

Search query (3): [SP]: [0001] the present invention relates to the treatment of coal.[0002] more particularly, the present invention provides a process for treating coal by removing moisture and volatile matter from the coal to produce a fuel product that is free of undesired pollutants that are emitted during the combustion of coal. any air-borne emissions from the combustion of the fuel product of the invention will be cleaner than those of untreated coal and may obviate post combustion or scrubbing technologies that are typically needed to clean the emissions from a coal-fired burner. the invention results in a less costly solution to the problem of dirty emissions than exists at present.[0003] the invention also seeks to produce a novel feedstock from coal that can serve as a feed material with high carbon content for the activated carbon and carbon electrode industries. the feedstock of the invention also serves as an ideal material for pulverized coal injection (pci) in blast furnaces in the iron and steel industry. background of the invention [0004] prior processes for treating coal involve removal of moisture and unwanted volatile matter from the coal (typically low-rank coals and lignite) to produce coal of higher quality, with increased heat release per unit mass of fuel. for example, u.s. pat. nos. 6,447,559 and 7,879,117 describe processes for producing a clean coal fuel that has a higher heating value per unit mass of coal, compared to the raw coal.[0005] however, these prior processes were not designed to eliminate all volatile matter. a small portion of the volatiles is retained in order to ensure a stable burn of the treated product in coal-fired boilers.[0006] anthracite coal is relatively scarce compared to bituminous coal and more costly to burn. to date, no one has developed a process to use it as a fuel, less so as a clean fuel. anthracite coal is a premium variety of coal that is distinguished for its low volatiles content and low moisture. its properties make it ideally suited for coke and steel manufacturing. owing to its unique properties, relative scarcity and several other factors, anthracite coal today commands high prices that are multiples of the prices for other coals. consequently, notwithstanding that its emissions are far cleaner than the emissions from bituminous or what is commonly referred to a brown or steam coal, anthracite coal is not now, nor anytime in the foreseeable future likely to be used as a fuel for industrial boilers. [0007] the ability therefore to upgrade low rank coals and impart to them some of the major characteristics of premium anthracite coal, together with a solution to the problem of the stability of the burn, has not been addressed. the present invention seeks to address this need. summary of the invention [0008] in one aspect, there is provided a process for producing a treated coal, whose chemical properties are similar to those of anthracite coal, from any variety of brown or steam coal, including lignite. the resulting treated coal (referred to herein occasionally as pristine-sa (sa standing for synthetic anthracite)) produced by the process of the invention consists essentially of carbon and hydrogen, and burns as clean as natural gas.[0009] in another aspect there is provided a treated coal consisting essentially of carbon and hydrogen, in which the moisture and volatile matter have been removed to produce a fuel product that is free of undesired pollutants.[0010] in a further aspect, there is provided a compacted product such as a briquette that combines the treated coal of the invention (pristine-sa) with biomass. pristine-sa fines are compacted with torrefied biomass (where the torrefied biomass is produced in the same reactors as pristine-sa, but in a parallel operation) into a solid fuel that can be fed directly into bituminous coal boilers. the proportions of biomass and pristine-sa are carefully adjusted to provide optimum combustion and flame stability, with minimal boiler fouling. in some instances, a small supplementary stream of a combustible gas may be required to sustain combustion.[0011] in another aspect, the present invention provides a process of combusting the treated coal of the invention with a combustible gas by introducing a slipstream of the combustible gas, for example natural gas, landfill gas or other suitable gas, alongside the treated coal in a quantity sufficient to sustain a stable burn in an existing industrial boiler configured to burn bituminous coals. detailed description of the invention [0012] according to a first aspect of the invention, a process is provided for treating raw coal to free it from inherent and surface moisture followed by the removal of volatile matter. this is accomplished through staged heating under defined temperatures at atmospheric conditions. this process results in a product that can be combusted in boilers configured to burn bituminous coals provided the treated coal is mixed with a supplementary fuel, such as naturally available fuel that can sustain the combustion of the treated coal by increasing the hydrogen carbon ratio of the two fuels.[0013] examples of supplementary fuels with high hydrogen content include landfill gas and natural gas, although pure hydrogen may also be used provided its production is commercially viable. the blended fuels comprising the treated coal of the invention and the supplementary fuel produce no toxic emissions and preferably reduced carbon emissions into the atmosphere.[0014] as bituminous coal boilers are typically not equipped to fire two fuels simultaneously, some modifications may be required to enable them to do so. such modifications include, for example, dual fuel inlets, feed rate controls, and optimal positioning of the fuel inlets for maximum efficiency to sustain combustion.[0015] there is a large number of combined cycle or multi-fuel boilers in the united states and abroad which are able to combust both coal and natural gas individually. the treated coal of the present invention is ideally suited for use in association with these boilers. the present invention thus adds value to both bituminous and sub-bituminous coals and also brings down the cost of compliance with environmental standards when combusting these coals due to their reduced emissions.[0016] in the past, when natural gas prices were relatively high, the co-firing of coal with natural gas to improve combustion did not make economic sense. today, despite the discovery of natural gas from shale deposits in the u.s., the expectations are that the price of natural gas will continue its gradual increase over time. this is because the increase in the supply of natural gas has already increased its demand over supply of many utilities switching to gas-fired boilers.[0017] consequently, the much anticipated price drop in natural gas prices may not persist, resulting in a slow-down in the conversion of coal-fired boilers to natural-gas fired boilers. the use of coal in combustion applications will continue as expected or forecasted by recognized domestic and international energy research institutions. for such combustion applications, the treated coal of the invention which has been devolatilized to a low-volatile clean coal that can be co-fired with a supplementary fuel such as natural gas or biogas will be an environmentally superior and economically viable alternative to burning raw coal, natural gas, or biomass separately.[0018] the concept of combining the treated coal of the invention (i.e., coal with near-zero volatiles) with a supplementary fuel such as natural gas in a coal-fired boiler is new. the present invention is ideally suited for use in combined cycle boilers, or multi-fuel boilers that are capable of burning more than one fuel separately or at the same time. while a large population of combined cycle or multi-fuel boilers is in existence, in common use, these boilers are designed to merely switch between one fuel and the other.[0019] the present invention differs from existing methods to remove volatile matter from coal (including coking processes) by using a multistage heating process, typically a two-stage heating process, to break down and remove all moisture and coal-derived volatiles as gases. the heating process employs temperatures in the 900-2500 degrees fahrenheit range. these temperatures are higher than those encountered in common processes that remove moisture and volatiles from coal. in the first stage the temperature is raised to a value in the range of 900-1500 degrees fahrenheit and, in the second stage, the temperature is further raised to a value between 1500 and 2500 degrees fahrenheit [0020] the moisture and volatiles in the gas phase are cooled and condensed in stages into separate streams of water and hydrocarbon liquid byproducts, while conserving the structural integrity of the feed coal to produce the treated coal of the invention. the hydrocarbon byproducts from the process consist of liquids ranging from coal tars and other heavy volatiles to methane, butane, and light aromatics. the commercial value of the liquids is a significant complement to the invention and results in a process whose economic viability is significantly improved.[0021] the time the coal is subject to the staged temperature conditions (the residence times) is longer than in prior processes. thus, the present pristine-sa process requires residence times ranging between 15-45 minutes to remove all of the volatile material in coal. typically, the residence time for the first stage is of the order of 15-20 minutes and the residence time for the second stage is a further 20-25 minutes.[0022] the end product produced by prior processes that remove moisture and volatile material from coal is a

