# United States Patent [19]

**Edwards**

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[54] **MIXING CHAMBER CONSTRUCTION**


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[51] **Int. Cl.** ..... **B28c 5/16**, B22c 5/04, B01f 7/16

[58] **Field of Search** ..... 259/7, 8, 161, 162, 259/163, 178 R, 178 A, DIG. 34, 151



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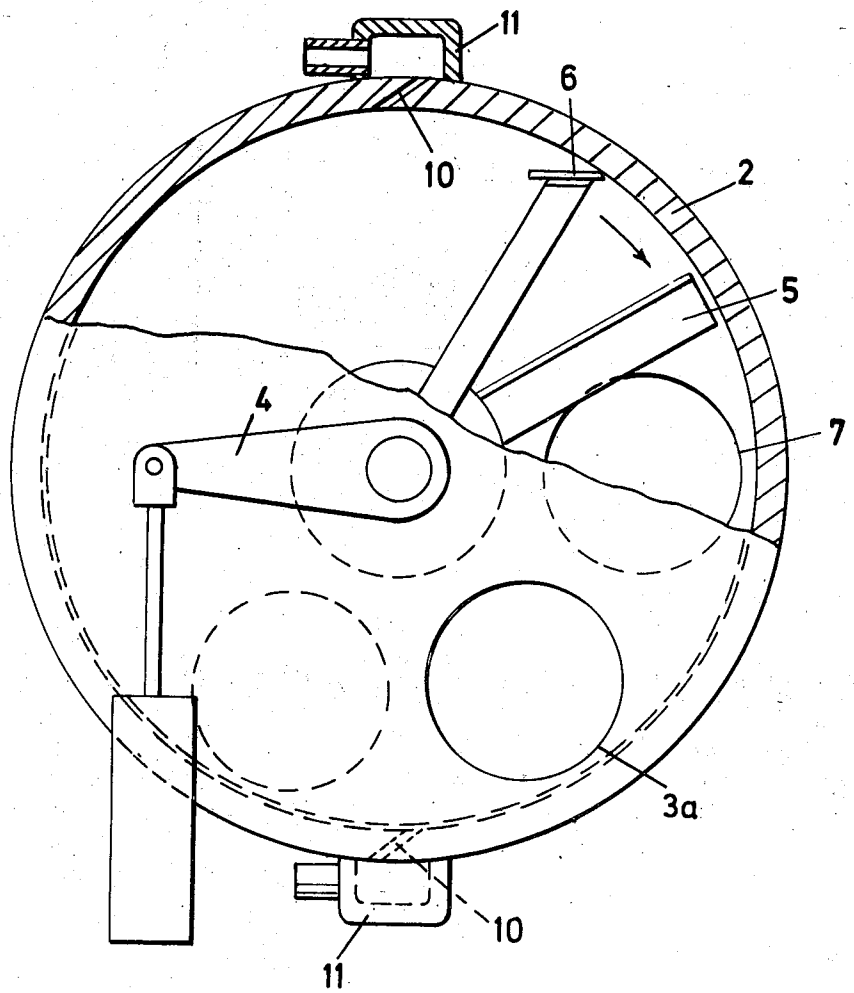
*Attorney*—Roberts B. Larson et al.



[57] **ABSTRACT**

A mixing chamber for mixing cold-setting foundry sand mixtures comprising a cylindrical wall, a base, a roof, a material inlet, a material outlet and a rotary mixing element. The mixing element has an axis which is substantially co-axial with the axis of the cylindrical wall. The mixing chamber further has a first pair of diametrically opposed blades to sweep the base of the chamber during rotation of the element and a second pair of diametrically opposed blades, angularly offset from the first pair of blades, to sweep the cylindrical wall of the chamber during rotation of the element.


