

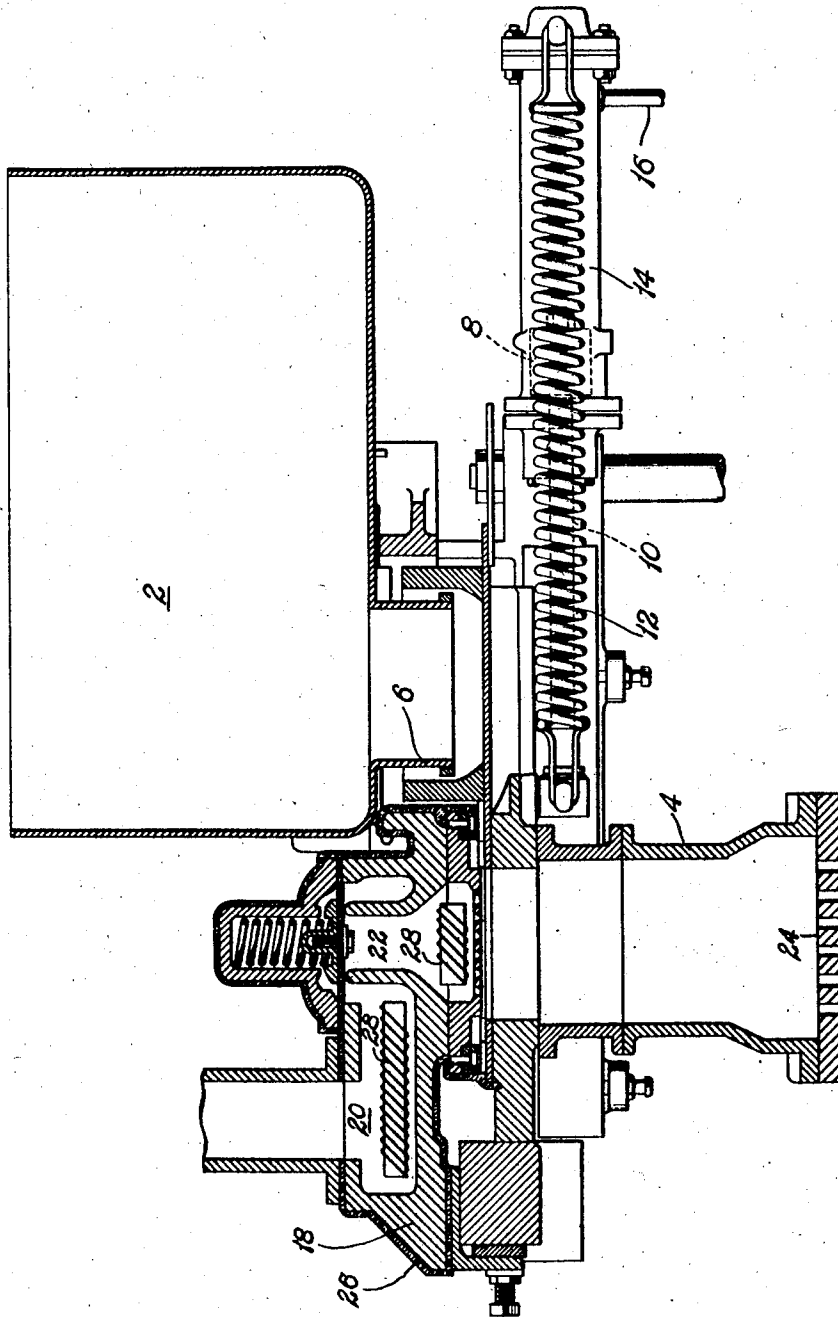
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CORE MANUFACTURE

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CORE MANUFACTURE

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My present invention relates to core manufacture and comprises an improved method of forming cores which is superior to methods now in use in that it substantially reduces the time required in the production of cores and in that cores made thereby are superior to cores made by prior processes. The new method requires but slight change in standard core producing machinery for its practice.

In the usual foundry practice, core material comprising sand combined with water, oil or other wetting agent, is forced under air pressure into a core box to form the core, which is thereafter baked to evaporate the wetting agent and set the binder. This baking of the moist core requires a substantial period of time, depending upon the size of the core, the particular wetting agent employed, and the relative proportions of the wetting agent and the sand. The method of the present invention eliminates or substantially reduces this final baking or heating of the formed core.

