United States Patent

[11] 3,542,299

[72] Inventor **Samuel A. Sholl**
Clearfield, Pennsylvania

[21] Appl. No. **744,073**
[22] Filed **July 11, 1968**
[45] Patented **Nov. 24, 1970**
[73] Assignee **Clearfield Machine Company**
a corporation of Pennsylvania

[54] **FOUNDRY SAND RECOVERY METHODS**
5 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **241/24,** 241/29
[51] **Int. Cl.** **B02c 15/00,** B02c 23/00
[50] **Field of Search** ..... 241/24, 29, 30, 79.1, 80, 109, 110, 117–119, (Foundry Sand Treatment Digest 13)

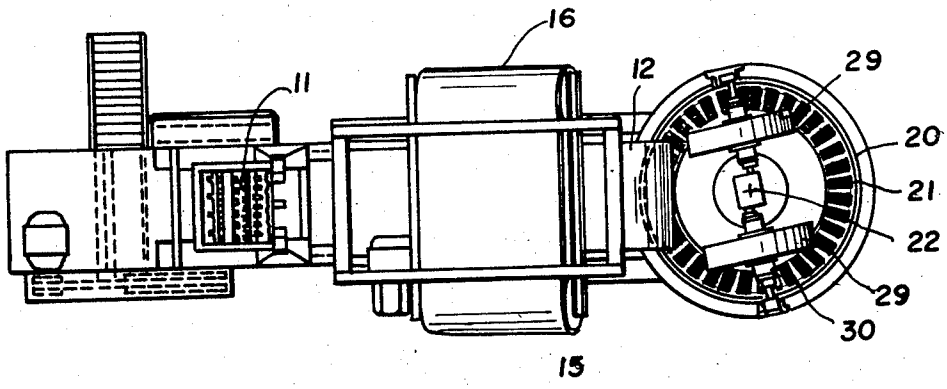
[56] **References Cited**

UNITED STATES PATENTS

1,110,222	9/1914	Morat	241/117
1,700,713	1/1929	Campion	241/19
2,594,929	4/1952	Howell	241/24

Primary Examiner—Donald G. Kelly
Attorney—Buell, Blenko & Ziesenheim

ABSTRACT: A method is provided for reclaiming used foundry molds and cores by the steps of reducing them to a size less than 4 inches, removing free iron particles and subjecting them to a rubbing action between two relatively moving surfaces having simultaneously a parallel and a tangential component of motion relative to one another and spaced apart at least one-fourth inch.



Patented Nov. 24, 1970 3,542,299

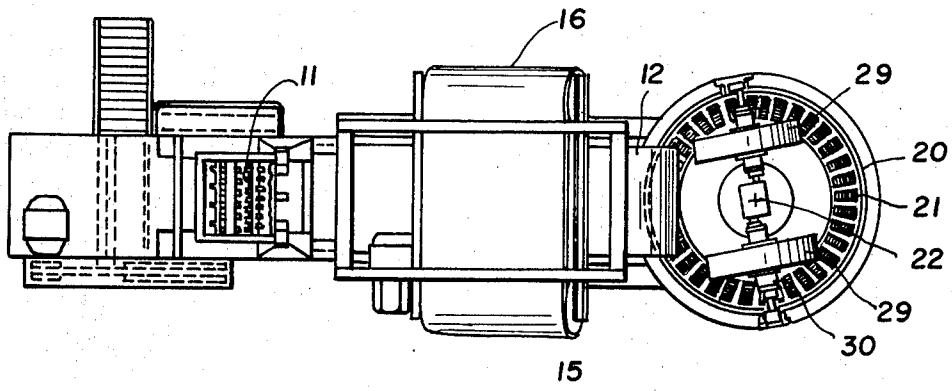


Fig. 1.

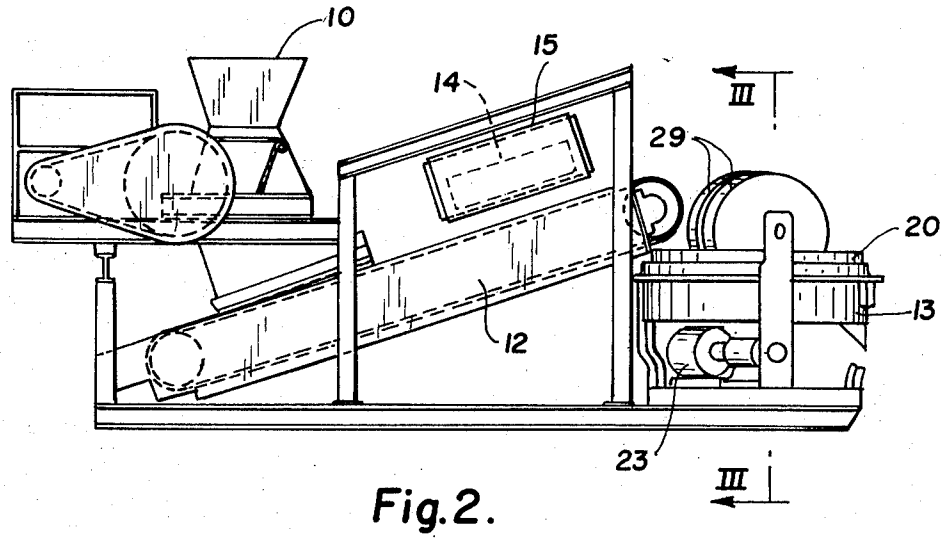


Fig. 2.

