J. J. SHEDLOCK.
APPARATUS FOR MAKING ARTIFICIAL FUEL.
APPLICATION FILED NOV. 6, 1906.

FIG. 2.

Witnesses.

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THE BOWIS PERRY CO., WASHINGTON, D. C.
APPARATUS FOR MAKING ARTIFICIAL FUEL.
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Inventor:
J. J. Shedlock
By: Attorneys

Witnesses:
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To all whom it may concern:

Be it known that I, JAMES JOHN SHEDLOCK, engineer, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in Apparatus for Making Artificial Fuel, of which the following is a specification.

This invention relates to the production of artificial fuel from coal of any suitable description such as small coal or other suitable solid carbonaceous material or refuse coal etc., and is carried into effect by heating the said coal alone or in combination (according to the nature and character of the coal) with any suitable liquid hydro-carbon such as gas tar, asphalts, coke asphalt, petroleum, etc.

In a prior patent dated 8th November 1904 No. 774765 granted to me a process is described for the manufacture of artificial fuel from a mixture of coal or other suitable solid carbonaceous materials and tar or other suitable liquid hydrocarbonaceous materials in suitable proportions by causing the said mixture to ascend in a sub-divided condition in a closed chamber and during such ascent subjecting said mixture in detail to the action of highly heated inert aeroform fluid or fluids in such chamber, vaporizing the more volatile constituents of said mixture and carrying off such vapors with the aeroform fluid or fluids and thereby forming producing or developing a pitch-like coating or pitchy deposit on the solid particles of said mixture so that the latter on subsequent compression while heated will thereby produce solid fuel blocks; apparatus being also described and illustrated in said patent for carrying out said process.

Now the present invention relates to the manufacture of artificial fuel wherein the fuel material is rendered tacky or sufficiently adhesive also by forming producing or developing a pitch-like coating or pitchy deposit on the solid particles of said fuel material during the heating and mixing thereof so that on subsequent compression while heated same will thereby produce solid or hard fuel blocks or briquets.

Apparatus for the manufacture of artificial fuel according to this invention comprising the combination with a gas-tight vessel in which the fuel material is heated to the required degree, of an automatic feeding and measuring device adapted to deliver the fuel material into said gas-tight vessel, a series of hollow shelves or trays superposed and spaced apart in said gas-tight vessels with ducts through said hollow shelves through which the fuel material may pass from shelf to shelf, means to pass said fuel material over the surface of each shelf in turn and then pass it on to the next shelf below, means to apply heat internally to said hollow shelves, means to regulate the amount of such heat, means to withdraw from the space between the hollow shelves the volatile constituents evolved from the said fuel material, an automatic delivery device (adapted to form a seal) to discharge the heated fuel material from said gas-tight vessel in suchwise as to prevent the entrance of atmospheric air into the gas-tight vessel as the fuel material is withdrawn therefrom, means to deliver said discharged fuel material while in a heated condition into a press and a suitable press adapted to form solid fuel material into solid blocks of fuel or briquets.

When the coal contains only a minimum quantity of volatile hydro-carbons it is necessary to add a sufficient quantity of the liquid hydrocarbon, but when the coal is of a sufficiently bituminous nature such admixture of liquid hydrocarbon may not be necessary.

The fuel materials in a suitable sub-divided state (either combined with a liquid hydrocarbon or in their natural state) are fed into a hopper forming part of an automatic feeding and measuring device hence they are delivered into a gas-tight vessel provided with a number of superposed hollow shelves or trays provided with inlet and outlet passages through which hollow shelves heated liquids or aeroform fluids, such as steam, hot air or furnace gases are forced or drawn by means of pumps or exhausters, the speed at which the pumps or exhausters are driven serves to regulate the quantity of the said heating media passing through the said hollow shelves or trays which in their interior may advantageously be provided with baffles so as to insure an equal distribution of heat. Each of these hollow shelves or trays is provided with a passage or passages (forming communication one to the other) through which the fuel material may pass and in the space between each hollow shelf or tray is arranged one or more radial or other arms supported by a shaft common to the whole of them and which when set in motion will cause the said radial or other arms (which will hereinafter be referred to as the "radial
2. The fuel materials being fed on to the upper hollow shelf or tray will by means of the radial arms be made to pass over its surface until they are brought to the passages in the hollow shelf or tray through which they fall onto the hollow shelf or tray next beneath it, and so on through the entire series. The fuel materials in thus being successively carried over the heating surfaces of the respective hollow shelves or trays become heated to the degree necessary to give off their more volatile constituents and become so softened that when withdrawn from the lower part of the gas-tight vessel and subjected to the necessary amount of compression the said materials produce solid blocks of fuel. By thus heating the fuel material in detail, same is rendered tacky or becomes sufficiently adhesive to form solid fuel blocks when subjected to pressure while heated. The volatile constituents of the said materials as evolved are withdrawn from the spaces between the hollow shelves or trays through pipes by means of a pump or exhauster and conveyed to a condensing apparatus of any suitable construction for their liquefaction and recovery if required. The hot softened fuel materials as above described are discharged from the lower part of the gas-tight vessel by means of a similar automatic device (adapted to form a seal) as used for supply of the fuel materials into the gas-tight vessel the object being to prevent the entrance of atmospheric air into the gas-tight vessel as the fuel materials are withdrawn therefrom.

