UNITED STATES PATENT OFFICE.

HERBERT R. SMITH, OF COLUMBUS, OHIO, AND HARVEY M. MUNSELL, OF NEW YORK, N. Y.

IMPROVEMENT IN LIQUID FUELS.

Specification forming part of Letters Patent No. **219,181**, dated September 2, 1879; application filed February 24, 1879.

To all whom it may concern:

Be it known that we, HERBERT R. SMITH, of Columbus, in the county of Franklin and State of Ohio, and HARVEY M. MUNSELL, of the city, county, and State of New York, jointly have discovered or invented a new and useful Liquid Fuel, of which the following is a specification.

The object of our invention is to produce a cheap, economical, effective, and easily-manipulated liquid fuel for use in steam-boiler furnaces, gas-manufacture, metallurgic operations, and other purposes, and especially one possessing the capacity of being injected or blown in the form of spray or liquid into a combustion-chamber or retort, where it may be ignited either separately or in combination with air or steam or the products of combustion from solid carbonaceous material, or a combination of two or more of these substances; to which end our improvement consists in combining with a liquid hydrocarbon, such as coal-tar or petroleum, solid carbonaceous material in the form of powder, so that the two may be intimately commingled, and yet retain a liquid form.

To carry out the object of our invention, we reduce a solid carbonaceous material, such as coal, charcoal, coke, shale, or other equivalent well-known substances, to powder, preferably an impalpable powder, by grinding or crushing, in any of the well-known ways now in vogue. This powder we intimately commingle with any of the well-known suitable liquid hydrocarbons, preferably such as those obtained from the distillation of coal, the residuum of the distillation of petroleum, or the crude petroleum itself, by stirring them in a tank, or by passing them through a revolving vessel provided with means for agitating and commingling the substances. Such apparatus, being well known in the art, needs no description here.

This mixture may be made either at the mines, oil-wells, or refineries, or at the point where the fuel is to be used. The most economical plan, however, and the one we prefer, is to distill the tar from the coal at the mines, and mix it with the powdered carbonaceous material before shipment.

Any tendency of the solid carbonaceous material to settle could be obviated by agitating the fuel in well-known ways before using it; or any tendency to congelation could be obviated by heat applied in well-known ways—for instance, by passing heated air or steam or hot water through a coil of pipes in the reservoir or receptacle.

It is difficult to give the proper relative proportion of the solid and liquid material, as it would depend somewhat upon temperature, the character of the material used, and the purpose for which it was intended; but we prefer to use equal parts of liquid and powdered material, or, as a guide, to put into the liquid so much of the powdered carbonaceous material as it will absorb and yet retain its liquid or viscid condition.

It is obvious that in some conditions the fuel might become almost solid; but it can be readily liquefied by the application of heat, as above mentioned.

This fuel can be supplied to the combustion-chamber in many well-known ways. The various forms of apparatus patented in this country by Silas C. Salisbury, of New York city, are well adapted for this purpose, and embody the forms which we deem best as the result of experiment.

We are aware that many kinds of artificial fuel have been used composed of a liquid hydrocarbon commingled with a solid carbonaceous material in the form of blocks; but such material is obviously incapable of being used in metallurgic operations or blown into a furnace through an injector. We are also aware that powdered carbonaceous material has been blown into a combustion-chamber; but such fuel has been found unsuitable for certain metallurgic operations—such, for instance, as the manufacture of iron—as the granules of fuel become embedded in the metal and deteriorate its quality. We are also aware that liquid hydrocarbon has been injected into a furnace by said Salisbury and others, and therefore make no claim to such a fuel. But, so far as our knowledge extends, we believe ourselves to be the first to use an artificial liquid fuel composed of a liquid hydrocarbon with carbonaceous material in the form of powder intimately mixed therewith.

The advantages of such a fuel are very great,

as it is obviously much cheaper than the same bulk of liquid hydrocarbon, and the particles of the powder present so large a surface to the action of the incandescent materials in the furnace as to produce rapid combustion and chemical assimilation of the elements therein employed, and the fuel is portable and readily manipulated.

We claim as our invention—

The artificial liquid fuel hereinbefore described, consisting of carbonaceous material in the form of powder intimately mixed with a liquid hydrocarbon.

In testimony whereof we have hereunto subscribed our names.

HERBERT R. SMITH.
HARVEY M. MUNSELL.

Witnesses:
WM. T. PAYNE,
GEO. A. SAXER.