Oct. 21, 1930. P. L. J. MIGUET 1,778,809

STIRRING OR POKING APPARATUS FOR ELECTRIC FURNACES

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Fig. 1

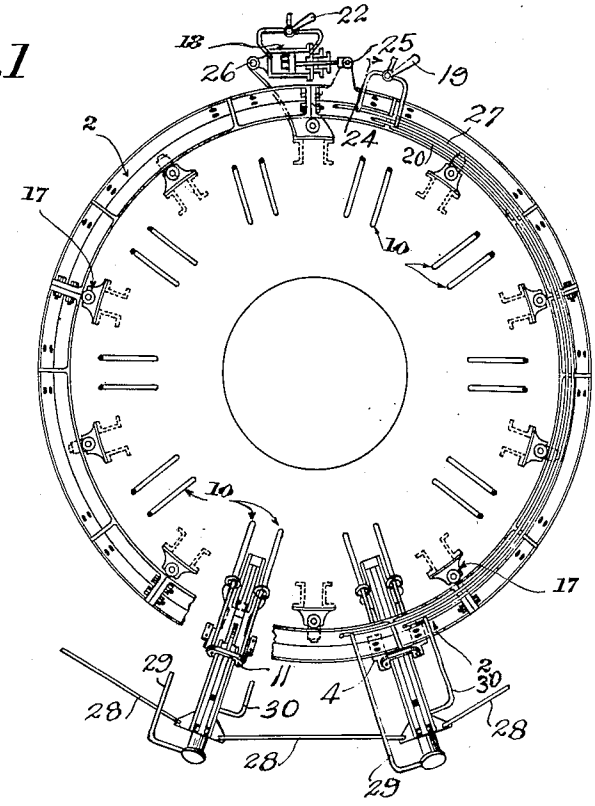
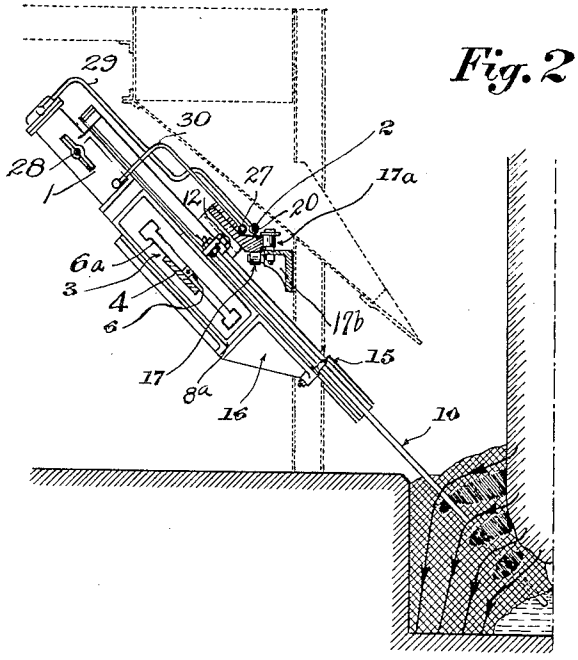


