May 10, 1927. 1,627,982

M. MAGUET

METHOD AND MEANS FOR THE TREATMENT OF SLAGS BY FLUIDS UNDER PRESSURE

Filed Oct. 6, 1923

FIG.1

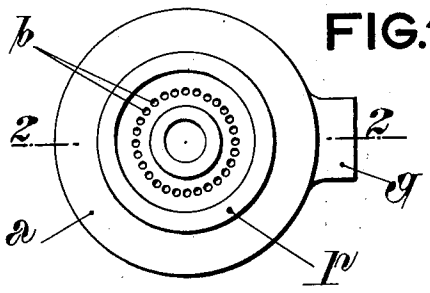


FIG.3

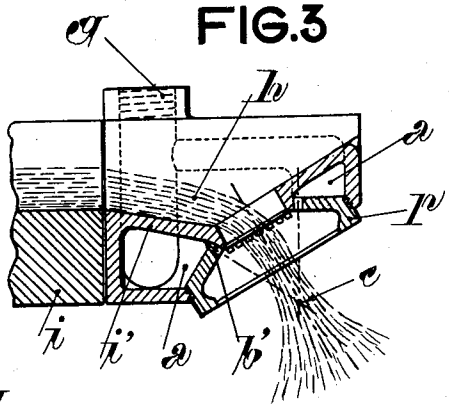


FIG.2

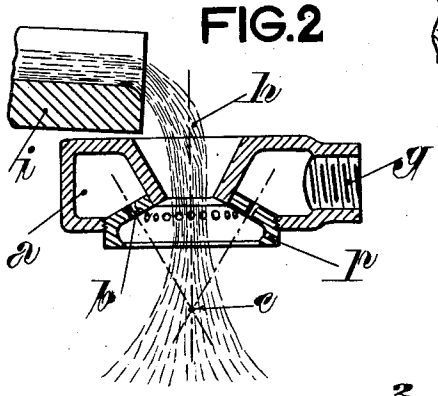
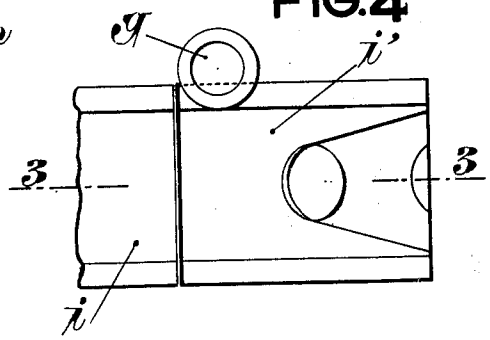


FIG.4



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UNITED STATES PATENT OFFICE.

MARTIAL MAGUET, OF LE TEIL, FRANCE, ASSIGNOR TO LA SOCIÉTÉ ANONYME DES CHAUX ET CIMENTS DE LAFARGE ET DU TEIL, OF LE VIVIERS (ARDECHE), FRANCE.

METHOD AND MEANS FOR THE TREATMENT OF SLAGS BY FLUIDS UNDER PRESSURE.

Application filed October 6, 1923, Serial No. 666,975, and in France October 26, 1922.

In certain of the known methods for the disintegration of blast-furnace slags by means of a liquid or gaseous fluid under pressure, the jet of molten slag, whether or not it be expanded is subjected on one side only to the blast from one or more tuyères of any shape, or else the jet of slag is pulverized by a rotatory apparatus which, at the same time, allows the compressed fluid to escape from the centre towards the circumference. For success, these processes necessitate a high expenditure of compressed fluid, without the certainty of always obtaining completely uniform disintegration.

The object of the present invention is to push the operation of disintegration to the extreme limit desirable, with a minimum expenditure of compressed fluid, while at the same time maintaining uniform disintegration.

The method consists in causing a solid stream of slag (by "solid" I mean undivided) at a high temperature and of substantially circular cross-section, to fall freely into the centre of an inverted cone formed by converging jets of fluid under pressure, the said jets acting uniformly on the stream of molten slag in a downward direction from the periphery to the centre of the slag stream, the axis of flow of the slag coinciding with the axis of the cone formed by the converging jets.

This method of acting on the molten slag is realized in practice by making use of an insufflation apparatus in the form of an annular tuyère having converging jets.

