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1,802,235

MEANS FOR SUPPORTING CHINA AND EARTHENWARE DURING
THE FIRING PROCESS IN THE TUNNEL OVEN OR KILN

Filed Jan. 12, 1929

3 Sheets-Sheet 1

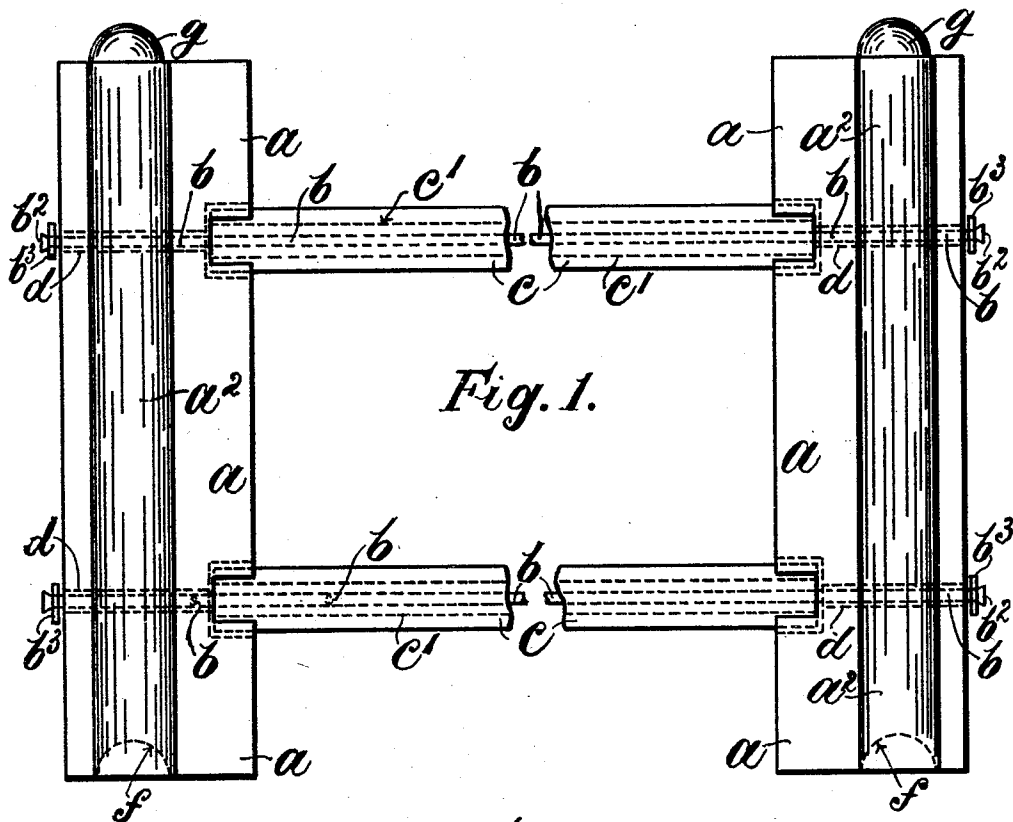


Fig. 1.

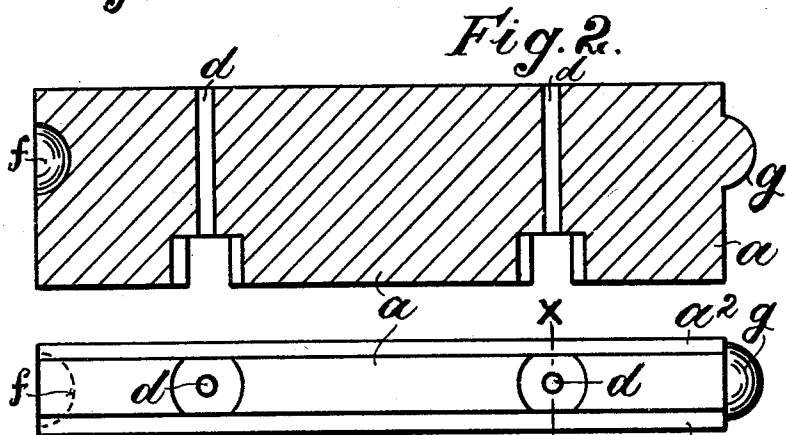


Fig. 2.