**10 Claims, 4 Drawing Figures**



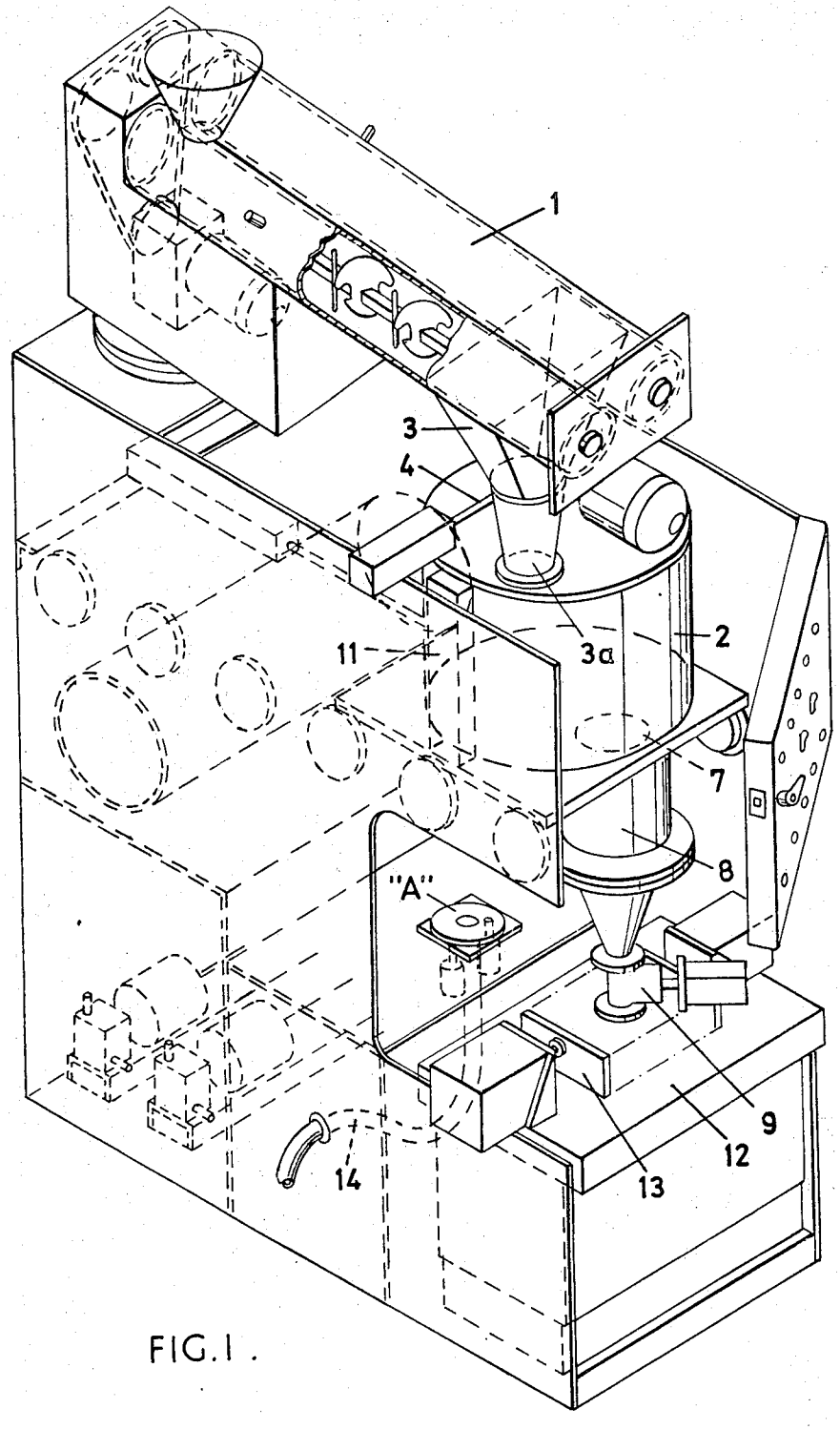
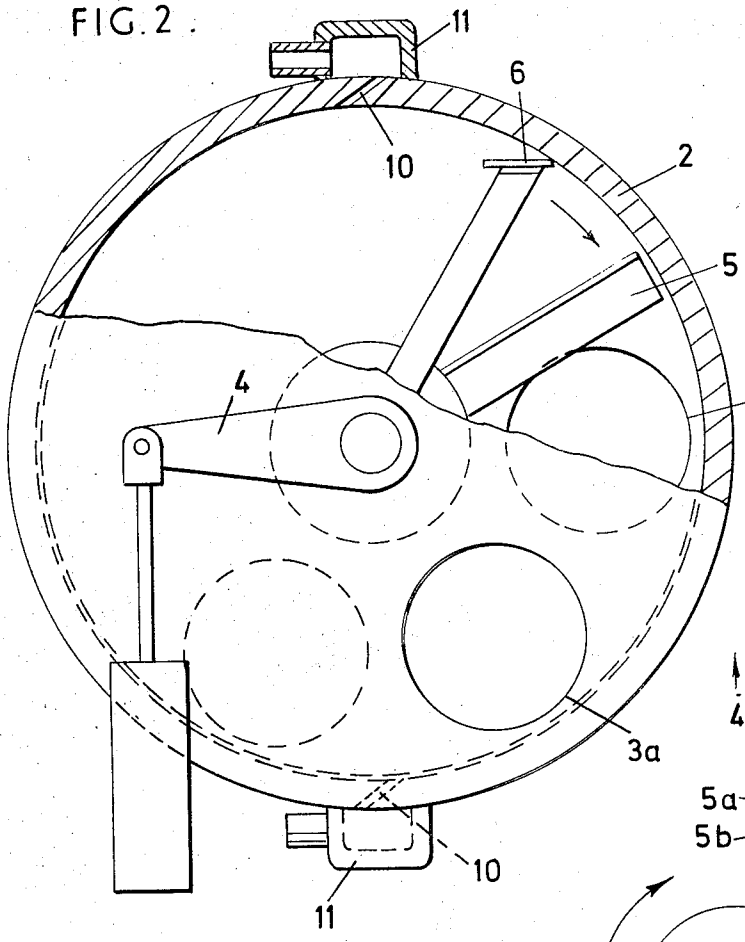



