

UNITED STATES PATENT OFFICE.

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SMOKELESS BRIQUET AND PROCESS OF MAKING THE SAME.

972,333.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, ROBERT A. CARTER, JR., a citizen of the United States, and a resident of New York city, in the county of Queens and State of New York, have invented certain new and useful Improvements in Smokeless Briquets and Processes of Making the Same, of which the following is a specification.

This invention relates to smokeless briquets and the process of making the same out of substantially one or more waste products, or by-products of comparatively little value, in the manufacture of gas for domestic and manufacturing purposes.

In the manufacture of gas and more particularly what is known as "water gas" two of the waste products are oil tar and oil tar pitch which is the residue from the distillation of the oil used in that process of making gas. These waste products have little or no commercial value, it being quite customary to burn them to obtain their heat in the further manufacture of the water gas.

Another waste product in the manufacture of gas is "breeze." The coke which is obtained from the destructive distillation of coal in the manufacture of gas is more or less broken and pulverized as the result of handling to get the same from the retorts to the consumer. This coke is quite brittle and portions of it are pulverized or broken into fine particles by rubbing against each other and against the conveyer, or other means used to transport it to the proper bins prior to its sale. This fine coke which is formed of small particles, is screened from the other coke to make the latter merchandizable, and is a by-product of very little value as compared with the coke. In some instances there is no sale for these screenings or "breeze" as known in the art, and which is approximately 10% to 20% or more of the total output of coke depending upon how it is handled, while in other localities there is a market for it at a very low figure.

By my invention I take either or both the oil tar and oil tar pitch and combine it with some suitable carbonaceous material such for instance as anthracite or bituminous slack or with the waste breeze or with any combination of these materials. I then mold the briquets and subsequently subject them to volatilization to drive off substantially

all the volatile matter which may be in the briquet.

If the briquets are not subjected to volatilization the gases of the binder are given off quickly when the briquets are fed to a boiler or a stove, resulting in the smoke or gases being under considerable pressure which, when used for instance in domestic service, will cause the smoke and volatile gases to be forced out through the crevices and cracks of the stove besides forming soot within its drafts, passages and connecting pipes. This objection applies also more or less to the use of such briquets as fuel for boilers for manufacturing purposes.

I have found in practice that the best results are obtained with a minimum amount of oil tar or oil tar pitch, just sufficient being used to moisten the carbonaceous material making it of a consistency which will permit it to be shaped into briquets which will substantially hold their shape at least long enough to be placed into a volatilizer where they are subjected to the necessary heat to drive off substantially all their volatile matter. Unless the minimum amount of binder is used the resulting briquet will be lighter and more porous besides having less calorific value than a similar briquet of the same size made with a larger quantity of binder. If more coal tar or coal tar pitch is used than sufficient to merely render the carbonaceous material moldable, the excess binder being driven off in the subsequent steps of the process will not only render the interior of the briquet quite porous, but its surface or exterior will be in this condition and easily broken resulting in considerable waste from the handling of the briquets. Besides such a porous briquet absorbs more moisture. Preferably the carbonaceous material which I use to make my briquets is this waste breeze, above referred to and with it I bind the minimum amount of oil tar or oil tar pitch which will render the mass of sufficient consistency to permit it to be molded into briquets which will retain their form at least long enough to place them in the volatilizer.

While my invention is not to be limited to the proportions I here mention, I have found in practice that very good results are obtained and an excellent briquet formed by combining with the breeze between substantially 7% to 10% of oil tar. When I use oil tar pitch I have been able to use a lower per-

centage, excellent results being obtained with substantially 4% to 5% of the oil tar pitch. I have found in practice that with substantially these percentages of oil tar and oil tar pitch, whichever is used, a resulting briquet is obtained which has a smooth and hard outer surface, is less abrasive, not so porous, firmer, and less liable to absorb moisture than a briquet formed with a higher percentage of binder.

When the minimum amount of binder is used whether it be oil tar or oil tar pitch alone, or in combination with each other, the resulting briquet loses less weight in passing through the volatilization process and hence the resulting briquet is of greater density. It has the same calorific value per pound as the lighter and more porous briquet formed with a greater amount of binder, but its heat value is higher per cubic foot because it is of greater density. When these briquets are used in domestic service, where the fire box is of a certain and generally relatively small cubic capacity it is of material advantage to have the briquets of the maximum amount of calorific value per cubic foot. With my briquet, for instance formed with a minimum amount of binder and therefore of the greatest density, it is not necessary to replenish the fire so often or force it to get the same amount of heat as it would be with a more porous briquet. I have found in practice that the briquets formed with the minimum amount of binder are heavier than similar ones formed with a greater amount of binder. It is obvious also that while better results are obtained by the use of the minimum amount of binder, my briquets can be made at less cost and further that as there is less material to volatilize in the briquets, than in those using a higher percentage of binder, that the volatilization will take a shorter period and therefore the process of making the briquets can be expedited and a greater output be obtained in a given period.

While I preferably use the carbonaceous material formed of this waste coke known to the trade as breeze, I may, however, use the oil tar or oil tar pitch binder with anthracite or bituminous slack either alone or combined together with the breeze.

