

July 20, 1965

S. WEINGRAD

3,196,252

PORTABLE KILN

Filed March 7, 1963

2 Sheets-Sheet 1

FIG. 1

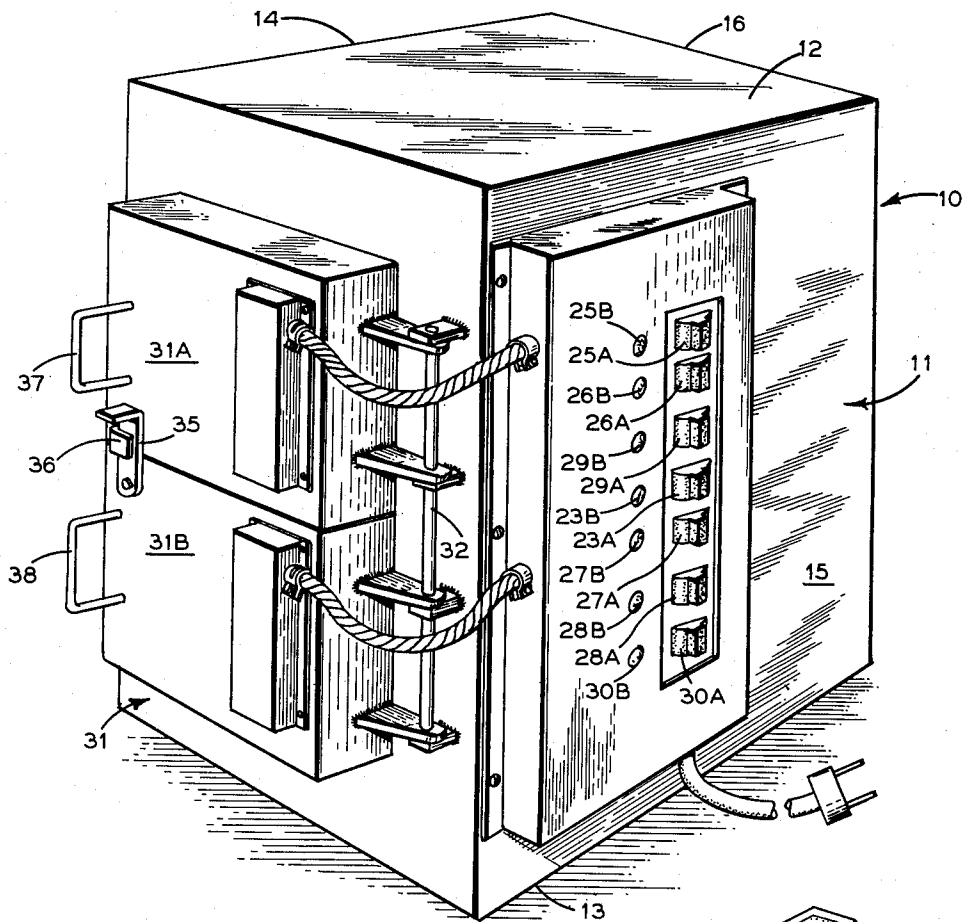


FIG. 5

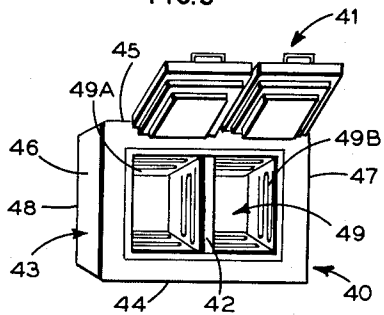
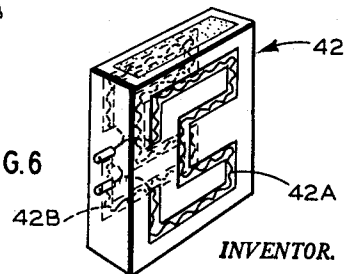