In accordance with the invention a thermo-setting synthetic resin which is solid at room temperatures and melts at the temperature of steam or of superheated steam, as for example urea formaldehyde, is mixed with sand to form a dry core material. Live steam superheated under pressure is then applied to this dry mix to liquefy the resin and force the mix into the core box. The resin both in its fluid or semi-fluid state while subjected to the temperature of the steam and in its solid state upon resolidification and setting in the core box after formation of the core serves as an adhesive to bind the particles of sand together in a firm core. The core made as above described contains little if any water and hence may be used immediately or stored for future use without preliminary drying. During the molding operation the high heat of the molten metal liquefies or burns the resin, insuring ready flowing of the core material from the cored holes of the metal.

Standard core blowing machines may be readily modified for use in the practice of the invention as it is only necessary to use steam under pressure instead of air, to provide suitable heat insulation about the parts of the machine head into which the steam is admitted and to include heating means in the path of the steam to the core material in order to maintain the temperature of the steam and prevent condensation, or, if desired, to superheat the steam if a resin having a correspondingly high melting point is mixed with the sand.

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In the attached drawing the single figure illustrates diagrammatically in cross-section the head of a conventional core blowing machine suitably equipped for practice of the invention. The machine as shown in the drawing includes the usual bin 2 for the core material, the funnel 4 mounted for reciprocation from the position shown in the drawing to one beneath the outlet 6 from the bin 2 by means of the piston 8 and rod 10 under the opposing actions of a spring 12 and pressure fluid admitted to the piston cylinder 14 through a pipe 16, the fixed casing section 18 provided with the communicating chambers 20 and 22 for admission of operating fluid to the funnel 4 and the core plate 24 secured to the funnel 4 for engagement with the top of the core box (not shown). In order to practice the invention on the conventional machine above briefly described, it is only necessary to provide suitable heat insulation 26 over the surface of the casing 18 and to provide suitable grid and strip heaters 28 within the chambers 20 and 22. A dry mix comprising, for example, 99 per cent. by weight of sand and 1 per cent. by weight of uncured urea formaldehyde, preferably in comminuted or powdered form, is placed in the bin 2 and steam under pressure is admitted to the chamber 20. The steam after passage about the heaters 28 heats the core material in the funnel 4 sufficiently to cause the resin therein to become fluid and wet the sand, whereupon the plastic mass is forced by the pressure of the steam through the apertures in the core plate 24 and into the core box. Upon cooling, the resin solidifies and sets, with the result that a firm relatively infrangible core is formed that may be readily handled and stored.

From the above description of the new process it will be apparent that the inclusion of a thermo-setting synthetic resin in the core material and the use of steam under pressure both for heating the material and for forming the core substantially reduces the time required for producing cores and results in a core in which the sand and resin are firmly bound together into a substantially homogeneous mass.

As heretofore indicated, any thermo-setting resin that is solid at room temperature and becomes fluid at the temperatures of steam or of superheated steam, say from 212 to 300° F., could be used in the process. For example, instead of urea formaldehyde, the melamine condensates or phenol formaldehyde could be mixed with sand to form the core material. The relative amount of resin in the core mixture is not

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critical but in general the quantity of resin employed should be between $\frac{1}{2}$ and $1\frac{1}{2}$ per cent. by weight of the total mixture. This range may vary with the development of new resins. When less resin is employed, the core material does not become sufficiently strong when the resin solidifies. When an excess of resin is used, the cost of the cores is materially increased.

The following is claimed:

1. The method of forming cores which comprises mixing dry sand with a comminuted thermo-setting resin to form a dry core material, and then applying steam under pressure to the core material to heat and liquefy the resin and to force the material into a core box for formation of a core.

2. The method of forming cores which comprises mixing sand and a comminuted uncured thermo-setting resin together to form a dry core material, heating the material with live steam to render the resin fluid and finally forcing the material while hot into a core box by steam pressure whereby upon cooling and setting of the resin a firm core comprising sand bound together with cured resin is produced.

3. The method of forming cores which comprises making a dry mixture of sand and a thermo-setting resin with the resin comprising from one-half to one and one-half per cent. by weight of the total mixture, heating the mixture with live steam to render the resin fluid and finally applying steam pressure to the heated mixture to force the mixture into a core box.

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4. The method of forming cores which comprises mixing dry sand with comminuted urea formaldehyde and then applying steam under pressure to the mixture to heat the mixture and render the resin fluid and to force the mixture while heated into a core box for formation of a core.

5. The method of forming cores according to claim 4 wherein the urea formaldehyde comprises substantially one per cent. of the mixture.

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