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F. E. JOHNSON.

METHOD OF TREATING MOLDING SAND.

APPLICATION FILED JUNE 1, 1903.

Fig. 1

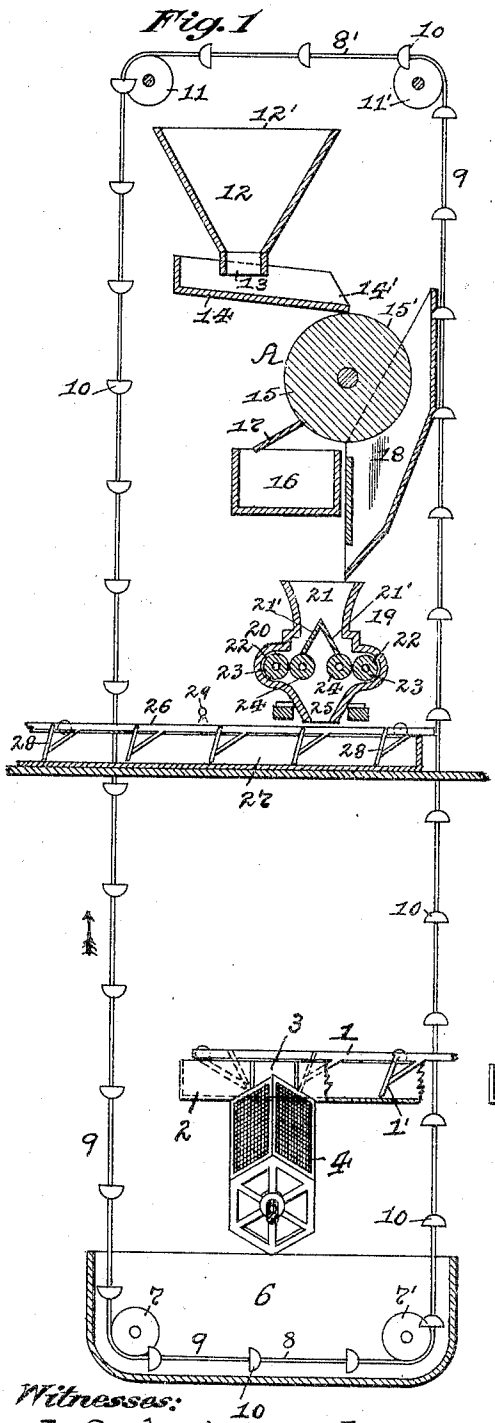
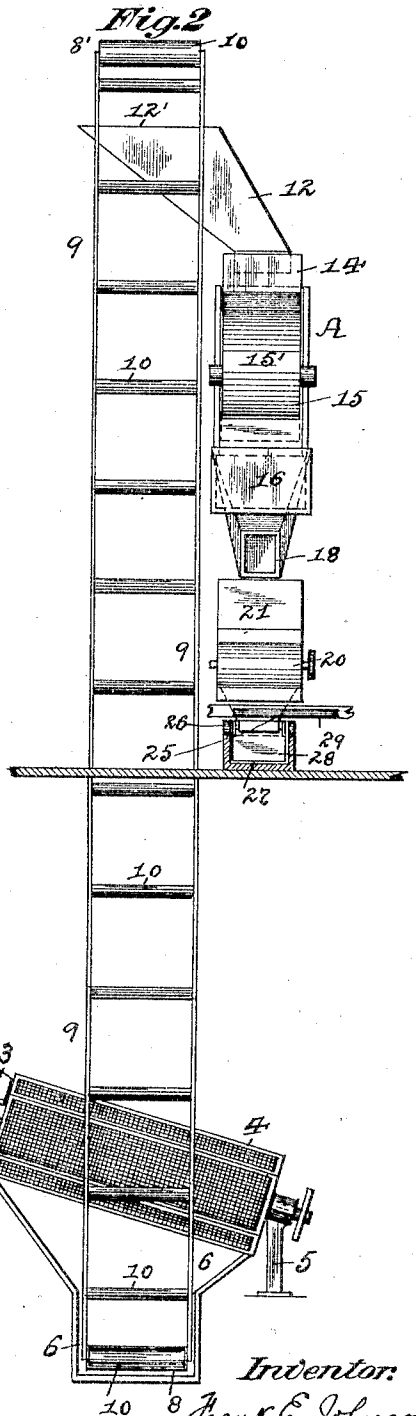


Fig. 2



Witnesses:
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UNITED STATES PATENT OFFICE.