INVENTOR.
SAMUEL A. SHOLL
BY
Buell Blenko & Zisenheim
his ATTORNEYS

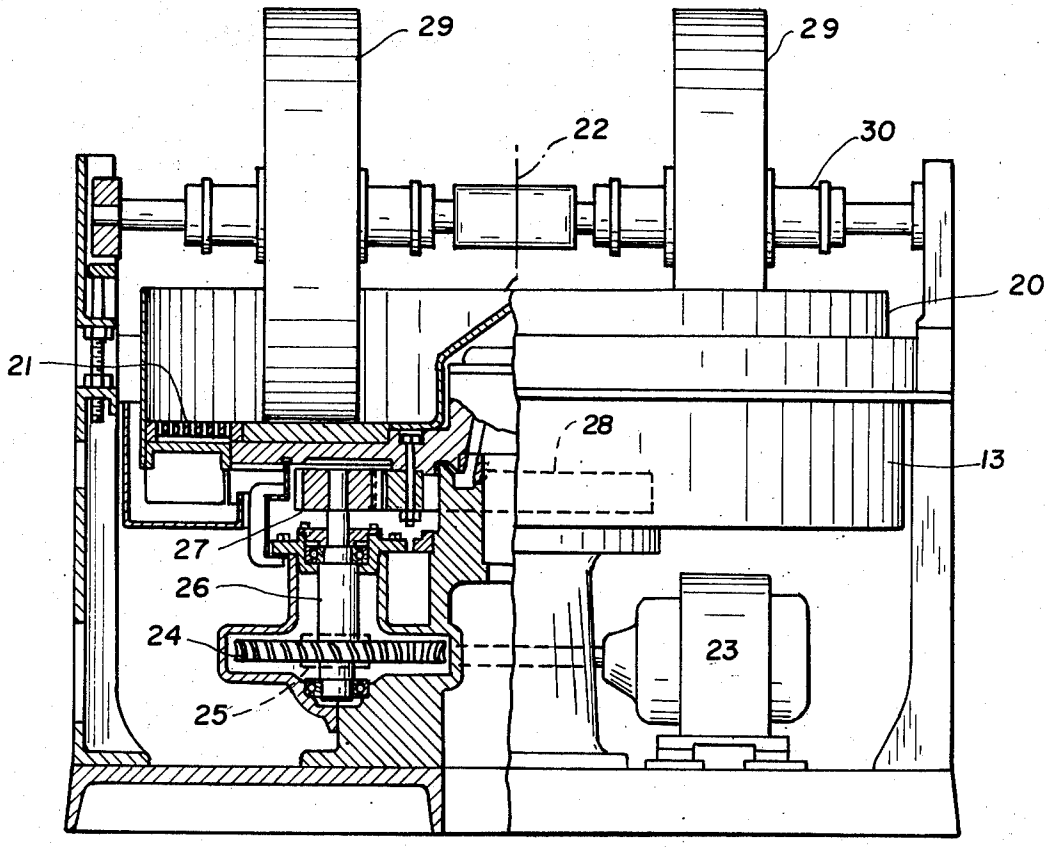


Fig. 3.

INVENTOR.
SAMUEL A. SHOLL
BY
Buell Blenko & Zauenhaus
his ATTORNEYS

FOUNDRY SAND RECOVERY METHODS

In the foundry art vast amounts of refractory particulate material such as sand is used in connection with various binder materials in the formation of molds and cores for casting metals. After the metal is cast into the mold or around the core the mold or core is removed and discarded or recovered as much as is possible with presently existing methods. When the mold or core is removed it is generally broken into pieces bonded together by the binding agent and must be broken and reduced in size to the original discrete particles. It is necessary in any recovery process to obtain from the recovered molds and cores a particulate material whose composition and size range is generally the same as that of the original starting material.

In the past many methods of recovery have been proposed for the solution to the problem of sand recovery. Virtually all such methods have been based upon attrition methods. For example Ward U.S. Pat. No. 2,766,496 provides a method in which the sand to be reclaimed is suspended in liquid suspension (water) and two streams are hurled against each other at high pressure to break down the sand and coating. Bird U.S. Pat. No. 2,331,102 uses a crusher and pebble mill in which the sand in liquid suspension is milled. Many other methods of attrition in liquid suspension also have been proposed. The problem with all of these methods is that there is an excessive production of fine materials which must be discarded and the product is a liquid suspension from which the sand and water must be separated in whole or in part. While such methods will reclaim a portion of the sand or other particulate refractory material from used molds and cores, they have proven to be economically unsatisfactory because of the high losses in fines and the cost of water removal.

