UNITED STATES PATENT OFFICE.

JULIUS AUGUSTUS ROTH, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVED ARTIFICIAL FUEL.

Specification forming part of Letters Patent No. **47,337**, dated April 18, 1865.

To all whom it may concern:

Be it known that I, JULIUS AUGUSTUS ROTH, of the city of Philadelphia, and State of Pennsylvania, have invented a new and useful chemical process to conglomerate the fine atoms of so-called "wasted coal," for the production and utilization of the same as a solid fuel for all purposes wherever fuel is applied, reference being had to the samples accompanying my specification, which I call "conglomerated coal."

It is a well-known fact that wherever the mineral coal is mined and prepared for the market a large portion is rejected as not marketable on account of its being too small to be burned on the grates now in use. This wasted coal has been thrown aside at the mines, and has accumulated to millions of tons in the State of Pennsylvania alone, and ever since the mines have been worked no use has been made of the same. However, various attempts by different men have been made to utilize this wasted coal, and several plans have been brought forward with a view to arrive at a practical manipulation, but up to this time none have succeeded for their own or the good of mankind. In most of these attempts recourse was had to resinous, calcareous, muriatic, and carbonaceous substances as the binding agents for the dust of coal, and the ideas thereby exhibited merely show a desire to accomplish the proper result, as well as a great want of the knowledge necessary for that purpose. Mineral fuel is known to require a considerable amount of shifting and transportation before arriving at the place where it is to be used, by which it is subjected to rough and hard collisions. Besides, it is exposed to all the changes in the atmosphere. It is also known that nearly in all cases where the fuel is used it is stored in damp vaults or cellars; consequently again exposed to the dampness In that atmosphere, as well as to the different gases constantly circulating therein, by which the heretofore-applied agents for binding the coal-dust together are attacked and made lame—that is, they lose their binding quality and the pieces formed fall apart. I have also found that the theory to use the carbonic acid collected by the small quantity of lime in the coal mortar from the atmosphere to make the carbonate of lime is insufficient for the practical application for the purpose of forming a permanent solid fuel, and remains, therefore, theory only. When resinous matter is the binding agent of the coal-dust, particularly that of anthracite coal, a great difficulty exhibits itself at once when the fuel is placed into the stove or grate. The resinous substance is readily ignited by the fire, and burns away with dispatch, but leaving the coal-dust unignited, which makes it useless. I also find that the use of muriatic substances compare with that of carbonic acid in the absorption of disuniting elements from the air and various gases to which the coal necessarily is exposed while stored away. I have succeeded in combining firmly together these wasted atoms of coal-dust, which I conglomerate by chemical means different from any previously used for the purpose of utilizing it in a perfect solid state, so that moisture or other causes have no effect upon the same, and I am now able to give a clear and practical description of the means which I apply.

I generally use about one-eighth part of lime in solution to seven-eighths part of the coal-dust, which I mix thoroughly together, either by machinery or otherwise, forming thereby a mortar of such temper as is required for the manipulation of the same into balls or blocks. When a sufficient quantity of these blocks are made, I place the same into a shed or chamber, made of brick or other material, in such a position that corresponding cellular-arranged passages are formed and left open throughout the whole stack of blocks. I now introduce by connecting-flues sulphurous-acid gas into the chamber or shed containing the cellular stack of blocks for the purpose of charging the lime contained therein with the acid, and thereby converting it into sulphate of lime, by which the mass is hardened and made solid. I obtain the gas from the coarser part of the coal-waste and the sulphate so plenty about the coal-mines, which I burn with a slow draft on a grate, by which their gases are discharged, and this gas so obtained I convey into the chamber containing the blocks to be treated with the acid. After sufficient gas has been introduced, the blocks are solid and hard, and ready for transportation to the market.

Having described my chemical process for the production of artificial fuel, I will now state what I claim and desire to secure by Letters Patent—

The impregnation of the solution of lime with sulphurous acid obtained from coal or other sulphates for the purpose of conglomerating the waste coal-dust, and thereby producing a solid fuel, substantially as set forth in my specification.

JULIUS AUGUSTUS ROTH.

Witnesses:

CHARLES SERGEANT,

GEO. M. DALLAS, Jr.