Aug. 28, 1956 J. D. HEIBEL ET AL 2,760,314

METHOD OF MAKING CERAMIC PIECES

Filed July 2, 1954

FIG. 1

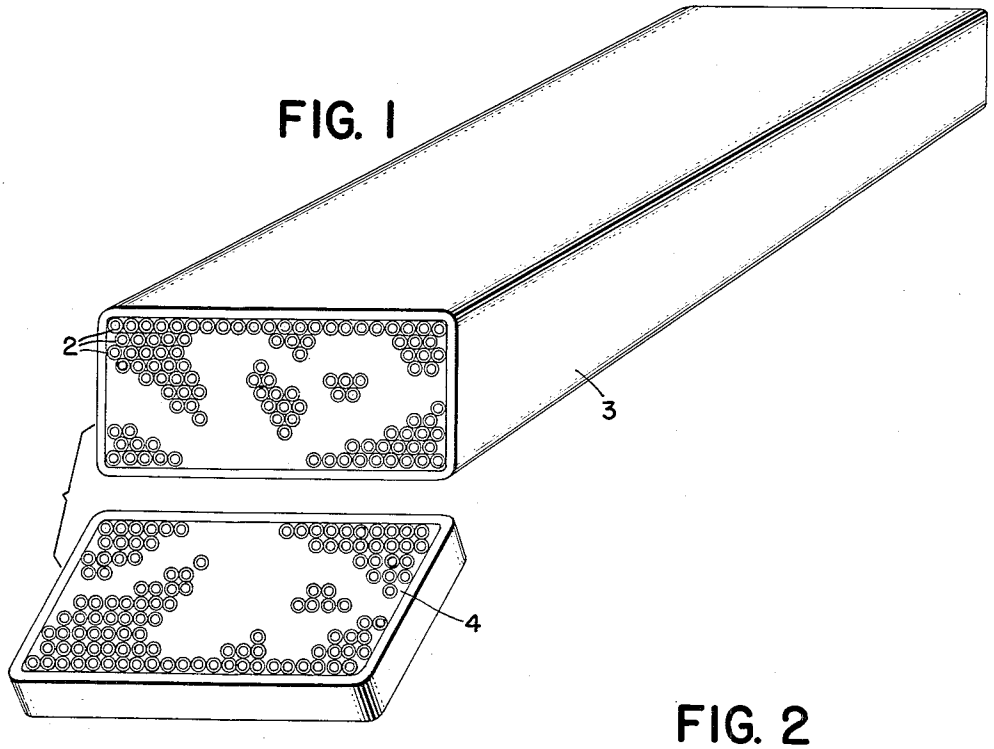


FIG. 2

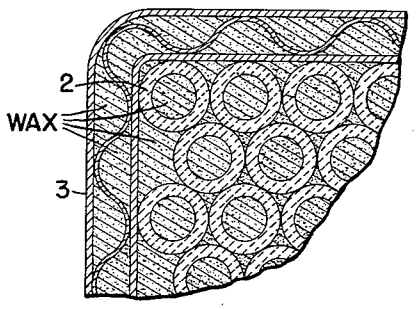
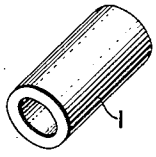


FIG. 3



INVENTOR
JEROME D. HEIBEL
BOBBY L. JOYNER

BY Ralph Hammar

ATTORNEY

United States Patent Office 2,760,314
Patented Aug. 28, 1956

2,760,314

METHOD OF MAKING CERAMIC PIECES

Jerome D. Heibel and Bobby L. Joyner, Erie, Pa., assignors to Erie Resistor Corporation, Erie, Pa., a corporation of Pennsylvania

Application July 2, 1954, Serial No. 441,042

2 Claims. (Cl. 51—283)

This invention is intended to produce short unfired ceramic tubes with smooth chip-free edges by sawing the short tubes from long unfired ceramic tubes supported in a wax which can be easily separated after the sawing operation. In one form, the invention is used to make short unfired ceramic tubes from a bundle of longer tubes cast in a water soluble wax and cut crosswise of the longer tubes at the desired length so that each cut produces a plurality of short tubes. The longer tubes are so well supported by the wax that the ends of the short tubes are smooth and chip free.

