United States Patent Office.

GEORGE McKENZIE, OF GLASGOW, SCOTLAND.

Letters Patent No. 113,905, dated April 18, 1871.

IMPROVEMENT IN COMBINING CARBONACEOUS MATTERS FOR THE MANUFACTURE OF GAS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GEORGE McKENZIE, of Glasgow, Scotland, have invented a new and useful Method of Compounding Bituminous Coal and Tar to be used for the manufacture of illuminating-gas, of which the following is a specification.

My invention consists in a new method of combining tar with bituminous or gas-coal, for the purpose of increasing the quantity and the illuminating power of the gas obtained from the distillation of the coal by reducing the entire coal to a very fine powder and grinding in the tar with the coal under pressure.

I am aware that many attempts have been heretofore made, both in this country and in Europe, to utilize tar in the manufacture of illuminating-gas, and that a number of patents has been issued for various processes and methods of distilling tar for this purpose; but hitherto the results obtained by none of these processes have been satisfactory.

In a patent granted in Great Britain, in 1848, to Frank C. Hills, a method is described of mixing with tar a quantity of breeze or the siftings of coal or coke for this purpose.

Others have employed a mixture of sawdust and tar, and a Mr. Way, of England, has proposed the use of a porous stone which he saturates with tar.

It is evident that the object aimed at in all these methods has been the distillation of tar, the breeze or coal and coke, the sawdust, and the porous stone being employed merely, or principally, as a convenient medium of favorably presenting the tar to the action of the heat.

My invention does not, therefore, consist in the use, broadly, of tar for the manufacture of illuminating-gas, nor broadly in the mixing of coal with tar for that purpose, such uses of tar being common, but in the particular method, herein described, of compounding bituminous coal and tar by grinding the two together, whereby a composition of matter is formed differing materially from any compound of coal or coke and tar heretofore made by merely mixing breeze or the siftings of coal or coke with tar.

My method of compounding coal and tar for the purpose indicated is as follows:

Any of the bituminous coals are taken and pulverized to a very fine powder by being ground in a suitable mill or by rollers.

While the process of grinding is going on, or afterward, a quantity of tar is mingled and ground in with the coal, thus completely and intimately incorporating the two together.

It is not sufficient to merely mix the tar with coal-siftings without grinding. It is absolutely essential that the tar should be completely incorporated with the pulverized coal, which can be effectually done only by grinding the two together in a suitable mill or with properly-arranged and constructed rollers.

When bituminous coal has tar thus compounded with it, it does not merely become a convenient medium or instrumentality of distilling the tar by presenting it favorably to the action of heat, but the coal, by being finely pulverized, itself becomes distilled, and gives up its gases simultaneously with the tar, the gaseous products of the two mingling together and forming an illumination-gas of a higher degree of illuminating power than when either is distilled alone.

When the coal is in larger masses than the minute particles produced by pulverization, as it is when in the condition of screenings or breeze, it does not give up its own gases until the distillation of the tar is nearly or quite completed. It serves, therefore, in such conditions, first as a vehicle for conveying the tar spread over its surface into the retort before itself undergoes distillation.

So far as the distillation of the tar is concerned, coal-screenings or breeze, when mixed with the tar, serve the same purpose as the screenings of coke in Mr. F. C. Hills' process, before referred to, and the porous stone in the process of Mr. Way, heretofore referred to.

By finely pulverizing the bituminous coal and then grinding into it a small quantity of tar, the tar, as such, seems to disappear, the coal absorbing the tar or otherwise becoming so intimately united with it that they appear to become inseparable, so much so that the combination resists the action of boiling water, and apparently any degree of heat short of that which will cause destructive distillation; and it follows that the carbonization of the two combined substances in the process of gas-making is simultaneous.

It is important that a proper proportion of tar should be used in this my improved method of combining it with coal. If too large a proportion is used the result will not be satisfactory.

The proportion which I have found to be most favorable is not more than from ten to fifteen gallons of tar to a ton of coal, according to the quality of the tar. This will increase the illuminating power of gas about four (4) candles—that is, when coal is treated which will itself yield gas of, say, twelve (12) candles' power, the compounding with it by my process of, say, ten gallons of tar, will cause it to yield a gas of sixteen candles' power. If less tar is used the increase will be proportionately less; but if more is used no increase above sixteen candles' power, or thereabout, will be obtained.

My experiments have led me to the conclusion that

the results as above stated define about the limit of the advantage possible to be derived from the use of tar as a gas-stock.

I would recommend that the tar be heated quite hot preparatory to being mixed and ground with the coal. When cold, tar is usually stiff and tenacious. If made hot, when ground with the coal the labor of completely incorporating it with the coal will be greatly lessened.

From the foregoing it will be seen that I do not claim, broadly, as my invention, the mixing of tar with coal preparatory to submitting them to the process of carbonization in the manufacture of illuminating-gas; but

What I do claim, and desire to secure by Letters Patent, is—

The method herein described of compounding bituminous coal and tar, to be used in the manufacture of illuminating-gas, by finely pulverizing all the coal and incorporating the tar with the pulverized coal by grinding the two together, substantially as specified.

GEORGE McKENZIE.

Witnesses:

I. P. FITCH,

HENRY ASH.