United States Patent

[11] 3,543,832

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[21] Appl. No. **631,673**
[22] Filed **April 18, 1967**
[45] Patented **Dec. 1, 1970**

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[32] Priority **April 21, 1966**
[33] **Germany**
[31] **No. M69223**

[54] **APPARATUS FOR THE MANUFACTURE OF MOLDS FOR CASTING METALS**
3 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **164/203,** 164/260; 259/1
[51] **Int. Cl.** **B22c 15/10**
[50] **Field of Search** ..... 164/37, 39, 169, 172, 203, 260, 206, 261; 25/41(J); 173/139; 259/1, (vibrators fluid)

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ABSTRACT: A vibrating apparatus adapted particularly for packing foundry sand compositions to make metal casting molds in which the vibrator housing has a removable cap made of a highly wear-resistant material and the vibrator housing is connected by means of an elastomeric collar to a tubular connecter pipe and the tubular connecter pipe has a handle construction mounted thereon by means including an elastomeric sleeve.

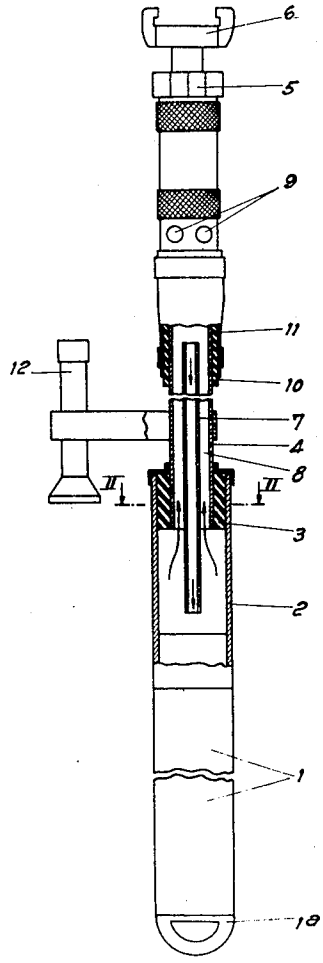


Fig. 1

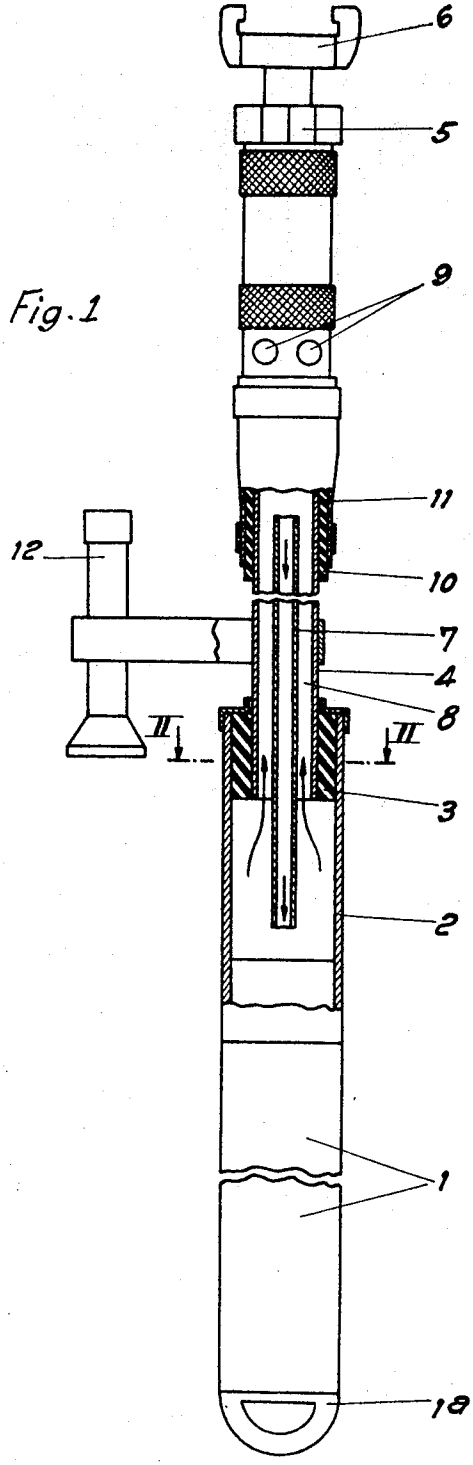
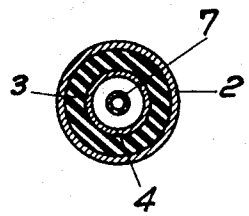


Fig. 2



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APPARATUS FOR THE MANUFACTURE OF MOLDS FOR CASTING METALS

This invention relates to a process for the manufacture of molds for casting metals in which the starting material employed consists of granular molding substances, in particular for the fabrication of cores, the molding substances being compacted by vibration after having been introduced into the negative mold.

At the time of manufacture of molds, it is important to ensure that the molding substance completely fills the mold recesses (negative mold) formed by the pattern and foundry-flask as well as the corebox, and that the sand or like molding substance has a compact texture, especially on the outer mold face, in order that the liquid metal should not be permitted to penetrate into the molding substance while casting is in progress, that is to say in order to prevent the "metallization" of the mold. For this purpose, the molding substance is either vibrated or rammed in accordance with known techniques, these operations being performed either by means of vibrators which are fixed outside the mold-flask, or by means of vibratory rammers.

