

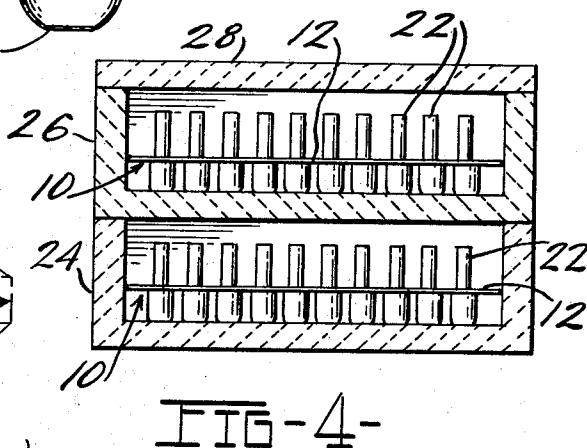
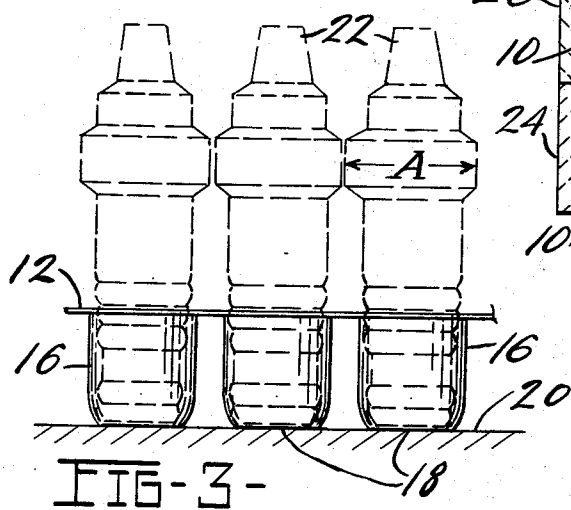
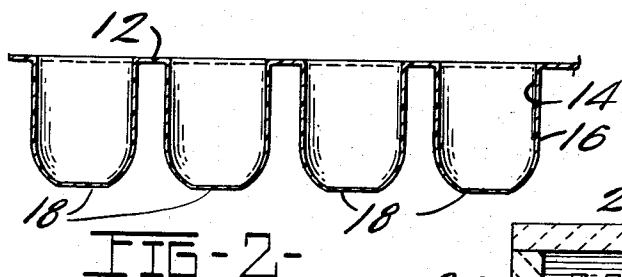
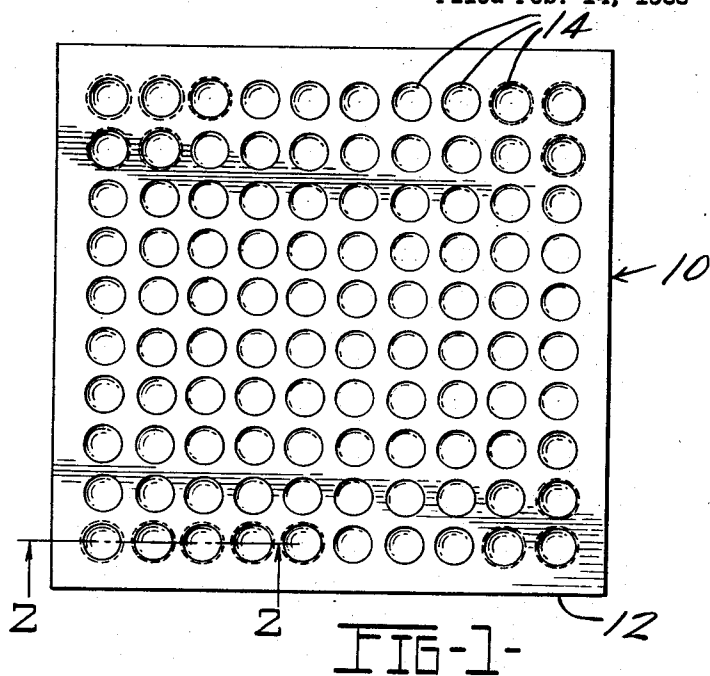
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COMBUSTIBLE SUPPORT

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3,499,634

COMBUSTIBLE SUPPORT

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5 Claims

ABSTRACT OF THE DISCLOSURE

A combustible support for holding elongated articles upright in a sagger prior to firing the articles in a kiln. The support comprises a single, thin sheet of synthetic resinous material with a number of cups formed therein. The cups are shaped and spaced to receive and to hold the articles in an upright, laterally spaced position.

