

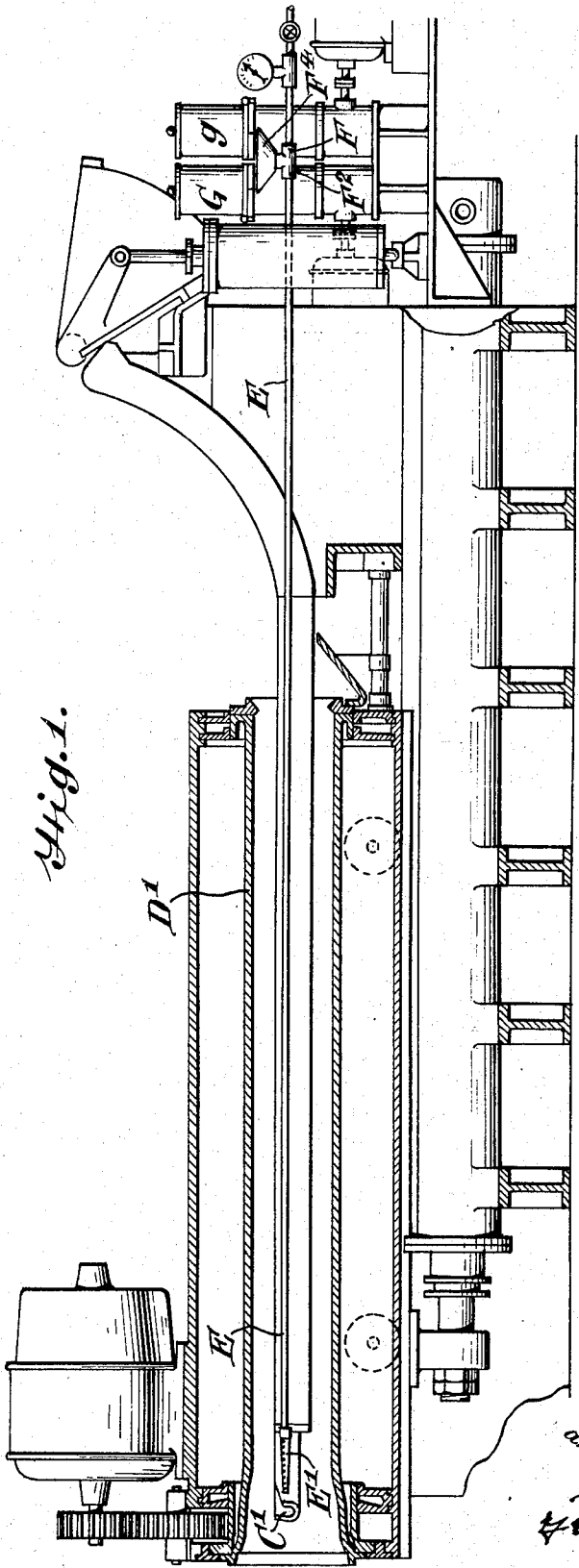
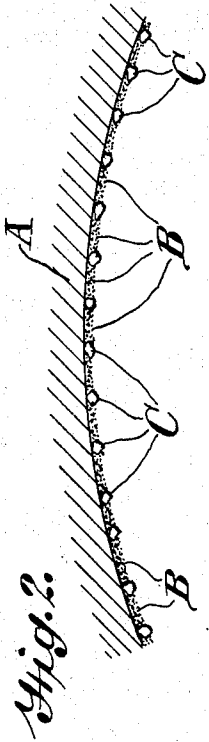
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COATED METALLIC CENTRIFUGAL PIPE MOLD

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COATED METALLIC CENTRIFUGAL PIPE
MOLD

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5 Claims. (Cl. 22-189)

Our invention relates to the coating of metallic centrifugal pipe molds with a finely divided dry coating material of such loosely adherent and loosely coherent structure as results from the application of the finely divided dry coating material to the mold by directing a jet of a carrier gas charged with the finely divided dry coating material against successive contiguous areas of the mold surface, that is to say, by the method described and claimed and illustrated in one mode of application in the patent granted to Messrs. Russell and Langenberg, Number 1,949,433 of March 6, 1934. In the centrifugal casting of pipes in molds coated with the finely divided dry coating material as described in the said Russell and Langenberg patent, under certain conditions with regard to the fluidity of the molten iron poured into the mold, the molten metal will not at all times pick up the rotary motion of the mold with sufficient promptness to insure that after contacting with the coated mold surface it would be carried along by the mold with sufficient speed to insure that its centrifugal motion will hold it in contact with the mold and, as a result, portions of the molten metal will at times fall away from the surface of the mold carrying with it portions of the coating material and falling upon the molten metal lying at the time beneath the falling metal and from both causes imperfect pipes are produced characterized by what are known as mold splashes and liable to have undesirable areas of chill. The object of our invention is to so change or modify the structure of the coating applied to the mold that it will at the same time be less liable to slip on the surface of the metallic mold to which it is applied and more able to take a better grip upon the freshly poured metal, thereby decreasing the liability of the molten metal to slip on the surface of the coating or to cause a slipping of the coating on the surface of the mold, thus insuring that the rotary motion of the mold shall be more promptly transmitted to the molten metal flowing into the mold. These results can, we have discovered, be effected by admixing with the finely divided dry coating material forming the coating of the mold, sand like grains of a hard and compact crystalline structure and of a substance or substances substantially non-reactive and substantially nonfusible under conditions existing during the casting of a pipe, the sand like grains being of materially larger size than the particles of finely divided dry coating material and so distributed through the finely divided coating material that they will contact in large part with