FIG. 6



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2 Sheets-Sheet 2

FIG. 2

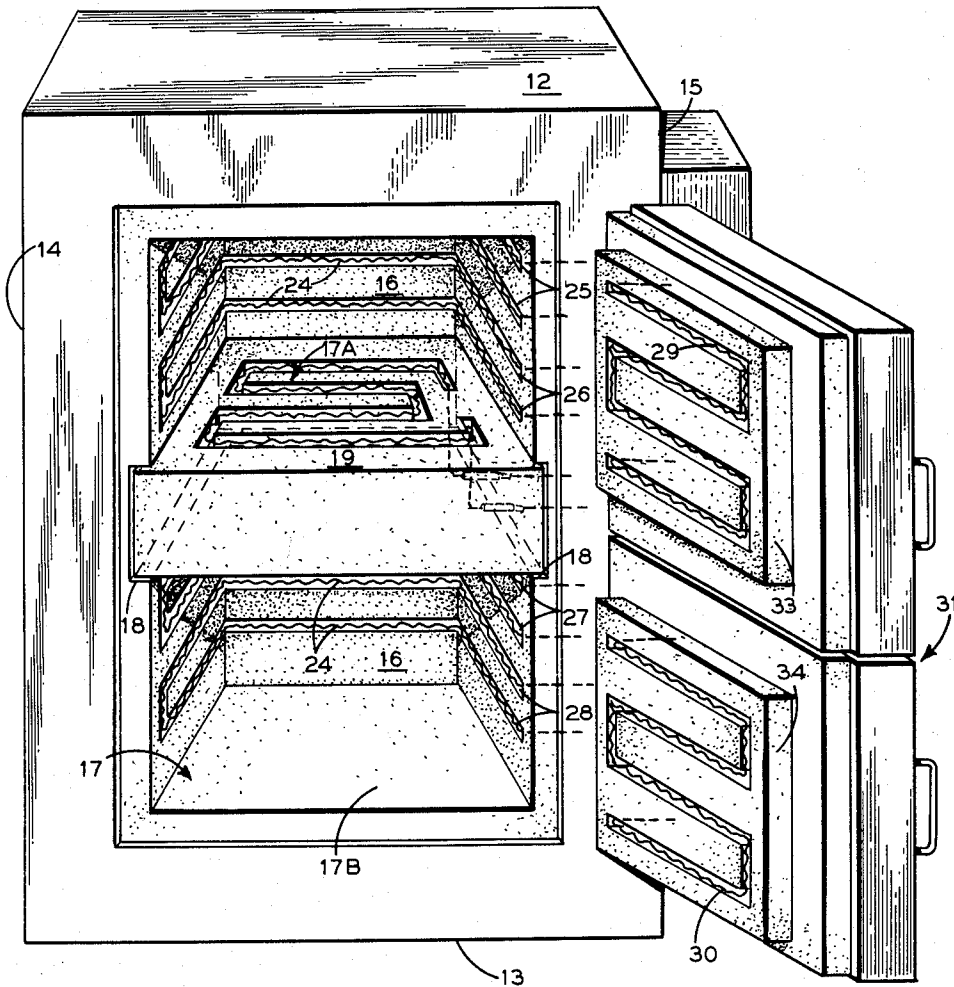


FIG. 3

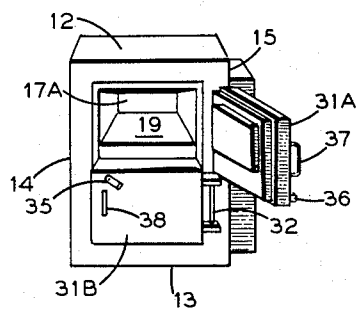
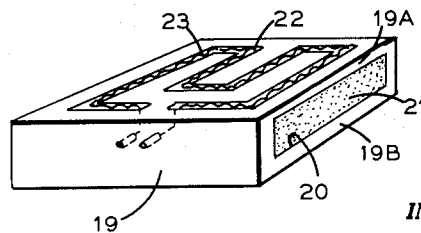


FIG. 4



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PORTABLE KILN

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2 Claims. (Cl. 219—394)

This invention relates in general to a portable kiln, and more specifically to an improved portable kiln which is readily adapted for hobby, test or laboratory use and which is versatile in operation for efficiently and economically firing either a capacity load or less than a capacity load of ware, and/or for simultaneously firing pieces of ware at different temperatures and/or in different time cycles.

