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PROCESS OF BRIQUETTING

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The present invention relates to a process of briquetting and more particularly to a process of briquetting subdivided solids of all types, such as combustibles, ores, mixtures of combustibles and ores, and the like.

It is to be understood that throughout the present specification and claims the briquetting of subdivided solid materials to which the present invention relates is meant to include any type of solid material which is usually briquetted for one or more reasons or which can be briquetted, and although specific substances will be mentioned, the scope of the present invention is not meant to be limited to any particular substance or substances.

Until the present time, the processes of briquetting subdivided solid materials such as combustibles, ores and the like resulted in products having numerous faults. This was particularly so if the starting material was moist. It was therefore necessary in an attempt to eliminate the faults in the production of briquettes to previously dry the subdivided solid material of which the briquette was to be formed. This pre-drying of the basic material was both costly and time-consuming.

It is therefore an object of the present invention to provide a process of briquetting which does not require the pre-drying of the basic material of which the briquette is formed.

It is a still further object of the present invention to provide a process of briquetting which not only can be used with a wet, solid material, but which according to a preferred embodiment requires wetting of the starting material if the same is too dry; and by which process the resulting briquettes have stable shape and are weather-resistant.

Other objects and advantages of the present invention will be apparent from a further reading of the specification and of the appended claims.

With the above objects in view, the process of briquetting of the present invention mainly comprises the steps of intimately mixing a wet, subdivided solid material with a molten pitch having added thereto a minor proportion of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of the wet, subdivided solid material and the molten pitch having the polycyclic aromatic hydrocarbon added thereto; and drying and cooling the homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

As stated above, the present invention relates to the briquetting of any subdivided solid material. Among those materials which may be briquetted according to the present invention are ash-containing combustibles such as coal sediments, small coke, small coke sediment, brown coal, peat, lignite, oil shale, all types of minerals, sediments from clarifying plants, ores, and the like. The present invention permits the briquetting of any of these types of materials in any size or shape down to

fine dust, without the necessity of previously removing the moisture content thereof as was required by the previous processes. Thus, it is possible to briquette wet flotation sediment without any previous drying thereof.

Of major importance according to the present invention is the requirement that the pitch with which the wet, subdivided solid material to be briquetted is mixed have a sufficient content of polycyclic aromatic hydrocarbons having a maximum of three rings. Since pitch generally contains extremely limited amounts of polycyclic aromatic hydrocarbons having a maximum of three rings, if any at all, it is necessary according to the present invention to add such hydrocarbons to the pitch before mixing the same with the subdivided solid material. The amount of polycyclic hydrocarbon in the pitch is preferably between 2–40% by weight.

The polycyclic hydrocarbons which are preferred for use with the present invention are those obtained from the high boiling point distillation of mineral coals and the like, such as raw naphthalene, naphthalene, raw anthracene, anthracene, raw phenanthrene, phenanthrene, raw carbazole, carbazole and the like. It should be noted that raw naphthalene and raw anthracene may contain phenanthrene and carbazole in amounts of up to about 30%. It should also be noted that single polycyclic hydrocarbons of the type mentioned may be used, or any combination of polycyclic hydrocarbons.

The amount of molten pitch mixed with the basic material, the term "basic material" as used throughout the specification referring to the subdivided solid material to be briquetted, may vary within rather wide limits depending upon the type of basic material utilized and other factors which will become apparent. Generally, however, the amount of molten pitch will be between 1–30% of the amount of basic material. Preferably the amount of molten pitch as binding agent is between 5–10%.

The pitch is generally added to the basic material in molten condition at a temperature up to about 100° C., although according to an embodiment of the present invention it is possible to add the pitch to the basic material while the pitch is in solid, subdivided state and to heat the mixture while mixing the same so as to melt the pitch and form a homogeneous mass of the basic material and the molten pitch.

Any pitch having a sufficient amount of polycyclic hydrocarbons or having a sufficient amount of polycyclic hydrocarbons added thereto, may be utilized, i. e. mineral coal pitch, or mineral coal tar pitch obtained from high temperature coke oven tar, low temperature tar, horizontal retort tar, oil gas tar, water gas tar, and other pitch such as brown coal tar pitch, wash oil pitch, and the like.

It is most preferred, however, to utilize mineral coal tar pitch having added thereto decomposed coal or air-blown mineral coal tar pitch which is produced by bubbling air through the substance from which the pitch is derived. Either type of mineral coal tar pitch may have a fluxing agent added thereto.

