Jan. 22, 1929. 1,699,575

F. W. E. SPIES

METHOD OF GRANULATING MOLTEN SLAG

Filed Aug. 4, 1927

Fig. 1.

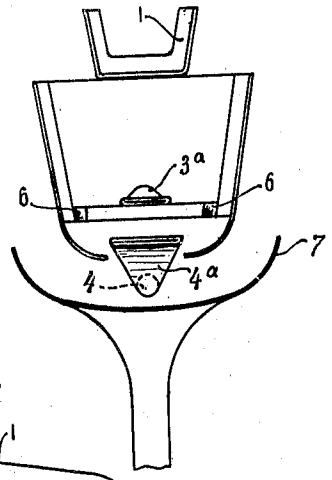


Fig. 2.

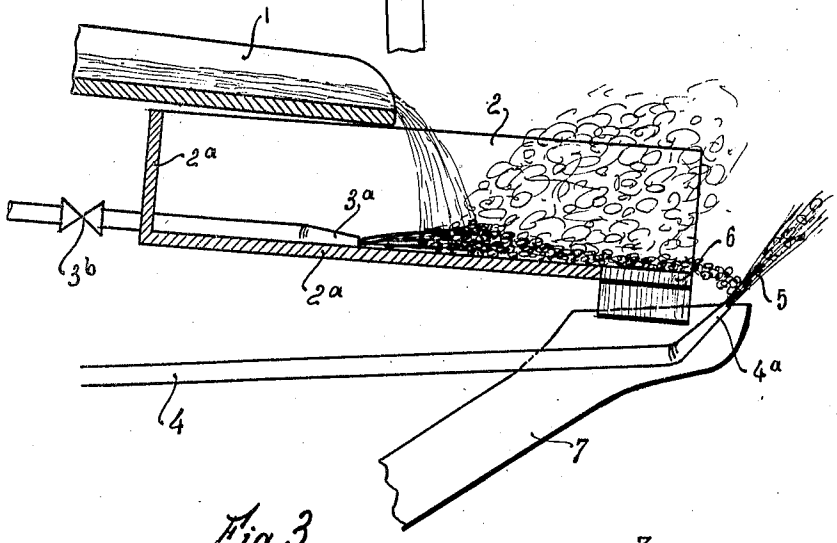
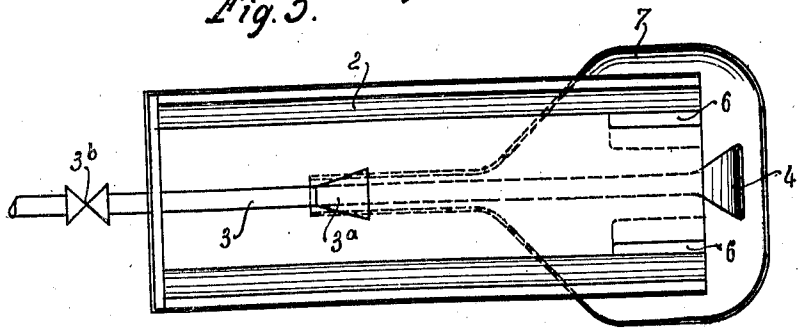


Fig. 3.



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UNITED STATES PATENT OFFICE.

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METHOD OF GRANULATING MOLTEN SLAG.

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My present invention relates to a method of granulating molten slag, for instance, from a blast furnace, its object being to obtain, with a minimum of cost, a practically dry product of sufficiently glassy character and suitable for the manufacture of cement, bricks and the like.

With this object in view, I bring the molten slag into contact with a relatively small quantity of water, for instance, of from 300–500 litres per ton of finished product, whereby the molten slag is strongly cooled down and converted into a spongy mass, and the water entirely or for by far the greater part evaporated. This spongy mass, while still comparatively hot, is exposed to the action of a jet or stream of relatively cool gas, preferably air derived from the cold blast main, whereby it is further cooled down and changed into finely grained material.