Results: 11

Search history

Search TAC=(coal and carbon and hydrogen and natural gas and moisture and multifuel) (Results 1)

1:

Search [SP]: 1. a process of producing a treated coal, which comprises heating the coal to remove volatiles and drying the product to produce a treated coal consisting essentially of carbon and hydrogen. 2. the process according to claim 1, wherein the process is carried out using a staged heating process to break down and capture volatiles as coal-derived gases. 3. the process of claim 1 and further comprising combusting the treated coal by introducing a co-current slipstream of natural gas alongside the treated coal in a quantity sufficient to sustain a stable burn in an existing industrial boiler configured to burn bituminous coals. 4. the process of claim 3 wherein the slipstream is introduced co-currently with the treated coal. 5. process according to claim 3 wherein the combustion is carried out in a combined cycle boilers or a multi-fuel boiler that is capable of burning both fuels separately or at the same time. 6. treated coal produced by the process of claim 1. 7. a treated coal consisting essentially of carbon and hydrogen, in which the moisture and volatile matter have been removed to produce a fuel product that is free of undesired pollutants. 8. a compacted product comprising the treated coal of claim 6 in combination with torrefied biomass. (Results 0)

Search [SP]: [0001] the present invention relates to the treatment of coal.[0002] more particularly, the present invention provides a process for treating coal by removing moisture and volatile matter from the coal to produce a fuel product that is free of undesired pollutants that are emitted during the combustion of coal. any air-borne emissions from the combustion of the fuel product of the invention will be cleaner than those of untreated coal and may obviate post combustion or scrubbing technologies that are typically needed to clean the emissions from a coal-fired burner. the invention results in a less costly solution to the problem of dirty emissions than exists at present.[0003] the invention also seeks to produce a novel feedstock from coal that can serve as a feed material with high carbon content for the activated carbon and carbon electrode industries. the feedstock of the invention also serves as an ideal material for pulverized coal injection (pci) in blast furnaces in the iron and steel industry. background of the invention [0004] prior processes for treating coal involve removal of moisture and unwanted volatile matter from the coal (typically low-rank coals and lignite) to produce coal of higher quality, with increased heat release per unit mass of fuel. for example, u.s. pat. nos. 6,447,559 and 7,879,117 describe processes for producing a clean coal fuel that has a higher heating value per unit mass of coal, compared to the raw coal.[0005] however, these prior processes were not designed to eliminate all volatile matter. a small portion of the volatiles is retained in order to ensure a stable burn of the treated product in coal-fired boilers.[0006] anthracite coal is relatively scarce compared to bituminous coal and more costly to burn. to date, no one has developed a process to use it as a fuel, less so as a clean fuel. anthracite coal is a premium variety of coal that is distinguished for its low volatiles content and low

