The present invention relates to the coking of coals and comprehends more particularly improvements in the preparing of coking coals for coke-oven charges whereby those variations in their bulk densities which are occasioned more especially by fluctuations in superficial-moisture content can be conveniently and cheaply adjusted to provide the coals with a predeterminable, preferred bulk density within that range of superficial-moisture contents generally found in coals employed in the coking art.

An object of the present improvement is the provision of novel means whereby those variations in the bulk density of a coal caused by changes in its superficial-moisture content can be obviated so that the same weight of coal can be always contained in the leveled charge of a coke oven.

A further object of improvement is the provision of means whereby the lower bulk density of a moist coal, or of coal mixtures, can be regularly increased, so that greater quantities thereof are chargeable into coke-oven coking chambers than would otherwise be possible.

A further object of invention is the provision of means for promoting maintenance of uniform operating conditions both in a coke-oven battery and in the associated by-product recovery system and realization of the attendant advantages to the structure and its operation.

The invention has for further objects such other improvements and such other operating advantages or results as may be found to obtain in the processes or apparatus hereinafter described or claimed.

It is well known in the art that variations in its surface or superficial-moisture content cause changes in the weight per cubic foot or bulk density of a coal. The charging from day-to-day of substantially uniform weights of coal or coal mixtures into the same coke ovens is practically impossible when, for example, the coals for one day's charging are taken from a storage where they have been subjected to rain or snowstorms for a considerable period before their use, whereas on the following day the coke-oven charges may comprise coals that are newly received from the mines and have substantially lower surface-moisture contents.

According to the present invention coking coals for charging into coke ovens and having in excess of about one per cent of superficial moisture are treated with relatively small amounts of agents that are effective to reduce the fluffing or bulking effect of this moisture and the coal particles can automatically become more closely packed without resorting to other measures. It has now been discovered that coals having more than about one per cent of superficial-moisture content, when treated with surprisingly small amounts of oily materials, such as bunker oils, absorbent oils of the type employed for the recovery of coke-oven light oil, creosote oils, watergas tars, and coal tars, oil emulsions, and other petroleum-derived oils and mixtures thereof with other materials having a varying oil content and viscosity, or the like, exhibit an increase in their existing bulk densities without apparent reduction in the moisture content. Oily materials ranging widely in viscosity from about 40 seconds at 100° F. (Saybolt Universal) to about 300 seconds at 123° F. (Saybolt Furol), preferably around 150 seconds at 100° F. (Saybolt Universal), have been found efficacious in practice of the present improvement. When employing such oily materials for the stated purpose it has been found that the extent of the beneficial effects thereby produced is somewhat less for the very viscous bunker oils than for those of lower viscosity. Wetting agents or so-called surface tension reducers which reduce the surface-tension of superficial water between the coal particles below its normal value are also suitable for the purpose, as are also solutions or suspensions of wetting agents in oils or oily materials. It has been found that, in general, materials adapted to wet the surface of moist coal in preference to the superficial or surface water of the coal itself or to decrease the wettability of coal by such moisture, can be employed to alter the bulk density of moist coal and provide the beneficial and novel results of the present invention. It is to be understood that where an oil is employed to effect said novel results, an oily material or wetting agent or a combination of an oily material and a wetting agent can be used to produce similar results.

In the practice of the present improvement, finely pulverized coking coals, or finely pulverized coal mixtures, are prepared in the usual manner for carbonization in coke ovens. By the term finely pulverized coal, as used herein and in the following claims, is meant coal of the fineness of pulverized coal that is conventionally used for coking purposes in the divers ovens of by-product coke-ovens. Such a coal is one of the fineness produced by crushing in a conventional hammer mill of conventional coke-oven by-product coke-oven plants, before passing over conveyor belts, as hereinafter described. Preferably at a point...
Just prior to admission of the coal into the hammer mill there is added to said coal the preferred quantity of an oily material or a solution of a wetting agent. The beneficial effects of the present invention can be secured by the use of wetting agents or any one of a variety of oils or oily materials. The rate of flow of the so-added material onto the coal is preferably controlled by a suitable metering device, and the quantity thereof is less than about one per cent, and usually only about ¼ per cent, by weight of the coal. The oil-treated coal then passes through the hammer mill and over conveyor-belts to the storage bins from which it is supplied, as required, to lorry cars for charging to the coking-chambers of coke ovens and is thereafter carbonized.