Fig. 2



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Fig. 4

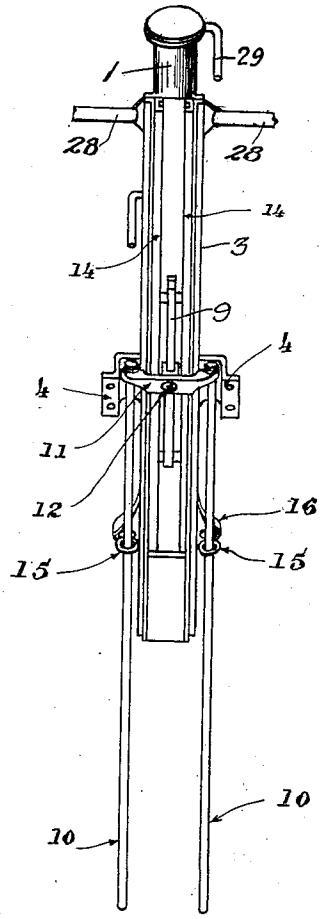
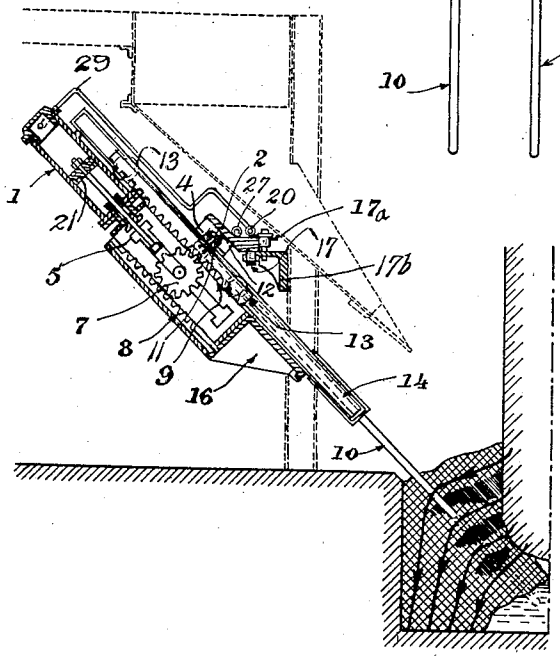


Fig. 3



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1,778,809

UNITED STATES PATENT OFFICE

PAUL LOUIS JOSEPH MIGUET, OF MONTRICHER, NEAR ST. JULIEN DE MAURIENNE, FRANCE, ASSIGNOR TO SOCIETE ELECTROMETALLURGIQUE DE MONTRICHER, OF SAINT-JULIEN-DE-MAURIENNE, SAVOIE, FRANCE

STIRRING OR POKING APPARATUS FOR ELECTRIC FURNACES

Application filed October 29, 1928, Serial No. 315,841, and in France February 7, 1928.

This invention relates to improvements in stirring or poking apparatus for electric furnaces.

In feeding material to electric furnaces it has been found that the conductivity of all parts of the fusion bed varies, the material clogs on the electrode and that gas pockets occur at the surface of the molten and solid materials. In order to remedy these irregular occurring conditions some means for poking and stirring the mass of material being treated in the furnace has been necessary.

The principal object of the present invention is to perform the poking and stirring operations mechanically by means of pneumatically operated cylinders which give the poking rods a longitudinal and transverse movement.

The invention comprises in the combination of a plurality of air cylinders having pistons and piston rods cooperating therewith arranged symmetrically about the furnace electrode at an angle of about 45° thereto, a plurality of pairs of racks, one rack of each pair being stationary and the other being operated by a pinion on the piston rod of each cylinder to operate the poking and stirring rods, an annular movable support carrying the air cylinders, the support being arranged concentric with the electrode and a horizontal cylinder to give movement to the circular support.

The invention will be described with reference to the accompanying drawings:—

Fig. 1 is a diagrammatic plan view.

Fig. 2 is a side elevation of the air cylinder.

Fig. 3 is a vertical section of same.

Fig. 4 is a plan view of the cylinder and poking rods detached.

A plurality of air cylinders 1, arranged at an angle of about 45° to the vertical, are mounted upon a movable annular support 2 which surrounds the base of the electric furnace shown in dotted lines in Figs. 2 and 3. The cylinders are secured to the support 2 by brackets 4 which are affixed to channel members 3 on the cylinders. The support 2 is supported by the horizontal rollers 17 and guided by the vertical rollers 17^a, each set of which rollers are mounted on a bracket 17^b fixed to the wall of the furnace. The piston rods 5 extend through the cylinder ends and each are provided with a crosshead 6, which slides in guides 6^a on the gear case 8^a. A toothed pinion 7 is mounted on the end of each piston rod 5 and engages a stationary rack 8 secured to the gear casing 8^a and also engages a movable rack 9. The rack 9 is provided with rollers 13 at either end which run in a U shaped channel 14. The middle of the rack 9 is pivotally connected to the centre of a yoke 11 by a pin 12 and two rods 10 are affixed to the two ends of the yoke. In this way the movement imparted to the rods 10 is double that of the piston in the cylinder 1. Guide rings 15 of substantially larger internal diameter than the diameter of the rods 10 are provided through each of which a rod 10 passes. The rings 15 are mounted on brackets 16 rigidly affixed to the casing 8^a and to the channels 14.