FIG. 1.

FIG. 2.



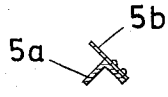




FIG. 4.

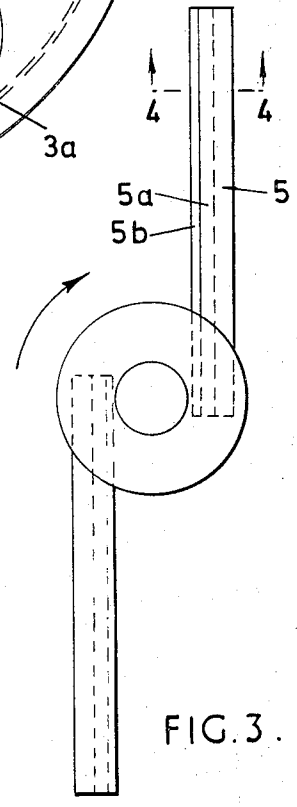



FIG. 3.

# MIXING CHAMBER CONSTRUCTION

This invention relates to a mixing chamber construction useful, for example, for mixing cold-setting foundry sand mixtures in the preparation of foundry moulds or cores.

The invention provides a mixing chamber construction comprising a cylindrical wall, a base, a roof, a material inlet, a material outlet, and a rotary mixing element in the chamber, the element having an axis substantially coaxial with the axis of said cylindrical wall and having first blade means adapted to sweep the base during rotation of the element and second blade means angularly offset from the first blade means and adapted to sweep the cylindrical wall during rotation of the element.

The first blade means may comprise a pair of angle iron members mounted tangentially relative to said axis and having rigid blades attached thereto or alternatively, the first blade means may comprise a relatively flexible pair of diametrically opposed blades, for example, spring steel blades.

Said second blade means may comprise a relatively flexible pair of diametrically opposed blades, such as spring steel blades and the degree of angular offset between the first and second blade means can be anything up to 90°.

According to a further feature of the invention the cylindrical wall can have tangentially disposed ports for introducing gas under pressure into the chamber for purging purposes.

Preferably, the second blade means are fixedly attached to a cross-member which also serves to sweep the roof of the chamber.

It has been found that with a construction according to the invention, if the rotary element is rotated at about 120 RPM foundry materials introduced to the inlet can be intermixed as they fall through the chamber, in about three quarters of a revolution of the mixing element. The inlet and outlet may therefore be angularly offset accordingly.

Alternatively, the mixing chamber may be used as a batch mixer wherein metered amounts of the two separate mixer are introduced into the mixing chamber and intermixed for a predetermined time period for example about 10 seconds for foundry mixtures.

The invention will now be described by way of an example with reference to the accompanying drawings in which FIG. **1** is a perspective view of apparatus for preparing foundry moulds and cores.

FIG. **2** is a plan view of the mixing chamber, with the upper part of the mixing chamber removed for clarity.

FIG. **3** is a plan view showing an alternative form of a lower part of a mixing element for the mixing chamber.

FIG. **4** is a sectional view along line **4—4** of FIG. **3**.

