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MECHANISM FOR REMOVING RESIDUES FROM VERTICAL RETORTS.

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1,144,065. Patented June 22, 1915.

Fig. 1

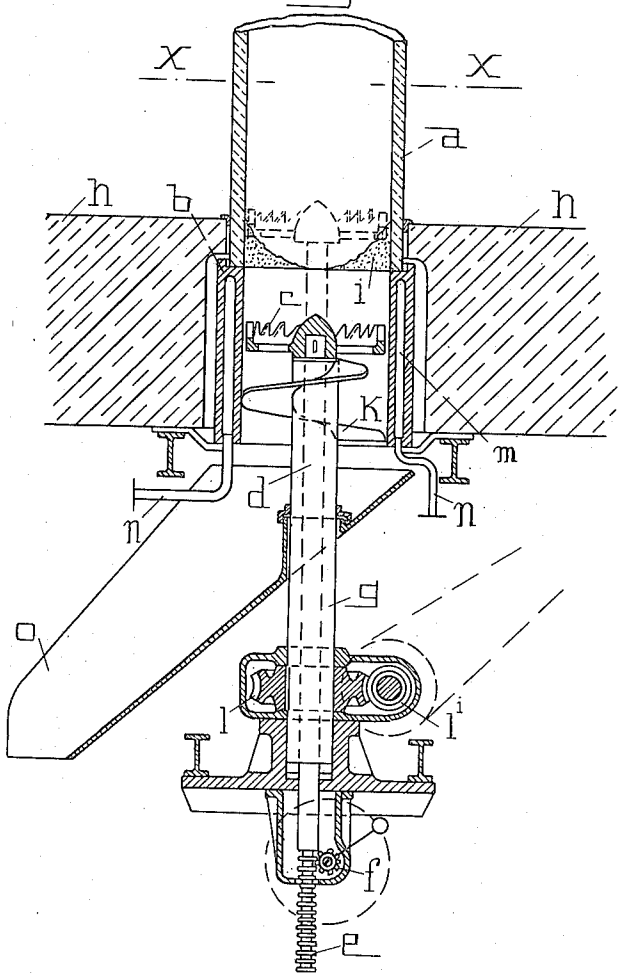
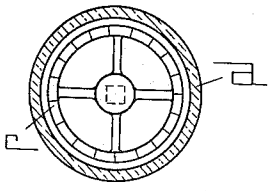


Fig. 2



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UNITED STATES PATENT OFFICE.

ALEXANDER ROITZHEIM AND WILHELM REMY, OF DUISBURG-RUHRORT, GERMANY.

MECHANISM FOR REMOVING RESIDUES FROM VERTICAL RETORTS.

1,144,065. Specification of Letters Patent. Patented June 22, 1915.

Application filed December 20, 1912. Serial No. 737,879.

To all whom it may concern:

Be it known that we, ALEXANDER ROITZHEIM and WILHELM REMY, subjects of the King of Prussia, German Emperor, residing at the city of Duisburg-Ruhrort, in the Kingdom of Prussia, German Empire, have invented certain new and useful Improvements in Mechanism for Removing Residues from Vertical Retorts, of which the following is a specification.

Our invention relates to an apparatus for continuously removing the residues of ore from vertical retorts when obtaining zinc.

When it is wished to reduce zinc ores continuously in vertical retorts for the purpose of obtaining zinc, it is necessary constantly to charge in ores at the upper opening of the individual retorts and to remove the residues freed from the metal at the lower opening in proportion as the reaction takes place.

Usually mechanical devices are used for the removal of the residues at the lower opening of the retorts. This could be done by conveyer worms and similar well-known apparatus. In practice, however, it is found that the highly heated residues of a pasty condition harden at the walls of the retorts and remain adhering thereto where the retorts project out of the highly heated furnace chamber and necessarily cool to a lower temperature. There is then formed at the lower mouth of the retort a rim of slag which more and more constricts the opening and finally entirely closes it, so that the charge or residues can no longer automatically slide down through the muffle.

