

UNITED STATES PATENT OFFICE.

JAMES M. COOPER, OF NEW YORK, N. Y.

FUEL.

SPECIFICATION forming part of Letters Patent No. 269,640, dated December 26, 1882.

Application filed August 21, 1882. (No specimens.)

To all whom it may concern:

Be it known that I, JAMES M. COOPER, of the city, county, and State of New York, have invented or discovered an Improved Fuel, of which the following is a specification.

My improved fuel consists in a mixture of anthracite or bituminous coal loosely with coke, the coke and coal being each broken or crushed and graded to suitable uniform sizes, like nut-coal, chestnut-coal, egg-coal, stove-coal, furnace-coal, &c., as may be desired, and also mixed thoroughly and substantially uniformly in certain proportions in each mass prepared. The properties of both bituminous and anthracite coal for use in heating in stoves, furnaces, and the like are well known, and also the properties of coke for like uses are well understood and need not be specified.

The object of my invention is to combine the properties of both these fuels—coke and coal—in such a manner as to avail of the useful qualities of each in combination in a more advantageous way than has heretofore occurred by the different mixings or unions of these substances that have happened, and to thus produce an improved merchantable composite fuel.

It is well known that coke will produce a hotter fire and is better for heating certain metals than coal, because the oils, bitumen, and volatile substances have been burned from it, and it forms while burning a firmer body. At the same time it does not produce a blazing fire like coal. Now, it is desirable from considerations of economy, as well as of practical convenience and utility, to mingle with coke more or less coal, either anthracite or bituminous, in the manner in which I do it, for many purposes, the result being to more thoroughly consume the coal and prevent waste by its breaking up, on account of its friable nature, and falling between grate-bars into the ashes. When mingled loosely, yet thoroughly and uniformly, with the coke, (both being graded to substantially uniform-sized lumps,) it is held by the body of the coke under heat and prevented from escaping as waste. Furthermore, it is practicable to continue a very hot fire for a longer period with mingled coke and coal in accordance with my invention, so that material economy results in the making of steam

and in developing heat. Any usual way of crushing and grading or sizing the coke and coal by special mechanical apparatus adapted for the purpose and any suitable way of commingling them properly afterward in due proportion may be employed; but suitable metallic rollers the bearings of which are adjustable for different sizes or grades of coke and coal are preferable to effect the crushing to lumps of such uniform size.

I do not confine myself to any exact proportions or per cents. of coal or coke in this combination or mixture, because for some purposes a small per cent. of coke would be best—say, for example, so little as ten per cent. for use in ordinary locomotive-engines adapted to burn bituminous coal, and in which the draft is not very strong. In other cases where the draft is very strong as much as fifty per cent. of crushed and graded coke can be commingled with the like graded coal of either kind with advantage, the force of the draft being in all cases the principal consideration for regulating the relative amount.

Some of the features of utility of my improved composite fuel are:

First, when burning the coke prevents the coal from packing, and therefore permits the necessary amount of air for complete combustion to circulate thoroughly through the fuel.

Second, in using my improved fuel to make steam there is less soot deposited on the heating-surfaces of boilers than where coal alone is used, and therefore more steam can be produced with a given amount of fuel.

Third, my improved fuel is less affected by forcing the rate of combustion, and therefore as a steam-producer has a higher economic vaporizing quality than bituminous coal.

Fourth, in my improved fuel the coke that is mingled with bituminous coal does not break easily into fragments, and the fuel therefore suffers but little waste by handling or transportation.

Fifth, when stored in vessels it is much less liable to the danger of spontaneous combustion than coal.

Sixth, it emits less smoke and is not so much injured by exposure to the weather and water as bituminous coal.

Seventh, the coke and coal being of uniform size, the fuel is not only readily fired, but it is regular in its consumption and in the heat it produces.

5 I am aware that different kinds of coal-dust have been mingled together and heated, and then compressed into blocks or cylinders, the heat serving to soften the coal-dust, so that its particles will adhere together under pressure.

10 I am also aware that coal and coke have been mixed together and formed by means of molds into solid blocks by pressure under heat, both with and without the use of extraneous adhesive matter to cause them to stick to-
15 gether.

I am also aware that water has been employed in the manufacture of coal or coal-dust or a mixture of coal and coke into blocks by the use of heat and pressure; but there are
20 many serious objections to the use of composite blocks for fuel, one of the principal of which is that it is impossible to attain as thorough combustion, and therefore as perfect heat and steam producing qualities, as with my im-
25 proved fuel.

I am also aware that English Patent No. 1,129 of 1855 suggests the mixing of coke with coal which is intended to be burned into coke, and burning and converting such mixture into
30 coke. This patent, however, makes no suggestion of producing a merchantable fuel consisting of uniformly-mixed and uniformly-graded coke and coal, which is a very important element of improvement in my fuel, be-

cause it affects the regularity of burning and 35 the proper circulation of air intimately with all the parts of the fuel.

I do not claim the commingling of pulverized coke or coal or the dust or waste of these substances; nor do I claim broadly the comming- 40 ling of these fuels without previous grading and special preparation, because such unregulated interminglings of coke and coal as I disclaim may have happened heretofore accidentally; or it may have happened that coke and 45 coal have been placed together by individual users in the fire-chambers of stoves, furnaces, &c. My invention, on the contrary, is limited to a special preparation of the improved fuel composed of regularly-graded and intimately- 50 intermingled coke and coal of like or substantially-uniform sizes of lumps, according to grade, the practical value and advantages of which as an improved fuel are demonstrated with the most satisfactory results. 55

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

An improved fuel composed of loosely and uniformly mixed graded or uniformly-sized 60 lump coke and coal, substantially as set forth.

In testimony whereof I have hereunto subscribed my name this 21st day of August, A. D. 1882.

JAMES M. COOPER.

Witnesses:

MARCUS S. HOPKINS,
WM. J. PEYTON.