United States Patent

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[54] **METHOD FOR RECOVERING COPPER BASE METAL FROM COPPER BASE ASHES AND RESIDUES**
1 Claim, 1 Drawing Fig.

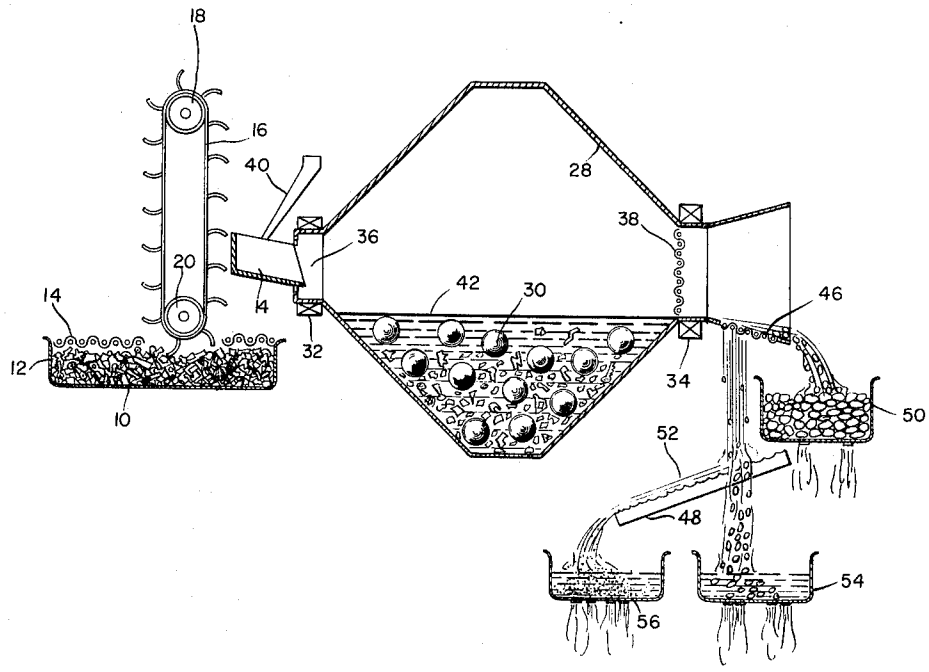
[52] **U.S. Cl.** **241/21,** 241/24, 241/30
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[50] **Field of Search** 241/15, 20, 21, 24, 30, 80

