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CONDENSING OF ZINC IN LIQUID FORM FROM ZINC VAPOUR

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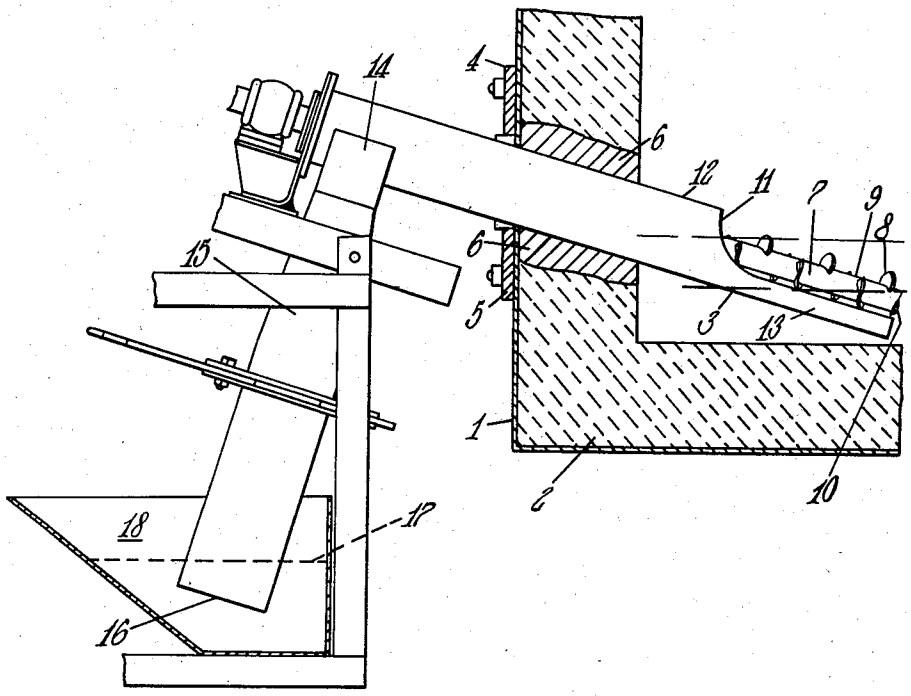

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2,886,309

CONDENSING OF ZINC IN LIQUID FORM FROM ZINC VAPOUR

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1 Claim. (Cl. 266—37)

This invention relates to the condensing of zinc in liquid form from zinc vapour and more especially to an improvement in a shock-chilling condenser for doing this, in which zinc vapor is condensed in molten lead circulating through the condenser under a reducing atmosphere.

Forms of such condenser are described in British Patents Nos. 572,961 and 735,043 (corresponding with United States Patents Nos. 2,464,262 and 2,801,162, respectively).

Dross and blue powder are formed in the condenser, most of it becoming entrained with the molten or liquid lead leaving the condenser and being collected by skimming with a perforated ladle from the surface of the lead in a sump outside the condenser.

The material thus removed normally contains about 30% of zinc and 50% of lead.

The present invention consists of a shock-chilling condenser for condensing zinc as liquid from zinc vapour in which liquid lead is used as a circulating medium through the condenser, characterised in that means are provided for withdrawing dross from the interior of the condenser by means of a conveyor inclined upwardly and rising above the liquid metal surface in the condenser, and arranged so that entrained liquid lead can drain back into the condenser from the dross being removed by the conveyor.

The dross so obtained is of relatively low lead content and high zinc content and with such a conveyor only a small amount of dross appears in the sump outside the condenser. The net effect is that the total weight of dross produced is reduced considerably, the amount of lead in the total dross being very much less and the amount of zinc not being greatly different, compared with the conditions obtaining with a condenser without the conveyor.

Thus separation of the liquid lead from the dross inside the condenser, where the atmosphere reducing to lead oxide prevails, ensures that no superficial oxidation of the liquid lead can take place and separation is thereby facilitated.

Conveniently, the conveyor is a screw conveyor.

The screw conveyor may be made with gaps in the screw so as to permit liquid lead to drain away while the solid dross is retained.

The invention will be further described with reference to an embodiment shown in the accompanying drawing which is a section through a part of a condenser.

The condenser is formed by a steel casing 1 with a refractory lining 2. Whilst in operation it contains molten lead up to the level 3. A screw conveyor housed in a casing 12 is introduced through a side wall of the

condenser, between locating flanges 4 and 5 and with clay packing 6 for hermetically sealing the conveyor in the condenser wall. This conveyor rotates on a shaft 7, and compared with a continuous screw, consists of alternate 120° portions 8 and 120° gaps 9. From the inner end 10 of the screw to a point 11 a short distance inside the condenser, the screw casing 12 is cut away leaving only the lower quadrant 13, thus permitting access to the conveyor of dross on the liquid metal surface in the condenser.

The dross is carried up by the screw, the liquid lead draining away through the gaps 9. Outside the condenser the dross falls through the orifice 14 in the upper part of the screw casing into a communicating pipe 15 fitted with a damper, the lower end 16 of which pipe is immersed in the dross which accumulates up to a level 17 in the container 18, thus inhibiting the admission of atmospheric air into and hence oxidation within the casing 12 and dross discharge pipe 15. Dross is removed at intervals from the container 18.

The improvement attained by the use of this dross extractor may be illustrated by reference to some results obtained on a furnace producing about 42 tons of zinc per day, the furnace gas being equally divided between two condensers, only one of which was fitted with a dross extractor according to the invention.

On the condenser without the dross extractor, the weight of dross collected in the sump during a week's operation was 8.9 tons; it contained 27% zinc and 51% lead, that is, 2.4 tons zinc and 4.5 tons lead. On the other condenser, with the dross extractor, the dross produced during a week's operation was as follows:

	Tons	Percent Zinc	Tons Zinc	Percent Lead	Tons Lead
Pump sump	1.0	38	0.4	43	0.4
Extractor	3.4	63	2.1	5	0.2
	4.4		2.5		0.6

The use of the dross extractor thus made an inappreciable difference to the amount of zinc collected in the dross but greatly reduced the amount of lead in the dross. Since the dross is extracted from an environment of metallic lead, and the lead content of the dross is only 5%, it is evident that the dross collected by the extractor must consist chiefly of fume and dust particles carried over from the furnace, without much entrained liquid metal.

The dust carried over is largely collected by the dross extractor and is obtained without any large admixture with liquid lead.

I claim:

In a shock-chilling zinc condenser having a top, bottom and side walls in which zinc vapour is condensed in molten lead circulating through the condenser under a reducing atmosphere, the improvement which comprises a dross conveyor inclined upwardly from adjacent the bottom of the condenser and extending through a side wall thereof to outside the condenser, a dross discharge pipe communicating with said conveyor outside the condenser, said conveyor comprising a conveyor element and a casing surrounding said conveyor element, said conveyor element having passageways to permit molten lead in dross removed by said conveyor element to return to

the condenser, the upper part of said casing being cut away adjacent the lower end of the conveyor to permit access of dross floating on molten lead in the condenser to the conveyor element upwardly from the lower end of the conveyor, and means for inhibiting the admission of atmospheric air into said dross discharge pipe and said conveyor and into the condenser where the conveyor passes through the wall thereof.

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