Dec. 28, 1965 J. DEAN 3,225,414

APPARATUS FOR SLIP CASTING CERAMIC ELECTRICAL WARE

Filed Nov. 1, 1962

Fig. 1

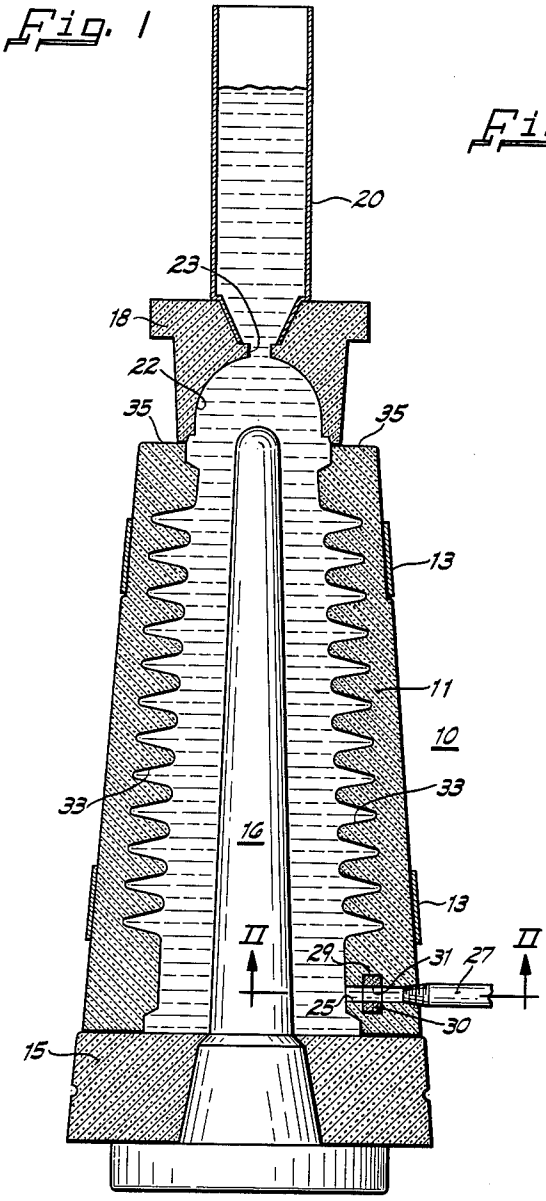


Fig. 4

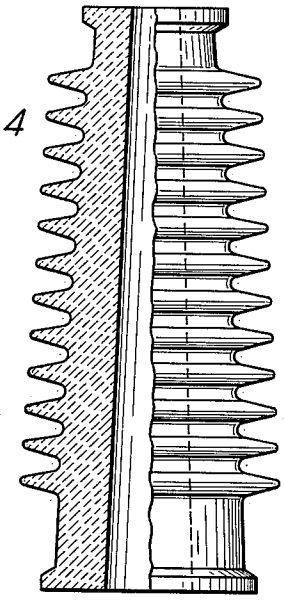
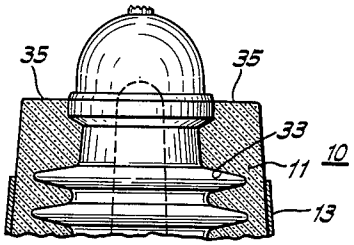


Fig. 3



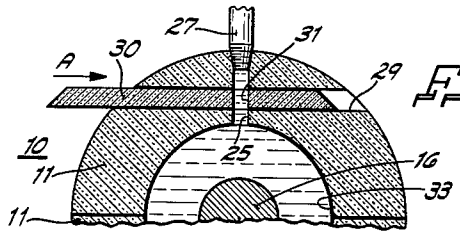


Fig. 2

INVENTOR.
John Dean
BY Robert W. Kalbfleisch
Attorney

United States Patent Office 3,225,414
Patented Dec. 28, 1965

3,225,414

APPARATUS FOR SLIP CASTING CERAMIC ELECTRICAL WARE

John Dean, Kenova, W. Va., assignor to McGraw-Edison Company, Milwaukee, Wis., a corporation of Delaware

Filed Nov. 1, 1962, Ser. No. 234,823
3 Claims. (Cl. 25—129)

This invention relates to forming ceramic parts and more particularly to an improved apparatus for slip casting.