No matter what type of pitch is utilized, it is preferred according to the present invention that the pitch have a maximum Kraemer-Sarnow softening point of 60° C., or if the softening point is higher than 60° C., then the pitch should preferably be refluxed until the softening point thereof is lowered to a maximum of 60° C. By softening point according to Kraemer-Sarnow it is to be understood as that temperature at which a mercury column in a little tube having an inner diameter of 6 mm. and weighing 5 g. passes through a tar pitch or bitumen layer of 5 mm. height which is contained in a little tube having the same inner diameter.

The degree of wetness of the basic material is practically unlimited according to the present invention and, for example, peat particles may be formed into briquettes wherein the peat contains as much as 90% of water. Because of the extraordinary dispersing power in the basic material of the molten tar pitch having the polycyclic hydrocarbon added thereto, the distribution of this binding agent in the individual portions of the basic material is so extremely intensive that the need for binding agent is greatly decreased. This, of course, results in lowering the cost of briquette manufacture.

Another advantage of the present invention is that because of the extraordinary properties of the molten tar pitch having the polycyclic hydrocarbons added thereto, only comparatively low pressure need be exerted on the shaped mass of basic material and molten pitch during the drying thereof. A still further advantage is the increased drying speed which is obtained by the use of the binding agents of the present invention.

The drying of the shaped mass can be carried out either by storing the same in open air, in a drying chamber, or an oven having air blown therethrough. Briquettes formed from coal sediment, for example, lose about 30% water by weight in 24 hours' storage in open air. The use of a drying chamber with heat and/or air blown over the mass decreases the drying time.

It is unnecessary, according to the present invention to maintain a raised temperature while mixing the basic material with the molten pitch, although increased temperature has been found to have a favorable effect on the distribution of the pitch binding agent between the particles of the basic material. It is also possible, according to the present invention, to utilize basic materials of different origin, shape and size, i. e. coal sediment and small coke, to produce briquettes having novel properties.

According to a preferred embodiment of the present invention, the basic material, if the same is too dry and/or not sufficiently wettable, is thoroughly wetted with water and, if necessary, by means of a wetting agent. Although the amount of water with which the basic material is moistened is practically unlimited, it has been found preferable to wet the basic material to a water content between 15–20% by weight. It is highly advantageous in this respect, to utilize a gas condensate obtained from a coking purification process in order to wet the basic material. Such gas condensate consists mainly of water and generally contains a small amount, up to about 0.20% of polycyclic hydrocarbons, such as naphthalene.

Such gas condensate is obtained in coking in the production of valuable coal products through cooling of the gas after removal of the ammonia and in which process the desulfurized gas is freed under pressure from benzol. By escape of the gases from the desulfurizing there is obtained a water-saturated gas at a temperature of about 30–35° C., which is then compressed at a pressure of about 7–9 atmospheres. The compression of the gas increases the temperature thereof to about 75–85° C. The gas is then fed at this pressure to a pressure cooler in which the gas by indirect cooling is cooled to a temperature of about 20° C., and a gas condensate is obtained. The gas loses the water and naphthalene contained therein until only traces remain, leaving the gas condensate. From there the gas is conducted to the consumer under pressure. The remaining gas condensate contains up to about 0.20% naphthalene, traces of light oil, is milky and has a temperature of about 20–23° C. The gas condensate consists mainly of condensed water.

Care should be taken during the drying of the shaped mass of basic material and molten pitch to prevent any additional water from contacting the mass. After the mass has been dried, however, the briquettes hardened and solidified, the briquettes are weather-resistant and need no longer be protected against dampness or temperature.

The process of the present invention is applicable to both combustibles and ores, in either wet or dry state. It is, for example, possible to utilize the process with such substances as flue dust, or dust, roasted pyrites, flue dust sediment, ore flotation sediment, and the like, alone or in combination with combustibles such as small coke sediment, small coke, coal sediment, coal dust, finely divided anthracite coal and the like.

The shaped and pressed articles obtained according to the present invention after drying of the mass are weather-resistant and are not adversely affected even upon exposure to rain and frost. It is desirable, however, to protect the shaped mass until solidification of the same by the sweating-out of water therefrom. The sweating-out of the water results in a larger pore size so that the shaped and pressed articles have particularly good reaction properties in the blast furnace or foundry shaft furnace.

It is further possible according to the present invention to sinter the shaped and pressed articles at temperatures of about 600–700° C., thereby slowly removing the binding agent by degassing, this procedure not causing any falling apart or cracking of the article, because of the large pores and the high solidity thereof.