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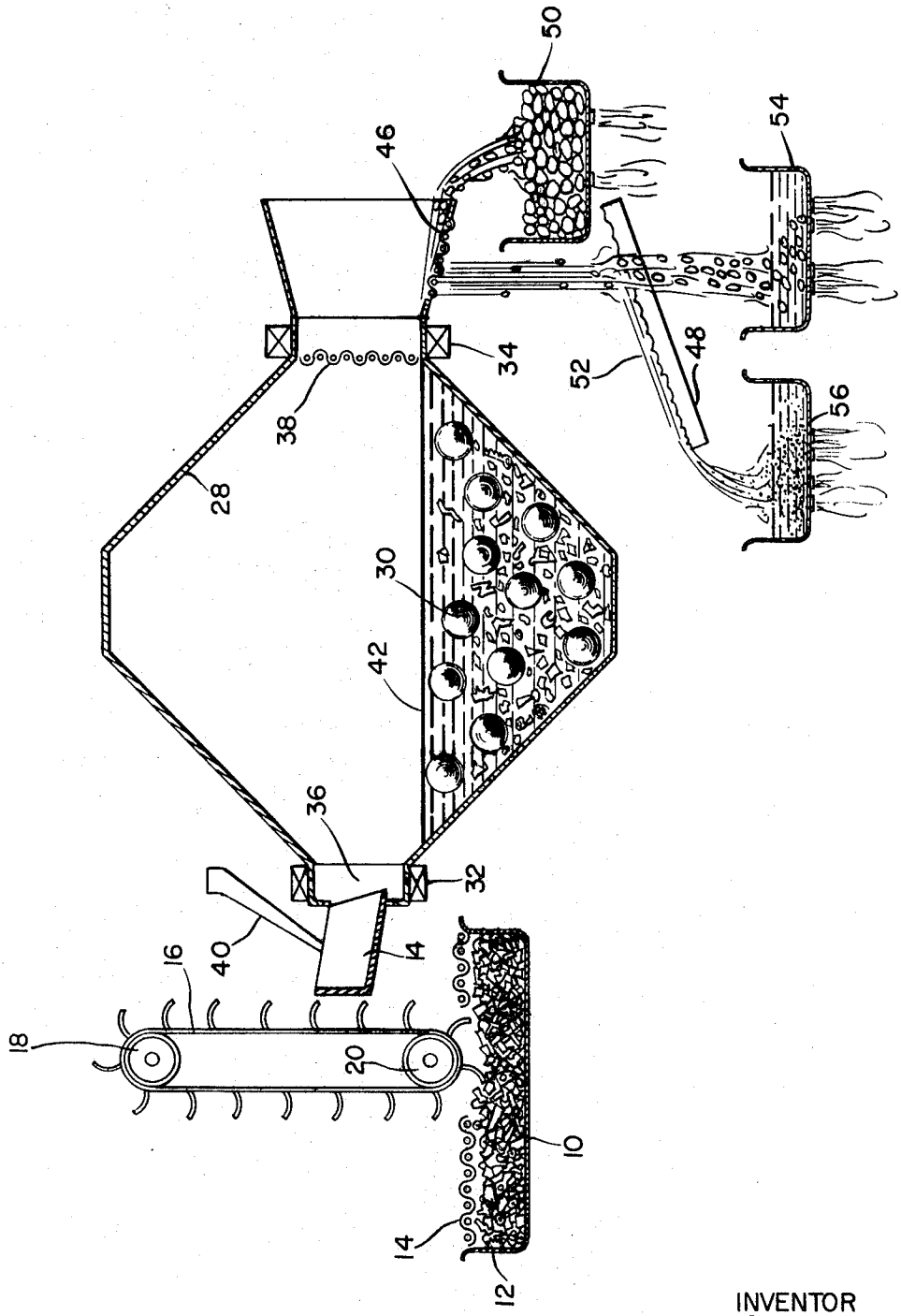
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ABSTRACT: Copper base aggregates are washed with water to remove dust, are ball milled to separate oxides by shock, are screened to remove lumps for reprocessing and are cleaned by flowing with water over a vibrating table, to produce an intermediate copper base product for remelting.



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METHOD FOR RECOVERING COPPER BASE METAL FROM COPPER BASE ASHES AND RESIDUES

BACKGROUND AND SUMMARY

The present invention relates to the recovery of copper base metal from copper base aggregates, particularly copper base ashes and residues from other copper base metal production and fabrication processes and more particularly to such recovery in an efficaciously and economically. Difficulties have been encountered particularly in removing oxygen economically in order to leave a copper base intermediate product useful as a copper melt or copper melt additive.

The primary object of the present invention is to provide a process and a device for providing such an intermediate copper base product by washing with water to remove dust, ball milling to separate oxides by shock, screening to remove lumps for reprocessing, and cleaning by flowing with water over a vibrating table. It has been found that, under the contemplated circumstances, it is more economical to dispose of the oxides separated in the foregoing manner than to attempt to recover useful copper base materials from the oxides by various techniques.

Other objects of the present invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the process and device, together with their steps, parts and interrelationships, which are exemplified in the present disclosure, the scope of which will be indicated in the appended claims.

BRIEF DESCRIPTION OF DRAWING

For a fuller understanding of the nature and objects of the present invention, reference is made to the following detailed specification, taken in connection with the accompanying drawing which is a diagrammatic view of an apparatus embodying the present invention.

DETAILED DESCRIPTION

With reference to the drawing, the starting material is copper base ashes and residues **10**, commonly called grisley, which is supplied to a well **12** through a coarse screen **14**. Generally the copper base ashes are composed of one or more of a member of the class consisting of brass, cupronickel and bronze, containing at least 40 percent copper and a remainder of other constituents.