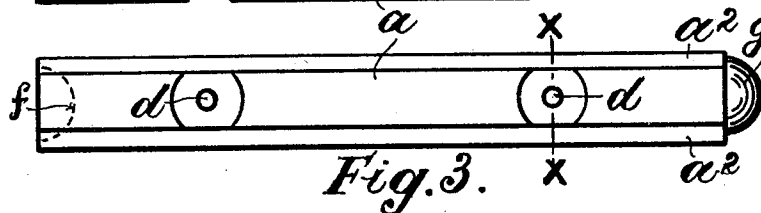


Fig. 3.

Fig. 4.

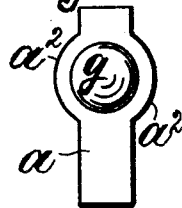
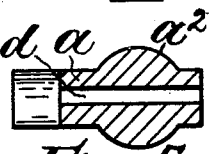


Fig. 5.

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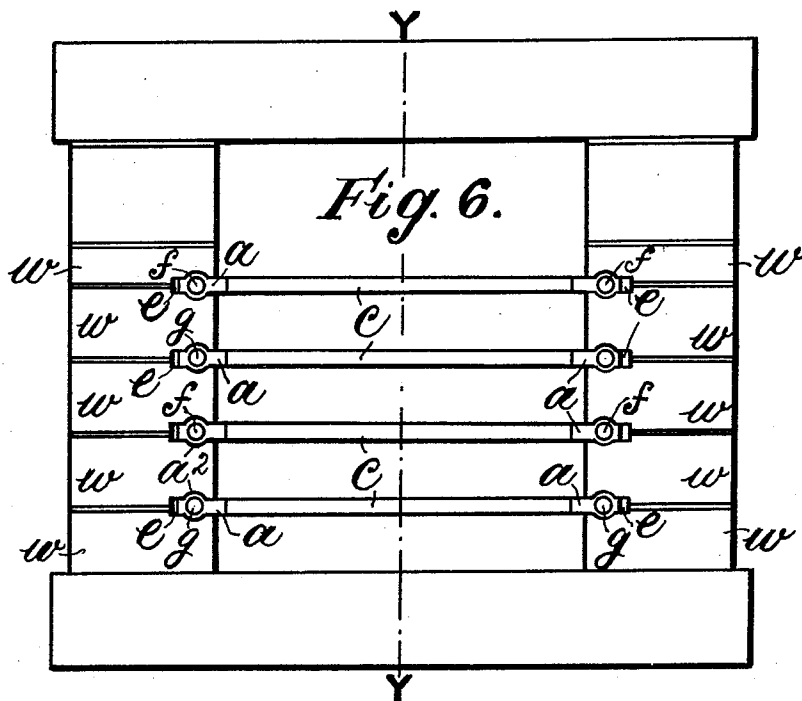
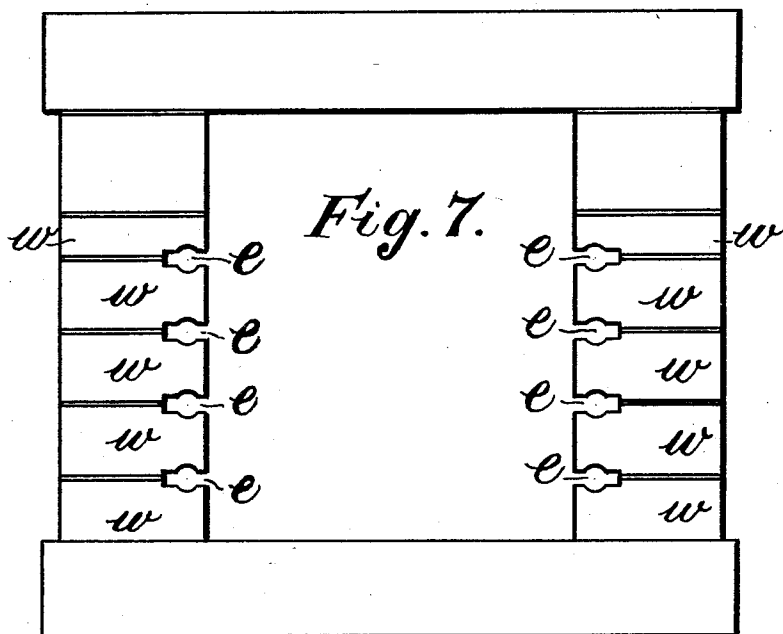
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3 Sheets-Sheet 2



