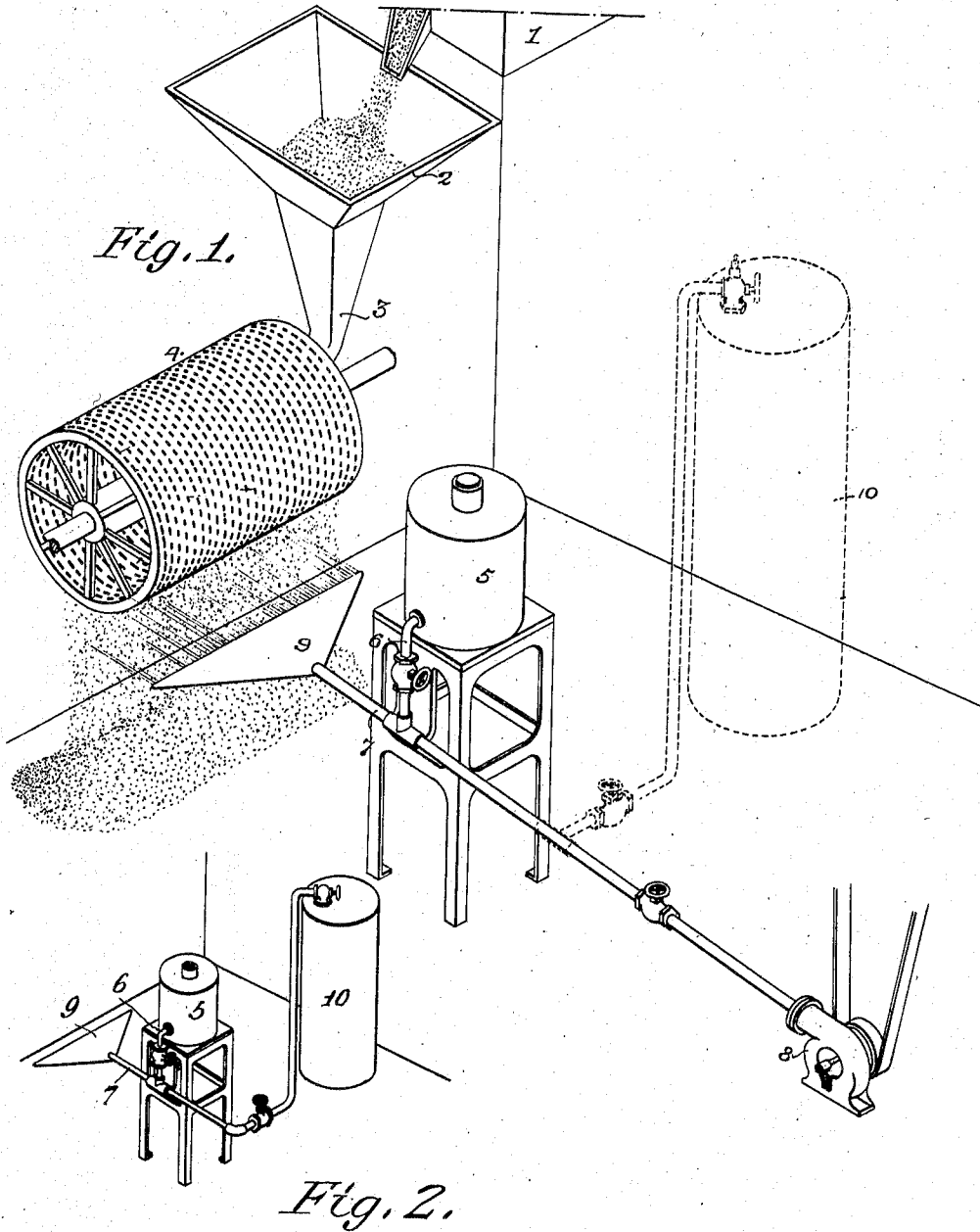


J. S. ROBESON.
 PROCESS OF PREPARING GRANULAR MATERIAL FOR MOLDING PURPOSES.
 APPLICATION FILED FEB. 6, 1905.

947,129.

Patented Jan. 18, 1910.



Witnesses:-

Wills A. Burrows
 Augustus B. Oppen

Inventor
 Jacob S. Robeson.
 by his Attorneys,
 Houson & Houson

UNITED STATES PATENT OFFICE.

JACOB S. ROBESON, OF CAMDEN, NEW JERSEY, ASSIGNOR TO ROBESON PROCESS COMPANY, OF CAMDEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PROCESS OF PREPARING GRANULAR MATERIAL FOR MOLDING PURPOSES.

947,129.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed February 6, 1905. Serial No. 244,496.

To all whom it may concern:

Be it known that I, JACOB S. ROBESON, a citizen of the United States, and a resident of Camden, New Jersey, have invented certain Improvements in Processes of Preparing Granular Material for Molding Purposes, of which the following is a specification.