the metal surface of the mold and project in large part through the inner surface of the coating formed by the finely divided dry coating material. The distribution of the sand grains to bring about the actual contact of a very large proportion of the grains with the metallic surface of the mold is best effected by charging the jet of carrier gas charged with finely divided dry coating material with an additional charge of the sand like grains which, owing to their greater mass, will, as the coating is applied to the mold be projected through the finely divided material so as to come in large part in contact with the metallic mold surface while the size of the grains will be such that they will, at the time the molten metal comes in contact with the coating, project in part beyond the inner surface of the portion of the coating formed by the finely divided dry coating material and come in actual contact with the molten metal.

By preference we use for the sand like grains of our composite coating silica sand, the particle size of which, or of any other available sand like material, should be such that it will pass a sieve of 20 meshes to the inch, more preferably, a sieve of 30 meshes, while approximately 75% of the sand is retained on a sieve of 50 meshes to the inch. Any other sand like material having a hard, compact, crystalline structure and substantially nonreactive and nonfusible under conditions existing during the casting of a pipe can be used in place of silica sand, as, for example, carborundum, but pains should be taken that the grains of sand like material are of such structure as to retain their form without breaking up under the stresses to which they are subjected during casting and it is also important that the sand like material should be uncontaminated with clay or other material which might act like a lubricant and prevent the proper adhesion of the sand like grains to the mold surface or impair their grip upon the molten metal.

We have found in practice that the necessary percentage of the sand like grains to be admixed with the finely divided dry coating material will vary very largely with variations in the fluidity of the molten iron, under certain conditions an admixture of 5% by volume of sand with the finely divided dry coating material will be effective, while under certain other conditions, fifty or more frequent occurrence, we have found that an admixture of 50% of the sand like grains was advantageous, but for all practical variations which are liable to occur in practice we have found that an admixture of 20 to 25% of the sand like grains

is adequate and satisfactory and presents no objectionable features where conditions as to the fluidity of the molten metal are such that no admixture of the sand like grains with the finely divided dry coating material is necessary.

For practical purposes it has been found desirable that the particle size of the finely divided dry coating material should be approximately such that it will pass a sieve of approximately 150 meshes to the inch and it is with material of approximately this fineness that we prefer to use the sand like grains having the characteristics which we have described and a size which will pass a sieve of 20 meshes to the inch while approximately 75% is retained on a sieve of 50 meshes to the inch.

As pointed out in the Russell and Langenberg patent, it is preferable that the coating applied to the metallic centrifugal mold should not, for the best results be materially thicker than is necessary to effect such retardation in the cooling of the molten metal as will avoid the formation of a chill both because with increased thickness in the coating there is more liability to slips and fractures impairing its continuity and because the character of the casting is better than where the retardation in the cooling of the metal is greater. Under some conditions, however, it may be desirable to increase the thickness of the coating and this we have found can be accomplished by the use of our composite coating which is distinctly less liable to fracture under conditions of use than is the coating formed of the finely divided dry coating material without the incorporation of the sand element.

It is distinctly advantageous that the finely divided dry coating material should be used in such quantity that when evenly and compactly distributed over the surface of the mold it will form a coating the depth of which will be less than that of the diameter of a material percentage of the sand like grains admixed with the finely divided dry coating material so that such grains even though running in contact with the surface of the metal mold will, at the time molten metal is charged into the coated mold, project inward beyond the surface of the coating formed by the finely divided material and come in actual contact with the surface of the casting.

The admixture of sand like grains with the finely divided dry coating material facilitates the handling of the coating material in the feeding mechanism in that it materially increases what we may call the fluidity of the composite coating material as compared with that of the finely divided dry coating material when used alone, greatly lessening the liability of the coating material clogging in some part of the feeding mechanism and making the feed more accurate in any class of feeding apparatus which may be employed to deliver the coating material to the carrier gas jet.

Our invention may perhaps be better understood as described in connection with the drawing which forms part of this specification and in which

Figure 1 is an elevation of a centrifugal pipe casting machine adapted for use in the practice of our improved method of coating the mold and

Figure 2 is a somewhat diagrammatic illustration showing on a greatly exaggerated scale the general structure of our improved coating as applied to a centrifugal metallic pipe mold.