The sintered or non-sintered shaped and pressed articles retain their shape and form during the smelting or foundry process until the melting point is reached, and do not fall apart by action of choke damp or steam of the charged gas, and, in fact, are even further solidified until the melting temperature is reached. The briquettes are only degassed and sintered upon reaching the melting temperature.

The present invention may also be applied to the briquetting of substances, such as alkali earth oxides and hydroxides which may then be further calcined and/or sintered. The calcination and/or sintering of the alkali earth oxides or hydroxides, particularly in a rotating oven, has been practically impossible until the present time, especially if these substances were in finely divided wet or powdery condition. This applies as well to magnesium hydroxide, magnesia, calcium hydroxide, acetylene sediment, and limestone, as to dust which is derived from the sintering of magnesia or dolomite and the burning of lime.

The calcination and/or sintering process of these substances becomes very simple according to the present invention when the wet or wetted substance is mixed with molten pitch to which has been added polycyclic hydrocarbon. The amount of molten pitch utilized is variable depending on the basic material and is generally between 1–30%. After mixing the basic material with the molten pitch, briquettes are formed by pressing or granulating, i. e. by rolling in a slanting drum to a size which is suitable for further treatment in a rotating or blast oven.

It makes no difference whether or not these substances are pure, and the same may contain such impurities such as silicic acid and the like. After drying the mass in natural or artificial manner, either briquettes or granules are formed which are so solid that they may be further treated at a calcining or sintering temperature of 500–800° C., at which temperature a coke skeleton is formed and the particles adhere to one another to form a mass which does not fall apart upon further heating. It is even possible to roast the substances before the calcining or sintering process to increase the speed of reaction in the formation of a coke skeleton.

According to another preferred embodiment of the present invention the finely divided wet or wetted basic material is mixed with a spent sulfite liquor as well as with the molten pitch. The sulfite liquor is mixed with the basic material either before or simultaneously with the mixing of the basic material with the molten pitch without it being necessary, in most cases, to warm the starting material. This embodiment applies equally to

the briquetting of combustible or non-combustible materials such as ore and the like.

The final mixture may be shaped in the cold utilizing a slight pressure, i. e. of about 1 kg./cm.^{2} by rolling in the manner used in granulation processes or by any similar means. The application of heat during the mixing so as to have a raised mixing temperature is generally not necessary. It is generally sufficient to utilize a molten pitch which is at a temperature of about 100° C., or higher to utilize a cold spent sulfite liquor, which is preferably condensed, in a thin stream or in a form of a mist, preferably while thoroughly agitating the mixture.

Since the formed material is not by itself weather-resistant, it is preferable from this point of view to subject the shaped article to a "shock" heating by suddenly raising the same to a temperature of 200° C. By this proceeding the tar product passes to the outside and the sulfite liquor passes into the article so that the article becomes completely water-insoluble. The shaped article can be roasted or sintered or in raw state subjected to a foundry process.

It is further suitable, in order to make the mixture of basic material and pitch homogeneous to utilize a shock milling apparatus of known construction having a centrifugal wheel rotating in opposite direction to and different speeds with a shock disc. This apparatus has the effect not only of thoroughly distributing the basic material and the pitch, but also of further disintegrating the solid particles by the force of hitting the same against the shock disc rotating in the opposite direction. The shock disc may have ridges, ledges or projections thereon.

The simultaneous inner mixing of the components of the mixture with one another in the mill is extremely advantageous for further carrying out of the process of the present invention. It is thereby possible to mix solid substances and molten tar pitch by charging the mill and also to simultaneously further subdivide the coal, coke and ore in the mill so as to disperse the solid substances into a completely homogeneous mixture which fulfills all requirements for further carrying out of the present invention.

It may be desirable in many instances to facilitate the milling operation by first treating the mixture of the substance to be dispersed in a pre-mixer. It makes no difference whether the substance to be dispersed is warm or cold when introduced into the mill because the construction of the mill results in an excellent mixing with practically no waste. There is no squeezing or pressing of the substances between the mill elements and there is little heat produced during the operation of the mill. Furthermore, there is very little power consumption, and the surprising varied application possibilities of the shock mill is not limited according to the present invention to only subdividing. By a regulation of the shock disc in stationary position at different distances from the centrifugal wheel it is possible to regulate the size and degree of fineness of the milled substance as well as the grain size thereof. For example, if coal, coke or another combustible is introduced into the shock mill along with an ore and a molten tar pitch, it is possible to adjust the milling and dispersing so that the substance leaving the mill is further suitable for treatment in a briquetting press, an extrusion press, or a rolling press for the formation of briquettes or granules which may be further treated in a carbonization oven, coking oven, roasting oven, sintering oven or in a blast furnace.