The bulk densities of a coal or coal mixture having a superficial-moisture content in excess of one per cent, will generally be found to reach a maximum value at some point where the amount of added oil is less than one per cent by weight, thereafter decreasing with further additions of said oil. It is interesting to note that the addition of an oil to dry coal or coal of which the superficial-moisture content is less than about one per cent, decreases the bulk density, the amount of said decrease being at a maximum when substantially one per cent of said oil, or the like, has been added. A positive control of bulk densities of coal within narrow limits by means of small additions of oil, or the like, is possible, and is one of the novel features of the present invention and differs from any small effect incidental to the prior use of larger quantities, for example 2 to 3 per cent by weight, of oily materials on coal for the purpose of increasing the hydrocarbon content of the gas resulting from the carbonization of such oil-coal mixture, or for dustproofing, or the like.

The quantity of an oil, of an oily material, or of a wetting agent (the latter being preferably employed in a fluid medium), that is necessary to be added to coal or coal mixtures for realization of the benefits of the present improvement, varies within narrow limits and can be determined simply and easily by empirical methods. The moisture content of a portion of the to-be-charged coking coal is first determined, after which further portions of said charge are each thoroughly admixed with a different quantity less than one per cent by weight of a preferred oil. Thereafter the bulk densities of said portions are determined by a standard test, as for example by the A. S. T. M. (D291-1929) method for cubic-foot weights of coal in box tests.

For simplicity and easy reference, a curve can be drawn by plotting the so-determined values for bulk density, in pounds per cubic foot, corresponding to the different added weights of an oil to a coal or coking charge. This procedure is clearly illustrated by a glance at the curves shown in Fig. 1. For example, curve I was drawn from the results tabulated below and obtained after following the above-described procedure for a coking charge having a moisture content of 4.5 per cent. Curves II, III, and IV are a graphic illustration of results obtained with the same procedure applied to similar coking charges varying only in their moisture contents, which were 1.9 per cent, 0.9 per cent and 3.1 per cent respectively. The investigation resulting in the following tabulation and the illustrated curves of Fig. 1 was made to stabilize the quantity of coal charged daily in a by-product coke-oven plant where the bulk density of the coking charges sometimes varied as much as ten pounds per cubic foot, in the day-to-day operation, as a result of changes in the moisture content of said coking charges from about 4.5 per cent to less than about 1 per cent. Separate samples of said coking charge having a 4.5 per cent moisture content were first admixed with ½%, 1%, ½%, 1%, and 2% by weight respectively of an oil admixture having a viscosity of about 150 seconds at 100°C (Saybolt Universal). The so-treated samples and one untreated sample were then tested according to the A. S. T. M. method to determine their respective bulk densities. This was followed by like tests of similar coking charges of 2.9 per cent and 0.9 per cent moisture content respectively, excepting only that, in the case of the coking charge containing 2.9 per cent moisture no tests were made with additions of ½% per cent and ½% per cent of said oil admixture. The obtained bulk-density values, fully identified in the following tabulation, were then plotted as the abscissas on the graph paper of Fig. 1 and the corresponding values for per-cent-weight of oil admixture plotted as the ordinates, the respective curve being thereafter drawn through the points where said corresponding abscissas and ordinates intersect.