Heretofore, the small kilns used by hobbyists, schools, manufacturers, test laboratories and the like, had many undesirable limitations imposed thereon. As a technical matter it is not desirable to fire a kiln unless the inside cubic area of the kiln is filled to capacity with ware. This is necessary in order to obtain uniform distribution and transfer of the heat to the ware for obtaining optimum firing results. Because the cubic area or volume of the kiln, heretofore known, was fixed for a given capacity load, it frequently happened that when only one piece of ware, or ware of less than full capacity was fired, the heat, instead of being reflected into the ware, was absorbed by the walls of the kiln. Ware that is fired in too large a volume does not get the desired uniform firing. Therefore, for optimum results, the kiln must be completely filled with ware so that the heat may be absorbed primarily by the ware. Consequently, the disadvantage of the prior known kiln constructions was that for less than capacity loading, the firing of the ware was inefficient and uneconomical. For this reason firing was generally delayed until a full capacity was reached. Oftentimes, in specific tests or hobby applications, a full load was never possible. Also it frequently happens that a piece of ware may be larger than the available volume of a kiln which is sized to fire but small pieces. Thus, the versatility of the known kiln constructions was greatly limited.

For the foregoing reasons, much difficulty has been encountered by those working on relatively small specialized projects or tests that require the use of a kiln. There also arise situations in which several pieces of ware, which could otherwise be fitted into a given volume of a kiln, which required for various reasons to be fired at a different temperature or in a different timing cycle. Because the prior known kiln constructions could not readily handle such mixed firing situations, the ceramist was forced to fire either all the ware in the same manner, or else he was required to make two or more runs in which the specific pieces of ware are fired in accordance with the manner desired.

Therefore, an object of this invention is to provide a new and improved portable kiln construction which is arranged and constructed so as to render it more versatile than the portable kiln heretofore known.

Another object of this invention is to provide a portable kiln construction in which the capacity or volume of the kiln to be fired can be varied at will and with a minimum of effort so as to accommodate different loads of ware, yet permitting the kiln to be fired at optimum full load capacity.

Still another object of this invention is to provide a kiln construction in which pieces of ware may be simultaneously fired at varying temperatures and/or timing cycles.

Still another object of this invention is to provide a single unitary kiln which is constructed and arranged so as to be readily divided into two or more heating compartments so as to accommodate a full capacity load or

2

load less than capacity under firing conditions which are optimum for full load firing.

Another object of this invention is to provide a readily portable versatile kiln which is relatively inexpensive to construct, which is easily fabricated, and which is positive in operation.

Still another object of this invention is to provide a kiln having a readily removable divider for optionally dividing the heating chamber of the kiln into a plurality of compartments and which divider is constructed and arranged so as to thermally insulate one compartment from another.

In accordance with this invention the foregoing objects, and other features and advantages are attained by a portable kiln comprising essentially a housing lined with refractory material to define a heating chamber which can be optionally divided into a plurality of firing compartments by means of a readily removable divider means. In accordance with this invention the divider means is specifically arranged and constructed so as to thermally insulate one firing compartment from the other when the divider means is disposed within the heating chamber and still provide a strong support for carrying the ware. If desired, a heating element may be embedded in the exterior surface of the divider means so as to supplement the heating elements which line the enclosing walls of the heating chamber in the respective compartment areas.

In accordance with this invention the heating chamber and the respective compartments partitioned therefrom may be constructed so as to be loaded from either the top or front. In either event the heating chamber is sealed by closure means which are pivotally mounted to the housing for swinging between open and closed positions. The construction of the closure means is such that it comprises a plurality of separate and distinct door means which are constructed and arranged so as to cover the access opening to each of the respective compartments defined by the divider means of the heating chamber. The arrangement of the respective door means is such that any one may be operated independently of the other, or all of the doors may be opened as one. The latter possibility is attained by suitable means for latching the doors together whereby the respective doors may be opened simultaneously. Several heating means line the walls of the respective compartments and means are provided for independently controlling the actuation of the respective heating means.

