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WATERLESS GREEN MOLDING SAND

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The present invention relates generally to molding sand for foundry use and has for its principal object the provision of a novel and improved green sand. A more specific object has to do with the provision of a waterless green molding sand.

Many difficulties encountered in the foundry today result from the use of water as a bonding agent for green sand, the principal one of which is involved with the formation of steam in the mold as the latter receives the molten metal. The elimination of water from the sand avoids any damage to the mold caused by such formation and imprisonment of steam. This permits the use of a finer sand, inasmuch as the permeability need not be as great as is required when steam is present. The final result is greater accuracy in the mold and smoother and more accurate castings.

Another disadvantage avoided by the use of waterless sand is the tendency of water-bonded sand to dry out in the hopper. When the supply of conventional sand stands for any substantial period of time, it becomes too dry to use and must be restored to the proper moisture content before use.

In the accomplishments of these objects, we have found that a gelled non-drying oil such as petroleum oil is a satisfactory binding agent for green sand. For this purpose, we have found several gelling agents that have the property of producing a gel that retains its strength at high atmospheric temperatures and does not melt.

The preferred gelling agent is a product sold by the National Lead Company under the trade name "Bentone 34," which is dimethyldioctadecyl ammonium bentonite. The petroleum oil that gels best with this gelling agent is paraffin oil. This gelled material does not melt at high atmospheric temperatures and it also maintains its stability at low temperatures, on standing, or under mechanical working.

The paraffin oil takes the place of the sea coal and wood flour used in conventional green sand, for it burns out in contact with the molten metal to provide voids to permit expansion of the sand, and in burning it coats the surface of the mold with soot, similar to the action of burning sea coal and wood flour.

Other gelling agents which can be used instead of "Bentone 34" are silica gel, the mineral attapulgite, and aluminum stearate, each of which forms a gel with petroleum oil. A mixture of half "Bentone 34" and half bentonite can also be used with success.

Any natural or synthetic molding sand can be used but we prefer to use synthetic silica sand for this purpose.

The mixing can be accomplished in any conventional manner. We have found it satisfactory to combine the oil and gelling agent with the sand in the muller and mulling it until thoroughly mixed, as in the mixing of conventional water-clay bonded green sand.

The proportions of oil, gelling agent and sand have

not been found to be extremely critical. We prefer to use a proportion in the range of 1½% to 3% by weight of paraffin oil, 2% to 3% "Bentone 34," and the remainder silica sand. A small amount of kerosene, less than 1%, has been found to have some advantage.

Examples of mixtures which we have used and found satisfactory are as follows:

	Percent
"Bentone 34"	2½
Paraffin oil	1¾
Silica sand—AFS 58 mesh	95¾
"Bentone 34"	2¼
Paraffin oil	2½
Kerosene	¼
Silica sand—AFS 150 mesh	95
"Bentone 34"	1¼
Bentonite	1¼
Paraffin oil	3
Silica sand—AFS 150 mesh	94½

Although we have successfully used paraffin oil of 100 seconds viscosity, we believe that oil of much higher viscosity, say 2500 seconds, is equally, if not more satisfactory.

We claim:

1. Green molding sand consisting essentially of a mixture of silica sand, 1½%–3% petroleum oil, and 2%–3% of an agent for gelling said petroleum oil comprising dimethyldioctadecyl ammonium bentonite.

2. Mold sand consisting essentially of a mixture of silica sand, 1½%–3% paraffin oil and 2–3% dimethyldioctadecyl ammonium bentonite.

3. Molding sand consisting essentially of a mixture of silica sand, 1½–3% paraffin oil, 2–3% dimethyldioctadecyl ammonium bentonite, and less than 1% kerosene.

4. Molding sand consisting essentially of a mixture of silica sand, approximately 3% paraffin oil, 1–2% dimethyldioctadecyl ammonium bentonite, and 1–2% bentonite.

5. Molding sand consisting essentially of a mixture of silica sand, approximately 2½% dimethyldioctadecyl ammonium bentonite, and approximately 1¾% paraffin oil.

6. Molding sand consisting essentially of a mixture of silica sand, approximately 2¼% dimethyldioctadecyl ammonium bentonite, approximately 2½% paraffin oil, and approximately ¼% kerosene.

7. Molding sand consisting essentially of a mixture of silica sand, approximately 1¼% dimethyldioctadecyl ammonium bentonite, approximately 1¼% bentonite, and approximately 3% paraffin oil.

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