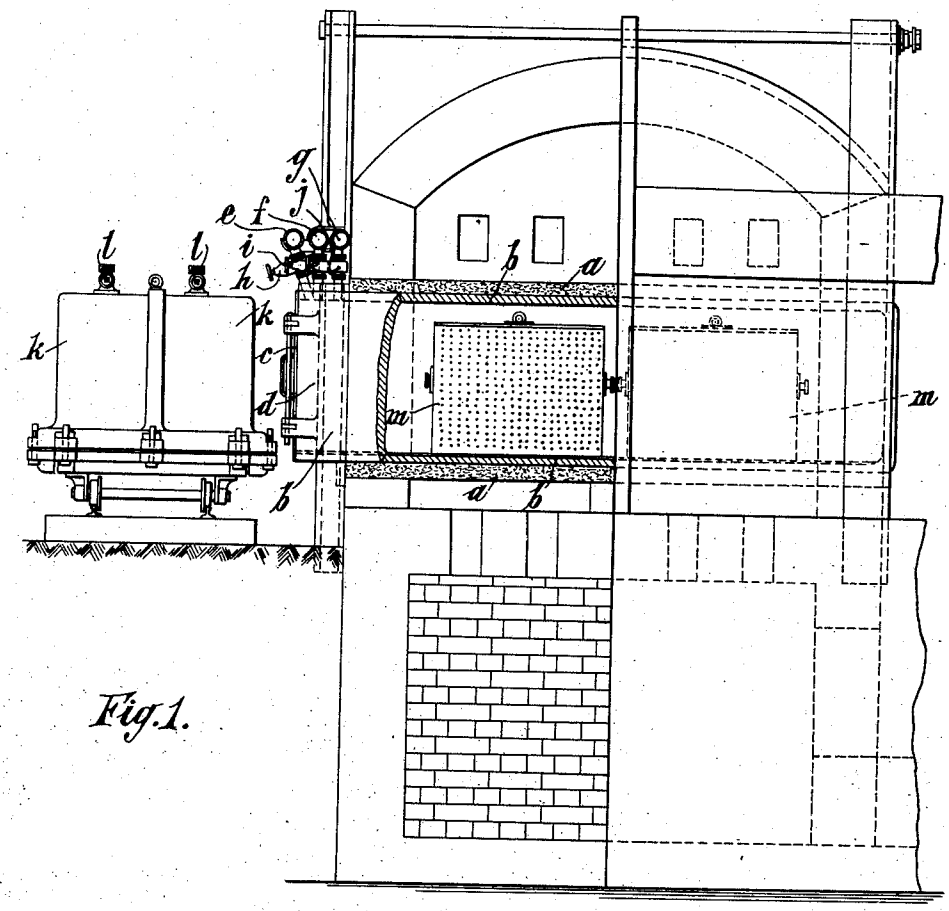

Fig. 1.

Witnesses

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Inventor

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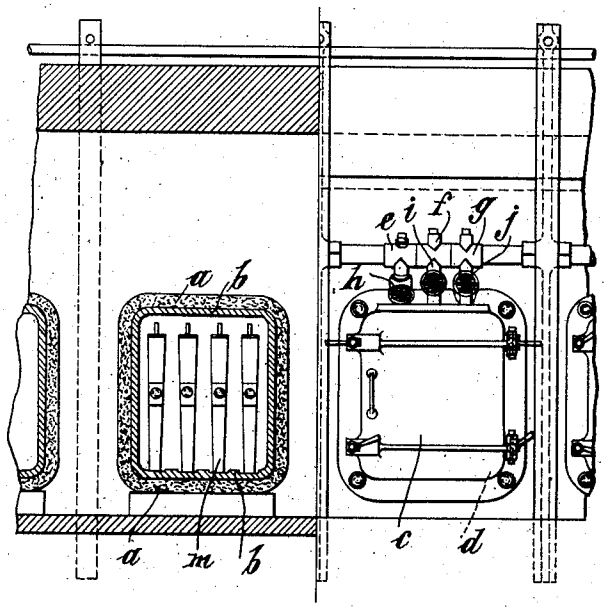

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

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METHOD OF MANUFACTURING AND PURIFYING COKE.

1,047,845. Specification of Letters Patent. Patented Dec. 17, 1912.

Application filed July 1, 1910. Serial No. 570,016.

To all whom it may concern:

Be it known that I, WILLIAM SPEIRS SIMPSON, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in Methods of Manufacturing and Purifying Coke, of which the following is a specification.

The object of this invention is to produce a pure quality of coke or similar fuel by distillation *in vacuo* during which operation certain valuable by-products are obtained by volatilization and condensation, oxidation or other waste of such by-products is avoided, and the remaining coke will contain the highest possible percentage of fixed carbon since, owing to the exclusion of air from the vacuum chamber wherein the substances under treatment are heated, a minimum quantity of carbon monoxid or carbon dioxid is formed so that the loss of carbon by oxidation is practically negligible.