moisture. its properties make it ideally suited for coke and steel manufacturing. owing to its unique properties, relative scarcity and several other factors, anthracite coal today commands high prices that are multiples of the prices for other coals. consequently, notwithstanding that its emissions are far cleaner than the emissions from bituminous or what is commonly referred to a brown or steam coal, anthracite coal is not now, nor anytime in the foreseeable future likely to be used as a fuel for industrial boilers.[0007] the ability therefore to upgrade low rank coals and impart to them some of the major characteristics of premium anthracite coal, together with a solution to the problem of the stability of the burn, has not been addressed. the present invention seeks to address this need. summary of the invention [0008] in one aspect, there is provided a process for producing a treated coal, whose chemical properties are similar to those of anthracite coal, from any variety of 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flame stability, with minimal boiler fouling. in some instances, a small supplementary stream of a combustible gas may be required to sustain combustion.[0011] in another aspect, the present invention provides a process of combusting the treated coal of the invention with a combustible gas by introducing a slipstream of the combustible gas, for example natural gas, landfill gas or other suitable gas, alongside the treated coal in a quantity sufficient to sustain a stable burn in an existing industrial boiler configured to burn bituminous coals. detailed description of the invention [0012] according to a first aspect of the invention, a process is provided for treating raw coal to free it from inherent and surface moisture followed by the removal of volatile matter. this is accomplished through staged heating under defined temperatures at atmospheric conditions. this process results in a product that can be combusted in boilers configured to burn bituminous coals provided the treated coal is mixed with a supplementary fuel, such as naturally available fuel that can sustain the combustion of the treated coal by increasing the hydrogen carbon ratio of the two fuels.[0013] examples of supplementary fuels with high hydrogen content include landfill gas and natural gas, although pure hydrogen may also be used provided its production is commercially viable. the blended fuels comprising the treated coal of the invention and the supplementary fuel produce no toxic emissions and preferably reduced carbon emissions into the atmosphere.[0014] as bituminous coal boilers are typically not equipped to fire two fuels simultaneously, some modifications may be required to enable them to do so. such modifications include, for example, dual fuel inlets, feed rate controls, and optimal positioning of the fuel inlets for maximum efficiency to sustain combustion.[0015] there is a large number of combined cycle or multi-fuel boilers in the united states and abroad which are able to combust both coal and natural gas individually. the treated coal of the present invention is ideally suited for use in association with these boilers. the present invention thus adds value to both bituminous and sub-bituminous coals and also brings down the cost of compliance with environmental standards when combusting these coals due to their reduced emissions.[0016] in the past, when natural gas prices were relatively high, the co-firing of coal with natural gas to improve combustion did not make economic sense. today, despite the discovery of natural gas from shale deposits in the u.s., the expectations are that the price of natural gas will continue its gradual increase over time. this is because the increase in the supply of natural gas has already increased its demand over supply of many utilities switching to gas-fired boilers.[0017] consequently, the much anticipated price drop in natural gas prices may not persist, resulting in a slow-down in the conversion of coal-fired 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designed to merely switch between one fuel and the other.[0019] the present invention differs from existing methods to remove volatile matter from coal (including coking processes) by using a multistage heating process, typically a two-stage heating process, to break down and remove all moisture and coal-derived volatiles as gases. the heating process employs temperatures in the 900-2500 degrees fahrenheit range. these temperatures are higher than those encountered in common processes that remove moisture and volatiles from coal. in the first stage the temperature is raised to a value in the range of 900-1500 degrees fahrenheit and, in the second stage, the temperature is further raised to a value between 1500 and 2500 degrees fahrenheit [0020] the moisture and volatiles in the gas phase are cooled and condensed in stages into separate streams of water and hydrocarbon liquid byproducts, while conserving the structural integrity of the feed coal to produce the treated coal of the invention. the hydrocarbon byproducts from the process consist of liquids ranging from coal tars and other heavy volatiles to methane, butane, and light aromatics. the commercial value of the liquids is a significant complement to the invention and results in a process whose economic viability is significantly improved.[0021] the time the coal is subject to the staged temperature conditions (the residence times) is longer than in prior processes. thus, the present pristine-sa process requires residence times ranging between 15-45 minutes to remove all of the volatile material in coal. typically, the residence time for the first stage is of the order of 15-20 minutes and the residence time for the second stage is a further 20-25 minutes.[0022] the end product produced by prior processes that remove moisture and volatile material from coal is a (Results 11)

1) Family number: 18524817 (US1484258A)

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Title: PROCESS FOR THE TREATMENT OF COAL

Classifications:

International (IPC 8-9): C10B1/04 (Advanced/Invention);
C10B1/00 (Core/Invention)

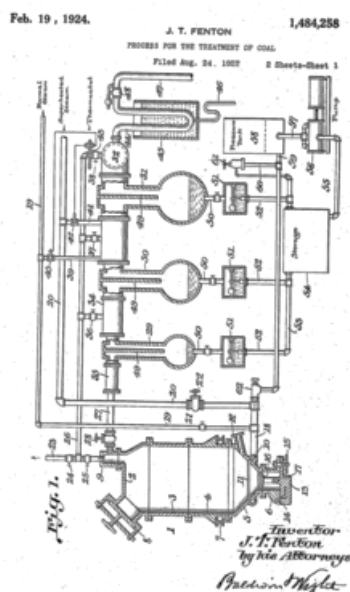
International (IPC 1-7): C10B49/04

CPC: Y10S208/952 C10B1/04

European: C10B1/04

US: 201/29 201/30 201/35 201/38 201/4 203/87 203/93 208/130
208/428 208/430 208/432 208/952

PatBase - US1484258_A



Family:

Publication number	Publication date	Application number	Application date
US1484258 A	19240219	US19220584040	19220824

Priority:

US19220584040 19220824

Probable Assignee:

FENTON JAMES T

Assignee(s): (std):

FENTON JAMES T

Inventor(s): (std):

FENTON JAMES T

2) Family number: 2600365 (US4052168A)

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Title: PROCESS FOR UPGRADING LIGNITIC-TYPE COAL AS A FUEL

Abstract: Source: US4052168A A process for agglomerating bituminous fines into a useful low-sulfur particulated fuel by subjecting the bituminous fines to an autoclaving treatment at a controlled elevated temperature and controlled high pressure for a period of time sufficient to convert the moisture and a portion of the organic constituents therein to a gaseous phase and to effect a controlled thermal restructuring of the chemical structure thereof, providing a solid agglomerated coke-like product and a by-product fuel gas. It is further contemplated that the bituminous fines feed material can be subjected to a preliminary mechanical separation treatment to extract some of the impurities therein prior to the autoclaving step. It is further contemplated that the feed material can comprise bituminous fines blended with up to about 50 percent by weight of particulated cellulosic materials, such as agricultural and forest waste materials, which similarly are converted during the autoclaving treatment to a useful solid coke product.