It is, for example, possible to mix sifted ore, combustible and auxiliary agents having a grain size of up to 10 mm. with another finely grained smeltable raw material such as flotation sediment, flue dust sediment and the like, and to adjust the water content thereof to preferably about 15% either by mixing with wet or dry substances or by the addition of water. This wet, non-homogeneous mixture is then with the addition of molten tar pitch intimately mixed and homogenized in a shock mill to a suitable grain size, for example 80% passing through a sieve of 0.5 mm. openings. The final mixture can then, after being shaped, be subjected to a metallurgical process.

The basis of the present invention is not changed by heating the mass leaving the mill if necessary, i. e. in a heated stirrer, although such heating is not generally necessary.

Generally, the pitch is in hot molten condition when mixed with the basic material. However, according to a preferred embodiment of the present invention it is possible to lower the amount of pitch necessary for the binding of the particles of the basic material by heating the mixture of pitch and basic material while mixing the same, i. e. by means of steam. In such case it is possible to utilize coal pitch in solid condition after finely dividing the same. The heating of the basic material and pitch mixture while mixing the same has the surprising effect of requiring the utilization of less pitch than is possible if only the pitch is heated and introduced into the basic material in molten, fluid condition. Although the scope of the present invention is not meant to be limited to any theory as to why this method of proceeding results in the possibility of using less pitch, it is believed that the warming of the particles of the basic material allows the same to adhere to each other with a thinner layer of pitch between the particles.

In any case, this method of proceeding, namely, heating the mixture of basic material and hot or cold pitch while mixing the same can result in lowering of up to 30% of the amount of pitch required. The use of hot molten pitch results in a still greater saving over the use of cold pitch.

A further advantage of the present invention resides in the fact that the process thereof does not require any structural alterations of the already existing briquetting plants. Furthermore, this process results in a saving of steam, since lower temperatures can be used in the mixing-kneading apparatus. Still further, the throughput of the presses is increased because of the increase in weight of the briquettes.

The following examples are given as illustrative of preferred embodiments of the present invention, the scope of said invention not, however, being limited to the specific examples given.

Example 1

Coal sediment having a water content of 34% by weight is thoroughly mixed with 5% by weight of hot, fluid, molten tar pitch to which has been added 2% naphthalene, the pitch being introduced into the coal sediment in a thin stream. After mixing, the mass is shaped. Shaping of the mass does not require a pressure greater than about 1 kg./cm.^{2}. The formed article is dried in a drying chamber at about 50° C., for about 8 hours or in open air for about 20 hours, thereby solidifying the mass. The resulting briquettes have standard characteristics.

Example 2

Fine granules of magnesium hydroxide containing 40% of water are intimately mixed with 7% molten tar pitch consisting of 25% anthracene (including raw anthracene) and 75% of refluxed hard pitch having a Kraemer-Sarnow softening point of 55° C. The resulting mass is shaped and dried at temperature of 80° C., thereby solidifying the same. The dried pieces are then treated in an oven at a temperature up to 1600° C., so as to calcine and sinter the same.

Example 3

Finely divided fat coal having a water content of 15% by weight is intimately mixed with 1% by weight of condensed spent sulfite liquor (32° Bé.) and 3% by weight of fluid molten tar pitch (110° C.), consisting of 70% by weight briquette pitch (65° K. S.) and 30%

by weight raw anthracene, thereby forming a dispersion of the molten tar pitch and the wet coal. This mixture is by means of an extrusion press (pressure of about 1 kg./cm.^{2}) shaped into cylindrical form, and cut into lengths of about 20–50 mm., and then formed by means of a rolling drum into a ball shape. In order to make these briquettes weather-resistant, the same are preferably heated with hot waste gas for a short time (about ½ hour) at a temperature of about 150–200° C.

Example 4

Finely milled oil shale having a water content of about 5% is intimately mixed and dispersed with about 2% condensed spent sulfite liquor (32° Bé.) and 2% fluid, molten, tar pitch (120° C.) consisting of 90% brown coal tar pitch and 10% raw naphthalene. The mixture is then shaped in a briquette press. The final briquettes can then be treated in a smelting oven without further drying.