BACKGROUND OF THE INVENTION

This invention relates generally to a support for holding elongated articles in an upright position in a sagger and particularly to a combustible support for holding the articles upright while several saggings are stacked and moved into a kiln.

At the present time it is difficult to load small elongated articles such as green spark plug insulators into saggings for firing in a kiln such that the articles remain spaced and upright during firing. If the articles are not upright during firing, a high percentage may be defective due to warpage. The problem is particularly difficult because of variations in sagger and ware size. It is seldom possible to pack the articles tightly enough so that during subsequent moving of the saggings they will not tilt or fall over. Even if possible, it may be undesirable to pack the articles tightly because of ware damage during firing.

SUMMARY OF THE INVENTION

The tray or support of the present invention is preferably a single thin sheet of a combustible synthetic resinous material with a plurality of cups formed therein. The cups may be vacuum formed, or formed in an injection molder or other processor. The cups are shaped to receive elongated articles in an upright position. The center-to-center spacing of the cups is slightly larger than, e.g., a few thousandths of an inch, the maximum diameter of the articles. This allows the articles to expand during firing without being distorted.

Accordingly, it is an object of the present invention to provide a method for loading small elongated articles into saggings such that the number of defects caused in articles during firing in a kiln is reduced.

Another object of the present invention is to provide an inexpensive support for holding elongated articles in an upright and laterally spaced position in a sagger prior to firing in a kiln.

Still another object of the present invention is to provide a support for holding articles in an upright position in a sagger prior to firing in a kiln, but which will burn completely during firing and thus permit the articles to expand without being distorted.

Other objects and advantages of the invention will become apparent in the following detailed description of a preferred form thereof, reference being had to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view showing a combustible support of the present invention;

FIG. 2 is an enlarged cross-sectional view taken along

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line 2—2 of FIG. 1 showing the formed cups in detail;

FIG. 3 is a side elevation of a portion of the support showing elongated articles positioned in the cups; and

FIG. 4 is a cross-sectional side view of two stacked saggings, each holding a support and articles.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIG. 1, the tray or support 10 comprises a single flat sheet 12 of combustible material having a plurality of spaced cups 14 formed therein.

The sheet 12 is made from a material which will burn easily and leave at most a trace of ash. Preferably, the material is a synthetic resin, e.g., a low ash, non-filled, unoriented butyrate, polystyrene or polyethylene; however, other combustible materials such as cellulosic sheets will work. To reduce the cost and the amount of ash formed during combustion, the material should be just thick enough to have the necessary strength to support the articles.

Construction of the cups 14 is shown in detail in FIGS. 2 and 3. When the support 10 is manufactured from a flat sheet of material 12, cups 14 can be vacuum formed or pressed into the sheet; where the support 10 is manufactured from raw material, it can be injection molded. The vacuum forming process will normally cause the sides 16 to be tapered toward the bottom 18 of the cups 14 and will cause the bottoms 18 of the cups to be very thin. However, the use of a plug assist as the cups are vacuum formed will produce a more uniform thickness in the walls and the bottoms of the cups 14. This may be necessary to give the support adequate strength. The sides 16 of the cups 14 serve primarily to support the sheet 12 above the horizontal sagger bottom 20 and secondarily to hold the articles 22 straight in the cups 14. The bottoms 18 of the cups 14 serve no useful purpose and may therefore be very thin. As shown in FIG. 3, the weight of the articles 22 will flatten or collapse the thin bottoms 18 of the cups 14. If the sheet 12 and the cup sides 16 burn away before the cup bottoms 18 burn away, the thin, collapsed bottoms 18 are not enough to cause the articles 22 to tilt or fall.

The combustible support 10 can be designed to hold any small elongated articles 22 which are to be fired in a kiln, such as spark plug insulators as shown in FIG. 3. The cups 14 are shaped to receive the upright articles 22. The center-to-center spacing of the cups 14 is slightly greater than the maximum diameter A of the articles 22 (see FIG. 3). Consequently, the articles 22 are separated and held upright by the support 10.