Classifications:

International (IPC 8-9): C01B31/02 C10B53/00 C10B53/02 C10L1/10 C10L1/32 C10L5/00 C10L5/44 C10L9/00 C10L9/02 C10L9/08 (Advanced/Invention); C01B31/00 C10B53/00 C10L1/32 C10L5/00 C10L5/40 C10L9/00 (Core/Invention)

International (IPC 1-7): B03B1/00 C01B31/02 C10B47/00 C10B47/02 C10B47/06 C10B47/12 C10B51/00 C10B53/00 C10B53/02 C10F5/00 C10F7/02 C10L1/10 C10L1/32 C10L5/00 C10L5/04 C10L5/44 C10L5/48 C10L7/02 C10L9/00 C10L9/08 C10L9/10

CPC: C10B53/02 C10L1/322 C10L5/44 C10L9/086 C10L9/00 C10L9/02 Y02E50/10 Y02E50/14 Y02E50/30

European: C10B53/02 C10L1/32A C10L5/44 C10L9/00 C10L9/02 C10L9/08D Y02E50/10 Y02E50/14 Y02E50/30

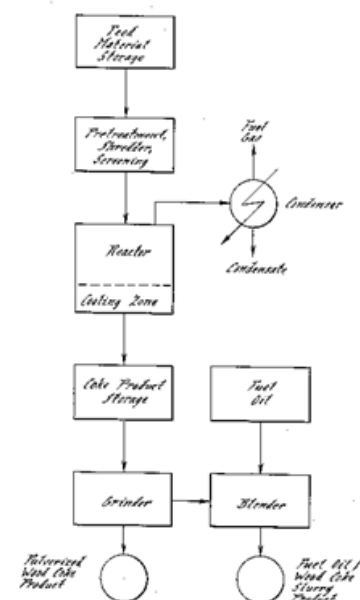
US: 201/21 201/25 44/1G 44/282 44/492 44/500 44/504 44/51 44/589 44/591 44/594 44/599 44/603 44/605 44/607 44/608 44/621 44/626

PatBase - US4129420_A

U.S. Patent

Dec. 12, 1978

4,129,420

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Priority:

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Probable Assignee: KFX INC

Assignee(s): (std): SPOSOB PROIZV TOPLIVA IZ CELLJ ; KOPPLEMAN E ; KOPPELMAN EDWARD

Assignee(s): VENNERS THEODORE TRUSTEE OF K FUEL KOPPELMAN PATEN ; EDOWAADO KOTSUPERUMAN ; EDWARD KOPPELMAN ; K FEUL PARTNERSHIP ; K FUEL LTD ; K FUEL PARTNERSHIP LTD ; KFX INC ; KOPPELMAN E ; KOPPELMAN EDWARD ENCINO CALIF V ST A ; KOPPELMAN EDWARD ENCINO CALIF ; KOPPELMAN EDWARD US ; KOPPELMAN EDWARD ENCINO CALIF US ; SPOSOB PROIZVODSTVA TOPLIVA IZ CELLJULOZNYKH MATERIALOV ; VENNERS THEODORE TRUSTEE OF K FUEL KOPPELMAN PATENT LICENSING TRUST ; KOPPELMAN EDWARD ENCINO CALIF VSTA

Inventor(s): (std): KOPPELMAN E ; KOPPELMAN EDWARD ; EDOWAADO KOTSUPERUMAN ; KOPPLEMAN E ; SPOSOB PROIZVODSTVA TOPLIVA IZ ; KOPPELMAN ; EDWARD KOPPELMAN

Inventor(s): SPOSOB PROIZVODSTVA TOPLIVA IZ CELLJULOZNYKH MATER ; E KOPPLEMAN ; SPOSOB PROIZVODSTVA TOPLIVA IZ CELLJULOZNYKH MATERIALOV ; SPOSOB PROIZVODSTVA TOPLIVA IZ CELLJULOZNYKH ; SOK ; KOPPELMAN EDWARD US ; KOPPELMAN EDWARD ENCINO CALIF ; KOPPELMAN EDWARD ENCINO CALIF V ST A ; KOPPELMAN EDWARD ENCINO CALIF VSTA

3) Family number: 30228577 (US4252069A)

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Title: Low load coal bucket

Abstract: Source: US4252069A An improved fuel-air admission assembly incorporating a split coal bucket which permits a pulverized coal-fired furnace to be operated at low loads without the use of auxiliary fuel to provide stabilization. The split coal bucket comprises an upper and a lower coal nozzle pivotally mounted to the coal delivery pipe, the upper and lower coal nozzles being independently tiltable. When the furnace is operating at low loads, the primary air and pulverized coal stream discharging from the coal delivery pipe is split into a first and a second coal-air stream and independently directed into the furnace by tilting at least one of the nozzles away from the longitudinal axis of the coal delivery pipe, thereby establishing an ignition stabilizing pocket in the locally low pressure zone created between the spread apart coal-air streams.

Classifications:

International (IPC 8-9): F23C5/06 F23C7/02 F23C99/00 F23D1/00 F23K3/00 F23K3/02 (Advanced/Invention);

F23C5/00 F23C7/00 F23C99/00 F23D1/00 F23K3/00 (Core/Invention)

International (IPC 1-7): F23C11/00 F23C5/0 F23C5/00 F23C7/00

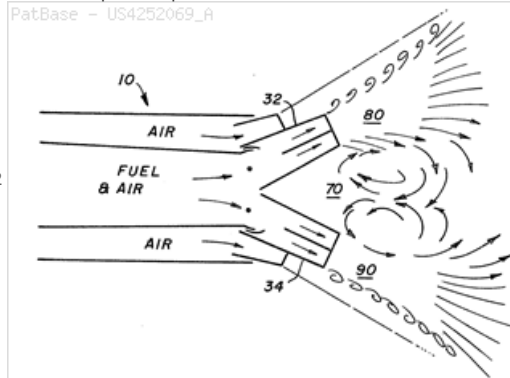
F23C7/02 F23D1/00 F23D1/02 F23K3/00 F23K3/02 F23N1/02

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European: F23C5/06 F23C7/02 F23D1/00 R23D201/101

US: 110/104B 110/106 110/261 110/263 110/265 110/347 239/587.2

PatBase - US4252069_A

**Family:**

Publication number	Publication date	Application number	Application date
AU198057380 A1	19801016	AU19800057380	19800411
AU530834 B2	19830728	AU19800057380	19800411
CA1136924 A1	19821207	CA19790338638	19791029
CA1149677 A1	19830712	CA19790338707	19791030
DE3064180 D1	19830825	DE19803064180	19800214
EP0017721 A2	19801029	EP19800100740	19800214
EP0017721 A3	19801210	EP19800100740	19800214
EP0017721 B1	19830720	EP19800100740	19800214
EP0017721 B2	19870520	EP19800100740	19800214
ES490436 A1	19810216	ES19800490436	19800410
ES8103344 A1	19810516	ES19800490436	19800410
IN151051 A	19830212	IN1979CA00406	19790421
JP1195746 C3	19840312	JP19800046992	19800411
JP55140009 A2	19801101	JP19800046992	19800411
JP58028488 B4	19830616	JP19800046992	19800411
US4252069 A	19810224	US19790029605	19790413
US4274343 A	19810623	US19790029606	19790413
US4434727 A	19840306	US19830503079	19830613
ZA8002180 A	19810624	ZA19800002180	19800411