The two common methods of slip casting objects are to admit casting slip into a porous mold or through casting wells disposed in either the top or bottom of the mold. Use of a casting well in the top of the mold may result in the entrapment of air during the pouring of the slip resulting in ware of less density with lower mechanical and electrical strength. In molds which contain a core there is an additional disadvantage in that streamers are often caused along the core which require a further finishing operation for their elimination. It is also possible that streamers which build to an excessive thickness will result in an inherent stress causing impairment of the mechanical and electrical properties of the fired ware.

Injecting casting slip through a well near the bottom of the casting mold overcomes the difficulties mentioned above, since air is forced out of the mold cavity ahead of the incoming casting slip while the level of slip is simultaneously raised in such a manner that streamers are not formed. The conventional manner of injecting casting slip through such a bottom casting well is to connect the casting well to a supply of slip which is maintained under pressure during both the filling operation and thereafter until the ware has been cast. After the mold is filled it is necessary to make up the shrinkage in volume caused by moisture being taken up from the slip by the porous mold.

Casting wells, through which casting slip is fed, cause defects. This is true whether the mold is fed through a casting well in the top of the mold or through a well in the bottom of the mold. The defects appear as areas of excessive shrinkage, cracks, and low mechanical and electrical strength. Sometimes open voids will occur beneath the surface in the area of the casting well which cannot easily be detected short of destructive inspection which destroys the ware.

The apparatus of the present invention utilizes a casting well near the bottom of the mold cavity which eliminates the difficulties encountered when filling from the top. Further, the defects described as incident to the use of casting wells are avoided by interrupting flow through the lower casting well and thereafter allowing the mold to be filled during the casting operation through a casting well that communicates with a part of the cavity that forms a portion of the finally formed object which will be trimmed away. By so doing the defects caused by the casting well are removed with the trimmed waste portion to yield an article of ware free of such defects.

It is an object of this invention to provide an improved apparatus for slip casting ceramic ware.

It is a further object of this invention to provide an apparatus for slip casting that avoids both streamers caused by filling the mold from the top and structural defects arising from the use of a casting well.

These and other objects and advantages of this invention will become apparent from the following description when taken in connection with the accompanying drawings, wherein:

FIG. 1 is an elevation view in partial section of the mold of this invention;

FIG. 2 is a section taken along line II—II of FIG. 1;

FIG. 3 is a partial elevation, partially in section with the cap portion of the mold removed showing part of the newly cast shape before the latter has been trimmed; and

FIG. 4 is an elevation partially in section of the completed ware formed by the mold of FIG. 1.

Referring to FIG. 1 an upright porous mold **10** is shown having a pair of mating outer mold sections **11**, which are retained in position with respect to one another by the bands **13**. The mold sections **11** are supported on a base ring **15** and extending upwardly through the center of the base ring and positioned thereby is a central core **16**. Above the mold sections **11** is a cap or auxiliary cavity forming portion **18** and a reservoir **20** which is in fluid communication with the auxiliary cavity portion **22** through the casting well **23**.

Through a lower portion of one of the mold sections **11** is a second casting well **25**, which has a supply conduit **27** connected thereto. As seen in FIGS. 1 and 2, a rectangular passage **29** intersects the casting well **25**. A cooperating rectangular gate **30** having a passage **31**, therethrough is slidably disposed in the passageway **29** for movement between a position where passage **31** is aligned with the casting well **25** and a position whereby the gate **30** interrupts fluid communication between the conduit **27** and the ware forming cavity portion **33**. The gate **30** is preferably made of the same material as the mold section **11** to afford as nearly as possible a uniformity throughout the material of the mold section.

The configuration of the formed object is determined by the cavity bounded by the mold sections **11**, the cap **18**, base ring **15**, and core **16** which would yield an object defined by the composite of the cavity portions **22** and **33**. Each of the above indicated mold portions which surround the object forming cavity are made of a porous material such as plaster of Paris.