In order to still further and more fully explain the nature of this invention the following description of the apparatus is given with reference to the accompanying drawings:

Figure 1 is an elevation and Fig. 2 is a plan both partly in section of a complete installation for the manufacture of briquets in accordance with this invention. Fig. 3 is a vertical sectional view of the closed-in vessel F—showing the interior thereof. Fig. 4 is a horizontal cross-sectional view on line X—X, Fig. 3.

The small coal or coal dust mixed with the required quantity of liquid hydro-carbons such as tar is fed into the hopper A whence the elevator B conveys the materials into the mixer C which delivers them into the elevator D for the supply of the fuel apparatus E which accurately measures and regulates the quantity of such mixed fuel materials for delivery into the closed-in vessel F. The said vessel F is provided with a series of hollow trays or hollow shelves G through which heated gases from the furnace H are drawn by the pipes I I', I' by means of the fan or exhaust J the passage of the heated gases being regulated by the valves K, one for each shelf.

The fuel materials as delivered by the feed apparatus E fall upon the upper shelf or tray G whence they are removed from tray to tray by means of the revolving arms K (carried by the vertical spindle X which is driven by the gearing and pulleys Y) these arms K serving to push the fuel material over each tray in turn until said material falls through the slots or apertures L (with which each tray is provided) onto the tray beneath and so on. These hollow trays G being internally heated by the furnace gases passing through them (or other suitable source of heat) it follows that the fuel material in being carried over the trays must also become heated, and as a consequence the lighter volatile constituents of the fuel materials are vaporized, these vapors as soon as released from the fuel materials are withdrawn from the closed-in vessel F by means of the fan or exhauster M and forced into the condenser N whence the liquefied vapors or oils are removed as required. The fuel materials in passing over the various superposed trays G contained in the closed-in vessel F having parted with their volatile constituents are then delivered into the hopper O (whence they are conveyed to the upper part of the briquetting machine P of any suitable character by the elevator Q.) The hopper O is closed at the top and communicates by means of a pipe with the vessel F. The treated material as it falls into the hopper O fills the same, forming a seal for such vessel. The briquets as formed in the machine P fall onto the traveling band R for conveyance to any required point; or the fuel material may be otherwise suitably pressed or molded into briquet form and removed.

The various machines and apparatus are driven from the shafting S S and pulleys T T T; power being obtained from the engine U which also drives the hydraulic pumps V which supply the necessary power to operate the briquetting machine P.

What I claim is:

1. In an apparatus for making artificial fuel, the combination of a gas tight vessel in which the fuel material is heated, an automatic feeding and measuring device delivering into said vessel, a series of hollow shelves or trays in said vessel, each provided with a discharge aperture, means for moving the material treated over each shelf, means for heating said shelves internally, and means for regulating the amount of heat applied to said shelves, substantially as described.

2. In an apparatus for making artificial fuel, the combination of a gas tight vessel in which the material is heated, automatic feeding and measuring devices delivering the
material into said vessel, a series of hollow trays each provided with a discharge aperture located within said vessel, means for moving the material treated over said shelves, means for supplying heated gas to the interior of said shelves, means for regulating the amount of gas supplied to said shelves, and delivering devices for the material treated and the volatilized products, substantially as described.

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

JAMES JOHN SHEDLOCK.
Witnesses:
H. D. JAMESON,
F. L. RAND.