UNITED STATES PATENT OFFICE.

CHARLES HORNBOSTEL, OF BROOKLYN, NEW YORK, ASSIGNOR TO EDWARD HORNBOSTEL, OF SAME PLACE.

IMPROVEMENT IN PROCESSES OF APPLYING OXYGENATED AIR IN BLAST-FURNACES.

Specification forming part of Letters Patent No. **191,530**, dated June 5, 1877; application filed May 13, 1876.

To all whom it may concern:

Be it known that I, CHARLES HORNBOSTEL, of the city of Brooklyn, in Kings county and State of New York, have invented an Improvement in the Process of Applying Oxygenated Air in Blast-Furnaces, of which the following is a specification:

This invention relates to an improved method of increasing the combustion of fuel in various classes of furnaces for the purpose of economizing fuel and intensifying the heat, and facilitating various metallurgical operations, such as the reduction of ore and the melting, puddling, and working of metals. This object has heretofore been accomplished by increasing the volume of air supplied to the furnace by means of a bellows, fan, or other blast-producing machinery; but in such method, in order to supply the full amount of oxygen necessary to induce complete and rapid combustion, and obtain the greatest heating effect of the fuel, it has been found necessary to employ a large volume of air, necessitating the heating of the useless volume of nitrogen contained therein, which materially lessens the effectiveness of the operation. My invention is designed to overcome this objection, and also to oxidize and carry off the impurities contained in most varieties of fuel, such as sulphur, &c., which materially interfere with metallurgical operations; and to this end my invention consists in an improved process of preparing oxygen gas and applying the same to metallurgical operations, and to assist in the combustion of fuel.

By the ordinary process of preparing oxygen gas from black oxide of manganese and sulphuric acid, the complete decomposition of the materials can only be effected by the aid of heat, which, besides being expensive and requiring refractory and highly non-corrosive vessels for its generation, offers no effective means of applying the gas, after it is generated, to the purposes intended.

I have discovered that, by bringing a current of air, under pressure, into violent contact with a mixture of sulphuric acid and black oxide of manganese, or by passing the air through or into contact with an extended surface of the same, complete decomposition of the materials can be effected without the use of heat, and at the same time the gas can be conveniently and continuously applied to metallurgical operations, and to assist the combustion of fuel in furnaces.

In carrying out my invention, I mix the sulphuric acid and black oxide of manganese in the proper proportions, which may be the same as usually employed, although for convenience I prefer to employ the manganese slightly in excess of the ordinary proportions, so as to form a thicker mass, taking care to have the black oxide of manganese as pure and free from metallic manganese as possible, in order to form no unnecessary residuum in the vessels. These materials I place in a vessel of any desired construction, into which leads a pipe from a blast apparatus, which projects downwardly toward the bottom upon which the material is placed, or enters said vessel in such manner as to force the air violently into contact with the material, or through it. From the top or other convenient part of the vessel extends a pipe, by which the admixture of gas and air is conducted to the place of use.

Upon forcing a current of air through the induction-pipe, so as to violently agitate the mass of material, or pass through it, or otherwise come into contact with every particle of the same, the decomposition will commence, and continue until thoroughly completed, without the assistance of heat, and the gas will be taken up as it is generated, and thoroughly commingled with the air, and in this condition can be effectively applied to the intended purposes.

By means of my improved process I am thus enabled to produce the gas without the aid of heat, which effects a material saving in expense, and enables me to employ, in the construction of the generating-vessels, comparatively inexpensive materials, such as wood and lead, instead of the expensive glass or platinum vessels heretofore found necessary, and at the same time affords an effective

means of applying the gas continuously while the charge lasts, and, when exhausted, the charge may be quickly replaced and the operation continued, as before.

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

The process herein described of applying oxygen gas to metallurgical operations, and to assist in the combustion of fuel, by conducting a current of air, under pressure, into contact with or through a mixture of black oxide of manganese and sulphuric acid, and from thence to the place of use, substantially as described.

CHARLES HORNBOSTEL.

Witnesses:

A. WHITE,

A. G. ROGERS.