

UNITED STATES PATENT OFFICE.

PATRICK J. McNAMARA, OF BALTIMORE, MARYLAND.

PROCESS OF PROMOTING COMBUSTION.

No. 846,338.

Specification of Letters Patent

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To all whom it may concern:

Be it known that I, PATRICK J. McNAMARA, a citizen of the United States, residing in Baltimore city, State of Maryland, have invented certain new and useful Improvements in Processes of Promoting Combustion, of which the following is a specification.

My invention relates to a novel process of promoting combustion; and it has for its principal object to effect such complete combustion as will practically insure the elimination of free carbon, and thereby prevent the generation of smoke. This object of the invention is attained by sprinkling or sifting over the coal, either before or after the stove or furnace is charged, preferably after the fire has been started, a substantially non-combustible substance, preferably in a powdered form, which will have a tendency to envelop the coal and become incandescent.

In practicing my invention I have discovered that a substance most suitable to attain the desired result is a mixture containing the following ingredients in about the proportions mentioned, viz: silica, 80.88 per cent.; oxid of iron, 6.28 per cent.; alumina, 8.60 per cent.; lime, 0.38 per cent.; magnesia 0.59 per cent., and water 3.27 per cent., or any substance or substances which will become incandescent at a comparatively low temperature. While I have found the proportions above stated to give the most satisfactory results, yet I do not wish to be understood as limiting myself to the exact proportions given, as they may be varied in a reasonable degree.

In preparing the mixture the ingredients are thoroughly mixed with a sufficient quantity of water to reduce the mass to a slightly plastic condition. The excess of water is allowed to evaporate, and when the mass is in a dry condition it is reduced to a powdered form. In this form it is sprinkled over the coal, preferably after the fire has been started, and is permitted to sift down through the interstices between the coal. The powdered substance readily envelops the coal and quickly becoming incandescent the free carbon is substantially consumed, thus insuring perfect combustion.

Coal contains hydrocarbons which may be evolved as such by heating during the combustion of part of the coal in a deficiency of oxygen, or when the coal is cold or chilled

free carbon in the form of smoke may be liberated by the combustion of only the hydrogen content, if the temperature is below 800°, at which time oxygen has greater affinity for hydrogen than it has for carbon. Above 1,000°, however, oxygen has greater affinity for carbon than hydrogen, and the smoke disappears as the conditions favorable to smoke formation are removed. This is one of the results attained by concentrating the heat of combustion within the coal, by coating it with a porous substance which is a non-conductor of heat and which evolves heat by radiation from the coating and allows the gaseous products of complete combustion to escape through its pores.

Other substances which have the property adapted to become incandescent will accomplish the result sought to be attained, the term "incandescent" signifying a substance of heat non-conducting but radiating nature, the concentration of heat upon which soon brings it superficially to an incandescent condition.

Among the advantages to be derived from my invention are economy in the use of fuel and the prevention of smoke. In practice a saving of coal is effected by consuming the smoke and other combustible substances, the heat energy of which under ordinary circumstances is wasted, thus insuring complete combustion. The powdered substance mixes with and envelops the coal in such a manner that during combustion it quickly becomes incandescent and consumes the carbon as soon as it is liberated and before it can escape in a free state, it being understood that the coal is not so entirely enveloped as to prevent a suitable supply of air being furnished at the bottom of the grate to aid combustion. The formation of clinkers is prevented by the chemical action of the infusible heat-retarding substances employed on the alkali of the ash, rendering the same practically infusible, and but a minimum of residue of the powdered substance is left after the coal is consumed.

I have noticed in the practice of my process of complete combustion that I completely deodorize and neutralize the gases ordinarily resulting from combustion and completely rid the products of combustion of the objectionable and deleterious or injurious substances, thus obviating the otherwise bad

effects upon the health by producing a purer and more healthful surrounding atmosphere and heating effect.

What I claim is—

- 5 1. The process of promoting combustion, consisting in enveloping coal with a substance having the property of becoming incandescent at a comparatively low temperature.
- 10 2. The process of promoting combustion, consisting in mixing with coal a substance containing silica, oxid of iron, alumina, lime, and magnesia, in about the proportion specified.
- 15 3. The process of promoting combustion, which consists in mixing with the coal silica, oxids of iron, calcium, and magnesium.
- 20 4. The process of promoting combustion which consists in performing the combustion of fuel within a communicating porous coating of heat-non-conductive substance, concentrating the heat within the combusting fuel to a point at which carbon has a superior

affinity for oxygen than hydrogen, and securing the heat therefrom by radiation from the porous heat-non-conductive coating, 25 within which the fuel is caused to combust.

5. The process of promoting combustion, which consists in performing the combustion of fuel within a communicating porous envelop of heat-non-conductive substance, 30 concentrating the heat within the combusting fuel to a point at which carbon has a superior affinity for oxygen than hydrogen, and securing the heat therefrom by radiation from the porous heat-non-conductive envelop within which the fuel is caused to combust. 35

In testimony whereof I affix my signature in presence of two witnesses.

PATRICK J. McNAMARA.

Witnesses:

J. JEROME LIGHTFOOT,
TITIAN W. JOHNSON.