In order to impart a lateral movement to the cylinders 1 the annular support 2 is connected to one end of a piston rod reciprocating in a cylinder 18 by which a partial rotary movement is given to the cylinders 1.

The piston 23 in the cylinder 18 may be moved either in the direction of the arrow 24 or in the reverse direction by compressed air or steam. These fluids are conveyed to the cylinder by pipes which are connected to the ends of the cylinder. A manually operable valve 22 is provided in the pipe line to control the supply to and the exhaust from each end of the cylinder. Said cylinder is pivotally mounted as at 26 and the piston rod is pivotally connected to the support 2 as at 25.

The poker reciprocating cylinders 1 are braced by rods 28 which are connected to the cylinders near their outer ends and the movement of their pistons 21 is caused and controlled by compressed air supplied to said cylinders through pipes 20, 27, 29, 30, which are controlled by a manually operable valve 19.

In operation the rods 10 are given a longitudinal movement by the racks 9 operated by the piston rods 5 in the air cylinders 1 and also a to and fro lateral movement by the annular support 2 from the cylinders 18. The

rods 10 are however pivoted to the racks 9 by the yokes 11 and accordingly do not remain permanently parallel with the racks but pivot about the yokes 11 to an extent allowed by the guide rings 15. In this manner a poking and also a stirring action is imparted to the rods 10.

By this construction it is possible to employ heavier rods than is possible with manual poking and the mass is kept much more even throughout, the arrangement being applicable even in the cases of the high temperatures which prevail in the reduction of silica.

What I claim as my invention and desire to protect by Letters Patent is:—

1. Stirring and poking apparatus for electric furnaces comprising a plurality of pneumatic cylinders arranged symmetrically about the electrode, a plurality of piston rods, a plurality of pinions one on each piston rod, a plurality of racks each operated by pistons in said cylinders and a plurality of poking rods operated by the racks.

2. Stirring and poking apparatus for electric furnaces comprising a plurality of pneumatic cylinders arranged symmetrically about the electrode, a plurality of piston rods, a plurality of pinions one on each piston rod, a plurality of racks each operated by pistons in said cylinders, a plurality of stirring and poking rods operated by the racks, an annular support upon which the pneumatic cylinders are mounted and a horizontal cylinder having a piston therein to give a to and fro movement to the annular support.

3. Stirring and poking apparatus for electric furnaces comprising a plurality of pneumatic cylinders arranged symmetrically about the electrode, a plurality of piston rods, a plurality of pinions one on each piston rod, a plurality of racks each operated by a piston in said cylinders, yokes pivotally connected to the racks, a plurality of stirring and poking rods operated by the racks, an annular support upon which the pneumatic cylinders are mounted and a horizontal cylinder having a piston therein to give a to and fro movement to the annular support.

4. A stirring and poking apparatus comprising a poker; power operated means for reciprocating said poker axially; and a second power operated means for moving said poker and reciprocating means laterally to and fro.

5. A stirring and poking apparatus comprising a poker; a pneumatic cylinder and a piston coacting therewith adapted to reciprocate said poker axially; and a second pneumatic cylinder and a piston coacting therewith adapted to oscillate said poker laterally.

6. A stirring and poking apparatus for furnaces, comprising a plurality of pokers arranged around the periphery of the furnace chamber and adapted to be projected into the material being treated in the chamber; a power operated means for reciprocating each of said pokers axially; and a second power operated means for oscillating said pokers laterally.

7. A stirring and poking apparatus for furnaces, comprising an annular support surrounding the furnace; a plurality of pneumatic cylinders mounted on said support; a piston in each of said cylinders; a poker reciprocated axially by each of said pistons; and a second pneumatic cylinder having a piston coacting therewith adapted to oscillate said support and said pokers mounted thereon.

In testimony whereof I affix my signature.

PAUL LOUIS JOSEPH MIGUET.