

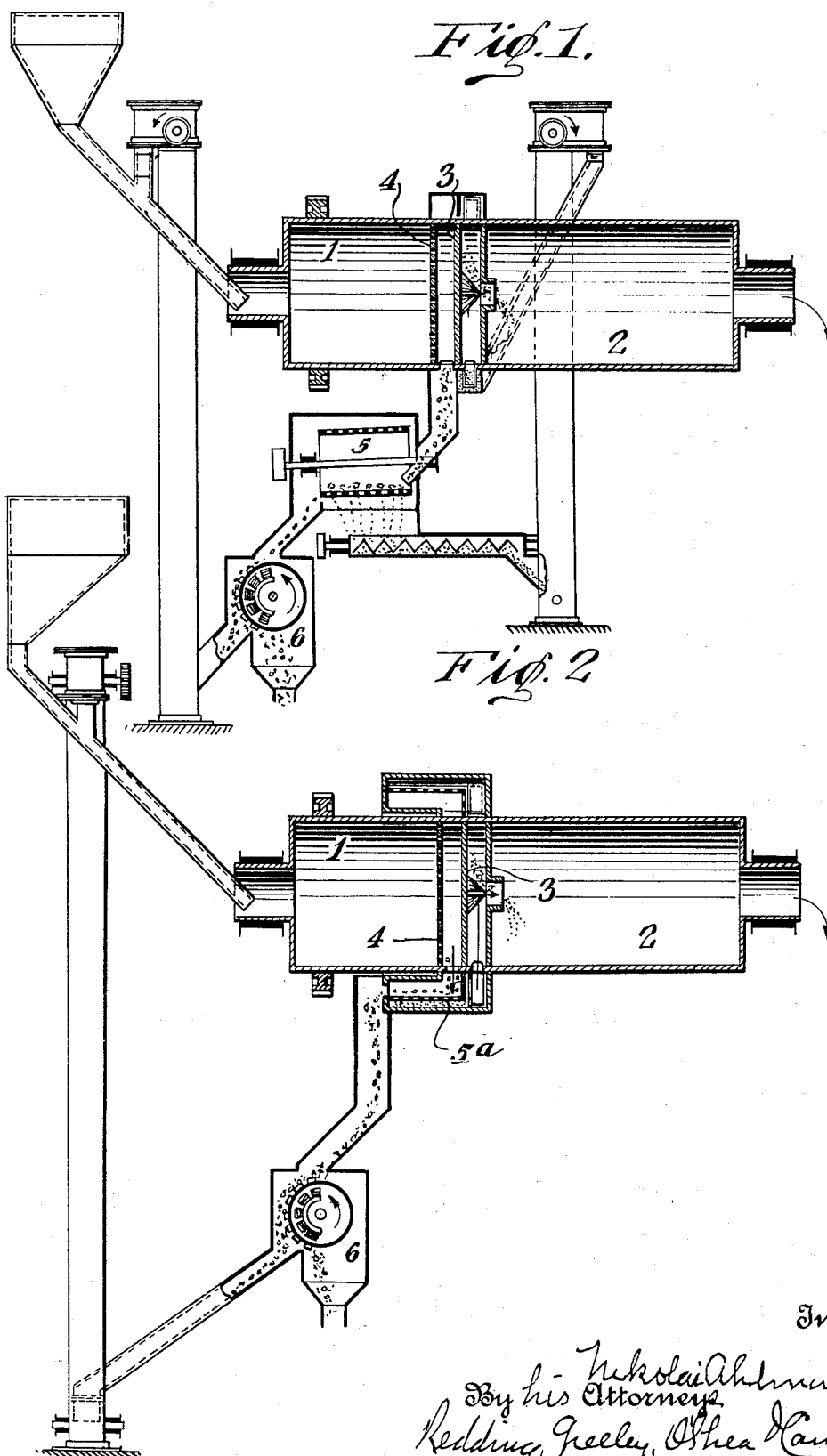
April 25, 1933.

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1,905,780

APPARATUS FOR GRINDING MATERIALS WHICH CONTAIN PARTICLES OF IRON

Filed Oct. 18, 1930



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APPARATUS FOR GRINDING MATERIALS WHICH CONTAIN PARTICLES OF IRON

Application filed October 18, 1930, Serial No. 489,634, and in Great Britain October 24, 1929.

When materials containing metallic iron, such as Thomas slag, are ground in tube or ball mills, the removal of this iron from the mill and the ground material causes very serious difficulty. The iron, because it cannot be ground, will in fact accumulate in the interior of the mill unless special measures are taken for continuous removal of the same, and the mill must therefore frequently be stopped in order that the accumulated iron particles may then be removed.

