

# United States Patent Office.

T. M. MITCHELL, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO "THE ANTHRACITE-FUEL-MANUFACTURING COMPANY OF PHILADELPHIA."

Letters Patent No. 92,736, dated July 20, 1869.

## IMPROVED PROCESS AND APPARATUS FOR UTILIZING THE WASTE COAL OF MINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, T. M. MITCHELL, Engineer of the city of Philadelphia, in the State of Pennsylvania, have invented a new and useful Improvement in the Process and Apparatus for Utilizing the Waste Coal of the Mines, by converting the said waste into solid inodorous lumps or blocks of pure fuel.

My said invention may be described in three parts or divisions: first, the drying and baking-portion of the apparatus; second, the mixing-portion of the same; and third, the process; and each part may therefore be considered under three distinct specifications; and the first and second parts having been fully described under respective specifications, marked "Division A" and "Division B," the present specification ("Division C") will relate specially to the process, but involve, to some extent, the use of the other two parts (A and B) of my said invention; and I do hereby declare that the following is a full, clear, and exact description of the said process.

The waste coal of the mines which is, by this process, to be converted into the solid inodorous lumps or blocks of fuel, is first to be washed or cleansed from all the dirt and loam contained in it, by means of any suitable agitating perforated separator, or rotating hollow cylinder of coarse wire or perforated sheet-metal, with water constantly passing through it, so that the latter will carry off, through the perforations or meshes, all the said dirt or loam, and leave the fine coal and shale remaining. The said remains are then hoisted, by means of any suitable hoisting-buckets, to the upper room of a suitable building, where it is dumped into a second rotating screen, the meshes of which allow the pure coal to escape through them into a hopper, opening above and communicating with a pair of smooth-faced iron rollers, which crush or grind the said particles of coal into a fine powder, the shale passing out of the building, as refuse, from the open lower end of the said screen.

The fine coal-powder is then conveyed, by a chute, or otherwise, to the mouth of any suitable sheet or cast-iron receiving-cylinder, provided with a rotating worm-shaft, that will convey or push the said coal-powder along in and out of the said cylinder.

Connected with the mouth of this receiving-vessel, is any suitable retort, in which coal-tar may be submitted to about 280° or 300° of heat, and thirty-five or forty per centum of volatile matter thrown off, so as to reduce the tar to a pitch, which, or its equivalent

resinous substance, is run, in a hot or melted state, into the said receiver simultaneously with the fine coal-powder, in the proportions of about from four to six gallons of the melted pitch or resin to a ton, or two thousand two hundred and forty pounds of the coal-powder; whereby the coal and pitch are mixed into a plastic mass, which continuously drops into a "mixer," the construction and mode of operation of which is fully described in the specification marked "Division B," and from this "mixer" the constituents of the mass, in connection with steam, being worked thereby into an intimately-mixed or thoroughly incorporated and heated condition, is conveyed in suitable portions to the moulds of a powerful press, of any suitable construction, and thereby condensed into solid lumps, blocks, or cylinders, of suitable sizes for fuel.

From the press, the said lumps, blocks, or cylinders, fall into receiving-"cars," which convey them into the "drying and baking-ovens," described and set forth in specification marked "Division A," whereby all the moisture and the odoriferous or volatile matter are driven off, and thus the treatment or process completed. The cars are now to be run out of the ovens, and their contents discharged, for cooling and transportation or storage, as solid inodorous lumps, blocks, or cylinders of pure fuel.

Being free from odor, this fuel may, like the broken anthracite coal, be acceptably stored for any length of time in the cellars of dwellings, and, being solidified, and entirely free from stones, shale, and dirt, the lumps will retain their form in the fire during the combustion of the carbonaceous matter; and the ashes crumbling in raking the fire, will pass freely through the grate in the pulverized condition required for agricultural purposes.

Having thus fully described my improvement,

What I claim herein as new, and desire to secure by Letters Patent, is—

The process described, the same consisting in intimately mixing the purified waste coal and the agglutinating or resinous matter together in a hot state, condensing the same into solid lumps, and finally depriving the said lumps of their volatile and odorous matter, substantially as and for the purpose described.

T. M. MITCHELL, *Eng.*

Witnesses:

BENJ. MORISON,

WM. H. MORISON.