Priority:

CA19790338638 19791029	CA19790338707 19791030	US19790029605 19790413
US19830503079 19830613	US19810270687 19810604	US19800175093 19800804
US19790029606 19790413		

Probable Assignee: COMBUSTION ENG**Assignee(s):** (std): COMBUSTION ENG**Assignee(s):** COMBUSTION ENGINEERING INC ; KOKKINOS ANGELOS ; MCCARTNEY MICHAEL S

Inventor(s): (std): MCCARTNEY M ; MICHAEL SCOTT MCCARTNEY ; ANGELOS KOKKINOS ; MIKAERU SUKOTSUTO MATSUKAATONE ; KOKKINOS A ; ANJIEROSU KOTSUKINOSU ; MCCARTNEY MICHAEL SCOTT ; MCCARTNEY MICHAEL S ; KOKKINOS ANGELOS

Inventor(s): ANJIEROSU KOTSUKINOSU ; MIKAERU SUKOTSUTO MATSUKAATONEE**Agent(s):** SMART AND BIGGAR**Designated states:** BE DE FR GB IT SE**4) Family number: 10328317** (US5645614A)

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Title: Process for the utilization of sewage sludges

Abstract: Source: US5645614A In the process, the wet sewage sludge originating from a preceding mechanical dewatering is mixed with brown coal, brown coal coke or their mixtures in a weight ratio of sewage sludge to brown coal or its mixtures with brown coal coke of 1:3 to 3:1 and subsequently compacted wet at moderate compaction pressures above 50 bar to dimensionally stable mouldings. The briquetted mouldings can then be fed to a power station boiler as an auxiliary fuel to a thermal utilization or utilized chemically in a pyrolysis or gasification process for the production of fuel gas or synthesis gas.

Classifications:

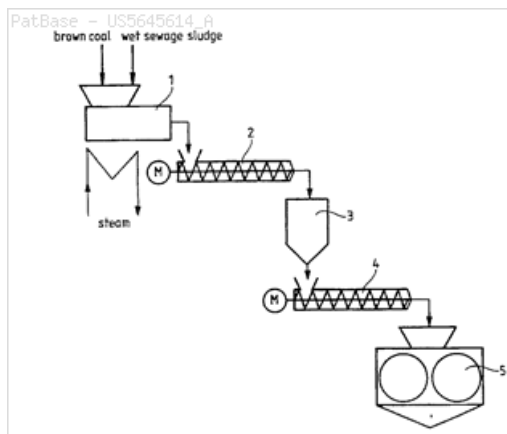
International (IPC 8-9): C02F11/12 C10L10/00

C10L5/40 (Advanced/Invention)

International (IPC 1-7): C02F11/12 C10L10/00 C10L5/06 C10L5/40

CPC: C02F11/12 C10L5/40 Y02E50/30

European: C02F11/12 C10L5/40 Y02E50/30

**Family:**

Publication number	Publication date	Application number	Application date
CZ9402218 A3	19950315	CZ19940002218	19940912
DE4330884 A1	19950316	DE19934330884	19930913
EP0643124 A1	19950315	EP19940113564	19940831
PL305011 A1	19950320	PL19940305011	19940912
SK108294 A3	19950412	SK19940001082	19940908
US5645614 A	19970708	US19940302576	19940908

Priority:

DE19934330884 19930913

Probable Assignee: BAYER AG**Assignee(s):** (std): BAYER AG ; RHEINISCHE BRAUNKOHLNW AG ; RHEINBAU AG**Assignee(s):** RHEINBRAUN AG ; RHEINBRAUN AKTIENGESELLSCHAFT ; RHEINBRAUN AG 50935 KOELN DE ; BAYER AG 51373 LEVERKUSEN DE ; BAYER AKTIENGESELLSCHAFT ; BAYER PATENTE KONZERN LEVERKUSEN GERMANY D 51368 R**Inventor(s):** (std): DUMMERSDORF DR HANS ULRICH ; DUMMERSDORF HANS ULRICH ; DUMMERSDORF HANS ULRICH DR ; ERKEN DIPL ING MANFRED ; ERKEN MANFRED ; ERKEN MANFRED DIPL ING ; HERBST DR GUENTHER ; HERBST GUENTHER ; HERBST GUENTHER DR ; HERBST GUNTER ; HERBST GUNTHER DR ; KREUSING DR HELMUT ; KREUSING HELMUT ; KREUSING HELMUT DR ; MENGE DIPL ING FRANZ JOSEF ; MENGE FRANZ JOSEF ; MENGE FRANZ JOSEF DIPL ING**Designated states:** AT BE CH DE DK FR GB LI LU NL**5) Family number: 23912311** (US2003009931A)

© PatBase

Title: TREATMENT OF COAL

Abstract: Source: US2003009931A Process for treating coal to enhance its rank, wherein the temperature of the material is gradually increased in a controlled set of atmospheres, to allow for the reduction of surface and inherent moisture and the controlled reduction of volatile matter while maintaining the coal's natural structural integrity. The process reduces the time, capitalization, and production costs required to produce coal of enhanced rank, thus substantially increasing the cost effectiveness and production rate over prior processes.