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METHOD OF TREATING MOLDING-SAND.

SPECIFICATION forming part of Letters Patent No. 780,349, dated January 17, 1905.

Application filed June 1, 1903. Serial No. 159,633.

To all whom it may concern:

Be it known that I, FRANK E. JOHNSON, a resident of Greensburg, in the county of Westmoreland and State of Pennsylvania, have invented a new and useful Improvement in Methods of Treating Molding-Sand; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the treating of foundry-sand after the same has been used in making castings.

Heretofore in the making of sand molds by molding-machines and in the handling of the molds and sand used therewith by conveyer apparatus in order to form a continuous process in molding the agitation of the sand has caused it through continuous use to become what is known in the art as "sharp" and "coarse" sand, and such sand also becomes rolled up into small round shapes like shot. This is caused by the fact that new sand must be added from time to time to give the sand the necessary strength, and this new sand being of a clay nature gathers the coarse or sharp sand around it and forms these small balls or shot. As soon as the sand reaches this state it becomes next to impossible to hold it together for molding purposes, and not only this, but castings made from sand in this condition are very rough and objectionable.

The object of my invention is to overcome these objections and difficulties and to so treat the foundry-sand as to bring it back as near as possible to its original state when first used in order to make the finest kind of sand for the purpose, and particularly when such sand is carried along after being used by conveyer apparatus in order to be used again in continuous operations.

My invention consists, generally stated, in the novel process or method as hereinafter more specifically set forth and described, and particularly pointed out in the claims.

To enable others skilled in the art to practice and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a face view of an approved apparatus for conveying sand, showing my invention applied thereto, and Fig. 2 is a side view of the same.

Like characters herein indicate like parts in both the figures of the drawings.

The apparatus shown in the drawings consists of the hot sand or lower conveyer 1, having the flights 1′ thereon, which is adapted to move within a trough 2 and can be of any ordinary or approved construction and operated in any suitable manner. Leading from this trough 2 is a chute 3, which connects with a hexagonal riddle 4, mounted in supports 5 and adapted to be revolved in any suitable manner or by any suitable means. Below and extending up to the riddle 4 is a boot 6, which is stationary and supported in any suitable manner, and within this boot 6 are the wheels 7 7′, around which the lower end 8 of an endless elevator 9 passes and upon which are the elevator-buckets 10. The upper end 8′ of the elevator 9 passes over the wheels 11 11′, and below this upper end 8′ and outside of the path of the elevator 9, as shown in Fig. 2, is preferably located a magnetic separator A, which consists of a hopper 12, supported in any desired manner and having its receiving-opening 12′ extending under the upper end 8′ of the elevator 9 and adjacent to the wheel 11, while its discharge-opening 13 communicates with an agitator 14, located under said opening 13 and operated by any suitable means. The agitator 14 is inclined, and its lower end 14′ extends adjacent to the upper part of a revolving roller 15, suitably supported and revolved, which end 14′ leads to the magnetized face 15′ of said roller 15, while below this roller 15 and at one side thereof is the trough or box 16, which has a scraper 17 above the same and engaging with the face 15′ of said revolving roller 15. Fitting under and around the other side of the roller 15 of the magnetic separator A is the chute 18, which is supported adjacent to and at one side of the box 16 and leads to the grinding apparatus 19. The grinding apparatus 19 is mounted in a casing 20, at the upper end of which is a hopper 21, leading under the chute 18, and within this casing 20,

below the hopper 21. are the two sets of rollers 22, which are composed of the outer rollers 23 and the inner rollers 24 and have the inclined ways 21′ above the same. These rollers 23 and 24 are mounted within the casing 20 and are operated in any suitable manner so as to revolve toward each other, and the inner rollers 24 are adapted to be revolved at a less speed than the outer rollers 23. Below the sets of rollers 22 and formed in the casing 20 is the chute 25, which leads from the passes between the rollers 23 and 24 to an upper conveyer 26, located and moving within a trough 27 and provided with flights 28 thereon.