A primary object of our invention is to render this formation of slag non-injurious, and to provide a continuous process of removing the residues of ore from vertical retorts, so that continuous working is assured.

Our invention consists in removing the crusts of slag which form at the lower mouth of the retorts when obtaining zinc, for the purpose of keeping open the lower mouth and thus enabling continuous working. The process does not comprise the step of removing the charge, but only the removal of the deposits of slag in order that the residues can unimpededly slide through.

Our new apparatus has for its object not the continuous removal or carrying away of residues of ore in vertical retorts when obtaining zinc but is directed to the removal of the crusts of slag which adhere to the lower mouth of the retorts for the purpose of keeping the lower mouth open so that said residues may readily pass therethrough for removal.

One form of apparatus adapted for carrying our new process into practice is represented by way of example in the accompanying drawing, wherein:—

Figure 1 is a vertical section through the apparatus, and Fig. 2 is a cross-section taken on the line X—X in Fig. 1.

Referring to the drawing, *a* designates the retort; it preferably is of circular section at its lower mouth and is mounted on the support *b*. Instead of this arrangement the muffle may be lengthened.

c designates a cutter, *e. g.* a milling-cutter, which is mounted on the square shaft *d* and keyed thereto. The lower end of this shaft is turned around and is formed as a kind of toothed rack, as is shown at *e*. A pinion *f*, which is rotated by means of a crank-handle, meshes with the teeth of the rack, so that the shaft *d* can be elevated and lowered by it. In the drawing the shaft *d* is shown guided by the spindle *g*. This spindle carries the worm *k* and the quantity of the charge which travels through the furnace can be regulated to a certain extent by varying the speed and pitch of the worm. The spindle *g* is driven by worm gears *l*, *l'*. The support *b* is provided with a cooling device comprising the chamber *m* and the water supply and discharge pipes *n*. A chute *o* is also provided.

The apparatus works as follows:—The muffle *a* is constantly heated to white heat, the heat extending to the line *h*—*h* where the furnace chamber is closed below. The charge is reduced and under the action of the heat is partially converted into slag; it becomes pasty and slides down the walls of the muffle. Where the muffle passes out of the furnace at *h*—*h* the temperature falls at once, because the action of the furnace gases ceases here. Nevertheless the heat penetrates a short distance beyond the line *h*—*h* into the mouth of the muffle owing to the conductivity of the material, so that the muffle is still glowing there if not so hot that the downwardly sliding slag remains soft. The slag congeals and remains adhering at this place. The amount of adhering slag increases as slag slides down from above, so that after a short time a plug of slag *i* is formed, by which the lower mouth of the muffle is constricted so much that the

residues no longer pass through it. The reduction process is consequently disturbed because the charge cannot slide down. Such a state of affairs is however prevented according to our invention. By rotating the pinion *f* the shaft *d* and with it the milling-cutter *c* is elevated from time to time while the spindle *g* rotates and drives with it the shaft *d*. The cutter *c* now cuts away the adhering slag *i* which has become relatively brittle owing to the original percentage of reducing carbon. The shaft *d* is then lowered so that the cutter is exposed to the high temperature for only a short time.

We claim:—

1. Mechanism for removing residues from vertical retorts, comprising a rotatable cutter mounted below the discharge end of the vertical retort, and means for raising and lowering the cutter as required during its rotation.

2. Mechanism for removing residues from the discharge end of vertical retorts, comprising a vertical spindle, an annular cutter thereon, mechanism for rotating the cutter and means for manually raising and lowering the spindle.

3. In mechanism for removing residues from vertical muffles, the combination with a water-cooled muffle support; of a chute below the support, a vertical spindle passing through the chute into the muffle support, an annular cutter on the spindle, a screw below the cutter, a circular rack on the spindle, a pinion for actuating the rack and means for driving the spindle, cutter and screw.

In testimony whereof we affix our signatures in presence of two witnesses.

ALEXANDER ROITZHEIM. [L. S.]
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Witnesses:
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ALBERT NUFER.