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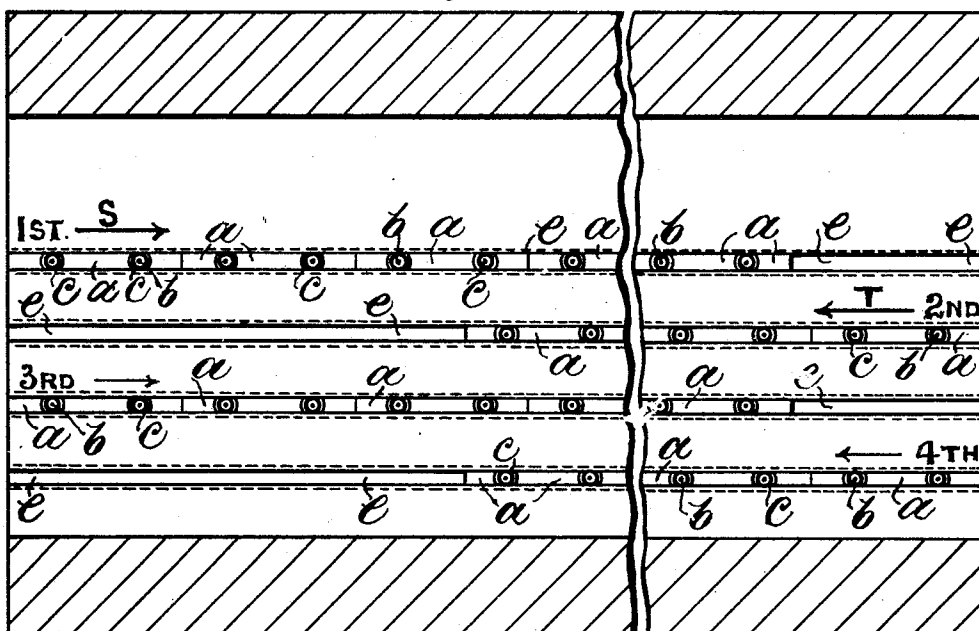
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Fig. 8.



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UNITED STATES PATENT OFFICE

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MEANS FOR SUPPORTING CHINA AND EARTHENWARE DURING THE FIRING PROCESS
IN THE TUNNEL OVEN OR KILN

Application filed January 12, 1929, Serial No. 332,011, and in Great Britain January 18, 1928.

My invention relates to a new or improved means for supporting and conveying china and earthenware, or other articles requiring heat treatment in a tunnel oven or kiln; the object being to provide simple and durable means for supporting and conveying the articles through the tunnel oven or kiln, a further object being to distribute and utilize the heat to the best advantage to thoroughly and uniformly effect the articles under treatment.

The invention will be fully described with reference to the accompanying drawings.

Description of the drawings

Fig. 1 is a plan of a slidable frame several of these frames being employed for supporting and conveying the articles through the tunnel oven or kiln,

Fig. 2 is a sectional plan of one side of the frame,

Fig. 3 is a side elevation of Fig. 2,

Fig. 4 is an end view of Fig. 2,

Fig. 5 is a cross section through line X—X of Fig. 3,

Fig. 6 is a transverse cross section of a tunnel oven having a number of the slidable frames illustrated at Fig. 1,

Fig. 7 is a similar view to Fig. 6 without the slidable frames, and

Fig. 8 is a longitudinal section of the tunnel oven through Y—Y of Fig. 6. This view has been broken off to indicate that it can be of any suitable length.