It has been attempted to overcome this difficulty in various ways. One such method is to build into the preliminary grinding chamber of the mill itself a device serving to separate the iron from the material by electromagnetic means, and then to remove it from the mill. Another method consists in carrying the preliminary grinding so far, by using an uncommonly long preliminary grinding chamber, that the entire discharged material is sufficiently fine to be directed into the subsequent fine grinding chamber without any necessity of the otherwise usual separation and return to the preliminary grinding chamber of a certain quantity of material which has not attained sufficient fineness to be transferred to the fine grinding chamber. The material is then, at the discharge end of the preliminary grinding chamber, discharged from the chamber together with the iron particles by way of a grate bottom with sufficiently large openings, whereafter the iron is removed and the material transferred to the fine grinding chamber.

The first mentioned method, however, suffers mainly from the drawback that inspection and maintenance of the electromagnetic separating device in the interior of the mill itself is difficult, and the last mentioned method reduces very considerably the productive capacity of the mill. The reason is that the necessary grinding of the material in the preliminary grinding chamber to a fineness greatly in excess of the fineness suitable for the preliminary grinding bodies requires considerably more grinding (power consumption) and a considerably longer time than the usual working process, by which the separation of the sufficiently fine material

is effected at an earlier stage of the grinding process, and the separated coarse material is introduced once more into the preliminary grinding chamber.

The above mentioned drawbacks involved in the known processes are avoided, according to the present invention, by the following working process:—In the preliminary grinding chamber the grinding is continued only so far that the iron particles are set free from the useful material, whereby simultaneously some portion of the latter attains the fineness required for treatment in the following grinding chamber, while the remainder requires further treatment in the preliminary grinding chamber. At the discharge end of the latter all the material treated, that is the finely crushed and the yet coarse material as well as the iron, passes out from the mill by way of a bottom grate or openings in the mill tube, and is separated on an ordinary screening and magnetic-separating device, whereby the iron is removed. The sufficiently fine material is then transferred to the fine grinding chamber, and the insufficiently fine material is once more introduced into the preliminary grinding chamber for further treatment. Thereby the advantage is gained that there may be used a preliminary grinding chamber of moderate length and, therefore, of high efficiency.

Figures 1 and 2 of the drawing show diagrammatically two different constructions of a plant adapted to carry out the present process.

In the plant shown in Fig. 1, 1 is the preliminary grinding chamber, 2 the fine grinding chamber, 3 the partition between the two, and 4 a grate disposed in front of the partition. 5 is a screening device provided outside of the mill and connected on the one side to the space between the wall 3 and grate 4 of the preliminary grinding chamber, and on the other side to the supply end of the fine grinding chamber 2. 6 is a device similarly disposed outside of the mill and serving to separate magnetically the iron contents from the material to be ground.

As mentioned above the material to be ground passes, in sufficiently comminuted

state, from the preliminary grinding chamber 1 by way of the grate 2, in the direction of the arrow, to the screening device, where the sufficiently fine material is removed by screening and is then moved in the direction of the arrow to the fine grinding chamber 2, while the coarse material, together with the iron contents, is conveyed in the direction of the arrow to the magnetic separating device 6, where the iron is removed, and thence the coarse material is returned, in the direction of the arrow, to the inlet end of the preliminary grinding chamber. The screening device 5 and the magnetic separating device 6 may also be interchanged, so that the separation of the iron is effected previously to the screening of the material, or the two devices may be built together as one apparatus.

In the device shown diagrammatically in Fig. 2 the screening device 5^a is disposed about the periphery of the mill and rotates together with the latter, while the magnetic separation is effected in a stationary device 6. The latter may also be disposed about the periphery of the mill tube and rotate together with the same.

I claim as my invention:

Apparatus for grinding Thomas slag and the like comprising a drum having a preliminary grinding chamber and a fine grinding chamber, a screening device, means to deliver the material from the preliminary grinding chamber to the screening device, means to deliver fine material to the fine grinding chamber from the screening device, and a magnetic separating device, means to deliver the coarse material from the screening device to the magnetic separating device, means to deliver the non-magnetic separated material to the preliminary grinding chamber from the magnetic separating device, whereby the material from the preliminary grinding chamber is subjected to a screening and a separation of the iron contents, and the sufficiently comminuted material is conveyed to the fine grinding chamber, and the coarse material is returned to the preliminary grinding chamber, while the iron contents are removed.

This specification signed this 4th day of October, 1930 A. D.

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