Patented Apr. 30, 1929. 1,711,136

UNITED STATES PATENT OFFICE.

FRANK G. BROTZ, OF KOHLER, WISCONSIN, ASSIGNOR TO KOHLER COMPANY, OF KOHLER, WISCONSIN, A CORPORATION OF WISCONSIN.

MOLDING COMPOSITION.

No Drawing. Application filed March 10, 1926. Serial No. 93,786.

This invention has for its object to improve the quality of molding sand for use in foundry molding to facilitate the shaping of the sand into the desired form, to enable it to absorb and retain large quantities of moisture and increase its heat resistance and retard evaporation to prolong the life of the bond and assist in holding the shape of the mold during the flow of molten metal and during the time it is still in a liquid state.

Another object of the invention is to prevent the usual burning out of molding sand due to exhausting the natural vegetable fiber and bond contained therein. Also an object is to permit of the use of burnt-out sand by restoring vegetable fiber and bond thereto.

With the above and other objects in view the invention consists in the molding sand and the method of producing same as herein claimed and all equivalents.

In the ordinary use of molding sand the natural vegetable fiber and bond are soon burnt out and the sand becomes useless, resulting in great waste, not only by the loss of the sand itself, but by the production of defective castings. Defective castings result from the use of partially burnt out sand either by the washing of the sand or by a hardening of the molds in parts due to over-tamping or by developing stresses during shrinking owing to the non-resilient nature of the mold body.

I have found that this waste varies in inverse proportion to the amount of moisture retained in the sand and that by adding to the sand a vegetable fiber, such as granulated wood or sawdust, a greater quantity of moisture will be absorbed and retained and the heat-resisting properties are improved and the resiliency of the sand to resist over-tamping and to permit the casting to shrink is increased, with the result that the castings are improved, and, with the occasional addition of fiber and bond, the sand may continue to be used indefinitely.

In preparing the sand in accordance with this invention, I may use natural molding sand, silica sand, lake sand, or any other sharp sand, and, by the addition of approximately twenty per cent (20%) in volume of absorbent material, such as sawdust, wood flour, vegetable fiber, or any of the solid products of wood, and a usual bonding agent, such as bentonite, fire-clay, or bank clay, I have a composition which, when water is added, will absorb and retain the moisture to a much greater degree than the natural molding sand.

When moisture is added it is absorbed by the wood, which expands to increase the bulk and give a spongy resiliency to the same. This permits of tamping without the necessity for the usual skill required for avoiding over-tamping in spots for the resiliency prevents the sand from being packed in a dense mass. More important, however, is the fact that, when the mold is poured, moisture is driven off and the wood shrinks, allowing the mold to adjust itself to the flow and pressure of the metal and thereby eliminates casting losses ordinarily found in natural and other artificial molding sand. Furthermore, the development of a surrounding blanket of steam tends to increase the heat resistance to prolong the life of the bond and assist in holding the shape of the mold during the flow of molten metal and while the metal is still in a liquid state. The sponginess of the sand, due to the presence of the moisture-containing wood fiber, results in a more porous mold body having a greater number of air spaces, to facilitate venting and provide greater heat insulation. Furthermore, it more readily yields to the pressure due to the expansion and contraction of the casting when cooling and so prevents damaging by distortion, breaking, and the development of undesirable stresses.

Because the wood is not fusible and therefore does not adhere to the castings, the labor of cleaning is greatly reduced and much less sand for replacement is required.

The sand of this invention may be used repeatedly, the wood fiber retaining its ability to reabsorb moisture with each use.

By this method of producing molding sand, natural sand which has been spent my be restored to usefulness, and it is possible to use grades of sand that are not suitable for molding in their natural state because of their deficiency of fiber content and bond.

The castings produced with this sand are uniform and consistently sound and devoid of scabs and washes and are free from chills or hard spots so as to be suitable for porcelain enameling.

The term "wood fiber" as herein used includes all vegetable fiber suitable for the purpose and the proportions mentioned may be varied.

The sand of the present invention is not what is known as a core compound requiring

to be dried and baked to give it ability to stand alone, but constitutes what is known as "green sand", the sand that is shaped to the pattern in the drag and cope of the mold by hand working and tamping in a moist condition. To be workable such a green sand must have sufficient cohesiveness to retain its shape when slightly compressed and the presence of the bonding material, such as clay or bentonite, gives it such cohesiveness.

In the casing of large thin articles, such as bathtubs, such a quantity of metal is required to flow at such a high speed and at such a high temperature that there is a tendency to burn out the sand by driving off all moisture, in the absence of which the bonding material is incapable of holding the sand together and consequently the sand is released and permitted to wash away to impair the casting.

Previous use of sawdust and other vegetable fiber in core compositions which have to be baked or dried before using has been solely for the purpose of reducing the weight of the core body or making the core more porous to increase its ability to vent the gases through the relatively small core space. Such pores are produced by the shrinking of the sawdust or wood fiber during the preliminary baking of the core. The sawdust or other vegetable fiber in the green sand of the present invention, however, is moist when the metal is poured and gradually gives up the moisture to create a heat insulating blanket of steam to protect the sand from burning and to prevent the bonding material becoming dry and consequently to retain the shape of the mold by preventing the sand from washing.

The term "green sand" or "molding sand" is used to distinguished from such pre-dried and baked core materials and indicates the moist workable cohesive molding material capable of being shaped around a pattern.

What I claim as new and desire to secure by Letters Patent is:

1. A molding sand for general use not limited to core material comprising sharp sand and approximately twenty per cent (20%) in volume of wood fiber such as sawdust and a bonding agent such as fire-clay and water.

2. A molding sand for general use not limited to core material comprising sharp sand, wet sawdust and clay having the property of resisting packing and of producing a heat-resisting blanket of steam around the casting.

3. A green molding sand containing an excess of moisture for generating a protecting blanket of steam to prevent the drying of the bond during the pouring of the metal, comprising sharp sand, wet sawdust, and a bond.

4. A green molding sand rendered capable of retaining moisture in excess of that contained in its inter-crystalline spaces for developing a protecting blanket of steam during the pouring of metal and rendered capable of affording vent spaces to accommodate the passage of said steam by having as an ingredient an absorbent material charged with moisture such as wet sawdust.

In testimony whereof, I affix my signature.

FRANK G. BROTZ.

CERTIFICATE OF CORRECTION.

Patent No. 1,711,136. **Granted April 30, 1929, to**

FRANK G. BROTZ.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 95, for the word "my" read "may"; page 2, line 12, for the word "casing" read "casting", and line 41, for the word "distinguished" read "distinguish"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of June, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

CERTIFICATE OF CORRECTION.

Patent No. 1,711,136. Granted April 30, 1929, to

FRANK G. BROTZ.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 95, for the word "my" read "may"; page 2, line 12, for the word "casing" read "casting", and line 41, for the word "distinguished" read "distinguish"; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of June, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)