The apparatus illustrated in Fig. 1 is essentially the same as that described in the Russell

and Langenberg Patent No. 1,949,433, with the exception that in addition to the feeding mechanism indicated at G and operating to feed the finely divided dry coating material through the hopper F⁴ to the gun F, we have indicated at g a supplementary feeding device adapted also to deliver coating material to the hopper F⁴. As, in all other respects, the apparatus indicated is the same as that described in the Russell and Langenberg patent, it is unnecessary to describe it in detail except perhaps to note that the coating materials fed to the gun F are picked up in the gun by a jet of carrier gas introduced through the nozzle indicated at F² and the so charged jet of carrier gas transferred through the conduit E to the nozzle E¹ which directs the jet against the inner surface of the rotating mold D¹ in advance of the contact of the molten metal fed to the mold through the spout C¹.

Ordinarily, we have found it to be satisfactory and convenient to charge a single feeding mechanism such as is indicated at G with a thoroughly admixed charge of the finely divided coating material and sand in the proportion, say of 20 to 25% of sand by volume to that of the finely divided dry coating material as a mixture of this character is found to give satisfactory results in the character of the coating applied to the mold under practically all ordinary conditions of the molten metal poured into the mold but where it is desired to more exactly regulate the condition of the coating to the condition of the metal, this can be effected by charging one feeding device, such as G, with the finely divided dry coating material and another feeding device, such as g, with the sand so that by regulating the rate of feed of the feeding device g any desired percentage of sand can be fed to the gun, with the consequent formation of a coating in which the sand constituent will more closely approximate that which is found to be best in view of the character of the molten metal which at any time is being fed to the mold. The construction of the feeding device indicated at G and g is preferably that of United States Patent No. 1,939,703, granted December 19, 1933, but any feeding device capable of delivering a nicely regulated supply of mold coating material may be used and while we believe that apparatus of the kind indicated in Fig. 1 and fully described in the patent to Russell and Langenberg is that best adapted for use in coating and casting pipes, it must be understood that our invention is in no wise limited to the use of such an apparatus but is applicable to any method in which a jet of carrier gas directed progressively against contiguous areas of a metallic centrifugal mold is charged with finely divided mold coating material and also with sand grains of the general character which we have indicated as usable in connection with our process and adapted in connection with the finely divided material to build up our new mold coating as, for example, the apparatus described and shown in the applications filed by Russell and Langenberg on June 6, 1933, Serial Numbers, 674,502; 674,503; 674,504; 674,505, and 674,506.

Referring now to Figure 2, A indicates a section of a centrifugal metallic pipe mold, B, a coating of finely divided dry coating material such as is applied to a pipe mold by a charged jet of a carrier gas directed progressively against contiguous areas of the mold and C, C, etc., indicate grains of sand distributed through the coating of finely divided dry coating material in such a way as to contact in large part with the surface

of the mold A and to project in large part through the surface of the coating of finely divided dry coating material indicated at B. The drawing, it will be understood, is greatly exaggerated and is to be understood as in the nature of a diagrammatic showing of the general structure of the coating as of the time when the molten metal poured into the mold contacts with it.

As is pointed out in the Russell and Langenberg patent, 1,949,433, the coating of finely divided dry coating material is, at the time of its application to the mold by the jet of carrier gas, permeated by films of the carrier gas, the presence of which naturally increases the thickness of the coating and increases the efficiency of the coating as a retarder of heat transfer. The incorporation of the carrier gas with the finely divided dry coating material at the time the coating is applied to the mold no doubt facilitates the passage of the sand grains through the finely divided coating material into contact with the surface of the mold but that at the time of contact of the molten metal with the coating, a considerable portion of the sand grains project through the finely divided coating material and come in contact with the molten metal is made evident by the fact that a considerable amount of sand grains are found adhering to the casting, though very easily brushed away and not so embedded in the casting as to impair its smoothness.

Having now described our invention, what we claim as new and desire to secure by Letters Patent, is:

1. An internally coated metallic centrifugal pipe mold characterized in that its coating is made up of loosely adherent and loosely coherent finely divided dry particles of mold coating material intermixed with relatively large sand like

grains of a hard and compact crystalline structure substantially nonreactive and nonfusible under conditions existing during a casting operation.

2. An internally coated metallic centrifugal pipe mold characterized in that its coating is made up of loosely adherent and loosely coherent finely divided dry particles of mold coating material intermixed with relatively large particles of silica sand.

3. A coated metallic centrifugal pipe mold as called for in claim 1, in which the finely divided coating material is of such particle fineness as would pass through a sieve of approximately 150 meshes to the inch and in which the sand like material is of such particle size that it would pass a sieve of 20 meshes to the inch and preponderantly of such size that it will not pass a sieve of 50 meshes to the inch.

4. A coated metallic centrifugal pipe mold as called for in claim 1, further characterized in that the sand grains of the composite coating are so disposed therein as to contact in large part with the surface of the metallic mold and to project in large part beyond the surface of that portion of the coating formed by the finely divided dry coating material.

5. A coated metallic centrifugal pipe mold as called for in claim 1, further characterized in that the coating is in part made up of a quantity of the finely divided dry mold coating material which, if compactly distributed over the mold surface, would produce a coating of a thickness less than the diametric size of a substantial percentage of the sand grains which are distributed through the finely divided material.

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