It is obvious from a study of Fig. 1 that a horizontal line drawn through the value for bulk density of 46 pounds per cubic foot will intersect the so-drawn curves. The coking charges in said coke-oven plant were successfully stabilized by mixing with the coal accordingly as its contents of superficial moisture varied, those indicated oil admixtures required to maintain the same at a bulk density of about 46 pounds per cubic foot with the result that, from day to day, the leveled coke-oven charges always contained the same weight of coal, and the coke and the gas and other yields of by-products became substantially uniform and an established heating schedule was maintainable with importantly reduced regulation and control. The following tabulation gives the results of the above-described empirical tests for bulk densities with oil admixtures.

<table>
<thead>
<tr>
<th>Added oil per cent by weight</th>
<th>Bulk density in pounds per cubic foot with 4.5% moisture content</th>
<th>Bulk density in pounds per cubic foot with 2.9% moisture content</th>
<th>Bulk density in pounds per cubic foot with 0.9% moisture content</th>
</tr>
</thead>
<tbody>
<tr>
<td>No oil</td>
<td>41.6</td>
<td>43.4</td>
<td>52.5</td>
</tr>
<tr>
<td>1</td>
<td>45.0</td>
<td>45.6</td>
<td>50.6</td>
</tr>
<tr>
<td>1.5</td>
<td>45.8</td>
<td>47.4</td>
<td>49.7</td>
</tr>
<tr>
<td>2</td>
<td>46.4</td>
<td>48.2</td>
<td>48.1</td>
</tr>
<tr>
<td>2.5</td>
<td>46.8</td>
<td>48.6</td>
<td>46.4</td>
</tr>
<tr>
<td>3</td>
<td>47.4</td>
<td>49.0</td>
<td>46.6</td>
</tr>
</tbody>
</table>

It has been found and it should be emphasized with particularity that maximum values for bulk density of any coal, or coal mixture, containing more than about one per cent of superficial moisture are usually achieved by additions of less than about one per cent by weight of an oil, or the like. The curves I, II, and IV, in Fig. 1, also show the bulk-density values produced by additions of up to about two per cent of the oil admixture to the same coking charge for the purpose of also showing the effects that result from the additions of more than about one per cent of an oil, or the like, to coal, as is commonly practiced, for example, to increase the hy-
drocarbon content of gas evolved from the coal during carbonization. As is clearly evident from the curves I, II and III, a maximum bulk density in any specific coal or coal mixture, alters with divers oil and moisture contents, a coke-plant operator can quickly and easily determine the quantity of oil necessary to be added thereto to establish either a minimum or a preferred bulk density therein, if its moisture content is known.

Such data also enable him, by adding varying quantities of oil that are below substantially one per cent by weight and are adjusted to the fluctuating moisture content of the coal, so to stabilize his coke-oven charges will always have substantially the same bulk density and consequently the same weight of coal regardless of their moisture content. This day-to-day charging of substantially the same height of coal into the ovens, made possible by the novel features of the present invention, tends to simplify the heating of the coke chambers and permits an operator easily to establish and maintain for long periods the same heating conditions with resultant decreased wear and tear on the structure of the whole coke-oven battery. This improvement in operation is further reflected in simplified control and regulation of apparatus employed in the recovery of by-products and in improved maintenance of the apparatus employed therefor. It is to be understood that when changes are made, as for example in the oil, the wetting agent or other oily material used, or are made in the coal or coals charged, or in their pulverization, or in their proportions in the mixture, that the above-described empirical determinations should be re-determined if the optimum conditions and results are to be obtained.

It is interesting to note, as is clearly shown by reference to curve III of Figure 1, and also to stress in consequence of its practical importance for purposes of coal carbonization, that, in the case of a coal, or of a coal mixture, containing less than about one per cent of superficial moisture the converse of the above-described phenomenon takes place: that is, with coal having less than about one per cent of superficial moisture, additions thereto of small amounts of oil, oily material, or the like, which in the case of a wetter coal would increase the bulk density, bring about instead only a decrease in bulk density. For coals that are designed for carbonization in coke-ovens this phenomenon is useful as a means of reducing the bulk density of the drier coals and especially of those that have a tendency to expand in the coking chambers, and also has the beneficial advantage that the bulk-density decrease can be brought about by a medium that in the carbonization process is cracked to produce combustible gas which, at least in part, makes up for lesser gas volume produced by the reduced weight of coal in an oven charge of decreased bulk density and in this respect is superior to water which has been used in the prior art for the purpose.