My invention consists of an improved method or process of preparing the material employed for the purpose of making cores for casting purposes. This material consists of sand, which may be new, or a combination of new and old, and is of various kinds possessing different characteristics, with all of which a binding agent is combined. This binding agent is usually in liquid form and possesses sufficient adhesive qualities to cause the granular mineral matter to stick together, both when being formed into the core in a moist or damp condition, as well as after such cores have been baked or dried; but which will not affect the breaking up or crumbling of the core when the casting operation has been completed and it is desired to remove the finished article from the mold.

In the manufacture of cores for casting purposes it is always necessary, in order to obtain a structure that will stand the strains incident to the casting operation, to provide a binder for the sand that will serve when the core has been baked or dried as a bond of sufficient strength to hold the particles together and permit fairly rough handling of the core; at the same time one that will char and become sufficiently brittle or rotten when it is to be removed from the casting. This binder in all instances is of an adhesive character, having the property of mucilage or glue, and while I propose to use as such binder a concentrated mass of waste sulfite liquor made in accordance with the process set forth in my application for patent filed May 18, 1904, Serial No. 208,625, it will be understood that other binding agents having the same or similar properties may be employed.

It is well known that sand or similar material employed for the purpose of making molds for casting metal requires to be moistened or tempered with water, which is usually sprayed thereon. This sand, however, is of an entirely different character from that employed in the manufacture of

cores, and such molds though dried are never subjected to the baking operation necessary to finish the cores; in fact, many, if not all, molds are in a damp condition when the metal is poured into the same, and their state is regulated entirely by the character of metal used. Cores, on the contrary, require to be baked, and in order to give them a "body" that will resist moisture, maintain their shape and relative hardness after they have been finished, and yet leave them in the condition to be readily broken after the casting operation, it is necessary to combine with the sand of which the core is composed a binder that will remain practically unchanged, even after the baking operation, in so far as its mechanical binding character is concerned. Material having an adhesive nature has been used for quite a long time as the binding agent but the difficulty experienced has been to give the sand intimate contact with such binder so that each particle will receive its proper proportion of adhesive necessary to provide the bridge or bond connecting it with the other particles.

The usual foundry method of preparing the cores and mixture, is to put on the floor the required quantity of each kind of sand to be used previously selected by the foreman or core maker as the proper material for the cores, and to spread or sprinkle on top of this pile the necessary amount of the dry or liquid binder that is to be used, afterward wetting the mass, as may be required, with water. This pile is then cut over and shoveled, being finally put through a riddle and then delivered to the core makers or put in a pile ready for their use. Various modifications of this practice include the riddling of the sand before the application of the binder and the mixing of both materials by machinery, all of which methods are more or less objectionable, and the results obtained therefrom lack the uniformity desirable in the manufacture of articles of this character.

I have discovered that a more intimate mixture of the liquid binding agent with the sand or other finely divided or comminuted mineral matter may be accomplished by spraying it upon such material when in a separated condition; such spraying being accomplished by the aid of fluid under pressure; compressed air being the preferred

medium, and the body of sand being in a loose condition, preferably falling in a fine stream or shower from a suitable elevation.

In the accompanying drawing, I have shown forms of apparatus capable of carrying my invention into effect, in which:

Figure 1, is a perspective view of one form of apparatus employing air as the distributing medium for the adhesive or binder, and Fig. 2, is a view of an apparatus employing steam for the purpose.

In the drawings, 1 represents a chamber heated by any suitable means in which the sand or other material may be dried; 2 a hopper to which dried sand or other material is passed having a spout 3, which conveys it to a suitable screen 4, rotatably or otherwise disposed, from which such material passes in a finely divided condition. The screen is conveniently located so that the liquid adhesive in a finely divided state may be discharged against and through the material as it leaves the screen.

In the present instance, 5 represents a suitable tank or receptacle containing the liquid adhesive, having a pipe 6 delivering such adhesive to a discharge pipe 7, which is connected to a blower 8, suitably driven; such discharge pipe having a flaring nozzle 9, whereby the liquid adhesive under the desired pressure may be discharged in a fine stream or atomized condition in a substantially horizontal plane against and through the falling finely divided material delivered by the screen.

Instead of a blower, steam may be delivered to the discharge pipe from a steam boiler 10, as shown in Fig. 2, and also indicated by dotted lines in Fig. 1. The delivery pipes in each instance are suitably valved as shown. Other means of introducing the adhesive to the finely divided material may be employed, such for instance as tossing the sand or other material from a shovel into the air, and then spraying the binder upon it in its descent; throwing the sand or other material upon an inclined board from which it drops in a fine stream or shower through a spray of the adhesive, or it may be delivered in any other suitable manner through such spray of adhesive. In either instance, the spray of liquid adhesive in a finely divided condition and under the pressure of a suitable fluid, such, for instance, as air under pressure, provides such an intimate admixture of the binder with the sand that I am enabled to use a smaller amount of adhesive than heretofore used in the ordinary practice such as described, and at the same time produce better results.

