April 22, 1941. M. LANGENOHL ET AL 2,239,530

LINING COMPOSITION FOR CENTRIFUGAL CASTING MOLDS

Filed Jan. 3, 1939

Fig. I.

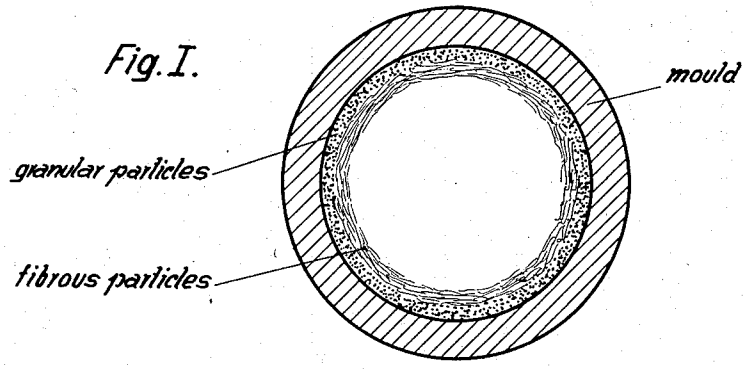


Fig. II.

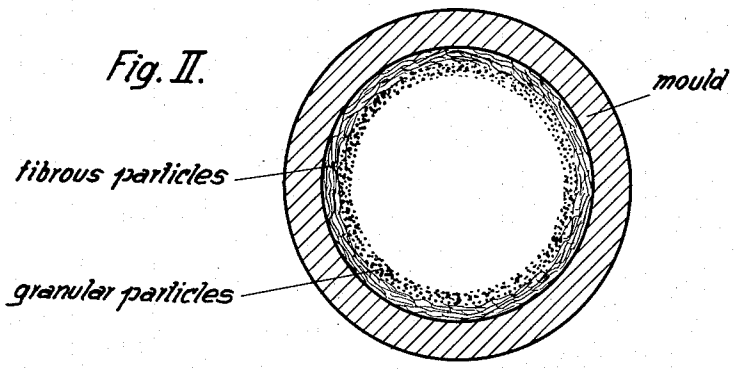
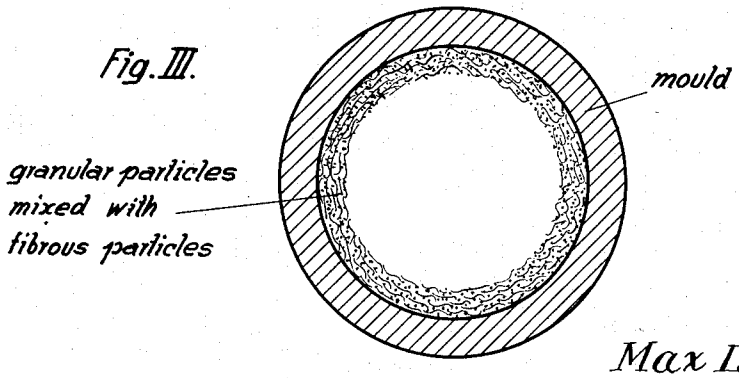


Fig. III.



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LINING COMPOSITION FOR CENTRIFUGAL CASTING MOLDS

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Application January 3, 1939, Serial No. 249,008
In Germany January 10, 1938

3 Claims. (Cl. 22—189)

This application is a continuation in part of our withdrawn earlier application filed November 25, 1938, Serial Number 242,416.

This invention relates to a lining composition of low heat conductivity for centrifugal casting molds for the production of centrifugal castings, with soft outer layer. For this purpose it is known to use as lining composition substances of elongated or fibrous shape, which form in the rotating centrifugal casting mold a felt or sponge-like mass of a matted structure and this forms a layer which cannot be washed away by the inflowing metal; such a lining, for example, as is described in the applicant Langenohl's British Patent 441,335, of January 10, 1936.