From the above-given, it becomes obvious that by means of appropriate additions of oil and of oil to a coal its bulk density can be relatively precisely adjusted to a preferred value: if the coal is dry (less than about one per cent of superficial moisture) either water or oil can be employed as a bulking agent to bring about a decrease in bulk density, and if the latter has been used a purpose subsequent addition of water effect an increase in the bulk density, whereas if the former (water) has been employed, further additions of water will effect only a further decrease of bulk density; if the coal to be treated contains more than about one per cent of water, additions of small amounts of oil always decrease the bulk density whereas the opposite effect is produced with further water-additions up to a water content of about 6 to 8 per cent; and a moist coal that has had a bulk density established by small additions of oil can have that density decreased by further additions of water.

Thus, by means of additions of oil and water to a coal in a sequence that is consistent with its characteristics it is possible to adjust or to alter its bulk density within relatively precise limits.

While oils and oily materials, as above mentioned, are preferred because they are easily available and convenient to employ in a by-product coke-oven plant, it is also possible to utilize wetting agents to secure the ultimate results made possible by the present improvement. Numerous commercial wetting agents occur as fluids or in solid or semi-solid form and can be employed for the stated purpose. If said wetting agents are manufactured in the form of solids, semi-solids, or the like, it is preferred for ease in handling and admixing with coal, to employ them as solutions or suspensions in fluid media, as for example in water, in oily materials, or in other inorganic or organic solvents. The preferred results can also be achieved by employing in sequence oily materials and wetting agents in the stated or in reverse order. An example of a wetting agent that can be employed for the stated purpose is an ester of a sulfonated bi-carboxylic acid (U. S. Patent 2,028,091) occurring as a solid named "Aerosol OT 100%" (diocylton sulfosuccinate, see Bulletin of the National Formulary Committee; Aug.-Sept., 1942) and made up by the manufacturer as a free-pouring liquid in various concentrations and is described by the manufacturer as comprising "Aerosol OT 100%, water, and a mutual solvent."

The total quantity of an oily material or wetting agent necessary to effect the preferred change in the bulk density of a mixture of coking coals for forming a coke-oven charge can be added to one of the component coals before its admixture with other coals, or breese, or the like, to form a charge, and the end effect in the admixture is substantially the same as though it were applied to the entire mixture. Thus a coal that has been treated with the proper amount of oil at the mine can be used in admixture with untreated coal to form a coke-oven charge of adjusted bulk density. This addition of an oil to a coal, at any preferred point, other than just before the hammer mill does not diminish the effectiveness of the oil to produce the stated novel results if there is compensation for the deficiency due to any in between operations to which the coal may be subjected, such as transportation, storage, crushing, handling or the like, any deficiency in the preferred quantity of an oil being corrected by adding further small and regulable quantities of the same or a different oil or even of a wetting agent previous to the treatment of the coal in the hammer mill. A coal, after the preferred oil treatment, need not be carbonized.
immediately but can be stored, the admixed oil offering some added protection against a further increase in the superficial-moisture content of the coal charge.

The following specific examples show results obtained in large-scale operation by the practice of the present improvement.

**Example 1**

At a by-product coke-oven plant, moisture variations brought about substantial changes in the weight of coal-mix it was possible to include in the levelled coking chambers. It was proposed to stabilize the weight of said charges at 12.40 net tons by the use of small quantities of an oil having a viscosity (Saybolt Universal) of about 100 seconds at 100° F. The oil, stored in a suitable tank, was fed by gravity to a pump which discharged the oil through a pipe line of suitable size to a point near the inlet of the hammer mill at which point it was added to the entering coking-coal mixture. A suitable valve and metering device controlled the quantity of oil added to the coal mixture, said metering means being provided with an automatic cut-off to arrest the flow of oil when the coal feed was interrupted. The coal mixture, after addition of the oil, passed through the hammer mill and over conveyor belts to storage bins from which it was discharged to lorry cars for charging to the coking ovens. A lorry car weighing device supplied the actual weight of coal charged to each oven; however, more immediate control of variations in bulk density from the preferred figure was exercised by the presence of means, directly after the hammer mill, for determining cubic-foot weights of the oil-treated coal-mix.

