

UNITED STATES PATENT OFFICE.

ALFRED BERNEY, OF JERSEY CITY, NEW JERSEY.

IMPROVEMENT IN PROCESSES FOR USING ANTHRACITE-COAL DUST OR SLACK AS FUEL IN LOCOMOTIVE-BOILERS.

Specification forming part of Letters Patent No. **136,960**, dated March 18, 1873.

To all whom it may concern:

Be it known that I, ALFRED BERNEY, of Jersey City, in the State of New Jersey, have made and invented a new and useful improvement in the mode or plan of burning bituminous or soft coal with anthracite screenings or dust to make steam in locomotive-boilers, of which the following is a specification:

The increased cost of bituminous and anthracite coal, the vast waste of anthracite dust now accumulating in the country, the unsuccessful attempts heretofore to utilize it by simple process, render it a necessity to use it as a fuel. By repeated and continued experiments I find it is best to use bituminous or soft coal and anthracite dust separately in such proportions as may be required to keep the steam up to the necessary working point and to prevent a waste of steam by blowing off. The fine dust is the best and cheapest, as pea-coal is now in demand, being a smaller coal than chestnut, and in demand at fair prices, so much so that some mining companies are rescreening their old coal-dust heaps to get it out. The pea-coal does not burn quickly and lies dead upon the grates. The dust, however, almost instantaneously ignites and burns.

My process is very simple and practicable, and is invented and intended for use upon and in railroad locomotive-boilers.

To enable any one to use my invention, I fully describe the method of using it, which is as follows:

I first divide the tender into two about equal parts by a partition, made of wood or iron, lengthwise, with a bulk-head of loose boards, so that the dust and coal can be readily reached by the fireman; or it can be done by laying loose boards across the tender. The first method, however, is best. In one division I stow bituminous or soft coal, and into the other I throw anthracite-coal dust. Both of these should be well saturated with water or not, as desired. With the improved sparker it is not necessary to wet them. I then make a fire in the locomotive fire-box, in the usual manner, with wood and bituminous coal, taking care to add no dust until the heat is up to one hundred pounds pressure, as the locomotive

has no chance to use the exhaust or natural draft when stationary. When the engine is started the anthracite-coal dust may be used in such proportions as the requirements of the train will permit. Shake the grates well every fifty miles, firing the engine in the usual manner as far as the coaling is concerned. Experiments for weeks on different engines show that about one-half each of coal and dust can be burned to advantage, and it can be mixed before being put on the tender in that proportion; but use has shown that it is much better, for many reasons, not to mix it before being placed upon the locomotive-tender, but to use each kind, as a greater or less quantity of heat may be required, for these reasons: First, some railroad engines steam much freer than others, especially those with a feed-water heater, or a gas, smoke, heat, steam, and oxygen conductor to the fire, or those with large fire-boxes and grate-surface, or where an engine has a small light train, or where the speed is slow, stoppages long and frequent, or where engines are compelled to wait on account of accident. Engineers are well aware of the annoyance of too much steam, so as to compel the boiler to blow off. On many this is a cause of censure, and is a strain on the boiler as well as a waste of fuel. Second, on the contrary, every minute in the day there are engines that are compelled to haul heavy trains at great speed caused by delays at stations, or by the requirements of the time-table, in which case a greater proportion of bituminous coal must be used and a less proportion of the dust; in fact, by due attention to the use of the two fuels in proper proportions, the fireman and engineer have complete control of the regulation of the supply of steam. Third, short accommodation trains, after the fire is built as above, run twenty-five miles, by using the coal-dust alone. Switching-engines can use it alone, or but a mere trifle of soft coal.

It is desirable to have this invention to work satisfactorily and cheaply, too. Use on the same boiler a good feed-water heater, a long fire-box, a fire-grate raised up to the same pitch as the anthracite-coal-burning boilers, a spark, gas, smoke, steam, and heat conductor, a well-perforated door, and a combus-

tion or oxygen-heating chamber, as by these appliances or any of them much economy is gained, and more steam can be made with the dust and much less bituminous coal used. The saving of costly bituminous coal by the use of anthracite dust, as already shown upon several roads in Massachusetts and Rhode Island, will be enormous. Anthracite dust has as much heating and steam-producing power as bituminous coal, pound for pound, and is really less objectionable to use on account of smoke and smell.

I do not claim as my invention any of the methods of making balls, bricks, or combinations of various inflammable materials; nor do I claim the mixing of bituminous dust with anthracite dust smaller than chestnut-coal in the proportions of one-quarter of the former with three-quarters of the latter, wet with water before using. Neither do I claim to coke the bituminous coal with anthracite dust, as experiments made by me have shown that it will not coke except a larger quantity

of bituminous coal is used than I do; in fact, the dust, to be consumed quickly and profitably should be kept lively by the draft, so that the hard particles will be burned. Soft coal does coke, being used separately, and adheres enough of itself to make a solid fire; yet I have found that when no large masses of coke were in the furnace the engines steamed more freely.

What I claim as my invention, and desire to secure by Letters Patent, is—

The improved process herein described for using anthracite-coal dust or slack as fuel to make steam in locomotive-boilers, the same consisting in adding bituminous coal and anthracite-coal dust to the fire under a locomotive-boiler, substantially as described, so as to utilize anthracite-coal dust in generating steam, as set forth.

ALFRED BERNEY.

Witnesses:

JOHN A. HEDRICK,

THOMAS C. CONNOLLY.