Referring to FIG. 4, which is a cut away view of two stacked saggings 24 and 26 and a sagger cover 28, the sheets 12 of the combustible supports 10 have overall dimensions slightly smaller than the interior dimensions of the saggings. This facilitates insertion into the sagger, but movement of the supports 10 within the saggings is minimized. Since the supports 10 are preferably of thin synthetic resinous material, they will not support the full weight of the articles and are, therefore, inserted into the saggings prior to loading of the articles 22 thereinto. However, the support can be constructed thick enough to act as a tray and, in that instance, can be filled before it is placed in the sagger.

In one example of the support, a sheet of synthetic resinous material about 0.01 inch thick and about 13½ inches square is vacuum formed with an 18 by 18 grid of spaced holes ⅛ inch in diameter to receive green spark plug insulators. The material selected should produce less than 0.02% ash when burned to prevent discoloration of the insulators. The support is then placed in a sagger having interior dimensions of about 13½

inches square and 4 inches high and a wall thickness of $\frac{5}{8}$ inch. Six to nine saggars are filled with green spark plug insulators and stacked. The stack is then covered and conveyed through a kiln for firing.

In another embodiment of the invention, the support comprises a single flat sheet of combustible material having holes cut into it adapted to receive the upright articles. The sides of cooperating saggars are notched or grooved to hold the support at a predetermined height above the bottom of the sagger.

It will be appreciated that although the cups are shown as formed with rounded bottoms, any other convenient shape may also be formed. In many instances a generally flat bottom for the cups will be required. Various other modifications and changes may be made to the support without departing from the spirit and scope of the invention.

What I claim is:

1. The method of loading a plurality of elongated articles to be fired in a kiln into a sagger having a generally horizontal bottom, such that the articles are held upright and laterally spaced, comprising the steps of:

placing in the sagger a generally planar combustible spacer having a plurality of cups adapted to receive and to hold the upright articles, said cups having sides for holding said spacer in a generally horizontal position at a level spaced a selected distance above the bottom of the sagger, and said cups having a center-to-center spacing greater than the maximum lateral dimension of the upright articles, and

placing the articles in an upright position in said cups.

2. The method of claim 1 wherein said spacer is fabricated from a thin sheet of a combustible synthetic resinous material.

3. The method of loading a plurality of elongated articles to be fired in a kiln into a sagger having a generally horizontal bottom, such that the articles are held upright and laterally spaced, comprising the steps of:

placing the articles in a generally planar combustible spacer having a plurality of cups adapted to receive and to hold the upright articles, said cups having sides for holding said spacer in a generally horizontal position at a level spaced a selected distance above the bottom of the sagger, and said cups having a center-to-center spacing greater than the maximum lateral dimension of the upright articles, and

placing said spacer and the articles contained therein into the sagger.

4. A support for holding a plurality of elongated articles to be fired in a kiln in laterally spaced, upright position in a sagger having a generally horizontal bottom, said support comprising: a generally planar spacer fabricated from a thin sheet of combustible synthetic resinous material, said spacer having a plurality of cups formed therein to receive the articles, said cups having rigid sides for holding said spacer in a generally horizontal position at a level spaced a selected distance above the bottom of the sagger and thin collapsible bottoms which do not prevent the articles to stand upright in the sagger when said spacer and said rigid sides burn away, and the center-to-center spacing of said cups being greater than the maximum lateral dimension of the upright articles.

5. The method of loading a plurality of elongated ceramic spark plug insulators to be fired in a kiln into a sagger having a generally horizontal bottom, such that the insulators are held upright and laterally spaced, the insulators having a generally cylindrical shape with ends that are small relative to the longitudinal dimension thereof and a radially extending flange positioned between the ends, comprising the steps of:

placing in the sagger a generally planar combustible support having a plurality of cups formed therein and shaped to receive one end of each of the insulators for holding the insulator in an upright position, said cups having sides for holding said support in a generally horizontal position at a level spaced a selected distance above the bottom of the sagger, and said cups having a center-to-center spacing greater than the diameter of the flange portion of the insulators, and

placing the insulators in an upright position in said cups.

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