In the accompanying drawing, Fig. 1 is a perspective of a bundle of longer unfired ceramic tubes cast in wax with a cut-off bundle of short unfired ceramic tubes adjacent one end; Fig. 2 is an enlarged fragmentary section through the bundle of tubes; and Fig. 3 is a perspective of one of the short tubes.

In the drawing, 1 indicates an unfired ceramic tube such as used in the manufacture of electrical condensers. The tube may for example have a diameter of the order of ⅛ of an inch and a length of ½ of an inch or less. In the manufacture of the condenser, after firing electrodes are applied on the inner and outer surfaces and usually the inner electrode coating extends over one of the end surfaces so that the terminal connections to both electrodes can be made on the outside of the tube. It is desirable that the end surfaces of the tube be smooth and free from chipping which would interfere with the use of the tube in the manufacture of electrical condensers.

Figs. 1 and 2 show a construction in which the short unfired ceramic tubes 1 can be cut off from longer tubes without producing any chipping of the end surfaces. In this construction, a large number of long extruded unfired ceramic tubes 2 are arranged side by side in a generally rectangular bundle enclosed by corrugated cardboard walls 3 and the entire bundle is filled with wax so that the tubes 2 and the cardboard 3 are all in effect cast in wax. The casting process is conveniently carried out by heating the wax to a temperature at which it becomes liquid and introducing the wax into a mold which contains the tubes 2 and the cardboard 3. Upon cooling, the bundle of tubes 2 with the cardboard 3 form a solid mass from which sections 4 having a length corresponding to the desired length of the short tubes 1 can be cut off with a cut-off saw. The sections 4 can be re-heated to remove most of the wax and treated with

a solvent to remove any residual wax. By this process, short unfired ceramic tubes of uniform length and with the end surfaces free from chipping are readily made.

In the cut-off operation, water is used as a lubricant for the purpose of washing the grit and sawdust from the cut and flushing the saw blade to prevent clogging. The preferred wax for use in this process is water soluble so that it will be dissolved from the blade. Unless the sawdust like particles of wax are flushed away, the blade will jam and the cut will not be smooth.

The preferred compound for casting the bundle of unfired ceramic tubes is wax, because it is very fluid when melted, strong when cooled, and is easily removed from the cut tubes. Wax also is economical, does not penetrate the ceramic, and does not alter the chemical characteristics of the ceramic.

The cardboard enclosure for the bundle of tubes cast in wax is important in that it completely eliminates any chipping of the end surfaces at the saw cut, particularly at the outside edge of the bundle where the tubes are less firmly supported than the tubes at the center of the bundle. The cardboard is in effect a reenforcement for the bundle.

The wax fills all of the interstices and provides complete support for the brittle unfired ceramic so that the walls of the individual tubes are firmly supported by the wax on both the inside and outside and warping of adjacent pieces does not cause cracking.

What is claimed as new is:

1. A method of cutting short unfired ceramic tubes from long tubes of unfired ceramic which comprises arranging a plurality of the long tubes of unfired ceramic side by side in a bundle, enclosing the bundle with cardboard, casting wax into the interstices to make the bundle with the enclosing cardboard a solid body, cutting the body along lines to sever therefrom sections containing a plurality of short unfired ceramic tubes embedded in wax, said cutting being made with a saw while lubricating the saw with water to wash grit and sawdust-like particles of wax from the cut and to flush wax from the saw blade to prevent clogging, and thereafter heating the cut-off sections to remove the wax and to separate the short ceramic tubes.

2. A method of cutting short unfired ceramic tubes from long tubes of unfired ceramic which comprises arranging a plurality of the long unfired ceramic tubes side by side in a bundle, casting wax into the interstices to make the bundle a solid body, cutting the body along lines to sever therefrom sections containing a plurality of short unfired tubes embedded in wax, said cutting being made with a saw while lubricating the saw with water to wash grit and sawdust-like particles of wax from the cut and to flush wax from the saw blade to prevent clogging, and thereafter heating the cut-off sections to remove the wax and to separate the short cearmic tubes,

References Cited in the file of this patent

UNITED STATES PATENTS

2,354,931	Tolman	Aug. 1, 1944
2,511,962	Barnes	June 20, 1950