UNITED STATES PATENT OFFICE.

WILLIAM A. SHEPARD, OF NEW YORK, N. Y.

IMPROVEMENT IN PROCESSES FOR MAKING QUICK-BURNING FUEL.

Specification forming part of Letters Patent No. **166,941**, dated August 24, 1875; application filed January 5, 1875.

To all whom it may concern:

Be it known that I, WILLIAM A. SHEPARD, of the city and State of New York, have invented a new and useful Process for Making a Quick-Burning Fuel, of which the following is a full, clear, and exact description:

The object of my invention is to supply steam fire-engines, furnaces, mills, and machine-shops run by steam-power, and to dwelling-houses generally, a fuel so highly inflammable that it will quickly kindle itself when lighted with a match, make a quick fire, and give intense heat.

My invention consists in a new process of thoroughly saturating all kinds of fuel *in vacuo* with petroleum.

I place hard coal, soft coal, coke, peat, charcoal, green or dry wood, or any composition fuel, in a steam-tight tank. A complete saturation can only be effected by expelling all moisture from the fuel. This cannot be done simply by exhausting the air from the materials in the charging-tank. Therefore, to do this I introduce into the steam-chamber containing the fuel superheated steam. Ordinary wet steam of from 212° to 230° heat will not do. The steam must possess a higher degree of temperature. Then I condense this steam by injecting a spray of cold water. This thoroughly expels all moisture from the material in the chamber and makes a vacuum therein. I believe this process to be the only one discovered which completely expels moisture from material *in vacuo*, so that it is then fit for saturation with petroleum. The volatile portion of the petroleum, such as gasoline, possessing from 70° to 90° of gravity, must be driven off, either by currents of air passed through the petroleum or by distillation, before the petroleum is fit to use for saturating the fuel. If the petroleum is not so first treated, but is used for saturation in a crude state, the volatile vapors will rapidly dry out of the materials charged with them. They will rapidly pass off into the atmosphere, and destroy in part the effect of the saturation. There is also another equally important reason why the lighter products of the petroleum must be driven off. These highly-volatile vapors would surely evaporate from the surface o the materials treated, and as they are heavier than the air they would gradually accumulate around any quantity of the fuel when stored, and, mixing with the air, gradually form an explosive gas. But when these vapors have been first expelled no such results would happen. Having treated the petroleum as just described, I introduce it in a cold state into the vacuum-chamber to thoroughly saturate the material therein. Then I draw off the fluid not used up by saturation. If it is desirable to take off an excess of moisture from the fuel so charged, I connect this chamber with another tank, from which I exhaust the air, afterward permitting a current of air to pass through the material in the charging-tank into the vacuum-tank. Thus I carry off all excess of moisture, which then may be condensed in the vacuum-tank by chilling it after any well-known method. The fuel is then ready for immediate transportation.

The above method is quite inexpensive, and the product is also inexpensive, costing the consumer but a trifle more than his fuel would have originally cost him.

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

The process of making a quick-burning fuel, which consists in expelling the air and moisture of materials, such as are specified, placed in a close chamber, by means of superheated steam; then producing a vacuum by injecting a spray of cold water; then saturating the material while *in vacuo* with petroleum, the lighter products of which have been removed, and then drying the fuel in the chamber by sending through it a current of air, substantially as described.

In testimony whereof I hereunto subscribe my name at the city of Washington, District of Columbia, in the presence of two attesting witnesses, this 24th November, 1874.

WILLIAM A. SHEPARD.

Witnesses:
A. PELLETIER,
A. H. EVANS.