Classifications:

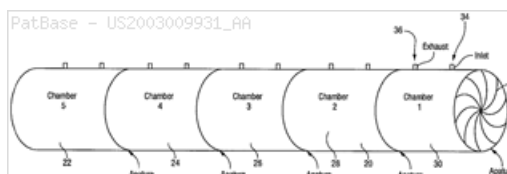
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International (IPC 1-7): C10B53/02 C10B57/02 C10F5/00 C10F7/00 C10F7/06 C10L5/00 C10L5/02 C10L5/10 C10L9/00

CPC: Y02P20/145 C10L5/06 C10B53/02 C10B57/02 C10L5/04 C10L5/10 C10L5/32 C10L5/36 C10L5/44 C10L9/08 Y02E50/10 Y02E50/14 Y02E50/30

European: C10B53/02 C10B57/02 C10L5/04 C10L5/06 C10L5/10 C10L5/32 C10L5/36 C10L5/36D C10L5/44 C10L9/08 Y02E50/10 Y02E50/14 Y02E50/30

US: 44/490 44/490P 44/491 44/491S 44/492 44/492S 44/542 44/542S 44/550 44/550S 44/551 44/592 44/592S 44/600 44/608 44/608S 44/620 44/620P 44/621 44/621S 44/626 44/626S 44/500

**Family:**

Publication number	Publication date	Application number	Application date
AU200137916 A5	20010514	AU20010037916D	20001102
CA2389970 AA	20020503	CA20002389970	20001102
CA2389970 C	20120327	CA20002389970	20001102
CN102229807 A	20111102	CN201110142494	20001102
CN102229807 B	20151014	CN201110142494	20001102
CN105623774 A	20160601	CN201610015312	20001102
CN1415000 A	20030430	CN20008018174	20001102
CN1415000 B	20160203	CN20008018174	20001102
DE60048281 D1	20131128	DE20006048281	20001102
EG22787 A	20030831	EG20000001386	20001104
EP1240280 A2	20020918	EP20000992027	20001102
EP1240280 A4	20101117	EP20000992027	20001102
EP1240280 B1	20131002	EP20000992027	20001102
EP2610328 A1	20130703	EP20130153292	20001102
ES2441204 T3	20140203	ES20000992027T	20001102

HK1161893 A1	20161021	HK20120102379	20120308
PT1240280 T	20140103	PT20000992027T	20001102
SI1240280 T1	20140331	SI20000031077T	20001102
TR200201914 T2	20021121	TR20020001914T	20001102
US2003009931 AA	20030116	US20020207792	20020731
US2006123698 AA	20060615	US20060344179	20060201
US2011099893 AA	20110505	US20100926944	20101220
US6447559 BA	20020910	US20000704738	20001103
US7879117 BB	20110201	US20060344179	20060201
WO0132803 A2	20010510	WO2000US41772	20001102
WO0132803 A3	20020117	WO2000US41772	20001102
ZA200203819 A	20021204	ZA20020003819	20020514

Priority:

CN20008018174 20001102 EP20000992027 20001102 US19990163566P 19991105
US20000704738 20001103 US20060344179 20060201 US20020207792 20020731
WO2000US41772 20001102 US20100926944 20101220

Probable Assignee: CLEAN COAL TECHNOLOGIES INC

Assignee(s): (std): CLEAN COAL TECH INC ; CLEAN COAL TECHNOLOGIES INC ; SAUDI AMERICAN MINERALS INC ; SAUDI AMERICAL MINERALS INC

Assignee(s): HUNT LARRY H ; UDI AMERICAL MINERALS INC SA ; CLEAN COAL TECHNOLOGIES INC CORAL SPRINGS ; CLEAN COAL SYSTEMS INC

Inventor(s): (std): HUNT L H ; HUNT LARRY ; HUNT LARRY H ; LARRY H HUNT

Inventor(s): LH HUNT ; HUNT LARRY H CORAL SPRINGS ; L H HUNT

Agent(s): GOUDREAU GAGE DUBUC ; BRIERLEY ANTHONY PAUL; LEHMANN MARIA ISABEL; NIXON AND VANDERHYE PC; NIXON AND VANDERHYE

Designated states: AE AL AM AT AU AZ BA BB BE BF BG BJ BR BY CA CF CG CH CI CM CN CR CU CY CZ DE DK DM EE ES FI FR GA GB GD GE GH GM GN GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LI LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NL NO NZ PL PT RO RU SD SE SG SI SK SL SN SZ TD TG TJ TM TR TT TZ UA UG UZ VN YU ZA ZW

6) Family number: 23890537 (WO04005428A1)

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Title: COAL DRYING AND CHARRING PROCESS

Abstract: A process for the treatment of coal feed stream including the steps of a) removing moisture from the coal feed stream by heating to a first predetermined temperature and subsequently b) converting the volatile matter within the coal feed stream to a gas stream product by heating the coal feed stream to a second predetermined temperature c) collecting a gas product stream and d) recovering a substantially moisture free coal char product With volatile matter controlled and pre-determined by the process operator.

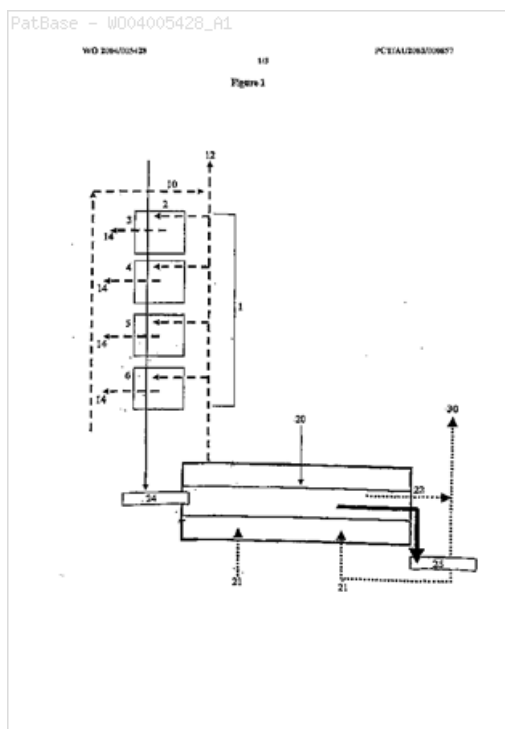
Classifications:

