

UNITED STATES PATENT OFFICE.

ALFRED BERNEY, OF JERSEY CITY, NEW JERSEY.

IMPROVEMENT IN PROCESSES OF USING ANTHRACITE-COAL DUST AS FUEL IN FURNACES.

Specification forming part of Letters Patent No. **137,820**, dated April 15, 1873; application filed April 9, 1873.

To all whom it may concern:

Be it known that I, ALFRED BERNEY, of the city of Jersey City, in the county of Hudson, State of New Jersey, have invented a new and useful Improvement in the Process of Burning Anthracite-Coal Dust, Slack, or Screenings to Generate Heat in Furnaces of Boilers, &c.

It is a well-known fact that hundreds of millions of tons of anthracite dust lie worthless at the mines in Pennsylvania; that it is to be found in the towns and cities at from one-eighth to one-quarter of the price of other coals. The great difficulty in burning it has made it valueless, and the only demand is from brick-makers who use it. In its very nature it packs so together that no air can get through it. My invention is to overcome this difficulty by artificial means.

To enable others to use my invention, I fully describe the process of using it in the following specification.

It is necessary to make a sharp draft by some artificial means, as the natural draft is practically useless. Artificial crevices must be forced through the mass of dust, not in a general grate, but in small holes or crevices. There are various well-known ways of making drafts, such as using hollow wrought or cast iron grate-bars, with half-inch holes, placing them upward to the fire and connecting these flues with the upper part of the boiler so as to allow the superheated steam to pass through the flues and thus blow the crevices through the dust. Or, hollow pipes can be connected with a blower to use cold or hot air; or grates cast with fire-holes or crevices with a blower-pipe inserted in the ash-chamber under the grates, with a close door so as to keep out the cold air; or cold-water flues set from a quarter to a half an inch apart can be used with a blower.

To alter old furnaces quickly and cheaply, and to overcome the objection of the ashes filling up, I insert a new set of grate-bars made of cast-iron. These bars are to be cast so as to rock. Make them not over six inches wide, with interstices a quarter of an inch wide at the top, the solid parts to be an inch wide and to be connected through the center with a solid bar two inches thick. This leaves the cross-

bars to act as teeth to crush any cinders, clinkers, &c. The upper part of the grate is cast on two angles pitched from the center to allow the clinkers, ashes, &c., to slide down easily to the openings. Connect all these bars in the usual manner, and by rocking every five hours the ashes and clinkers will easily fall into the ash-pan or chamber. Set the bars a quarter of an inch apart on the frame. Use a good blower and blow into the chamber beneath the fire hot or cold air or superheated steam. Use no natural draft if your blower is strong enough.

Pipes may be inserted from the blower-pipe to the grates so as to blow up at intervals of four inches apart, and so placed as to clear the rocking grates; or they can be placed between the water or steam bars, as above.

A chamber must be arranged behind the flues so that any ashes, sparks, or unconsumed dust can drop in and be removed at intervals when necessary.

On high-pressure boilers of stationary land-engines, or steamboat, tug, or ship engines, no blower will be necessary, or, at least, only a small one.

What must be done is to so arrange the draft by any means as to keep the dust of the anthracite coal in motion while being consumed with fire, and to force crevices through it to take the place of crevices in large coal, and to force the air into the furnace by power.

After a furnace is arranged to burn the dust, build or make a fire of wood and bituminous coal, and, when steam is raised sufficient to turn the blower, or exhaust-draft, or superheated steam, then use the dust in sufficient quantity to generate the heat desired. If, however, the furnace is not large enough to contain all the dust required, use some bituminous coal. It is well to shake the grates every five or six hours.

I do not confine myself to anthracite dust or screenings alone; but my invention is applicable to bituminous dust and anthracite dust in combination, or bituminous dust alone, or the use of anthracite dust, or slack and bituminous coal, as described in my patent of March 18, 1873. I do not claim the use of bituminous dust in proportions of one-quarter of it to three-quarters of anthracite dust; but

What I do claim, and desire to secure by Letters Patent of the United States of America, is—

1. The improved processes herein described for using anthracite coal dust, slack, or screenings, with bituminous coal or dust, as fuel to generate heat, the same consisting in adding or using anthracite coal dust, slack, or screenings, with or without bituminous coal or dust, to the fire in furnaces, as described, so as to utilize the anthracite dust in generating heat.

2. The process of making artificial crevices by force of air in the use of anthracite dust, slack, or screenings alone, or in combination with bituminous coal or dust, or with anthracite coal, to generate heat, substantially as described and for the purpose set forth.

ALFRED BERNEY.

Witnesses:

GEO. W. STOKES,
THOMAS C. CONNOLLY.