In the present embodiment the ultimately finished ware is identical to the cavity portion **33** surrounded by the mold sections **11** and an auxiliary object portion is formed by the cavity portion **22** within the cap **18**. The composite object cast in the mold is without a severe change in cross section at the juncture of ware forming cavity and the auxiliary cavity. Specifically it is to be noted that the cross section of the ware forming cavity **33** immediately below the cap **18** and the cross section of the cavity **22** immediately above the mold sections **11** are substantially the same. Further as shown in the preferred embodiment, the casting well **23** communicates with the cavity **22** at the location most remote from the cavity **33**.

Utilizing the apparatus described above an article of ware is formed by supplying casting slip to the mold as assembled in FIG. 1 so that the level of slip, rising from the bottom of the mold cavity portion **33**, fills both cavity portions **22** and **33** and causes sufficient casting slip to enter the reservoir **20** to both provide make up slip and apply a hydrostatic pressure to the object forming cavity portions during the balance of the casting operation. The gate **30** is then moved to interrupt fluid communication through casting well **25** and make up slip is supplied from the reservoir **20** through casting well **23** during the balance of the casting operation.

When the cast object has become sufficiently solidified for further processing, it is removed from the mold and the auxiliary portion trimmed from the ware. In the embodiment shown, because the ware forming portion of the mold is coextensive with the mold sections **11**, the trimming operation can be simplified by removing the cap **18** and core section **16**, and thereafter trimming the object, using the top surfaces **35** (FIG. 3) of the mold sections **11** as a guide.

The resulting ware as shown in FIG. 4 is free from streamers, particularly adjoining the core of the mold, by reason of filling from the bottom of the mold and avoids the defects occasioned in the vicinity of the casting well by feeding slip to the cavity at a location remote from the ware forming portion to cause any such defects to occur in a portion trimmed from the object and discarded.

While a single embodiment of the invention has been shown and described, it is not intended that the invention should be limited thereto, but should include such other embodiments and variations as come within the scope of the appended claims.

I claim:

1. A mold for slip casting ceramic objects comprising: a lower object forming porous mold portion defining a vertically extending cavity, having a casting well communicating with said cavity through an upper wall of said object forming portion; a reservoir disposed above said object forming mold portion in fluid communication with said cavity through said casting well; a lower passage extending through said object forming mold portion in fluid communication with said cavity adjacent to the lowermost portion thereof, and selectively operable closure means movable transversely of said lower passageway to interrupt fluid communication through said lower passage.

2. A porous mold for slip casting ceramic ware comprising a vertically extending cavity, said cavity including a lower ware forming portion and an upper auxiliary portion communicating with said ware forming portion substantially throughout the area of the upper terminal end of said ware forming cavity portion; an upper casting well communicating with said auxiliary cavity portion at a location remote from said ware forming cavity portion; a reservoir extending upwardly from said mold and communicating with said cavity through said upper casting well; a fluid passageway communicating with said cavity adjacent to the lowermost portion thereof; and selectively

operable closure means for interrupting fluid flow through said passageway comprising a transverse passageway in said ware forming mold portion intersecting said fluid passageway and a gate member formed of a material having a porosity similar to the porosity of the associated ware forming mold portion, said gate being slidable into and out of a position wherein fluid communication through said fluid passageway is interrupted.

3. A mold for slipcasting ceramic ware comprising a lower ware forming porous mold section defining a vertically extending cavity; an upper auxiliary porous forming section which is in fluid communication with said ware forming section substantially throughout the entire area of the upper end of said ware forming cavity section; a casting well communicating wtih said cavity through said auxiliary portion at a location remote from said ware forming portion; a passageway through said mold in fluid communication with said ware forming cavity section adjacent to the lowermost portion thereof; and selectively operable closure means for interrupting fluid flow through said passageway, said closure means including a gate formed of the same material as said ware forming section of said cavity and slidable transversely of said passageway between a position permitting continuous fluid communication through said passageway and a position interrupting fluid communication through said passageway.

References Cited by the Examiner

UNITED STATES PATENTS

1,304,571	5/1919	Kirk et al.	264—86
1,564,274	12/1925	Rand	264—86
1,882,191	10/1932	Purinton	246—86
2,261,583	11/1941	Hemphill	264—219
2,288,661	7/1942	Wadman	264—86

ROBERT F. WHITE, *Primary Examiner.*

ALEXANDER H. BRODMERKLE, *Examiner.*