Empirical data were first obtained, by the methods previously described, to determine the quantity of the preferred oil necessary to be added, because of variations in moisture content of this particular coal-mix, to yield the preferred weight of an oven charge, namely 12.40 net tons. These data were required to specify correct sizes of the oil pump, pipe line, control valve and metering device for the oven-addition system. It was found that said preferred weight for an oven charge corresponded to a weight of 41 pounds per cubic foot of said charge, measured in a standard cubic-foot box. Variations in either direction from this cubic-foot weight, as shown by the weights of samples of the treated coal-mix taken from the conveyor belt at a point after the hammer mill, were quickly corrected by resetting the valve which controlled the rate of oil flow to the coal-mix entering the hammer mill.

Having described the means employed at this by-product coke-oven plant for controlling oil additions to the coal-mix and thereby assuring coking-charges of substantially uniform weight regardless of their moisture content, we can now examine actual records of results thereby obtained and compare them with those taken from records of previous operation without oil additions. These contrasting records were taken from the coke-oven operating sheets for the same two-months' period in successive years and are illustrated in Figures 2, 3 and 4.

As hereinabove mentioned, in practical operations prior to the present invention, coke-oven charges could not, from day-to-day, be made of uniform weight because of variations in the moisture content of the coal, which altered its bulk density. Curves V and VB of Figure 2 clearly demonstrate this fact. The curve V, the solid line, shows the operation without the use of oil and traces the daily variations in net tons of coal it was possible to include in a charged, levelled oven and which ranged from about 11.90 to 12.40 tons per oven, whereas the preferred weight was 12.40 tons. The curve VB, green line, shows that the fluctuations in moisture content of said coal charges were from about 2.5 per cent to about 6.5 per cent, the latter being largely responsible for the variations in the weights of the levelled oven charges. The said curves V and VB illustrate the inverse relationship that generally exists between the moisture content of the coal and the weight of coal that it is possible to charge to an oven; that is, as the moisture content of the said coal increases, the weight per oven charge decreases.

The curves in Figures 3 and 4 show the coke-oven operation in the same plant for the same calendar period of the following year, while using oil according to the present improvement. Curve VI, the broken line, shows the fluctuations in the moisture content of the coal-charge, the solid line, treated with oil before their charging into the ovens, the fluctuations ranging from about 3 per cent to about 8 per cent and being even greater than those shown in curve VB. Oven charges formed of this untreated coal would clearly have varied in their weights to an even greater extent than shown in curve V. Curve VII, the solid line, shows the very small amounts of oil, ranging from nearly zero to only about 0.15 per cent by weight of the coal, that were added to the to-be-charged coal, having the moisture contents shown in curve VI, and in the manner hereinabove described. The said curves VI and VII demonstrate that, in general, a direct relationship exists, between the moisture content of a coal and the amount of oil that is necessarily added to maintain it at a constant bulk density, namely, that as the moisture content of the coal increases or decreases, the amount of oil that must be added respectively also increases or decreases.

Curves VIII of Figure 4 graphically illustrates the remarkable uniformity in the weights of oven charges achieved at this coke-oven plant by the practice of the present invention, despite wide fluctuations in the moisture content of said charges. The startling contrast between this controllable uniformity of weights of oven-charges, as shown by curve VIII, and the very irregular and largely uncontrollable fluctuation in the weights of substantially similar but untreated coal-charges, as shown by curve V, would be more obvious were one mentally to superimpose Figure 4 upon Figure 2 so that the topmost lines parallel to the axis of ordinates, namely those representing a value of 12.40 net tons, coincided for both said figures.