Example 5

Fine grained iron ore having a moisture content of 14% is intimately mixed with 1% condensed spent sulfite liquor (34° Bé.) and 2% molten tar pitch (140° C.) consisting of 80% briquette pitch (65° K. S.), 15% raw anthracene and 5% redistillate. The mixture is shaped by granulation and then subjected to a shock heating at a temperature of 80–90° C. These ore briquettes, as in a previous example, can be immediately subjected to a further treatment in a roasting oven to shape the same.

Example 6

85% magnesium hydroxide, having a water content of 10% is intimately mixed with 5% condensed spent sulfite liquor (30° Bé.) and 10% molten tar pitch (130° C.) consisting of 5% raw anthracene, 87% wash oil pitch and 8% hard pitch distillate. The resulting mass is then shaped and sintered as in the previous examples.

Example 7

Shaped articles are produced as in Example 6, except that the same are first smelted at 500° C., and then sintered. The gases recovered from the smelting, upon condensation may again be used as binding agent (about 50% of the total amount consisting of binding agent.

Example 8

3% coke dust (grain size up to 10 mm.) is introduced along with 20% limestone sand (grain size of 2 mm.), 30% spathic iron ore (10 mm. grain size), 13% flue dust, 30% flue dust sediment (water content 50%), and 4% of liquid, molten, tar pitch at a temperature of 120° C., the tar pitch consisting of 5% raw anthracene, 10% raw naphthalene, 15% wash oil pitch, 70% briquette pitch (65° K. S.) into a shock mill and therein milled and intimately mixed. The mixture can then be made to stick together by means of a condenser and/or a rolling drum. These pieces can then be roasted, sintered or directly smelted in a blast furnace.

Example 9

35% lignite (grain size up to 10 mm.), 10% lime (grain size 3 mm.), 25% iron ore (grain size 8 mm.) and 20% iron ore concentrate are introduced into a shock mill along with 8% brown coal tar pitch, 2% raw anthracene and 15% water wherein the mass is intimately mixed and milled. The mixture is then carbonized so that a solid ore coke is formed which can then be smelted in a blast furnace.

It should be noted that in the roasting or sintering oven there is a better reducibility utilizing wet pieces than previously dried pieces. Furthermore, the content of CO_2 in the iron ore has no effect in the forming and sintering.

Example 10

98% of fine iron ore (Kahlenberg) is introduced along with 2% molten tar pitch consisting of 4% raw naphthalene and 96% briquette pitch (65° K. S.) and with 18% water into a shock mill wherein the mass is intimately mixed. The mass is then made coherent by means of a rolling drum. The pieces having a water content of 17% are treated in a blast furnace at a temperature of about 800° C., as compared to former requirement of a temperature of 1000° C. for roasting. This results in an increase of the Fe_3O_4 content of 15–18% as compared to prior processes, to a final content of 95–98%.

Example 11

95% iron ore (grain size 10 mm.) having a content of 24% CO_2 is intimately milled and mixed in a shock mill with 5% molten tar pitch consisting of 10% brown coal tar pitch, 3% raw anthracene, 5% raw naphthalene and 82% briquette pitch (65° K. S.) and with 12% water. The mixture can then be made coherent by means of rollers and the formed pieces may be treated in a blast furnace either raw or after roasting.

Example 12

A fine grained coal, having a water content of 1.2% is wetted in a rotating drum by means of steam and molten tar pitch consisting of briquette pitch (65° K. S.) and 20% raw anthracene. The steam-molten tar pitch mixture with which the coal is mixed is at a temperature of about 140° C. Upon contacting the coal, the steam-molten tar pitch mixture cools, the steam condenses and a dispersion is formed. The water content of the coal-molten tar pitch dispersion amounts to about 3.6% before being pressed into briquettes. The temperature of the mixing-kneader apparatus is about 10% above the softening point of the tar pitch and is actually at a temperature of about 55° C.

The briquettes leave the press in warm condition and may then be shipped. The weight of the briquettes is increased about 10%. The amount of molten tar pitch required is about 3.4%. This amounts to a lowering of the amount of binding agent needed from the previous value of 6.5% of the same pitch for the same amount of coal, besides a lowering of the amount of steam required by lowering the temperature in the mixing-kneading apparatus from 70° C. to 55° C. Furthermore, the throughput of the press is increased because of the 10% increase in weight of the briquettes.

The following examples illustrate the use of coumarone resin along with the pitch.