In the volatilization of the briquets I have found that the "coking propensity," by which I mean the propensity of the carbonaceous particles to adhere to each other in the process of volatilization of the volatile matter in the briquet, apparently does not depend upon the amount of binder used or the amount of gas given off by the binder. It is only necessary to apply sufficient binder, as noted, to hold the briquet together until it reaches the volatilizer. There the briquets are heated to a sufficient degree to render the particles of carbonaceous mate-

rial "sticky" so that they will adhere to each other. This action is further, apparently, augmented or supplemented by the gas driven off from the binder, though the exact chemical action which takes place I cannot state with certainty. I know, however, that in practice the finest briquets are those made with a minimum amount of binding material they being heavier, stronger, denser and of greater calorific value per cubic foot than briquets formed of identically the same materials but with a greater percentage of binder. The percentage of binder which I have here mentioned may of course be varied without departing from my invention, and it will also be varied when used with different carbonaceous materials, the percentage given applying to briquets made of finely powdered waste coke or breeze.

Broadly my invention may be considered as combining with any carbonaceous material the minimum amount of binder which will render it moldable and which will take the minimum amount of time to volatilize in the subsequent step of making the briquets. Though of course my invention in a more limited sense applies to the binder being oil tar or oil tar pitch or a combination of them and, further, the use of such a binder with coke waste or breeze in the manufacture of smokeless briquets.

Applicant is aware that coal tar has been previously used as a binder, but this application does not cover such a binder.

The coking propensity of a briquet made with a binder of oil tar or oil tar pitch is much greater than a similar briquet made with a binder of coal tar or coal tar pitch. In the latter binder there is much more free carbon in suspension than there is in the oil tar or oil tar pitch. The comparatively large amount of free carbon in suspension in the coal tar and coal tar pitch is inert and a deterrent, so far as binding the particles of the briquet together are concerned. In fact this inert carbon in suspension, itself requires a binder and consequently lessens the value of a given quantity of coal tar or coal tar pitch as a binder for a briquet.

The coking propensity of a briquet is further due to available hydrogen rather than to carbon. Oil tar and oil tar pitch having a greater quantity of available hydrogen than coal tar or coal tar pitch, a briquet formed with a binder of the former will have a greater coking propensity than the same briquet formed with a binder of the latter.

I have described this invention in connection with one manner of practicing the same, but it is to be understood that my invention is not to be limited to the details here set out for

What is claimed as new and what it is de-

sired to secure by Letters Patent is set forth in the appended claims.

1. A smokeless briquet formed of finely divided carbonaceous material and with a binder made from the residue of oil in the destructive distillation of oil in the manufacture of water gas, the volatile matter of the binder being driven off.

2. A comparatively dense and smokeless briquet formed of finely divided carbonaceous material and with the minimum amount of binder made from the residue of oil in the destructive distillation of oil in the manufacture of water gas, the volatile matter of the binder being driven off.

3. A smokeless briquet formed of finely divided carbonaceous material with a binder of oil tar, the volatile matter of the binder being driven off.

4. A smokeless briquet formed of finely divided carbonaceous material with a binder of about 7%-10% of oil tar, the volatile matter of the binder being driven off.

5. A smokeless briquet formed of finely divided coke or breeze with a binder of oil tar, the volatile matter of the binder being driven off.

6. A smokeless briquet formed of finely divided coke or breeze with a binder made from the residue of oil in the destructive distillation of oil in the manufacture of water gas, the volatile matter of the binder being driven off.

7. A smokeless briquet formed of finely divided coke or breeze with a binder of about 7% to 10% of oil tar, the volatile matter of the binder being driven off.

8. The method of making smokeless briquets comprising mixing with finely divided carbonaceous material a binder made from the residue of oil in the destructive distillation of oil in the manufacture of water gas, and subjecting the briquets to volatilization to drive off the volatile matter.

9. The method of making smokeless briquets comprising mixing with finely divided coke or breeze a binder made from the residue of oil in the destructive distillation of

oil in the manufacture of water gas, and subjecting the briquets to volatilization to drive off the volatile matter.

10. The method of making smokeless briquets comprising mixing with finely divided carbonaceous material a minimum amount of partly volatilizable binder just sufficient to render the mass workable, molding the briquets and then subjecting them to volatilization to drive off the volatile matter in the binder.

11. The method of making smokeless briquets comprising mixing with finely divided carbonaceous material just sufficient binder made from the residue of oil in the destructive distillation of oil in the manufacture of water gas, to render the carbonaceous material workable, and then subjecting the same to volatilization to drive off the volatile matter in the binder.

12. The method of making smokeless briquets comprising mixing with finely divided coke or breeze just sufficient binder made from the residue of oil in the destructive distillation of oil in the manufacture of water gas, to render the coke or breeze workable, and then subjecting the same to volatilization to drive off the volatile matter in the binder.

13. The method of making smokeless briquets comprising mixing with finely divided coke or breeze just sufficient binder made of oil tar or oil tar pitch to render the coke or breeze workable, molding the briquets and then subjecting them to volatilization to drive off the volatile matter in the oil tar or oil tar pitch.

14. The method of making smokeless briquets comprising mixing with finely divided coke or breeze about 7% to 10% oil tar, molding the briquets and then subjecting them to volatilization to drive off the volatile matter in the oil tar.

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Witnesses:

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