Therefore, a feature of this invention resides in a use of a novel constructed divider means for partitioning the heating chamber into a plurality of separate and distinct compartments, the arrangement being such that for small load firings only one of the chambers is made available to the exclusion of the other so as to obtain optimum firing conditions for less than capacity loads.

Other features and advantages will become more readily apparent when considered in view of the specification and drawings in which:

FIG. 1 is a perspective view of the improved front loading portable kiln construction in accordance with this invention;

FIG. 2 is a front perspective view of the portable kiln construction of FIG. 1 illustrated with the doors thereof in the open position;

FIG. 3 illustrates a perspective view of the kiln of FIG. 1 in which only one of the doors is open;

FIG. 4 is a detailed perspective view of the improved divider construction which partitions the heating chamber of the kiln of FIG. 1 into two separate and distinct compartments;

FIG. 5 illustrates a top plan view of a slightly modified kiln construction; and

FIG. 6 illustrates a modified divider means for use in the kiln of FIG. 5.

Referring to the drawings, there is illustrated therein the improved kiln construction of this invention. As shown in FIGS. 1 to 4, the kiln construction 10 comprises a housing 11 which is defined by a top wall 12, a bottom wall 13, a pair of opposed side walls 14, 15, and a rear wall 16 for defining therein a heating chamber 17. The interior walls of the housing 11 are lined with suitable heat resistant refractory material. In accordance with this invention the respective side walls 14, 15 and rear wall 16 are provided with a groove or recess 18 which is disposed in the horizontal plane intermediate the height of the respective side walls 14, 15 for slidably receiving therein a divider means 19 which is arranged to divide the heating chamber 17 into two separate and distinct compartments 17A, 17B. While only one divider means 19 is shown, it will be understood that more than one may be provided if it is desired to partition the heating chamber 17 into more than two compartments.

In accordance with this invention the partition or divider means 19 comprises a hollowed block of refractory material. In physical dimensions this block comprises a refractory block approximately five inches thick in which the walls 19A, 19B of the block are approximately one inch thick to define a hollow chamber 20 approximately three inches thick. In accordance with this invention the hollow of the refractory block is filled with an insulating material 21. A suitable material for obtaining the desired results is aluminum silicate fiber which is traded under the trademark of "Fibrefrax." Thus with the divider construction 19 defined, it has been found that the maximum amount of thermal insulation is afforded with a minimum of thickness.

As illustrated in FIG. 3, it will be noted that one surface of the heating block is provided with a groove 22 which is adapted to accommodate a heating element 23, as for example, an electrical resistant heater. In the illustrated embodiment, the arrangement is such that when the block 19 is disposed within the heating chamber 17 to divide it into the two distinct compartments, the heater 23 in the block or divider can be utilized to supplement the heating of the adjacent compartment defined thereby.

As shown in FIG. 2, each of the respective compartments 17A, 17B defined by the divider block 19 has provided in the side and rear walls thereof recessed areas 24 for accommodating the independent electrical heaters 25, 26 and 27, 28 which are utilized to heat each of the compartments respectively. In accordance with this invention the controls for the respective heaters 25, 26 and 27, 28 are located on the side 15 of the housing as best seen in FIG. 1.

In the illustrated embodiment of FIGS. 1 to 4, it will be noted that three heaters are used to heat the respective compartments. Heaters 25 and 26, which line the wall portions of the upper compartment, and heater 29 which is located on the door of the upper compartment, as will be hereinafter described, can be used to heat the upper chamber 17A. Also heater 23 in the divider 19 can supplement heaters 25, 26 and 29 to heat the upper chamber 17A. Heaters 27 and 28 which lined the walls of the lower compartment 17B and heater 30 which lines the face of the door closing the lower compartment 17B, as will be hereinafter described are utilized to heat the lower chamber.