Referring to FIGS. **1** and **2**, a pair of continuous screw-type mixer conveyor units **1**, for example units of the kind described in our U.K. Patent Specification No. 1051651 supplied with metered quantites of sand and resin and sand and catalyst respectively, discharge their resultant mixtures into a cylindrical mixing chamber **2** through a divided hopper **3** and an inlet **3***a* in the roof of the chamber under the control of a valve **4**. The valve **4** and units **1** operate for a time sufficient to supply an amount of material to the chamber slightly in excess of that required for a mould or core being prepared.



The mixing chamber incorporates a vertical axis rotary mechanical mixing element having a first pair of blades **5** made of spring steel which sweep the base of the chamber, these blades being inclined at about 45° to the vertical, and a second pair of spring steel blades **6** angularly offset from the first pair and which sweep the vertical cylindrical wall of the chamber, the second blades being inclined at about 30° to the chamber radius. The mixing element is rotated at about 120 RPM, and it has been found that with this arrangement, as the mixtures from units **1** fall through the mixing chamber they can be intermixed in about three quarters of a revolution of the mixing element. An outlet **7** in the base of the mixing chamber leading to a blowing chamber **8** is accordingly suitably angularly offset from the inlet **3***a*.

Alternatively, the mixing chamber can be used as a batch mixer. Referring to FIGS. **3** and **4**, an alternative form of the first pair of blades **5** of the mixing element is shown. In this embodiment, the blades **5** comprise two tangentially mounted angle iron members **5***a* having rigid blades **5***b* attached thereto, in place of the diametrically opposed spring steel blades.

When the complete charge in its finally mixed state has passed into the blowing chamber **8** it is held there through a closed valve **9** and compressed air is supplied to the mixing chamber through tangentially inclined ports **10** in the vertical mixing chamber wall via manifolds **11.** The compressed air purges the mixing chamber of any remaining material and builds up pressure on the final mixture in the blowing chamber. Then, when the pressure reaches a suitable blowing level, the air supply is terminated, and valve **9** is opened to allow the final mixture to be blown into a mould or core box on a lifting table **12,** the box being held by side clamps **13** and to the base of the blowing chamber by lifting table **12.** After the core has been blown, valve **9** is again closed, the core or mould box is released and lowered and the mixing chamber **2** with communicating blowing chamber moved to position marked "A." Then valve **9** is re-opened to discharge any remaining mixture into a suitable receptacle (not shown) via conduit **14** and to reduce the pressure in the mixing and blowing chambers to atmospheric. The apparatus can then be returned to its original position and the process repeated for another mould or core.

Whilst the above description relates to apparatus in which the mixing chamber is combined with a blowing chamber, it is to be understood that a mixing chamber construction according to the invention can be used in other applications for example with a conventional core shooter as disclosed in our co-pending application No. 8094/71 which has been cognated with our other co-pending application No. 59541/71.

I claim:

**1.** A mixing chamber for cold-setting foundry sand mixtures comprising a cylindrical wall, a base, a roof, a material inlet, a material outlet, a rotary mixing element in the chamber, the element having an axis substantially coaxial with the axis of said cylindrical wall and having first blade means adapted to sweep the base during rotation of the element and second blade means angularly offset from the first blade means and adapted to sweep the cylindrical wall during rotation of the element, means defining tangentially disposed ports in

said cylindrical wall and means for introducing gas under pressure to the chamber through said ports to purge the chamber.

**2.** A mixing chamber according to claim **1** wherein said first blade means comprises a pair of angle iron members mounted tangentially relative to said axis and having rigid blades attached thereto.

**3.** A mixing chamber according to claim **1** wherein said first blade means comprises a relatively flexible pair of diametrically opposed blades.

**4.** A mixing chamber according to claim **3** wherein said pair of diametrically opposed blades comprises spring steel blades.

**5.** A mixing chamber according to claim **4** wherein the blades of said first blade means are inclined about their longitudinal axes relative to said axis.

**6.** A mixing chamber according to claim **4** wherein said second blade means comprises a relatively flexible



pair of diametrically opposed blades.

**7.** A mixing chamber according to claim **6** wherein said pair of diametrically opposed blades of said second blade means comprises spring steel blades.

**8.** A mixing chamber according to claim **7** wherein each blade of said second blade means is inclined, about a longitudinal axis thereof, relative to the mixing chamber radius.

**9.** A mixing chamber according to claim **1** wherein said second blade means are fixedly attached to a cross-member which also serves to sweep the roof of the mixing chamber.

**10.** A mixing chamber according to claim **1** wherein the outlet of the mixing chamber is offset from the inlet thereof through 270° in a direction of rotation of the mixing element.

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