UNITED STATES PATENT OFFICE.

HENRY BIRD, OF PLYMOUTH, ENGLAND.

PROCESS OF MANUFACTURING PURPLE-ORE BRICKS.

SPECIFICATION forming part of Letters Patent No. 490,535, dated January 24, 1893.

Application filed April 2, 1892. Serial No. 427,571. (No specimens.)

To all whom it may concern:

Be it known that I, HENRY BIRD, a subject of the Queen of Great Britain and Ireland, residing at Plymouth, in the county of Devon, England, have invented new and useful Improvements in the Process of Manufacturing Purple-Ore Bricks, of which the following is a specification.

This invention has mainly for its object the production of bricks or blocks of "purple ore" resulting from the common process of the extraction of the copper contained in burned cupreous sulphur ores by the wet method, or from other washed cupreous sulphur ores, or equivalent ores and which shall be suitable for use in blast and other furnaces for the production of iron; and also for other purposes as bricks or blocks.

According to this invention the ore is ground in a mill, the condition in which it is thrown into the mill, although it usually contains a certain proportion of water, being apparently dry and sandy. I have found, however, when it is under the action of rolls, and being ground, it becomes wetter and wetter in appearance and eventually is brought to the state of a slurry. The ore, as freshly thrown out of the tanks at the copper works, usually contains too much moisture, but after standing for about twenty-four hours it mostly contains the required amount of water and this is the state in which it is usually sold to iron works; but in some cases in dry weather it may become desirable to add a little water in the mill to bring the ore into a state of slurry. The slurry produced as above described is run or tipped into molds, and heated, say upon a hot floor. When the material has set sufficiently hard to allow of the molds being removed, the bricks or blocks may be turned on their sides to facilitate their drying. By this drying, the bricks or blocks will become sufficiently hard to bear handling. They are then kilned in a kiln. They may be first subjected to a gentle heat to drive off the remaining moisture, after which the temperature is increased until they are white hot or of a bright red, at which they are kept for, say about twenty to thirty hours. They are left to soak for about forty-six hours, and then allowed to cool slowly. When cool they will be found more or less hard according to the temperature to which they have been subjected, and the degree of fineness to which the ore has been ground.

In carrying the invention into effect the purple ore as it is usually sold or supplied containing from about fifteen to seventeen per cent. of moisture is first ground, in which operation it becomes wetter and wetter until it is brought to the state of a slurry. When in this condition it is run out into wagons or trucks of a suitable size, and these trucks or wagons are then taken to the molds upon a drying floor, and the slurry is tipped out of them into the molds. When the material has set sufficiently hard to allow of the molds being removed, they are removed by lifting upward at each end, and the bricks or blocks are then turned on their sides on the drying floor, and there dried for such a length of time as will render them sufficiently hard to bear handling.

The next stage in the process of manufacture is the kilning. In the operation according to one mode of carrying out the invention, the bricks or blocks being piled or stowed in a kiln, and are dried for about twenty-four hours by slow firing; or, by passing through the kiln the hot waste gases coming from another kiln under full heat and firing. After this, full firing in the kiln takes place, and the bricks or blocks are subject to a high temperature for about forty-six hours, making a total of about seventy hours drying and firing in the kiln and this I find to be a very suitable duration of treatment when using the kind of kiln shown. Then after this the burned bricks or blocks are allowed to soak in the kilns for about another twenty-four hours, the soaking being effected by bricking up the fire-grates. After this treatment the bricks or blocks are cooled down (and this is done by letting air into kiln), and may then be taken out of the kiln and are then ready for use for making iron in blast furnaces or other furnaces; or for other purposes for which they may be suitable.

The blocks or bricks produced by these treatments are thoroughly sound and hard, and not liable to break up or crumble.

Sometimes in very hot weather say, when the ore before treatment has been exposed to hot sun or otherwise heated, it may not con-

tain sufficient moisture; in which case, a sprinkling of water may be added to it, say when being ground, to make up the deficiency. The quantity suitable for the purpose of this invention which the ore should contain before or when grinding is about fifteen to seventeen per cent.; and this is the quantity which it ordinarily contains as it is sold to iron works or when it has been out of the tank for about twenty-four hours.

If any free acid or copper exists in the ore, after washing, a little lime may be used to neutralize it: this will prevent corrosion of the apparatus for treating the ore.

When these ore blocks are used for making steel, manganese ore may be used in combination with the purple ore, or other suitable substances used in metallurgical operations in dealing with iron ore, or substances not deleterious to the blocks or bricks for the different purposes for which they may be used, may be used in combination with it.

It will be understood of course, that the forms in which the blocks are produced are not confined to rectangular form, as they may be made in any desired or suitable shape.

In the usual way of carrying out this invention, it will be observed that the blocks and bricks are produced from the purple ore without admixture of any extraneous matters, and without the addition of any water. By this latter feature, it will be obvious, the evaporation of water from the ore which has to be produced is very small, and the result of this feature, together with the other treatments specified, is that I am enabled to produce with the plant herein described, a given weight of bricks or blocks with the use of a very small weight of ordinary coal, including the burning, and the production of steam used for grinding the ore and heating the drying floor.

Having now fully described my invention I declare that what I claim is:—

The herein described method of making hard purple-ore blocks or bricks, consisting in grinding under the action of heavy edge runners the ordinary dry commercial loose or pulverulent purple ore without the addition of water or liquid or other extraneous matters, whereby the apparently dry ore is reduced to a state of slurry, then putting the slurry into molds of suitable form for producing bricks or blocks, then drying the slurry in the molds artificially upon a drying floor until it can be removed and the bricks or blocks so formed will stand of themselves on the floor without breakage, then further drying the bricks or blocks on said floor as turned out of the molds, then further drying them in a suitable burning kiln, and then burning them, substantially as set forth.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

HENRY BIRD.

Witnesses:

FREDERICK JOHN CHEESBROUGH,

J. A. COUBROUGH,

Both of 15 *Water Street, Liverpool.*