As shown in FIG. 4, each of the heaters 23, 25, 26, 27, 28, 29, 30 is provided with a corresponding switch 23A, 25A, 26A, 27A, 28A, 29A and 30A so that each of the heaters may be independently controlled. To determine which of the heater elements are energized, an indicating light 23B, 25B, 26B, 27B, 28B, 29B, and 30B is connected into the respective heater circuit, in a manner well known to those skilled in the art.

In accordance with this arrangement a closure means 31 is provided for closing the access opening to the heat-

ing chamber. In the illustrated embodiment it will be noted that the closure 31 comprises a plurality of separate and distinct doors, 31A, 31B one for each compartment. Each of the doors 31A, 31B is hingedly connected to the housing about a vertical axis or hinge pin 32. Each door is also lined with a suitable refractory material. As shown in FIG. 2 the door 31A, 31B is provided with a stepped portion 33, 34 respectively in which the respective heating element 29, 30 is embedded. The arrangement is such that the lower edges of the door are disposed in contiguous or abutting relationship, and means are provided for latching the respective doors together so that they may be utilized either as separate and independently operated doors, or as a unitary closure when the divider means is not utilized. Means for latching and unlatching the respective doors 31A, 31B to one another so that they may be either opened independently of one another or simultaneously all together, comprising a latch 35 which is pivotally mounted to the lower door 31B, and an L-shaped catch 36 fixed to the upper door 31A. The arrangement is such that to connect the doors 31A, 31B so that they open simultaneously, the latch 35 need be merely rotated to engage the catch 36 of the upper door. Thus it will be apparent, when viewing FIG. 1, that a pull on either of the door handles 37, 38 will effect opening of the doors 31A, 31B simultaneously. In the event that only a portion or one compartment of the heating chamber 17 is being fired, as for example, when the divider block is in place, the door of the firing compartment can be opened independently of the other door merely by pivoting the latch 35 in a clockwise direction, as viewed in FIG. 1 to effect its disengagement from the catch 36. Thus as seen in FIG. 4, either one or the other door may be independently opened without interfering with the other.

From the arrangement described it will be readily apparent that the kiln construction 10 described may be readily adapted for use for either full load firing, or for less than full load firing. For example, when it is desired to fire the kiln 10 at full capacity the divider unit 19 is simply removed, and the ware positioned within the heating chamber 17 so as to occupy the entire volume thereof. The doors, which are latched together are then closed as a unit, and the desired heating elements energized by the closing of the appropriate switches controlling the same.

In the event that less than the capacity load is to be fired, i.e. an amount of ware not capable of occupying the volume of chamber 17, the ceramist need only to insert the partition member 19 and utilize either one or the other of the smaller compartments 17A, or 17B defined thereby. Therefore, for less than capacity firing, the ware required to obtain the desired optimum firing conditions need only be half or some other proportion or fraction thereof of that otherwise required to fill the full heating chamber. Therefore, the advantage obtained by the instant invention is that a less than capacity load of ware can be fired in one or the other chamber, and the subsequent firing resulting therefrom will then have all the advantages that full load firing would otherwise attain.

Also it will be readily apparent that without the divider unit 19, large pieces of ware, or full capacity loading of ware can be economically fired at optimum firing conditions. Also that by utilizing the divider 19 in the heating chamber 17, one or the other of the compartments 17A, 17B can be fired with less than capacity loading while attaining the optimum firing conditions of full capacity firing.

With the construction defined it will be further readily apparent that when the divider is in place, one compartment 17A or 17B of the heating chamber 17 may be used to accommodate a particular type of glaze or decorating firing operation while at the same time the other compartment may be used for firing at a different temperature and/or time cycle.