Vibrators of the external type do not ensure satisfactory distribution of the molding material. In fact, such devices are even wholly unsuitable for the purpose of making molds having tapered contours or pronounced recesses. On the other hand, when making use of vibratory rammers, the molding material cannot be satisfactorily compacted unless it is poured into the flask and rammed in successive layers. However, the highly tamped and compacted external surface cannot form an intimate bond with the contiguous layer which is poured thereon, with the result that there are thus formed virtual joints which are detrimental to the strength of the mold. Furthermore, vibratory rammers are liable to cause direct damage to the mold surfaces of the pattern or the corebox whereas external vibrators can be employed only with metallic molds by reason of the high alternating stresses which they impart to the foundry-flasks and coreboxes.

The reasons explained above have led to the execution of the mold or core in several sections, especially in the case of molds having complicated and substantially tapering contours. In such cases, the molding material must be introduced, spread and tamped by hand within the different portions of the negative mold. This operation evidently demands a substantial amount of time.

The object of the present invention is to reduce to an appreciable extent the expenditure of energy and labor required in the fabrication of molds and mold elements (e.g. cores) of the type mentioned above and to improve the quality of the mold texture without any risk of damage to the pattern.

This object is achieved by means of the method according to the invention which consists in making use of molding substances having a sufficient fluidity which are distributed and compressed by means of an internal vibrator. It is possible to employ as molding substances all the solidification sands with or without iron oxide, cold resin sands, cement sands and the like.

For the vibrating operation, it has proved particularly advantageous to make use of the so-called "poker vibrators" which are attached to a handle by means of a flexible member and can be operated after the fashion of a trowel for the purpose of distributing the molding substance. An unexpected feature which has been found in practice is that these poker vibrators are not subject to excessive wear, even when the packed molding sands contain a very high proportion of quartz sand which is on an average considerably higher than is normally present in concrete structures. Wear develops almost entirely at the lower end of the vibratory poker, the end portion being advantageously removable and interchangeable for this reason.

One example of embodiment of an internal vibrator for the practical application of the method according to the invention is described hereinafter, reference being made to the accompanying drawings, in which:

FIG. 1 is a fragmentary side elevation view of an internal vibrator of the pneumatic drive type.

FIG. 2 is a transverse sectional view taken along the line II–II of FIG. 1.

The vibratory poker **1** is of the pneumatic drive type in the example under consideration but can operate equally well either by hydraulic or electric means. The poker is provided at its lower end with a removable screwcap **1***a* formed of material which affords high resistance to wear and is surrounded by a sleeve **2**. Said sleeve is fitted over a rubber collar **3** in which is inserted a tubular connecter pipe **4**. A rotatable handle **5** is fixed to the upper end of the connecter pipe and it is possible by actuating said handle either to start or stop the vibrator, that is to say to open or close the compressed-air intake, compressed air being supplied through a hose which is connected at **6**. The compressed air passes into the vibrator through an inner tube **7** and is discharged to the outside air through the annular passageway **8** between the tube **7** and the connecter pipe **4** and through discharge apertures **9**. In order to make the machine easier to handle, provision is made at the upper end of the connecter pipe for a flexible tubular handle **10** which is strengthened by a sheet metal sleeve **11**. The connecter pipe **4** can be employed at the same time for the attachment of a lamp **12**, in particular when the machine is used in molds of substantial depth.

The apparatus which has just been described therefore constitutes a trowel, the lower end of which works as a vibrator, so that the apparatus can be directed as required by the operator, contradistinction to poker vibrators of the known types which are employed, for example, in concrete construction work.

I claim:

1. A vibration apparatus for packing foundry sand compositions to make metal casting molds, comprising:

an elongated housing having a removable cap made of highly wear-resistant material removably secured to one end of said housing whereby said cap may contact the material to be vibrated;

vibrating-causing means disposed within said housing and adapted to impart vibrations thereto;

a handle construction spaced from and connected to the other end of said housing; and

coupling means connecting said handle construction to said other end of said housing (**1**) for permitting transverse or lateral motions applied to said handle construction to be transmitted to said housing and (**2**) for substantially preventing transmission of vibrations from said housing to said handle construction, said coupling means including:

a. an elastomeric sleeve mounted within the housing adjacent said other end thereof;

b. a tubular connecter pipe of rigid material received within and attached to said elastomeric sleeve and extending outwardly from said other end of said housing whereby the vibrations of the housing are substantially absorbed by the elastomeric sleeve and are not substantially transmitted to the rigid connecter pipe; and

c. an elastic sleeve encircling and secured to said rigid connecter pipe adjacent the outer end thereof, said elastic sleeve being surrounded by and connected to a portion of said handle construction for interconnecting said handle construction to said housing.

2. A vibration apparatus according to claim **1**, including a further tubular pipe disposed within said connecter pipe and extending between said housing and said handle construction, said further tubular pipe being smaller than said connecter pipe to define a first flow passageway within said tubular pipe and a second flow passageway within said connecter pipe in surrounding relationship to said further tubular pipe, said passageways being used to provide for flow of pressure fluid to and from the housing.

3. A vibration apparatus according to claim **1**, including a bracket attached to the connecter pipe between the housing and the handle construction and extending sidewardly therefrom, and a lamp mounted on said bracket and extending toward said one end of the housing for illuminating the material being vibrated.