Regardless of the day-to-day variation in the coals charged, whether they were freshly mined or stock coals previously exposed to rain or snow, this particular by-product coke-oven plant substantially uniformly maintained its oven charges at the preferred weight of 12.40 tons. As a direct result thereof, a greater uniformity was achieved in the produced quantity and quality of the coke, gas and other by-products and the temperatures of the oven heating flues were easily maintained at a constant preferred level.

**Example 2**

At another coke plant, by employing the discovery of the present invention, the bulk density of the to-be-charged coal was adjusted to yield
a substantially increased weight of coal-charge per oven by additions thereto of debenzolized absorbent oil from the light oil recovery plant. Absorbent oil is a petroleum-derived oil having a specific gravity of about 0.87 to 1.56° C. and a viscosity (Saybolt Universal) of about 80 seconds at 70° F. when discarded from the light oil system. The method of adding this spent oil to the coal-mix and the apparatus employed therefor were substantially similar to those described in Example 1 above. At this particular plant the normal weight of oven charges over a considerable variations was 35,300 pounds with a 4.1 per cent moisture content, which was not subject to important variations. To the usual coal mixture having a 4.2 per cent moisture content there was added ½% per by weight of the said debenzolized absorbent oil, said addition producing oven charges that averaged 36,340 pounds per charge, an increase of more than a half ton above the normal weight. The average net weight of oven charges increased to 37,150 pounds with the addition of ½% per cent by weight of oil to the same coal mixture. When ½% per by weight of said oil was added, it produced an average oven charge of 38,550 pounds, an increase of more than one and a half tons above the normal weight of oven-charges to which no oil had been added. At this plant, by means of additions to the coal of debenzolized absorbent oil within the range of ½% per cent to ½% per cent by weight, the amount of coal charged into and carbonized in the coking ovens, was thus regularly increased.

Example 3

In a manner similar to that previously described, empirical determinations of bulk densities were made on coking-coal charges after admixing therewith, in the form of a 60 per cent solution, of from 0.05 per cent to 0.5 per cent by weight of the coal of a commercial wetting agent. The so-treated coking-coal charges, prior to the additions of wetting agent, differed only in their moisture contents, which were 0.4 per cent and 3.6 per cent. The commercial wetting agent employed was an ester of a sulfonated dicarboxylic acid (U. S. Patent No. 2,028,091). It is a solid known in the trade as "Aerosol OT 100%" (diocetyl sodium sulfosuccinate, see the Bulletin of the National Formulary Committee: Aug.-Sept. 1942), and is made up by the manufacturer as a free-pouring liquid in various concentrations. The material employed in the present instance is described by the manufacturer as comprising 60% of "Aerosol OT 100%" in water and a mutual solvent. The following table shows the results of the empirical determinations on two coking-charge after the indicated quantities of this wetting agent, calculated to the dry material, had been admixed therewith.

<table>
<thead>
<tr>
<th>Added &quot;Aerosol OT 100%&quot; percent by weight (dry basis)</th>
<th>Pounds per cubic foot with 0.4% moisture content</th>
<th>Pounds per cubic foot with 3.6% moisture content</th>
</tr>
</thead>
<tbody>
<tr>
<td>No addition</td>
<td>49.7</td>
<td>41.8</td>
</tr>
<tr>
<td>0.05</td>
<td>46.9</td>
<td>41.0</td>
</tr>
<tr>
<td>0.10</td>
<td>45.2</td>
<td>40.3</td>
</tr>
<tr>
<td>0.30</td>
<td>43.0</td>
<td>38.9</td>
</tr>
<tr>
<td>0.50</td>
<td>43.0</td>
<td>38.9</td>
</tr>
</tbody>
</table>

The above tabulation shows clearly that coals having less than one per cent moisture are decreased in bulk density by addition of a solution of a wetting agent and conversely when the moisture content is above one per cent, the same amount of wetting agent increases the bulk density.