It is to be further noted that the divider unit 19 is

5

made of a refractory material in a particular manner so as to produce maximum insulation in the minimum amount of area, and that if a supplemental heating element is required, it can be constructed into the divider element 19, as shown in FIG. 3. Therefore, from the foregoing description it will be readily apparent that the construction defined results in a more versatile kiln than was heretofore known.

FIGS. 5 and 6 illustrate a slightly modified construction. As shown in FIG. 5, the kiln 40 is constructed so that it can be loaded from the top. Structurally it is similar to that of the kiln of FIGS. 1 to 4 with the exception of having a top opening closure 41, and a slightly modified divider construction 42.

Essentially, the housing 43 of kiln 40 is made up of a front wall 44, rear wall 45, side walls 46, 47 and bottom wall 48 to define a heating chamber 49 which can readily be divided into two or more compartments 49A, 49B by removable divider means 42. In FIG. 5, the kiln 40 is shown as being divided into two compartments. However, by employing other dividers 42, the number of compartments can be varied.

In this form of the invention of FIGS. 5 and 6, the divider 42 is constructed so a heater 42A, 42B is built into each side thereof. Thus, when the divider 42 is installed, the respective heaters 42A, 42B can be used to supplement the heater of the respective compartments 49A, 49B defined thereby.

The closure means 41 is similar to that hereinbefore described, except that it pivots about a horizontal axis so as to facilitate top loading of the respective compartments. In all other respects, the kiln 10 of FIGS. 1 to 4 and the kiln 40 of FIGS. 5 and 6 are substantially similar.

While the instant invention has been disclosed with reference to a particular embodiment thereof, it is to be appreciated that the invention is not to be taken as limited to all of the details thereof as modifications and variations thereof may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A versatile portable kiln readily adaptable for firing simultaneously a plurality of ware pieces either at the same temperature or at different temperatures comprising

- (a) a refractory lined housing having a front wall, a bottom wall, a rear wall, and opposed interconnecting side walls for defining a heating chamber having a full open top access opening,
- (b) said opposed front and rear walls having a coplanar groove formed in the inner surface thereof intermediate the ends thereof,
- (c) a readily removable divider means slidably received in said grooves for dividing said chamber with two distinct top loading compartments,
- (d) said divider means including a hollow refractory block,
- (e) a high heat resistant material packed in the hollow of said divider block to thermally insulate one compartment from the other when said divider is in place,
- (f) an electric heating element embedded in each surface of said divider block,
- (g) a plurality of electric heating elements lining the side, front and rear wall portions of the respective compartments,

6

(h) means for independently controlling the operation of the respective heating elements,

(i) and a closure means for sealing the access opening to said chamber,

(j) said closure means including a pair of doors hingedly connected to said housing,

(k) each of said doors defining a closure for each of said compartments,

(l) means for independently operating the opening and closing of said doors,

(m) and means for latching said doors together to effect simultaneous opening and closing of said doors.

2. A versatile portable kiln readily adaptable for simultaneously firing a plurality of ware pieces either at the same temperature or at different temperatures comprising

(a) a refractory lined housing having a top wall, bottom wall, rear wall, and opposed interconnecting side walls for defining a heating chamber having a full open front access opening,

(b) said opposed side walls and rear wall having a horizontally disposed co-planar groove formed in the inner surfaces thereof intermediate the height thereof,

(c) a readily removable divider means for dividing said chamber with two distinct compartments slidably received in said groove,

(d) said divider means including a hollow refractory block,

(e) a high heat resistant aluminum silicate fiber material packed in the hollow of said divider block to thermally insulate one compartment from the other when the divider is in place,

(f) an electric heating element embedded in each surface of said divider block,

(g) a plurality of electric heating elements lining the side and rear wall portions of the respective compartments,

(h) means for independently controlling the operation of the respective heating elements,

(i) and a closure means for sealing the access opening to said chamber,

(j) said closure means including a pair of doors hingedly connected to said housing,

(k) each of said doors defining a closure for each of said compartments,

(l) handle means for independently operating the opening and closing of said doors,

(m) and latching means for latching said doors together for effecting the simultaneous opening and closing of said doors.

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