

# UNITED STATES PATENT OFFICE.

ROBERT COURTNEY, OF ALBANY, NEW YORK.

## IMPROVEMENT IN ARTIFICIAL FUEL.

Specification forming part of Letters Patent No. 15,688, dated September 9, 1856.

*To all whom it may concern:*

Be it known that I, ROBERT COURTNEY, of the city of Albany and State of New York, have invented certain new and useful improvements in treating the chips or screenings of anthracite coal, commonly known as "coal-dust," the object of which is to convert them into a merchantable article possessing all the qualities of lump anthracite coal, and without any of the evils found to exist when such chips or screenings are used in making what is commonly called "composition" or "artificial" fuel.

It is well known to coal-dealers that in handling and transporting coal a great loss occurs by the breaking off from the lumps of small pieces or chips, usually termed "coal-dust," when the coal has been screened. These form in the course of the season quite a pile in the coal-yard, and can seldom be disposed of above the cost of refuse material. It is also well known that immense piles of fine coal or coal-dust accumulate at all the anthracite-coal depots and coal-mines of this country, particularly at those where coal-breakers are used, the transportation and handling of which to get it out of the way of the operatives form quite an item in the expenses of the shippers or miners, and which is entirely useless as it now lies, and would be gladly given away to any one who would remove it. So far as any efforts have been made to utilize these screenings, they have been directed toward making compositions, sometimes by mixing the fine coal with large quantities of crude clay, ashes, and garbage, or pine-leaves and raw turpentine, and then pressing the compound and allowing it to dry, which compositions, from the large amount of clay and other incombustible matter contained in them do not form perfect combustion, and owing to their extreme brittleness and friability will not bear much handling and cannot be transported to any distance, nor will they stand exposure to wet weather or dampness; sometimes by uniting the anthracite screenings with the screenings of bituminous and free-burning coals, and using liquid bituminous or solid resinous matter, and then by subjecting the mass to a high degree of heat, converting the whole into a coked condition. With this manner of treating the screenings has also been connected the press-

ing of the mass into molds. In all these efforts the liquid bituminous or solid resinous matters have been very freely used. Hence under the coking process these matters have produced large quantities of burning gases, and also extracted very much of the combustible matter from the fine coal. A great difficulty also occurred in this mode of preparation, owing to the excessive stickiness or gumminess of the compound, which completely clogged up and prevented the free working of the machinery either in mixing the composition or pressing it in molds. These with other causes have rendered these efforts so expensive that, even where proper means have been used to chamber the gaseous products and make them available for illumination, the efforts have neither been successful nor remunerative.

In my experiments I have ascertained that the failures of others in this track have arisen from combining in the one case too great a quantity of clay and other incombustible matter in the composition, and owing to the want of cohesion in the materials used in the compound the blocks were insufficient to bear handling and transportation, together with their want of combustibility and liability to crumble and melt down when exposed to damp or rain, and in the other case from combining other screenings and earthy matter with the anthracite screenings, and from using too great quantities of the liquid or solid bituminous or resinous matter, and from exposing the mass to too high a degree of heat.

My invention therefore, while it relates to utilizing these anthracite screenings, consists in the peculiar manner in which I treat them, as will herein fully appear.

I take such clay as the brick-makers use, either in the raw state or when dried and ground into powder; then thoroughly mix it with water until it acquires a creamy or pasty consistency a little thicker than lime-white-wash as ordinarily prepared for household purposes. I then mix it with the fine coal or coal-dust until the liquid is thoroughly incorporated with the mass, and then press the compound into bricks, blocks, or lumps of any required size or form, and then allow it to dry, either by exposure to the sun or atmosphere or by



heating it in ovens or kilns; and after all the moisture has been evaporated or expelled, I then steep it into a vat of coal-tar or other bituminous or resinous liquid matter until it is completely saturated with the liquid, which process requires from twelve to seventy-two hours or longer, according to the size of the block or lump so steeped. This process can be hastened by heating the liquid. I then draw off the liquid and allow the surplus bituminous or resinous matter to drain from the block or lump. I then place the block or lump into an oven or kiln, and then bake it moderately until the disagreeable gases which arise from the coal-tar or liquid used are expelled from the mass. By the time this is done it is baked sufficiently hard. It is then withdrawn and is fit for use.

I sometimes use lime for the same purpose as the clay, and when I do so I slake the lime with water until it assumes the consistency of a thick whitewash, and mix it with the coal-dust, and treat the mass precisely the same as that made with the clay. Sometimes I use the clay and lime together. When I do so I mix the liquid clay and liquid lime together in equal quantities, and then mix the coal-dust and treat the product precisely as I do that of the clay alone.

The advantages arising from this process of making composition fuel over the modes now employed are several.

First. By mixing the liquid clay or lime or equal parts of each with the coal-dust we get but a small amount of incombustible matter incorporated with the coal-dust, which is generally the purest coal, being formed by the abrasion of the lumps of the best coal, and consequently we get but little in the composition but clear carbon. In all other modes of manufacturing composition fuel the earthy matter preponderates largely, and as a consequence does not ignite as readily or create as perfect combustion of the compound.

Second. By submitting the blocks to the steeping process we get but a comparatively small amount of the bituminous matter incorporated into the blocks, but a sufficient amount to solidify it after it has been baked, and just

enough to assist in making a perfect combustion of the compound.

Third. By baking at a moderate heat after the block has been steeped we get rid of the disagreeable gases and smoke which are generated in such large quantities in the burning of all composition fuels which are made by mixing fine coal with coal-tar or other bituminous or resinous matter, and by my mode of treating this compound a sufficiently hard interior and a very hard glassy looking exterior are formed to the fuel, and we get an article which, by its superior hardness, will bear any amount of handling and can be transported to any distance without any visible abrasion of the surface, and one which will stand any change in temperature or exposure to wet weather or damp without affecting it in the least.

This manner of treating coal dust or screenings produces a block or brick of anthracite inferior in no respect to the best lump coal, inasmuch as the small amount of earthy or incombustible matter incorporated with it, does not prevent a perfect combustion of the fuel, and as the small quantity of liquid bituminous or resinous matter absorbed in the process does not yield any appreciable smoke or smell when the block or brick is burned in a grate or stove, and the moderate degree of heat to which the mass is subjected does not drive off any of the combustible matter of the fine coal, as must occur where the coking process is resorted to.

Having thus fully and clearly described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The rendering coal dust or screenings into a merchantable article of artificial fuel by combining coal-dust with clay, lime, and coal-tar, or other bituminous or resinous material, and subjecting them to all the parts of the process in manner and form set forth and described in the within specification.

ROBT. COURTNEY.

Witnesses:

RICHD. VARICK DE WITT,  
W. C. MILLER.