I have invented a method of dry reclaimation of sand which eliminates both of the problems mentioned above. By my method I am able to produce a reclaimed product of substantially the same size consist as the original particulate material and in the dry state.

Preferably I reduce the molds and cores to reclaimed to pieces whose size range is less than about 4 inches in largest dimension, preferably in the range between about 1 inch to 2 inches, removing free iron particles from said pieces and then subject the said pieces to a rubbing action between two relatively moving surfaces having simultaneously a parallel and a tangential component of motion relative to one another, said moving surfaces being not less than one-fourth inch apart. Preferably the moving surfaces are maintained in the range of one-fourth inch to 1 inch apart. It is important that this distance be maintained in order to maintain a minimum of fine material in the product. The product is preferably screened to obtain the desired size and oversize materials are recycled and again subjected to the rubbing action between the two relatively moving surfaces.

In the foregoing general description of my process I have set out certain objects, purposes and advantages. Other objects, purposes and advantages will be apparent form a consideration of the following description and the accompanying drawings in which:

FIG. 1 is a side elevation of an apparatus for carrying out the method of my invention;

FIG. 2 is a top plan view of the apparatus of FIG. 1; and

FIG. 3 is a segmental section on the line III–III of FIG. 2.

Referring to the drawings I have illustrated a hopper **10** feeding into a precrusher **11** designed to reduce materials fed to it to a size of 4 inches or less. A conveyor **12** extends from below crusher **11** to a screen plate dry pan **13**. A magnet **14** is located above belt **12** to remove ferrous material from conveyer **12**. A continuous moving transverse belt **15** bears against magnet **14** between the magnet and conveyor to carry the ferrous material removed from the conveyor to a discharge point **16** to one side of the conveyor. The belt **15** is self-unloading as it leaves the force field of the magnet **14**.

The screen plate dry pan **13** is made up of a moving solid pan **20** having a peripheral screen pan **21** fixed thereto. The pan **20** is rotated about axis **22** by motor **23** driving pinion **24** through worm **25**. The pinion **24** drives shaft **26** which carries pinion **27** which in turn engages annular rack **28** on the bottom of pan **20**. Mounted above pan **20** are two cylindrical wheels **29** on axles **30** which extend diametrically across pan **20**. The periphery of wheels **29** are spaced from pan **20** a distance of at least one-fourth inch or more.

Molds and cores to be recovered are fed into hopper **10** and through precrusher **11** where they are reduced in size and fed to conveyor **12**. As the conveyor carries the material from precrusher **11** it passes beneath magnet **14** which picks up ferrous material and holds it against belt **15** which carries the iron particles to discharge point **16**. The remaining material on conveyor **12** is discharged onto pan **20** where it is carried beneath wheels **29**. The material beneath the wheels **29** is subjected to a simultaneous parallel and tangential rubbing action which breaks down the particles to their original size consist without crushing the particles and without attrition of the particles and consequent losses.

Where the sand grains have been coated with organic resin binders the present invention improves the sand for the use with similar coatings. As a result the recoating of the sand is simplified and a reduction of 25 percent or more in binder use is achieved. This is an added bonus beyond the reduction of attrition losses.

In cases where mineral bonded sands are reclaimed, further processing may be necessary in a heat furnace or a wet scrubber as will be recognized in the art in order to remove the mineral bond coating residue on the refractory grains.

While I have illustrated and described a presently preferred practice of my invention in the foregoing specification, it will be understood that this invention may be otherwise embodied within the scope of the following claims.

I claim:

1. The method of reclaiming used foundry molds and cores of particulate refractory materials comprising the steps of:

a. reducing the molds and cores to a size less than 4 inches in largest dimension;

b. removing any free iron particles from said reduced material; and

c. subjecting the said reduced material to a rubbing action between two relatively moving surfaces having simultaneously a parallel and a tangential component of motion relative to one another, said moving surfaces being separated by a distance sufficient to cause separation of individual sand particles without substantial fracturing and promptly removing the separated particles from the two surfaces.

2. The method as claimed in claim **1** wherein the material after being subjected to step *c* is screened to remove larger particles above a desired maximum size and said larger particles are recycled to step *c*.

3. The method as claimed in claim **1** wherein the molds and cores are reduced in step *a* to a size between about 1 inch and 2 inches in largest dimension.

4. The method as claimed in claim **1** wherein the rubbing action is produced by feeding the material onto a rotating annulus and passing said annulus beneath a rotating cylinder whose axis of rotation is diametrical of and parallel to the plane of the annulus.

5. The method as claimed in claim **1** wherein the moving surfaces are between about one-fourth inch and 1 inch apart.