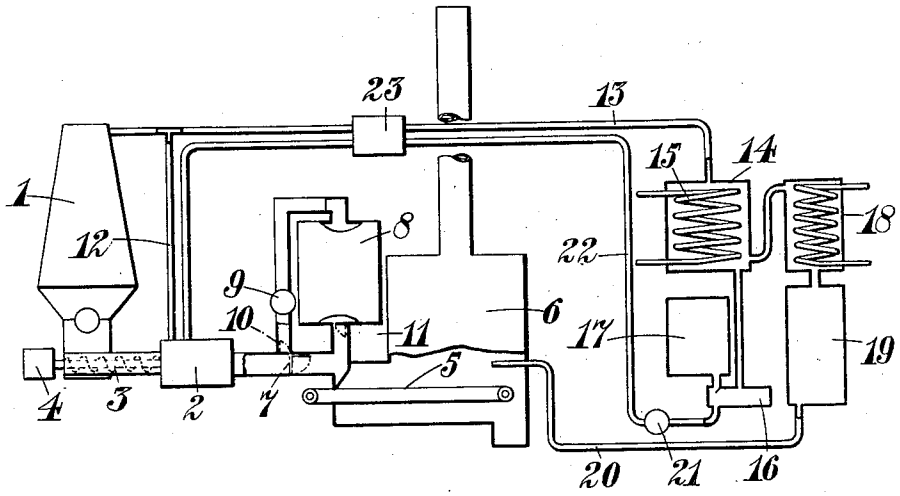
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March 17, 1925. 1,529,706

C. H. MERZ

FUEL

Filed Aug. 13, 1923



INVENTOR.

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BY

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UNITED STATES PATENT OFFICE.

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FUEL.

Application filed August 13, 1923. Serial No. 656,999.

To all whom it may concern:

Be it known that I, CHARLES HESTERMAN MERZ, subject of the King of England, residing in London, England, have invented certain new and useful Improvements in Fuels, of which the following is a specification.

This invention consists in improvements in or relating to fuels and has for its object to produce a new form of fuel for use in boiler and other furnaces. It has previously been proposed, for example in British specifications Nos. 117,290 and 118,777 to obtain solid fuel for large scale power production in the form of solid residue obtained from a low temperature coal distillation process, and in such cases the hot coke or equivalent residue obtained from the carbonization retort is led direct to the furnace by mechanical or other means. The oils and gas resulting from the distillation process are collected separately.

It is known from experience that a mixture in the nature of a colloid composed of coal and oil enables an inferior quality of coal to be satisfactorily burned in boiler or other furnaces, and that it is possible to obtain an improved colloidal condition when the union between the coal and oil is effected in the presence of heat as compared with the case when the component parts are admixed at normal atmospheric temperature.

The present invention has for its object to provide a new fuel either in a simple pulverized condition or having the nature of a colloid and accordingly the present invention may be described as comprising a process which consists in pulverizing fuel, when in a heated condition, in the presence of an inert fluid medium from which air or oxygen is excluded. The invention is preferably carried out when the fuel is heated to a temperature at which combustion would take place in air.

A feature of the invention, by which heat economy is effected, consists in pulverizing the fuel while it still retains heat, for example by taking as the fuel the residue resulting from a carbonization process, and in either case the fuel may in one form of the invention be pulverized in the presence of oil or gas or both. The temperature at which the fuel is pulverized is in such a case governed by the temperature at which the fuel residue is received in the pulverizing apparatus. If the fuel is that obtained from a low-temperature carbonization process, the temperature of the coke entering the pulverizing apparatus will generaly be approximately between 450° and 650° C. and such a temperature range may be taken as the preferred range for the invention.

The figure in the drawing shows a perspective view of the apparatus employed.

Apparatus according to the invention comprises in combination a pulverizer, means to enclose it so as to prevent access of air thereto, and means whereby fuel can be admitted to the pulverizer without admission of a material quantity of air. Means may also be provided for admitting inert gas to the pulverizer similarly so that the entry of air is for practical purposes excluded.

The fuel to be pulverized according to the present invention is solid carbonaceous fuel derived from coal and solid pulverizable fuel residues of a like nature, and the term "fuel" throughout the specification and claims, where the context indicates that this term is employed to denote the material to be pulverized will be understood as referring to the carbonaceous fuel and fuel-residues derived from coal as above mentioned.

The degree of subdivision to which the fuel is to be reduced will be that suitable for powdered fuel firing. Generally the degree of fineness is such that 80–85% of the pulverized fuel will pass through a 200 mesh sieve. Where pulverizing of the fuel is referred to throughout the specification and claims it will be understood that the degree of pulverization intended is of the order of that above referred to, although this may be varied within practical limits for powdered fuel firing.

In one preferred manner of carrying the invention into effect, now to be described by way of example only, with the aid of the accompanying diagrammatic drawings, fuel residue obtained from a low temperature distillation retort 1 (heated by superheated steam) is fed direct into an enclosed pulverizing apparatus 2 as above described, for example by means of a screw conveyor or like apparatus 3 operated by a motor 4. The pulverizer may be of the ball-mill type or of any suitable form which will reduce the fuel to the desired state of subdivision.

By feeding the fuel direct from the retort to the pulverizer by means of a screw conveyor or other mechanical device, entry of air to the pulverizer is obviated inasmuch as the fuel will thereby be introduced accompanied substantially only by retort gases.

The finely divided fuel thus obtained may be then fed in a heated condition directly on to grate 5 of the furnace 6 past the valve 7 whereby entry of air to the pulverizer is prevented; or the fuel may be stored if preferred in a storage tank 8, and subsequently supplied either hot or cold to the furnace. It is passed to the tank 8 by an elevator 9 via valve 10. Another valve 11 serves to close an exit from the tank leading to the furnace-grate.