From the above-given it is apparent that the present invention provides a number of novel uses and advantages. By the addition of preferred quantities of less than substantially one per cent by weight of an oily material or a wetting agent to a coking coal having a moisture content in excess of one per cent, the bulk density of said coking coal can be materially increased, thereby enabling the coke-plant operator to charge a greater average weight of coal to his individual coking chambers where maximum coke production is required. This is of particular advantage and a direct source of increased revenue, for example, in a plant where higher-moisture-containing washed coals are usually carbonized. By the addition of a wetting agent to obtain substantially uniform bulk densities when said coking charges vary in their moisture contents. By these means the coke-plant operator can maintain his coke-oven charges substantially uniform from day to day regardless of weather conditions, which formerly caused wide fluctuations in the coke tonnage charged. By stabilizing the daily quantity of coal charged, it is much easier to secure uniformity not only in the heating of the oven chambers and general oven operations but in the operation of all other by-product units in the plant. Uniform heating obviously results in an improved coke-product and in lower maintenance costs for oven operation. Because of low cost and general availability in a coke-oven plant, low-viscosity oils are preferred to produce the beneficial results. It is to be understood however that other oily materials of varying and higher viscosities and so-called wetting agents can be used if preferred. When a coking charge is a mixture comprising coals and/or other carbonaceous materials the preferred quantities of an oil required for said coking charge can be added to one component of said charge before its admixture with the other components. In the exceptional cases where dry or slightly moist or dangerously expanding coals must be charged, it is possible to employ the above-described methods to bring about a decrease in the bulk density of said coals.

The invention as hereinabove set forth is embodied in particular form and manner but may be variously embodied within the scope of the claims hereinafter made.

We claim:

1. A process of preparing for and coking in divers ovens of a coke-oven battery oven-charges of finely pulverized coal having both a moisture content of less than eight percent by weight and upon delivery to said ovens a bulk density excluding normally forming said oven-charges of a prescribed weight of said coal, said process comprising: altering the bulk density of said delivered finely pulverized coal asforesaid before charging the same into divers ovens of the coke-oven battery, by treatment comprising distributing over the finely pulverized coal to be charged sufficient amount of a mobile oil that is less than substantially one-half of one percent by weight of said coal and by said treatment furnishing the finely pulverized oil-treated coal with a bulk density such that a prescribed weight of the finely pulverized coal can be normally charged into said
ovens, and thereafter charging the same into divers ovens of the coke-oven battery and coking the same therein.

2. A process of preparing for and coking in divers ovens of a coke-oven battery oven-charges of finely pulverized coal having both a moisture content of less than eight percent by weight and upon delivery to said ovens a bulk density precluding normally forming said oven-charges of a prescribed substantially uniform weight of said coal for the divers said ovens, said process comprising altering the bulk density of said delivered finely pulverized coal aforesaid before charging the same into divers ovens of the coke-oven battery by treatment comprising distributing over the finely pulverized coal to be charged sufficient of an amount of a mobile oil that is less than substantially one-half of one percent by weight of said coal to change its bulk density to a value permitting said prescribed weight of the finely pulverized oil-treated coal normally to be charged into the ovens uniformly, and thereafter charging such oil-treated coal into divers ovens of the coke-oven battery and coking the same therein.

3. A process of preparing for and coking in divers ovens of a coke-oven battery oven-charges of finely pulverized coal having both a moisture content between one percent and eight percent by weight and upon delivery to said ovens a bulk density precluding normally forming said oven-charges of a prescribed weight of said coal, said process comprising; increasing the bulk density of said finely pulverized coal aforesaid before charging the same into divers ovens of the coke-oven battery by treatment comprising distributing over the finely pulverized coal to be charged sufficient amount of a mobile oil that is less than substantially one-half of one percent by weight of said coal and furnishing by said treatment the finely pulverized oil treated coal with an increased bulk density such that a prescribed weight of the finely pulverized coal can be normally charged into said ovens, and thereafter charging the same into divers ovens of the coke-oven battery and coking the same therein.

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