International (ipc 8-9): C10B47/30 C10B57/02 C10B57/10 C10G1/00 C10G1/02 F26B3/06 (Advanced/Invention); C10B47/00 C10B57/00 C10G1/00 (Core/Invention)

International (ipc 1-7): C10B047/30 C10B057/10 C10B47/30 C10B57/10

CPC: C10B47/30 C10B57/02 C10B57/10 C10G1/00 C10G1/02

European: C10B47/30 C10B57/02 C10B57/10 C10G1/00 C10G1/02



Family:

Publication number	Publication date	Application number	Application date
AU2002003359 A0	20020725	AU2002PS03359	20020703
AU2003243816 AA	20040123	AU20030243816	20030703
AU2003243816 BB	20050512	AU20030243816	20030703
MY135406 A	20080430	MY20030002506	20030703
TH64712 A	20041014	TH20031002464	20030702
TW200404092 A	20040316	TW20030118147	20030703
TWI342334 B	20110521	TW20030118147	20030703
WO04005428 A1	20040115	WO2003AU00857	20030703

Priority:

AU2002PS03359 20020703

AU20030243816 20030703

WO2003AU00857 20030703

Probable Assignee: WESFARMERS PREMIER COAL LTD**Assignee(s):** (std): KELLY BARRY J ; MOFFAT GRANT ; WESFARMERS PREMIER COAL LTD**Assignee(s):** PREMIER COAL LTD ; WESFARMERS PREMIER COAL LIMITED**Inventor(s):** (std): BARRY J KELLY ; GRANT MOFFAT ; KELLY BARRY J ; MOFFAT GRANT ; MOFFATT GRANT**Inventor(s):** GRANT MOFFATT**Agent(s):** WATERMARK PATENT AND TRADE MARKS ATTORNEYS; WATERMARK INTELLECTUAL PROPERTY PTY LTD**Designated states:** AE AG AL AM AT AU AZ BA BB BE BF BG BJ BR BY BZ CA CF CG CH CI CM CN CO CR CU CY CZ DE DK DM DZ EC EE ES FI FR GA GB GD GE GH GM GN GQ GR GW HR HU ID IE IL IN IS IT JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MC MD MG MK ML MN MR MW MX MZ NE NI NL NO NZ OM PG PH PL PT RO RU SC SD SE SG SI SK SL SN SY SZ TD TG TJ TM TN TR TT TZ UA UG US UZ VC VN YU ZA ZM ZW**7) Family number: 34627417 (GB200707579A)**

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Title: Fuel briquette

Abstract: Source: GB200707579A A process for the production of a fuel briquette comprising the steps of: `` providing wood and grinding/shredding to piece sizes screened to about 100 mm; `` torrefying the wood in an oven in an oxygen-controlled atmosphere at a temperature of about 300°C for sufficient time to reduce the volatile matter content of the wood to about 40 percent by weight; `` crushing the torrefied wood to a particle size screened to less than 10 mm; providing coal and optionally petroleum coke crushed to piece sizes screened to less than 5 mm and dried to moisture content less than 10 percent by weight `` mixing the components together in the following proportions to form a briquette feedstock: less than EMI ID=1.1 HE=38 WI=115 LX=433 LY=1145 TI=UI greater than briquetting the feedstock and curing in a reduced oxygen environment at about 300 {C.

Classifications:**International (IPC 8-9):** C10B53/02 C10L5/44 (Advanced/Invention); C10B53/00 C10L5/40 (Core/Invention)**CPC:** C10L5/44 C10L5/12 C10L5/361 C10L9/083 Y02E50/10 Y02E50/14 Y02E50/15 Y02E50/30 C10B53/02**European:** C10B53/02 C10L5/12 C10L5/36B C10L5/44 C10L9/08B Y02E50/10 Y02E50/14 Y02E50/15 Y02E50/30

Component	% by weight, dry
torrefied wood	5 - 40
coal	0 - 85
petroleum coke	0 - 60
binder	5 - 30

Family:

Publication number	Publication date	Application number	Application date
GB200707579 A0	20070530	GB20070007579	20070419
GB2448531 A1	20081022	GB20070007579	20070419
GB2448531 B2	20120208	GB20070007579	20070419

Priority:

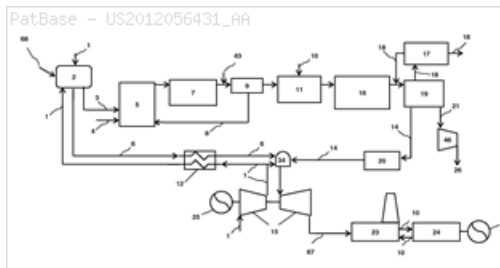
GB20070007579 20070419

Probable Assignee: COAL PRODUCTS LTD**Assignee(s):** (std): COAL PRODUCTS LTD**Assignee(s):** COAL PRODUCTS LIMITED**Inventor(s):** (std): WILLIS NEIL ; ROBERTS TREVOR LESLIE ; BISHOP ANDREW**Inventor(s):** TREVOR LESLIE ROBERTS ; ANDREW BISHOP ; NEIL WILLIS**8) Family number: 47677760 (US2012056431A)**

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Title: EFFICIENT LOW RANK COAL GASIFICATION, COMBUSTION, AND PROCESSING SYSTEMS AND METHODS

Abstract: Source: US2012056431A Efficient coal pre-processing systems (69) integrated with gasification, oxy-combustion, and power plant systems include a drying chamber (28), a volatile metal removal chamber (30), recirculated gases, including recycled carbon dioxide (21), nitrogen (6), and gaseous exhaust (60) for increasing the efficiencies and lowering emissions in various coal processing systems.