My invention will be readily understood from the following description aided by the annexed drawings in which:—

Figure 1 is a part sectional side elevation of a furnace showing one retort, pipe connection and truck. Fig. 2 is part sectional front elevation of a portion of a furnace showing two retorts with the pipe connections to one, one retort being closed and the other open and showing the cases or packages for containing the fuel.

For the purposes of this invention I construct a retort (or series of retorts) made of a fire resisting material *a* such as fire clay and lined with a cast iron or steel tube *b*, which projects somewhat at one or both ends of the retort. The retort may be cylindrical, oval, rectangular or of any convenient size or shape. The end or ends may be closed by means of cast iron doors *c* arranged so that they may be easily closed or opened and form an air tight joint when closed. The projecting end or ends *d* are provided with three tubes *e*, *f*, *g*, of suitable size and length affording inlets or outlets to the retort. These tubes or pipes *e*, *f*, *g*, are fitted with cocks or other closing devices *h*, *i*, *j*, so that they may be opened and closed independently. In operation one tube *e* is connected with an exhaust pump (not shown) whereby the vacuum is created and maintained in the retort and whereby also the volatilized substances resulting from the distillation of the contents of the retort, may be drawn off and conveyed into suitable condensing apparatus. A second tube *f* is connected with an external reservoir or generator of gases (not shown) suitable for the purpose of purifying the substances under treatment in the retort; such for instance as carbon monoxid (CO) which thus introduced is efficient to assist in eliminating sulfur and sulfurous compounds from the contents of the retort and the third tube *g* is connected with a separate and auxiliary exhausting and condensing plant (also not shown).

In operating this apparatus I first close the valves for the pipes *f* and *g* and open the valve for the pipe *e* to allow of a vacuum being created in the retort, and I partially distil the coal or other carbonaceous substance forming the retort charge and recover certain by-products which volatilize at comparatively low temperatures, then the vacuum connection *e* is closed and the desulfurizing and purifying gases are introduced into the retort, being admitted through the second pipe of tube *f:* then after a suitable time this gas supply tube *f* is closed and the third tube or pipe *g* is opened and a further distillation of the contents of the retort is carried on, at varying temperatures, and further by-products or impurities are separated and drawn off for condensation. When the operation is complete the door or doors *c* of the retort are opened and the contents (still hot) are withdrawn and passed into a receiver *k* of suitable shape and so constructed that it may be hermetically closed and the air exhausted therefrom by a vacuum pump through the valved pipe or pipes *l* until its contents are cooled. Any further substances which may be given off while cooling are recovered, whether gaseous or otherwise.

In some cases it is convenient before introducing the coal or other carbonaceous material into the retort to place the same in suitable cases or packages *m* both for convenience in handling and for shaping the coke into compact blocks or slabs during the cooling process. Such cases may be made of sheet iron or steel preferable rectangular in shape of any convenient length or width and from 4 to 6 inches in depth, having a cover hinged to one side and having suitable perforations on the edges or sides to allow the free escape of gases or other volatile substances during the process of distillation.

In cases where carbon monoxid is em-

ployed the same may be generated in a separate receptacle and conveyed from thence by a suitable pipe into the vacuum retort or it may be generated in a receptacle (having perforations in its top) which may be placed in the bottom of the vacuum retort or wherever else most suitable or may form a part of such retort. A convenient way of generating such carbon-monoxid is to mix ground carbonate of lime (or common chalk) with ground charcoal or other suitable form of carbon, in the proportion of 85% of the former to 15% of the latter (by weight) which mixture when subjected to heat yields volumes of CO that under suitable conditions acts as a reducing agent upon the sulfids of iron present in the coal.

What I do claim as my invention and desire to secure by Letters Patent is:—

1. A method of manufacturing coke which comprises distilling coke or other carbonaceous substance in a closed heating retort *in vacuo*, recovering by-products of such distillation, and purifying the coke while in said retort by subjecting the coke to the action of a desulfurizing agent.

2. The method of manufacturing and purifying coke consisting of partially distilling in vacuum, coal or other carbonaceous substance, in a heated closed retort, and recovering by-products which are passed to a condenser; then introducing desulfurizing and purifying gases into the retort to eliminate sulfur and other sulfurous compounds; cutting off said supply and further exhausting by a separate suction pump to carry any further products or impurities to a condenser, substantially as set forth.

3. In a process for the manufacturing and purification of coke, the employment of carbon monoxid for the purpose of eliminating sulfur or sulfurous compounds from the carbonaceous material under treatment, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

WILLIAM SPEIRS SIMPSON.

Witnesses:
PERCY E. MATTOCKS,
F. C. SMITH.