It may, perhaps, be impossible to say that each and every grain of sand receives a coating or a portion of the adhesive, but it seems to be a fact that the mechanical bond produced by this treatment of the sand is greater

than that produced by adding the binder in the old way, and the saving of adhesive employed over that in the old method is nearly, if not quite, 30%; a further item being that a greater quantity of old sand may be used with such mixture.

I am aware that it has been proposed to treat molding sand by spraying water upon the same, but no such purpose is intended by my process. The proportion of adhesive once prepared and determined for a given quantity of sand, receives no more water, as such addition would dilute it, and is delivered to the sand by the charge of fluid under pressure, which breaks such adhesive into a finely divided state and causes it to permeate the entire body of sand treated. The sand thus prepared is molded into cores in the usual manner, which cores are dried or baked, as may be desired, and are then ready for use. These cores are relatively denser and harder than those prepared from sand mixed in the old way, yet they are sufficiently brittle after the casting operation, and may be readily broken for removal from the finished article.

While I prefer to use compressed air as the means for separating the adhesive and delivering it in a finely divided state against and in intimate relation with the sand, it may be possible under some conditions to use the body of adhesive in a denser state and employ steam under pressure as the means of discharging it against the sand, such steam having such a content of water as will provide a given quantity of adhesive with an amount of moisture equal to that supplied in bulk when compressed air is employed as the medium for discharging it against the sand. The difficulty, however, of determining this water content of the steam and the danger of adding from such steam an excess of moisture which would seriously affect the adhesive qualities of the binding agent and consequently the character of the core, has led me to prefer the use of compressed air as the medium for discharging the adhesive upon the sand for making the cores. In most foundries both air and steam are accessible, and under the most favorable conditions steam might be employed. The necessity, however, for regulating the quality of steam used, would render this practice relatively impossible, except under the most favorable conditions and with the highest class of skilled labor.

Although I have described my process as relating to the preparation of material for the manufacture of cores from sand, it will be understood that it may be utilized with equally valuable results for the manufacture of briquets from coal or other fuel, or iron or other ores, and my invention broadly considered, is intended to extend to and cover the application of the adhesive in the

manner described to the finely divided or comminuted material whether the latter be sand, coal dust or other fuel, or iron or other metalliferous bearing material.

5 Having thus described my invention, I claim and desire to secure by Letters Patent:

1. The process of preparing finely divided and comminuted mineral matter for the manufacture of cores, briquets and other similar shapes, which consists in disposing such material in a loose and unconfined stream or shower, and discharging in a substantially horizontal plane against and through such unconfined stream or shower of finely divided and comminuted mineral matter a liquid adhesive in a finely divided and unconfined state.

2. The process of preparing finely divided and comminuted mineral matter for the manufacture of cores, briquets and similar shapes, which consists in disposing such material in a loose and unconfined stream or shower, and discharging in a substantially horizontal plane against and through such finely divided and comminuted mineral matter while in such unconfined condition a liquid adhesive brought to a finely divided and unconfined state by fluid under pressure.

3. The process of preparing finely divided and comminuted mineral matter for the manufacture of cores, briquets and similar shapes, which consists in disposing such material in a loose and unconfined stream or shower, and discharging in a substantially horizontal plane against and through such finely divided and comminuted mineral matter while in such unconfined condition a liquid adhesive brought to a finely divided and unconfined state by compressed air.

4. The process of preparing sand for the manufacture of cores, which consists in disposing such sand in a loose and unconfined stream or shower, and discharging in a substantially horizontal plane against and through the stream of sand while in such unconfined condition a liquid adhesive in a finely divided and unconfined state.

5. The process of preparing sand for the manufacture of cores, which consists in disposing such material in a loose and unconfined stream or shower, and discharging in a substantially horizontal plane against and through the stream of sand while in such unconfined condition a liquid adhesive brought to a finely divided and unconfined state by fluid under pressure.

6. The process of preparing sand for the manufacture of cores, which consists in disposing such sand in a loose and unconfined stream or shower, and discharging in a substantially horizontal plane against and through the stream of sand while in such unconfined condition a liquid adhesive brought to a finely divided and unconfined state by compressed air.

7. The process of preparing finely divided or comminuted mineral matter for the manufacture of cores, briquets and similar shapes, which consists in drying such material, then scattering or separating the same and disposing it in a loose and unconfined stream or shower, and then discharging in a substantially horizontal plane against and through the finely divided and comminuted mineral matter while in such unconfined condition a liquid adhesive in a finely divided and unconfined state.

8. The process of preparing sand for the manufacture of cores, which consists in drying such sand, then scattering or separating the same and disposing it in a loose and unconfined stream or shower, and then discharging in a substantially horizontal plane against and through such unconfined stream or shower of sand a liquid adhesive binding agent in a finely divided and unconfined state.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JACOB S. ROBESON.

Witnesses:

MURRAY C. BOYER,
JOS. H. KLEIN.