Classifications:**International (IPC 8-9):** B01D53/50 B01D53/56 B01D53/62 B01D53/64 B23P17/00 C01B3/02 C10J3/00 C10J3/02 C10J3/84 C10L5/00 C10L5/36 C10L9/08 F01D15/10 F01K13/00 F01K27/00 F26B21/00 (Advanced/Invention)**CPC:** C10L5/366 Y02E20/16 Y02E20/18 C10J3/84 C10J3/02 C10J2300/0909 C10J2300/0903 C10J2300/093 C10J2300/0969 C10J2300/1643 C10J2300/1656 C10J2300/1815 C10L9/08 Y10T29/49229**European:** C10L5/36H C10L9/08**US:** 1/1 252/372 29/888 29/888S 290/52 290/52P 48/210 48/210S**Family:**

Publication number	Publication date	Application number	Application date
AU2010249327 AA	20101125	AU20100249327	20100524
AU2010249327 BB	20160331	AU20100249327	20100524
CA2800166 AA	20121121	CA20102800166	20100524
EP2432857 A1	20120328	EP20100778529	20100524
EP2432857 A4	20150429	EP20100778529	20100524
US2012056431 AA	20120308	US20100321527	20100524
US2016102260 AA	20160414	US20150934459	20151106
US9181509 BB	20151110	US20100321527	20100524

International (IPC 8-9): C10L5/04 C10L5/08 C10L5/10 C10L5/16
C10L5/32 C10L9/08 C10L9/10 (Advanced/Invention);
C10L (Subclass/Invention)
CPC: C10L5/08 C10L2230/14 C10L2290/08 C10L5/32 C10L2290/20
C10L9/00 C10L9/08 C10L9/10 C10L2290/02 C10L2290/06
US: 44/542



Publication number	Publication date	Application number	Application date
AU2012333101 AA	20130510	AU20120333101	20120907
AU2012333101 BB	20160714	AU20120333101	20120907
CA2848068 AA	20140306	CA20122848068	20120907
CO7010817 A2	20140731	CO20140068729	20140401
EA201490565 A1	20140730	EA20140090565	20120907
EP2753678 A2	20140716	EP20120845210	20120907
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HK1199737 A1	20150717	HK20150100135	20150107
IN01722DN2014 A	20150306	IN2014DN01722	20140307
JP2014525514 T2	20140929	JP20140529896T	20120907
KR20140072066 A	20140612	KR20147008281	20120907
MX2014002717 A1	20140801	MX20140002717	20120907
US2015166917 AA	20150618	US20120343568	20120907
WO13066492 A2	20130510	WO2012US54160	20120907
WO13066492 A3	20130815	WO2012US54160	20120907
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US20110531791P 20110907 US20120343568 20120907 WO2012US54160 20120907

Assignee(s): (std): CLEAN COAL TECHNOLOGIES INC ; PONCE DE LEON IGNACIO

Inventor(s): (std): PAUL ANTON DILO ; PONCE DE LEON IGNACIO

Inventor(s): IGNACIO PONCE DE LEON

Agent(s): MADDERNS PATENT AND TRADE MARK ATTORNEYS; GOUDREAU GAGE DUBUC; MARGARITA CASTELLANOS ABONDANO; TINDALL ADAM; MITCHARD LEONARD C

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY LA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW

Abstract: Source: US2016115412A Process of producing a treated coal, by heating the coal to remove volatiles and drying the product to produce a treated coal consisting essentially of carbon and hydrogen.

International (IPC 8-9): C10B27/00 C10B53/04 C10B57/02 C10B57/10 C10L5/04 C10L5/36 C10L5/44 C10L9/08 F23C1/04 F23K1/04 (Advanced/Invention)
CPC: C10B53/04 C10B57/02 F23K1/04 F23K2201/20 F23K2201/501 C10L5/04 C10L5/361 C10L2290/08 F23C1/04 C10L2290/06 C10L9/08 C10L5/447 Y02E50/10 Y02E50/30 C10L9/083 C10L2270/00 C10L2300/20 C10L2290/02 Y02E50/15
US: 431/2 44/605 44/626

Family:

Publication number	Publication date	Application number	Application date
AU2014273996 AA	20141204	AU20140273996	20140530
CA2912824 AA	20151117	CA20142912824	20140530
CN105555918 A	20160504	CN201480030985	20140530
CO7590609 A2	20160429	CO20150304594	20151222
EP3004289 A1	20160413	EP20140803703	20140530
EP3004289 A4	20170118	EP20140803703	20140530
IN11109DN2015 A	20160603	IN2015DN11109	20151204
JP2016526087 T2	20160901	JP20160517043T	20140530
KR20160032046 A	20160323	KR20157037018	20140530
US2016115412 AA	20160428	US20140891893	20140530
WO14194208 A1	20141204	WO2014US40256	20140530

Priority:

US20130829006P 20130530 US20140891893 20140530 WO2014US40256 20140530

Probable Assignee: CLEAN COAL TECHNOLOGIES INC

Assignee(s): (std): CLEAN COAL TECH INC ; CLEAN COAL TECHNOLOGIES INC

Assignee(s): PAUL ANTON DILO ; PONCE DE LEON INGNACIO

Inventor(s): (std): PAUL ANTON DILO ; PONCE DE LEON IGNACIO ; PONCE DE LEON INGNACIO

Inventor(s): ANTON DILO PAUL ; IGNACIO PONCE DE LEON

Agent(s): MADDERNS PATENT AND TRADE MARK ATTORNEYS; GOUDREAU GAGE DUBUC; JUAN PABLO CADENA SARMIENTO; APPLEYARD LEES; MITCHARD LEONARD C

Designated states: AE AG AL AM AO AT AU AZ BA BB BE BF BG BH BJ BN BR BW BY BZ CA CF CG CH CI CL CM CN CO CR CU CY CZ DE DK DM DO DZ EC EE EG ES FI FR GA GB GD GE GH GM GN GQ GR GT GW HN HR HU ID IE IL IN IR IS IT JP KE KG KM KN KP KR KZ LA LC LI LK LR LS LT LU LV LY MA MC MD ME MG MK ML MN MR MT MW MX MY MZ NA NE NG NI NL NO NZ OM PA PE PG PH PL PT QA RO RS RU RW SA SC SD SE SG SI SK SL SM SN ST SV SY SZ TD TG TH TJ TM TN TR TT TZ UA UG US UZ VC VN ZA ZM ZW