In practicing my improved method I proceed as follows: After the molds have been made in the molding-machines they are generally placed upon a conveyer and the castings poured while on the same, which conveyer carries the molds containing the hot castings to a grating, and by the time these molds reach such grating the castings therein have become sufficiently set or cooled so that such molds, with their castings, are dumped upon such grating, and the hot sand will pass through the grating into the trough 2, containing the conveyer 1, leaving the castings upon the grating, from which they can be removed when desired. After this hot sand has passed into the trough 2 the conveyer 1 therein by its flight 1′ carries it to the revolving hexagonal riddle 4 through the chute 3, leading from the trough 2, and this riddle 4 allows such sand to pass through the same and drop into the boot 6 below such riddle 4. The elevator 9, having the buckets 10 thereon, is running continuously around the wheels 7 7′ and 11 11′, and the lower end 8 of such elevator 9 is passing through the boot 6, which allows the sand dropped into the boot 6 from the riddle 4 to be carried up by said buckets 10 in the direction of the arrow shown in Fig. 9 and over the wheel 11 at the upper end 8′ of the elevator 9. After such sand has been carried up by the buckets 10 over the wheel 11 it will be dumped into the hopper 12 of the magnetic separator A under the upper end 8′ of said elevator 9 through its receiving-opening 13 thereof onto the agitator 14, and the movement of such agitator 14 will allow the sand to pass out at its lower end 14′ onto the revolving roller 15, where any small particle of metal within such sand will be caught by the magnetized face 15′ on said roller and be held thereon until scraped off into the trough or box 16 by the scraper 17. The sand as it passes from the end 14′ onto the roller 15 will pass around said roller into the chute 18 and through such chute 18 into the hopper 21 of the grinding apparatus 19, and after the sand had passed into the hopper 21 it will be directed by the inclined ways 21′ within the casing 20 onto the rollers 23 and 24 of the two sets of revolving rollers 22. As the inner rollers 24 are revolved at a less speed than the outer rollers 23, the sand will be caught thereon and drawn through the passes between the rollers 23 and 24 by the faster-revolving rollers 23, and so crush the sand and grind out the coarse parts of the same, such as the small round shapes, balls, &c., hereinbefore referred to. After the crushed or ground sand has passed between the rollers 23 and 24 it drops through the chute 25 into the trough 27, where it is caught by the flights 28 of the conveyer 26 and carried to the molding-machines to be again formed into molds, and the operations as hereinbefore described are repeated, thus constituting a continuous process.

The sand is ordinarily tempered with water before being reused, sufficient water being fed to it to give it the proper consistency. The water for tempering may be supplied to the sand at any stage of its passage from the dumping-grating back to the molding-machines, in the drawings being shown as supplied after the sand has been rolled and crushed, the water being conveniently supplied by means of a water-pipe 29, located above the trough 27. The conveyer 26 within said trough 27 and the flights 28 thereof will thoroughly agitate the sand and mix the same with the water before being returned to the molding-machines.

It will be evident that the magnetic separator A may be omitted, if desired, and the sand be dropped directly from the buckets 10 of the elevator 9 at the upper end 8′ of said elevator directly into the grinding apparatus 19 through the hopper 21 thereon and that other forms of conveyer apparatus may be used for conveying the sand to the grinding apparatus. These and various other changes in the steps and operations of my improved method or process of treating foundry-sand may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages. It will thus be seen that my improved method of treating foundry-sand is simple and cheap in operation, and by its use the sand will last and be in good condition for an indefinite length of time in the continuous operations. Practical experience has proved that the sand so crushed or ground will become soft and velvety and be restored to its original state or condition, as well as overcoming the lumpy sand and making it the finest kind for the purposes intended.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method of treating molding-sand, which consists in taking the sand after having been used in a mold, reducing the same to a fine condition, tempering the same either before or after reducing, and then returning the same to the molds to be reused.

2. The method of treating molding-sand, which consists in taking the sand after having been used in a mold, grinding or crushing the same, tempering the same either be-

fore or after grinding, and then returning to the molds for reuse.

3. The method of sand-molding, which consists in taking the sand after having been used in the mold, grinding or crushing the same, adding water thereto until properly tempered and then again forming into molds.

4. The method of treating molding-sand, which consists in taking the sand after having been used in a mold, removing the metallic particles therefrom, reducing the sand to a fine condition, tempering the same either before or after reducing, and then returning the same to the molds to be reused.

In testimony whereof I, the said FRANK E. JOHNSON, have hereunto set my hand.

FRANK E. JOHNSON.

Witnesses:

ALBERT W. MCKENNEY,

JOHN R. HUNTER.