This starting material is elevated to a chute **14** by a vertical bucket conveyor **16**, which has driven pulley wheels **18, 20** for controlling an endless belt **22** having a series of bucket scoops **24**. The lower extremity of conveyor **16** projects into well **12** so that bucket scoops **24** continuously **16** projects the starting material to chute **14**.

The starting material from conveyor **16** is guided by chute **14** to a rotating drum **28**, which, in conjunction with steel balls **30**, constitutes a mill. Drum **28** is journaled at bearings **32, 34** for rotation about an axis, at the opposite ends of which are an inlet **36** and an outlet **38**. A stream of water, introduced at **40**, flows through inlet **36** to form a pool of water **42** in mill **28**, and through outlet **38**, which is associated with a series of screens to be described below. Generally the volume occupied by steel balls **30** ranges from one-third to one-half the volume of drum **28**. Steel balls **30** range in diameter from 1.5 to 5 inches.

Outlet **38** communicates with a series of a vertical screen **44** and an inclined screen **46**. Screen **44**, which is located in outlet **38** and is characterized by 1 to 2 inch openings, retains the copper base material within the mill for a sufficiently long

period for the balls to remove metallic oxide particles from larger agglomerates by shock. Screen **46**, which is characterized by openings one-sixteenth to one-fourth inch openings, serves to pass fines to an inclined vibrating table **48** and to guide coarse agglomerates to a container **50**. Vibrating table **48** is riffled as at **52**. As the aqueous slurry of fines flows over the vibrating table, which is inclined, the heavier metal bearing particles tend to be retained by the riffles in such a way as to flow transversely along the riffles for capture in a suitable container **54** and the lighter oxidized particles flow transversely of the riffles in the direction of inclination of the vibrating table for capture in a suitable container **56**.

OPERATION AND CONCLUSION

In the process of the present invention, in one example, screen **46** has openings that are 1¼ inch in diameter and screen **46** has openings that are one-eighth inch in diameter. Agglomerates from well **12** are transferred to chute **14** by conveyor **16** and immersed in a steady flow of water through inlet **40**. Within mill **28**, which rotates continuously, the agglomerates are impacted by steel balls **30** and the slurry produced by water **42** is flowed toward screen **38**, which retains balls **30** and the larger agglomerates and transmits that portion of the slurry containing particles less than 1¼ inch in diameter. This portion of the slurry flows over inclined screen **46**, which transmits that portion of the slurry containing the smaller particles and guides that portion of the slurry containing the larger particles. The larger particles, which are at least one-eighth inch in diameter, are caught by container **50**. The smaller particles, which are less than one-eighth inch in diameter, are flowed onto inclined vibrating table **48**, where the metal bearing particles are caught in container **54** and the residue is caught in container **56**. Containers **50, 54** and **56** all have lower openings, through which water escapes. Since certain changes may be made in the foregoing disclosure without departing from the scope hereof it is intended that all matter contained in the foregoing description and shown in the accompanying drawing be interpreted in an illustrative and not in a limiting sense.

What is claimed is:

1. A process for recovering copper base metal from copper base aggregates, said process comprising the steps of washing said aggregates with water to remove dust, ball milling said aggregates in an aqueous slurry to separate oxides by shock, screening said aqueous slurry to remove lumps for reprocessing, screening to separate a slurry component containing larger particles and a slurry component containing smaller particles, and flowing said slurry component containing smaller particles over a riffled vibrating support to separate metal bearing particles from oxidized residue, said copper base metal being selected from the class consisting of brass, cupronickel and bronze, said ball milling being effected with steel balls that range in diameter from 1.5 to 5 inches in a rotating mill having an axis, an inlet at one end of said axis receiving said copper base aggregates, an outlet at the other end of said axis discharging a slurry formed in said rotating mill, said axis being slightly inclined from said inlet to said outlet, said screening being effected by a first screen at said outlet for retaining predeterminedly large particles in said mill and a second inclined screen at said outlet for receiving a flow of slurry from said outlet in order to separate finer particles from coarser particles, the volume of said steel balls ranging from one-third to one-half the volume of said rotating mill, said screening including obstructing at said outlet with a screen having openings ranging from 1 to 2 inches.

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