Over the so-called "moist granulation", my method has the advantage of working without, or with only a very small excess of water and of yelding a substantially dry material, yet without requiring cooling drums or other mechanical appliances that are liable to heavy wear and tear. Consequently, with my novel method both the power and the water consumption are minimized, which is remarkable in view of the exceptionally high grade product, which is a fine, porous material without big lumps. Moreover, my method can be carried out in an installation which requires very little floor space.

In order that my said invention may be fully understood by those skilled in the art, I shall now proceed to describe the same with reference to the annexed, more or less diagrammatic drawing, which illustrates, by way of example only, an apparatus in which my process can be carried out. On this drawing:

Fig. 1 is a front elevational view,

Fig. 2 is a longitudinal sectional view, and

Fig. 3 is a plan view of said installation.

The molten slag from the blast furnace, or from any other source, is fed by the usual slag runner 1 onto a slightly downwardly sloping shoot 2, the walls of which are coated with cast iron wearing plates 2^a. Over the bottom of this shoot flows a stream of cold water ejected from a nozzle 3^a, at the end of a cold water supply pipe 3 provided with a valve 3^b. When coming into contact with this cold water and with the steam generated therefrom, the molten slag is suddenly cooled down to say 600° C. and converted into a spongy, dough-like mass. The supply of cold water is controlled in such a manner that the quantity of water just suffices to turn the molten slag into a semifinished product of the above said properties. As already stated above, a quantity of 300–500 litres of water per ton of finished product will ordinarily prove to be satisfactory. The excess of water, if any, is drained through two short, lateral slots 6, provided in the bottom of the shoot at the end thereof, this water being discharged by a conduit 7, the mouth of which extends to a certain distance in front of the end of the shoot 2 so as to also receive the water that may flow over the front edge of the shoot.

Mounted immediately in front of the end of the shoot and nearly on a level with its bottom is a nozzle 4^a forming the end of a pipe 4 connected with a suitable source of compressed air, for instance, the cold blast main, although it should be understood that it may also be connected with a source of other gas, or vapour, for instance, steam. The nozzle 4^a is upwardly inclined, its mouth being elongated in a horizontal direction at right angles to the longitudinal axis of the shoot 2, so that the still hot, spongy mass falling from the shoot is spread out and blown away in an upwardly inclined stream 5, the consequence being that said mass is broken up and cooled down. The product thus obtained is a substantially dry, finely granulated, porous mass of high quality, which, by the jet of air, is delivered into a storage bin or the like.

By adjusting the distance between the end of the runner 1 and that of the shoot 2, I may regulate the time during which the molten slag is in contact with the water.

What I claim is:—

1. In a method of granulating molten slag, bringing the molten slag into contact with water so as to convert it into a spongy mass, and exposing said spongy mass to the action of a relatively cool gas stream so as to change it into substantially dry, granulated material.

2. In a method of granulating molten slag from a blast furnace, bringing the molten slag into contact with a relatively small quantity of water so as to convert it into a spongy mass, and exposing said spongy mass to the action of a stream of cold air derived from

the cold blast main so as to change it into substantially dry, granular material.

3. In a method of granulating molten slag, allowing the molten slag to flow through a conduit in contact with a relatively small quantity of water so as to be converted into a spongy mass, and thereafter allowing said spongy mass to flow into the path of a relatively cool gas stream so as to be changed into substantially dry, granulated material.

4. In a method of granulating molten slag, allowing the molten slag to flow through a downwardly sloping shoot, flowing a relatively small quantity of water into contact with the molten slag in said shoot so as to convert the same into a spongy mass, and allowing said spongy mass from said shoot to fall into contact with an upwardly inclined stream of relatively cool gas whereby it is changed into and blown away as substantially dry, granulated material.

5. In a method of granulating molten slag, allowing the molten slag to flow through a downwardly sloping shoot, flowing a relatively small quantity of water into contact with the molten slag in said shoot so as to convert the same into a spongy mass, allowing said spongy mass from said shoot to fall into contact with an upwardly inclined stream of relatively cool gas whereby it is changed into and blown away as substantially dry granulated material, and allowing the excess of water to separate from the spongy mass before said mass is exposed to the action of the gas stream.

In testimony whereof I affix my signature.

FRIEDRICH WILHELM EMIL SPIES.