In the annexed drawing is given by way of example:

Fig. 1 is a diagrammatic plan view seen from below of an apparatus of tubular section having its tuyères preferably arranged on a dismountable member and the jets of which converge on the same point.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a section on line 3—3 of Fig. 4 showing diagrammatically a modification of the disintegrator combined with a channel which centers the jet of slag through the apparatus as it flows from the furnace.

Fig. 4 is a plan view of Fig. 3.

The apparatus shown in Figs. 1 and 2 consists essentially of a hollow ring a which communicates, by means of one or more conduits, such as y, with the source or reservoir of compressed fluid. The ring a is of metal and is provided with perforations b arranged regularly at the same distance from the axis of the apparatus and in a plane perpendicular thereto. The inclination of the apertures b towards the axis is uniform and determines the emulsion point c. The inclination of these orifices b or b', as well as their diameters, their cross-sections, and their number, are determined, in each case, by the fluid, liquid or gaseous, employed, and by the size of the slag jet h delivered by the channel i.

The apparatus can function not only in a vertical position as exemplified in Fig. 2, but in an inclined position provided that the orientation of the axis of the slag-jet be appropriately altered.

In the modification shown in Figs. 3 and 4 the member a is combined with a channel i' which centers the jet of slag through the apparatus as it flows from the furnace through the channel i.

The perforations b can be replaced by channels b^1 arranged on the edge of the member p, Fig. 3.

To disintegrate a molten slag jet, whether the slag be acid or basic, by the process of the invention, it is sufficient to direct the issuing slag jet h on to the apparatus a and to turn on the disintegrating fluid, which may be liquid or gaseous, at a pressure suitable to the formation of reduced slag desired, which formation will depend further on the fluid employed as well as on the slag under treatment.

By the improved method, molten slags are reduced in a very uniform degree by reason of the convergence of the fluid jets under pressure which work with their full live power, in spite of a low expenditure of disintegrating fluid. This mechanical reduction will be effected to a greater degree of fineness, the higher the pressures employed.

The speeds of reduction that may be attained allow of the immediate tempering of basic slags, whether by water or by air, by direct or combined action and which gives them hydraulic properties distinctly more pronounced than formerly.

The granules obtained are recovered in any manner. Also in the case of tempering by water under pressure the disintegrator device described hereinbefore can be arranged above a mechanical transporter

which gradually separates the disintegrated slag from the fluid to effect as may be required either dry or wet granulation.

I am aware that prior to my invention it has been proposed to granulate slag by jets of fluid directed downwardly with respect to the flow of the slag but in such cases the jets have been directed against an annular or a flat stream of slag and I therefore do not claim the use of downwardly directed jets of fluid broadly.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. A method for the reduction of molten slag by the action of a fluid under pressure consisting in causing a solid stream of calcareous slag at a high temperature and of substantially circular cross-section to fall freely into the centre of an inverted cone formed by converging jets of fluid under pressure the said jets playing uniformly on the stream of molten slag in a downward direction from the periphery to the centre of the slag stream, the axis of flow of the slag coinciding with the axis of the cone formed by the converging jets.

2. An apparatus for granulating molten slag, comprising an annular member, means for causing a solid stream of molten slag of substantially circular cross-section to fall freely through said member along the vertical axis thereof, said member having means adapted to direct streams of fluid on said stream of molten slag and converging on a point on the axis of said falling stream below said means, and means for conveying fluid under pressure to said fluid directing means.

3. An apparatus for granulating molten slag comprising an annular member, means for causing a solid stream of molten slag of substantially circular cross-section to fall freely through said member along the vertical axis thereof, said member having an annular series of perforations adapted to direct streams of fluid on said stream of molten slag and converging on a common point on the axis of said falling stream below the plane of said series of perforations and means for conveying fluid under pressure to said annular series of perforations.

4. An apparatus for granulating molten slag comprising an annular member, means for causing a stream of molten slag to fall freely through said member along the vertical axis thereof, said member having an annular passage adapted to direct a stream of fluid on said stream of molten slag and converging on said falling stream at a point thereon below said passage, and means for conveying fluid under pressure to said passage.

In witness whereof I have signed this specification.

MARTIAL MAGUET.