Example 13

85% finely divided iron ore is mixed in a kneading apparatus with a molten binding agent consisting of 10% hard pitch distillate, 5% raw anthracene, 5% coumarone resin 5/65, and 80% briquette pitch (Kraemer-Sarnow softening point of 65° C.) and further treated as in Example 1 to form briquettes. The water content of the mixture was 12%.

Example 14

90% copper pyrites having a grain size of up to 50 mm. is milled and mixed in a shock mill with 6% coke dust (grain size up to 10 mm.), and 4% of a cold, finely divided, solid tar pitch consisting of 5% raw anthracene, 7% wash oil pitch, 6% hard pitch distillate, 5% coumarone resin 5/65, and 77% briquette pitch (65° K. S.) along with an addition of 8% water. The mixture is mixed hot in a kneading apparatus at a temperature up to 70° C. and formed into briquettes by means of a briquette press.

Example 15

84% sulfur pyrites having a fine grain size is kneaded while warming with 5% of a binding agent consisting of 10% hard pitch distillate, 5% raw anthracene, 5% coumarone resin 5/65, and 80% briquette pitch (65° K. S.). The water content of the mixture is 11%.

It is possible to vary the molten tar pitch, by using a composition consisting of 70% briquette pitch (65° K. S.), 20% wash oil pitch, 5% raw phenanthrene and 15% coumarone resin 5/65.

The mixture leaving the shock mill mentioned in Example 14 is so completely mixed and homogenized, that the kneading mixer only performs the function of heating the briquette mass to the required temperature. If the briquette mass is warmed prior to the introduction into the shock mill, it is possible to form coherent briquettes from the mixture as soon as the same leaves the shock mill.

The briquetting does not require the use of a briquette press. It can be carried out by granulating by means of a rolling plate or rollers. In any case, the coherent product may be further treated by carbonization, coking, degassing, roasting or sintering processes or in a blast furnace, the size and shape of the product being adjusted according to the further treatment to which the same is to be subjected.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A process of briquetting, comprising the steps of intimately mixing a wet, subdivided solid material having a water content of between 3.9–90% by weight with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherrent briquette.

2. A process of briquetting, comprising the steps of intimately mixing a wet, subdivided solid material having a water content of between 3.9–90% by weight with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings and being selected from the group consisting of naphthalene, anthracene, phenanthrene and carbazole so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

3. A process of briquetting, comprising the steps of intimately mixing a wet, subdivided solid material having a water content of between 3.9–90% by weight with a molten mineral coal tar pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing decomposed coal and between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

4. A process of briquetting, comprising the steps of intimately mixing a wet, subdivided solid material having a water content of between 3.9–90% by weight with a molten mineral coal tar pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch having a maximum Kraemer-Sarnow softening point of 60° C. and containing decomposed coal and between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

5. A process of briquetting, comprising the steps of wetting a subdivided solid material with an amount of water sufficient to give subdivided solid material a water content of between 3.9–90% by weight; intimately mixing said wet, subdivided solid material with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

6. A process of briquetting, comprising the steps of intimately mixing a wet, subdivided solid material having a water content of between 15–20% by weight with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

7. A process of briquetting, comprising the steps of wetting a subdivided solid material with a gas condensate obtained from a coking purification process and consisting mainly of water and containing a small amount of at least one polycyclic hydrocarbon in an amount sufficient to give said subdivided solid material a water content of between 3.9–90% by weight; intimately mixing said wet, subdivided solid material with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

8. A process of briquetting, comprising the steps of wetting a subdivided solid material with an amount of steam sufficient to give said subdivided solid material a water content of between 3.9–90% by weight while simultaneously heating the same; intimately mixing said wet,

heated, subdivided solid material with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

9. A process of briquetting, comprising the steps of intimately mixing a subdivided solid material being wetted with a spent sulfite liquor and having a water content of between 3.9–90% by weight with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch; and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

10. A process of briquetting, comprising the steps of intimately mixing a wet, subdivided solid material having a water content of between 3.9–90% by weight with a molten pitch in an amount sufficient to bind said subdivided solid material and between 1–30% by weight, said molten pitch containing between 2–40% by weight of at least one polycyclic aromatic hydrocarbon having a maximum of three rings while maintaining a temperature at which said pitch is molten so as to form a homogeneous mass of said wet, subdivided solid material and said molten pitch containing said polycyclic aromatic hydrocarbon, the amount of water in the thus formed mixture being between .8 and 9 times the weight of the pitch and drying and cooling said homogeneous mass, thereby causing the components thereof to adhere to each other, thus forming a coherent briquette.

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