

# UNITED STATES PATENT OFFICE

JOHN Q. A. ZIEGLER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF  
ONE-HALF HIS RIGHT TO HENRY W. ADAMS, OF SAME PLACE.

## IMPROVEMENT IN COMPOSITIONS FOR ARTIFICIAL FUEL.

Specification forming part of Letters Patent No. 189,413, dated April 10, 1877; application filed  
November 28, 1876.

*To all whom it may concern:*

Be it known that I, J. Q. A. ZIEGLER, of the city and county of Philadelphia, and State of Pennsylvania, have invented an Improved Composition for Making Factitious Fuel, of which the following is a specification:

This invention relates to that class of compositions employed for preparing cheap artificial fuel; and it consists in mixing together, in suitable proportions, coal-dust or other small coal, clay, coal-tar, petroleum, and water, and incorporating them all together by means of a shovel, and throwing the same, from time to time, into furnaces, either alone or in conjunction with any other kind of fuel, for the purpose of creating an abundance of cheap flame and heat.

In carrying out my invention, I take a box of any convenient size and shape and place it in front of the furnace. Into this box I dump, say, a wheelbarrowful of ordinary coal-dust or small coal. I next scatter over this about ten per cent. of clay. I then pour on from a pint to a quart of water, and mix the mass thoroughly together. The water wets the clay and renders it plastic, so that the coal becomes more or less coated with it. I next add about a gallon of coal-tar or petroleum, and mix up the mass thoroughly by means of a shovel, with which I feed my furnaces, as occasion may require. The part which each of these ingredients plays in generating heat is as follows: The coal-dust, when burned in conjunction with the elements of this compound, is consumed to ashes, and sets free as much heat as any ordinary kind of coal. The clay, by its singular property of contracting when heated, holds together the coal-dust, and prevents it from falling through the grate-bars. The coal-tar or petroleum serves to kindle quickly the coal-dust, which is otherwise ignited reluctantly by reason of its compactness and moisture. The water is designed to make the clay plastic, so as to stick the small coals together, and to furnish steam in the furnace to be superheated and decomposed in contact with the carbonaceous flames and gases, and to yield oxygen and hydrogen to increase the heat of the furnace. In kilns for burning

bricks, tiles, and pottery-ware, the water in this factitious fuel plays a most important part. It is quickly converted to steam, and superheated at the expense of the redundant heat of the arches, thereby protecting them from being overburned, and lifting it up and circulating it through all the honey-comb of the kiln, by which means the sides and top of the charge are more uniformly and thoroughly calcined. The great abundance of cheap flame and incandescent gases which this artificial fuel generates is most favorable for the burning of kilns of bricks, tiles, pipes, pottery-ware, lime, and other similar bodies where the heat has to travel and insinuate itself through a great number of interstitial spaces, at a distance from the place of combustion.

After the fires are kindled in furnaces with other fuel, and the grate-bars are covered with glowing coals, I throw in with a shovel, from time to time, as occasion requires, this artificial fuel, either alone or in combination with any other fuel. The result is, that each independent shovelful burns by itself. The quickly-inflammable coal-tar takes fire, and the most volatile parts distill off and burst into flame first. This tends to coke and cake the mass together, the water passing off in the form of steam, and the heated clay shrinking, tends to hold the fine coal snugly together. Each shovelful, therefore, forms an independent lump of coke, so that the air can freely rise through the grate-bars and through the spaces between the ignited and glowing cakes. When these chunks of coke are burned sufficiently hard, they can be broken to pieces by a poker. Then they consume to ashes, like ordinary coal. The cheapness and the ease with which this factitious fuel is made renders it very desirable for many kinds of furnaces.

I am aware that coal-dust, clay, coal-tar, petroleum, and other similar substances, have been mixed together and compressed into bricks or lumps, and dried and waterproofed, and manufactured into artificial fuel for transportation and domestic use. I therefore disclaim any such manufacture and use. I am

not aware, however, that water has entered into this fuel, and been retained in it as such when thrown into furnaces for combustion. Neither am I aware that this fuel has ever been used in the partially-manufactured state in which I use it. In this state it cannot be transported and sold in the market for use. By using it in the crude condition, and at the time and place of its extemporaneous mixture, I save the additional expense of labor and money in compressing it into bricks and lumps, and waterproofing it, and handling it as a commercial product.

Having thus described the nature of my invention, what I desire to secure by Letters Patent is—

The composition artificial fuel consisting of small coal, clay, coal-tar or petroleum, and water, substantially in the manner and for the purposes hereinbefore set forth.

JOHN Q. A. ZIEGLER.

Witnesses:

ISAAC R. OAKFORD,  
HENRY W. ADAMS.