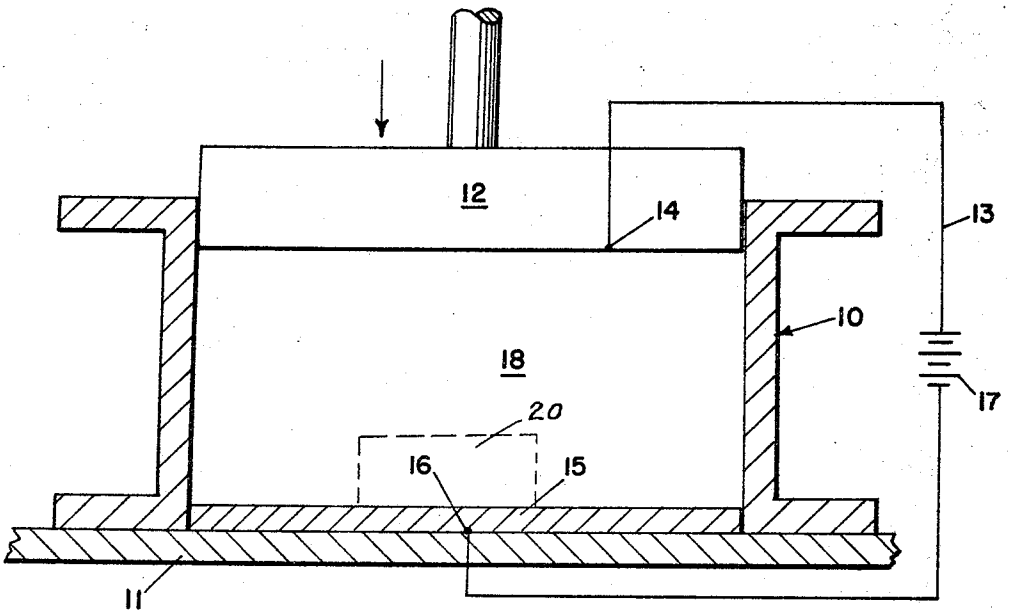
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PROCESS FOR MAKING SAND MOLDS

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INVENTOR
WALTER W. EICHENBERGER
BY
Charles L. Lovercheck
attorney

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# PROCESS FOR MAKING SAND MOLDS

Walter W. Eichenberger, 2615 W. 10th St., Erie, Pa. 16505

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## ABSTRACT OF THE DISCLOSURE

A method of making a foundry mold by connecting a high voltage, high frequency electrical power source across the sand in the mold during the molding process so that the sand particles are stressed and oriented thereby resulting in a denser and more accurate mold.

This invention relates to foundry molds and, more particularly, to foundry molds of the type suitable for use in sand casting.

In the process of making said castings, it is common practice to place a pattern on the pattern plate in a flask, fill the flask with crystalline material having piezoelectric properties such as silica sand around the pattern. The sand may contain a binder such as clay, bentonite, or other material commonly used as binders. The sand is then compressed around the pattern to form a mold. Considerably high pressures are required to compress the sand according to some processes and in other processes, the sand is rammed into firm position by impact. It is important that the mold have a high density and an extreme "hardness" in order to make highly precise castings.

It has been discovered that by connecting the body of sand in the mold into an electrical circuit and passing current through the sand or connecting a voltage across the sand so that the sand is in series with the circuit, the crystals of sand will vibrate at a frequency, depending upon the size of the crystals. This vibration of the sand crystals causes them to orient themselves in the sand and binder mixture and to result in a much denser, more accurate mold than is possible without them.

It has been discovered that when certain binders that are poor electrical conductors are used, it is desirable to mix a salt solution with the sand, such as sodium chloride, calcium chloride, or any other good electrolyte.

Thus, when the sand is compressed during molding and when the sand crystals are simultaneously vibrated, a much higher density mold results than when pressure alone is used. In an actual test utilizing a mold ten inches by ten inches by four inches thick, the mold hardness as measured by a "Dietert" instrument was fifteen points above that when the sand was squeezed and no electrical circuit was used.

It has been discovered that a suitable frequency for the voltage connected across the sand could be in the range of 20,000 to 40,000 cycles per second.

It is, accordingly, an object of the present invention to provide an improved process for making sand molds.

Another object of the invention is to provide a process for making sand molds wherein an electrical voltage is connected across the sand in the mold during the molding process.

Still another object of the invention is to provide a process for making sand molds wherein an ultrasonic frequency voltage is applied to the sand during molding.



With the above and other objects in view, the present invention consists of the combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing and more particularly pointed out in the appended claims, it being understood that changes may be made in the form, size, proportions, and minor details of construction without departing from the spirit or sacrificing any of the advantages of the invention.

The figure of drawing is a longitudinal cross-sectional view of a foundry flask having a voltage connected across the sand in the flask.

Now with more particular reference to the drawing, a flask **10** is shown supported on a base **11** that may be any suitable base for supporting a flask. A pattern plate **15** is indicated upon which a pattern of suitable shape would be supported of a type familiar to those skilled in the art. A ram **12** is show by way of example supported above the flask and is adapted to be forced down into the flask to compress sand indicated at **18** therein.

The pattern plate is electrically insulated from the flask and is connected at **16** through the electrical circuit **13** to the point **14** on the ram **12** and a source of electrical voltage **17** is indicated connected in the circuit. While a battery is indicated at **17**, it is to be understood that the source of electrical current could be any alternator, oscillator generator or suitable source of voltage, for example, a welding generator having a capacity of 500 amperes for a flask 10 inches by 10 inches and 4 inches deep.

In using the process, a pattern is placed on the pattern plate **15** directly above the point **16**, sand is placed at **18**, and the ram **12** is forced down into engagement with the sand in the flask to compact the sand around the pattern. Simultaneously, a voltage is applied at **17**; that is, across points **14** and **16**. The voltage will vibrate the sand in compaction and cause a high grade mold to result.

The foregoing specification sets forth the invention in its preferred practical forms but the structure shown is capable of modification within a range of equivalents without departing from the invention which is to be understood is broadly novel as is commensurate with the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

**1.** A process for making a foundry mold from sand having crystalline structure comprising
providing a container and a pattern,
placing said pattern and said sand in said container with said sand surrounding at least a part of said pattern,
connecting a source of electrical current to said sand in a circuit whereby said sand forms a part of said circuit,
applying a voltage to said circuit across said sand,
and simultaneously compacting said sand whereby a mold is formed around said pattern.

**2.** The process recited in claim **1** wherein
said sand has a binder material therewith,
said binder being taken from the group of bentonite and clay.

**3.** The process recited in claim **1** wherein
a salt solution is mixed with said sand.

4. The process recited in claim 3 wherein the salt in said salt solution is taken from the group of calcium chloride and sodium chloride.

5. The process recited in claim 1 wherein said voltage has a sufficient magnitude to cause said crystals of sand to vibrate.

6. The process recited in claim 1 wherein said source of current is an alternating current.

7. The process recited in claim 1 wherein said current source is an alternating current source having a frequency of at least 20,000 kilocycles per second.

8. The process recited in claim 1 wherein said container is a foundry flask, and said pattern is supported on a pattern plate.



**References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 1,997,263 | 4/1935 | Meissner | 264—24 |
| 2,295,294 | 9/1942 | Ross | 264—24 |
| 2,908,951 | 10/1959 | Melka | 164—207 X |
| 2,984,871 | 5/1961 | Venerus | 264—24 |
| 3,264,716 | 8/1966 | Silver | 264—24 X |


J. SPENCER OVERHOLSER, *Primary Examiner.*

EUGENE MAR, *Assistant Examiner.*

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