APPARATUS FOR FLAKING MOLTEN MATERIAL

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APPARATUS FOR FLAKING MOLTEN MATERIAL

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This invention relates to apparatus for flaking molten material. The apparatus is adapted to flaking molten materials in general but will be described herein particularly as applied to producing flakes from molten vanadium oxide. In the accompanying drawings which illustrate a preferred embodiment of the invention—

Figure 1 is a plan view of the apparatus;
Figure 2 is a side elevation;
Figure 3 is an end elevation and
Figure 4 is a plan view of an eccentric shaft used for actuating the apparatus.

The apparatus comprises in general an inclined trough, to the upper end of which, the molten material is supplied. The bottom of the trough is provided with a cooling jacket through which water or other cooling fluid flows. An eccentric shaft is connected to one end of the trough to agitate it, the other end of the trough being supported for swinging movement upon operation of the eccentric. Due to the shaking or bumping action of the trough and the cooling of its bottom surface, the molten vanadium oxide is cooled to solid form and is broken up into flakes which discharge from the lower end of the trough without need of providing a scraper for removing the solidified material from the trough.

Referring more particularly to the accompanying drawings, a metal trough indicated generally by reference numeral 2 comprises a bottom 3 and sides 4, the trough being inclined to the horizontal. The bottom 3 of the trough is provided with a cooling jacket which in the form illustrated is a channel formed indicated generally by reference numeral 5 and having a bottom 6 and side flanges 7. The bottom 3 of the trough is a plate which is welded to the channel member 5. The right-hand end of the trough 2, as viewed in Figure 2, is closed by a plate 7A and the left-hand end of the channel member 5 is closed by a plate 8. Water or other cooling fluid enters through a connection 9 and after flowing in contact with the lower surface of bottom 3 throughout substantially the length of the trough, exits through an outlet 10. A sloping plate 11 is provided adjacent the right-hand end of the trough for confining the cooling fluid to the cooling jacket and for receiving the molten vanadium oxide supplied to the trough from a feeding device 12.

An eccentric shaft, indicated generally by reference numeral 14, has concentric end portions 15 which are mounted in bearings 16 supported on blocks 17 resting on a foundation 18. The eccentric portion 20 of the shaft 14 is mounted in two bearings 21 secured to the bottom of the channel member 5 which forms a part of the trough 2. The eccentric shaft 14 is rotated by means of a pulley 22 secured to it, two belts 23 and a pulley 24 secured to shaft 25 driven by an electric motor 25a.

The trough is supported adjacent its lower end by two chains 26 from a support indicated generally by reference numeral 27. The support 27 has a base 28, two uprights 29 which straddle the trough, and a cross piece 30. The chains are connected at their upper ends to the cross piece 30 by bolt hooks 31 and at their lower ends are connected by bolt hooks 32 to angle members 33, which in turn are connected by bolts 34 to the channel member 5.

In converting molten vanadium oxide or other molten material into flake form, cooling water or other cooling fluid is passed through the cooling jacket formed by the trough bottom 3 and channel member 5, as previously described, in order to cool indirectly the bottom 3 of the trough 2. The motor 25a is operated, thereby rotating the eccentric shaft 14 and causing the trough 2 to be given a shaking or bumping motion. Molten vanadium oxide or other molten material is fed from the feed device 12 on to the plate 11 and the bottom 3 of the trough. The molten material is solidified due to the cooling action of the water or other cooling fluid. The solidified molten material passes downwardly in the trough, is broken up by the bumping motion of the trough and passes from the lower end of the trough into a container not shown.

It will be seen that upon rotation of the eccentric shaft 14 the upper end of the trough is given a combined upward, downward and lengthwise motion. As the upper end of the trough is moved to the right by the eccentric, the lower end of the trough is swung to the right and upwardly, and as the upper end of the trough is moved to the left by the eccentric, the lower end of the trough is swung to the left and upwardly. The combined result is a bumping or shaking action which, in conjunction with the cooling of the trough bottom, not only prevents the molten material from adhering to the trough but also breaks up the solidified material into flakes, which discharge from the lower end of the trough without the necessity of employing scrapers for removing the solidified material from the trough or crushing the material further before use.

The apparatus is of simple construction and eliminates the use of expensive gear reduction or other expensive mechanical devices commonly used for driving the surface on which the molten material is cooled.

The invention is not limited to the preferred embodiment but may be otherwise embodied or practiced within the scope of the following claims.

I claim:

1. Apparatus for flaking molten material, which comprises an inclined trough having a bottom, means for passing a cooling fluid in indirect heat exchange relation to said bottom to cool molten material supplied to said trough, eccentric driving means connected to said trough adjacent one end thereof for shaking it, and supporting means connected to said trough adjacent the opposite end thereof allowing swinging movement of said trough.

2. Apparatus for flaking molten material, which comprises an inclined trough having a bottom, means for passing a cooling fluid in indirect heat exchange relation to said bottom to cool molten material supplied to said trough, an eccentric shaft driving said trough adjacent its upper end and means for rotating said shaft, and flexible supporting means connected to said trough adjacent the lower end thereof allowing swinging movement of said trough.

3. Apparatus for flaking molten material, which comprises an inclined trough having a bottom, means for passing a cooling fluid in indirect heat exchange relation to said bottom to cool molten material supplied to said trough, an eccentric shaft supporting said trough adjacent its upper end and means for rotating said shaft, a support located above said trough adjacent the lower end thereof, and chains connected to said support and to said trough for causing swinging movement of said trough upon operation of said eccentric shaft.
4. Apparatus for flaking molten material, which comprises an inclined trough having a bottom, means for passing a cooling fluid in indirect heat exchange relation to said bottom to cool molten material supplied to said trough, an eccentric shaft supporting said trough adjacent its upper end and means for rotating said shaft, bearings mounted upon the bottom of said trough adjacent its upper end, said bearings fitting around a portion of said eccentric shaft and flexible means connected to said trough adjacent the lower end thereof allowing swinging movement of said trough.

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