According to the invention it is proposed to use, besides or in addition to such substances having a preferably elongated or even fibrous shape, such as asbestos, infusorial earth, rock-wool, slag-wool, glass-wool and similar heat resistant fibres, other substances of decided granular consistency, as sand-like materials, such as the different foundry sands, granulated slag and so on. This presents the advantage that the gas permeability of the composition is increased and can be regulated within wide limits. As compared with a lining which consists only of materials of approximately spherical structure, the use of a mixture of flat or fibrous particles and granulated substances possesses the advantage that a slower speed of rotation is required to produce a lining which is sufficiently resistant to withstand the washing-away action of the metal. Furthermore, by the addition of flat components to linings composed of granular substances a certain plasticity is imparted such as can otherwise only be attained by an addition of clay, but without the disadvantages thereof which arise by the use of plastic binding agents, owing to the fact that in the casting heat they cause a strong solidification of the mass with the result that the particles of the lining lose their yieldability. Moreover, plastic binding agents, such as clay, loam and the like, at casting temperature form residues which close the interstices between the particles and thus render more difficult the escapement of the gases. By the simultaneous use of substances of purely granular structure and of flat elongated or fibrous substances the speed of rotation of the chill can be varied within wide limits to enable in every instance the most advantageous speed to be used which must always be taken into consideration for the different kinds of metal and diameter and wall thickness of the centrifugal castings, for example in the production of tubes, to obtain the best products from casting, as investigations of Cammen and others have shown. The slowest speeds for forming a sufficiently resistant lining are sufficient when the granular substances lies nearest the inner wall of the mold and the flat particles form the exposed surface of the lining (see Fig. I). Inversely higher speeds must be used when the granular substances form the exposed surface of the lining (see Fig. II). In the case of a mixture of the two types of substances the speeds to be used lie between the maximum and minimum values (see Fig. III).

In certain instances it may be advisable to use as granular substances those having metallic character such as granulated cast iron or steel, ferro-phosphorus, ferro-silicon and other compounds of iron in granulated form or even granulated iron ore, so as to obtain a greater heat conductivity in spite of greater layer density.

The invention is particularly important for the casting of metals with a specially high melting point, such as steel. It is advisable, particularly in these cases, to make the exposed layer coming directly into contact with the metal of granular substances whose grain is between 0.5 and 2 millimetres or even more and which may consist of a known highly refractory substance such as quartzite, magnesite, aluminium nitride, calcined alumina and the like. An important point is, for ensuring the gas-permeability, the use of a grain size as uniform as possible, so that the gaps between the grains remain absolutely free. The coarser and more uniform the grain is selected, the thinner can the lining be made to obtain a sufficient heat insulation. For metals having lower melting point, such as brass and the like, smaller grains may be used, if desired.

In many instances it is useful to add certain binding agents to the lining composition. The addition of this binding agent also enables a reduction of the speed of rotation, which is necessary to produce a bearing surface of sufficient strength for the metal. However, in this instance, it is important to use binding agents which do not fill the gaps under the action of the casting heat and which considerably reduce the trickling property of the composition after the casting. Such binding agents preferably consist of substances which have a gel-binding effect on the lining substances and particularly surround the granular particles with a thin layer of gel without clogging the gaps. For this purpose sulphuric acid and sulfite lye come into question when ceramic granular substances and sand are used.

Jelly-like silicon and alkyde resins in a solvent such as acetone can be advantageously used.

To render ineffective the volatile components of these binding agents before the inflow of the metal, it is advisable, when using such binding agents, to heat the lining layer from the inner side preferably shortly before the casting, so that the volatile components evaporate. Such a preheating of the lining layer is also advantageous when casting metals with a high melting point, such as steel, for the purpose of still further reducing the heat leakage.

In certain instances it may also be of advantage to use granular substances and flat fibrous particles with a binding agent in such a manner that, by using a binding agent a relatively resistant layer of matted structure is produced on the inner surface of the centrifugal mold and then to apply on this layer a layer of loose grains, if necessary mixed with elongated fibrous substances. At the drawing of the casting only the latter are allowed to trickle out with the casting whereas the fibrous layer can remain in the mold as lining for the next following casting or castings. In this manner not only lining composition is saved but the drawing of the castings especially those of elongated shape, is facilitated.

It will be obvious that the structural make-up of the lining zone consisting of or mainly of fibrous and/or flattish elements, will not only impart to its zone of the lining the quality of compressibility but also, to a greater or less extent, the quality of resilience so that the lining as a whole, while being capable of yielding to a certain extent as the casting expands on solidifying, it will also expand to a certain extent as the casting contracts on cooling.

We claim:

1. A lining structure for centrifugal molds made up in part of interlaced refractory elements of fibrous and/or flattish forms so as to impart to said lining the form and properties of a sponge-like compressible mat, and in part of granular sand-like particles of refractory material whereby the gas permeability of the lining is increased, at least part of the firbous and/or flattish elements being located at the inner surface of the lining, whereby to permit a reduction of the critical speed of rotation necessary to resist the washing away action of the inflowing metal.

2. A lining for centrifugal molds as called for in claim 1, in which the granular sand-like constituents of the lining are distributed throughout the mass of the sponge-like mat of fibrous and/or flattish characteristics.

3. A lining for centrifugal molds as called for in claim 1, in which the granular sand-like constituents of the lining are disposed in an annular zone lying between the inner face of the mold and the outer face of the compressible zone, made up of interlaced fibrous and/or flattish refractory materials.

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