In the plant illustrated a proportion of the gases from the retort 1 pass by a pipe 12 to the crusher 2 or by a pipe 13 to a condenser 14. Cooling water circulates through a coil 15 in the condenser chamber 14 and is used as heated feed-water for a boiler which is served by the furnace 6. Distillates from the chamber 14 pass into a receiver 16 with which communicates an auxiliary oil-tank 17. Uncondensed gases pass from the condenser 14 through a cooler 18 and thence to a gas stripping plant 19 from which some or all of the fixed gas is passed via a pipe 20 back into the furnace 6.

From the container 16 a pump 21 serves to pump oil through a pipe 22 leading into the crusher 2, both the pipes 22 and 13 being contained for a portion of their length in a heater 23.

If it is desired to produce fuel having a colloidal nature the oil is supplied to the crusher 2 by means of the pump 21 so that the fuel is immersed in oil during pulverization. As will be understood from the diagram the oil employed may be in part oil obtained from the carbonization process, that is the oil condensed in 14, and is conveniently heated by means of hot retort-gases passing through the pipe 13 in the heating chamber 23 which serves as a heat-exchanger between the contents of the pipes 13 and 22. Any preferred means may be employed to regulate the temperature of this heater.

An advantage of using oil obtained from the carbonization process is that the oil is available in close proximity to the pulverizing apparatus, thus avoiding unnecessary transit of the oil.

It will be appreciated that the plant fulfils the triple function of crusher, mixer and oil container, in which either pulverization of the fuel alone or pulverization in the presence of oil can be effected. If it is desired to effect pulverization in the presence of a gas, the latter can be led into the pulverizer casing by means of pipe 12.

Preferably control means, such as the pump 21, is so operated as to ensure that the flow of oil to the crusher will be in correct proportion to the amount of solid fuel supplied from the retort.

It will be understood that control means will be installed to regulate the flow of liquid gases or solid fuel residue as and when required to the various parts of the plant. Pumps or pressure injectors or other control devices for determining the amount of fuel to be fed either into the furnaces or into the storage tank, will if required be provided. If the fuel is to be admixed with oils other than those obtained from the carbonization process, they can be stored in the tank 17.

It is found that a satisfactory fuel can be obtained by crushing the residues aforesaid in the presence of an inert gas, such as CO_2, or as has been before described, the fuel can be crushed without the delivery of any oil or gas whatever to the pulverizer other than that quantity of retort gas which may pass into it with the fuel.

It will be seen that by the present invention hot solid residue obtained from the carbonization process can be converted while still hot, into fuel eminently suitable for direct use in boiler or other furnaces, thus conserving some or all of the sensible heat remaining in the fuel residue when it is discharged from the retort; or alternatively the fuel either in the pulverized or colloidal condition, may be stored in tanks, but in the latter form, advantage has been taken of the better admixture of the component parts due to the admixing having been effected in the presence of heat.

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

1. A process for the purpose described, which consists in pulverizing fuel residue in a heaped condition in an inert fluid medium from which air or oxygen is excluded, which fuel residue is combustible and is derived from a low temperature carbonization process, substantially as described.

2. A process for the purpose described which consists in subjecting fuel to a carbonization process and pulverizing the residual fuel in an inert fluid medium from which air or oxygen is excluded, while said residual fuel still retains heat resulting from the carbonization process, substantially as described.

3. A process for the purpose described which consists in subjecting fuel to a low temperature carbonization process and pulverizing the residual fuel in an inert fluid medium from which air or oxygen is excluded while the fuel still retains heat resulting from the carbonization process, substantially as described.

4. A process for the purpose described, which consists in subjecting fuel to a car-

bonization process and in pulverizing the residual fuel when in a heated condition in the presence of oil and a gas from which air or oxygen is excluded, substantially as described.

5. A process for the purpose described which consists in subjecting fuel to a carbonization process and in pulverizing the residual fuel when in a heated condition in the presence of oil extracted during a carbonization process, from which air or oxygen is excluded, substantially as described.

6. A process for the purpose described which consists in subjecting fuel to a carbonization process and in pulverizing the residual fuel when in a heated condition in the presence of CO_2 from which air or oxygen is excluded, substantially as described.

7. An improved fuel which is obtained by subjecting solid fuel to a carbonization process and pulverizing the fuel residue when in a heated condition in an inert fluid medium from which air or oxygen is excluded, substantially as described.

8. An improved fuel which is obtained by subjecting solid fuel to a carbonization process, and pulverizing the fuel residue in an inert atmosphere from which air or oxygen is excluded while said residue still retains heat resulting from the said carbonization process, substantially as described.

9. An improved fuel which is obtained by subjecting solid fuel to a carbonization process and pulverizing the fuel residue in a heated condition in the presence of oil and gas from which air or oxygen is excluded, substantially as described.

10. An improved fuel which is obtained by subjecting solid fuel to a carbonization process, and in pulverizing the fuel residue in a heated condition in the presence of oil extracted during a carbonization process, from which air or oxygen is excluded, substantially as described.

11. An improved fuel which is obtained by subjecting solid fuel to a carbonization process and in pulverizing the fuel residue in a heated condition in the presence of gas from which air or oxygen is excluded, substantially as described.

12. An improved fuel which is obtained by subjecting solid fuel to a low temperature carbonization process, and in pulverizing the fuel residue in a heated condition in the presence of CO_2, from which air or oxygen is excluded, substantially as described.

In testimony whereof I affix my signature.

CHARLES HESTERMAN MERZ.