An important feature of this invention relates to the means for supporting and conveying the articles through the tunnel oven and for this purpose I employ a number of slidable frames of a refractory character and which will allow the free passage or circulation of the heat to the articles being conveyed. They are also capable of movement in all directions to allow of unequal pushing stresses and small irregularities in the width of the tunnel. One convenient type of conveying frame or support is illustrated in plan at Fig. 1 and is composed of two longitudinal bars or plates *a* constructed of fireclay, earthenware or heat resisting metal or substance and having nickel chromium

wires *b* or other nickel alloy or suitable refractory wires shrouded with fireclay *c* for supporting the articles to undergo heat treatment thereon. Each fireclay shroud *c* is preferably of tubular formation with the bore *c*¹ of larger diameter than the diameter of the nickel chromium wire *b* which passes through it. The said wires *b* pass through holes *d* in the bar or plate *a*, the projecting ends of the wires *b* being pinched flat at *b*² on the outside of a small washer *b*³.

By connecting the refractory wires to the longitudinal side bars or plates *a* in the manner described the fireclay sleeves or shrouds *c* lie between the two longitudinal bars or plates *a* and form an articulated durable and easily slidable supporting frame for the articles to rest on.

The longitudinal bars or plates *a* have a curved or rounded swelling *a*² at the top and bottom to move in correspondingly shaped grooves *e* formed in the walls of the oven which are composed of fireclay blocks *w* (see Figs. 6 and 7). One half of each groove *e* may be formed in one block and the other portion in the adjacent block as shown at Fig. 7 or in any other convenient way. The said longitudinal fireclay or the like bars *a* of each frame are constructed with recesses *f* and projections *g*, the projections *g* on the end of one frame fitting into corresponding recesses *f* in the end of the adjacent frame. All the frames are placed one behind the other so that all the projections *g* engage the recesses *f*. The slidable frame constructed as described is supplied with articles which rest thereon and is pushed into the tunnel oven so that the longitudinal bars or plates *a* take into the guides or grooves *e* in the inner walls of the tunnel as shown at Figs. 6 and 8. A second slidable frame similar to the first with articles thereon is placed behind the first frame to also engage the guides or grooves *e* and is moved slowly forward, all the frames being placed in a similar way to be slowly conveyed through the oven.

The top length of frames illustrated at Fig. 8 have been placed in position from the left hand end of the oven in the top grooves *e* and moved slowly in the direction of the

arrow S, the ends of the bars *a* making contact and forming a long moving support or conveyor for the ware.

Any suitable mechanism or means may be employed to transmit a slow sliding movement to the frames, each frame with the articles thereon being removed after passing through the full length of the oven and the articles have received proper heat treatment.

The outside of the tunnel oven may be covered with fireclay or other suitable insulating material in the ordinary way.

Another important feature of this invention relates to the distribution and utilization of the heat from cooling goods, that is, from the goods which have passed from the heat zone or hottest part of the oven, to exit. To accomplish this the tunnel is constructed with two or more sets of guides or grooves *e* for the slidable frames to move in, the number of grooves being in accordance with the size or capacity of the oven. For example at Figs. 6 to 8 four sets of longitudinal guides or grooves *e* are shown to permit of four lengths or sets of frames, with articles thereon, to traverse the tunnel. The slidable frames in their respective grooves *e* slowly travel in alternate directions, that is, the frames in the 1st and 3rd grooves *e* (Fig. 8) are pushed slowly in the direction of the arrow S and the frames in the 2nd and 4th grooves *e* in the direction of the arrow T by which means the alternate layers of articles on the frames travelling in opposite directions serve to bring each other to the same temperature.

Any convenient number of slidable frames or supports carrying articles to undergo heat treatment may be passed in alternate directions through the tunnel oven, the heat from each layer of articles affecting the superimposed layers, or the other layers travelling in the reverse direction.

Instead of employing grooves *e* for the conveying frames or supports to slide in I may employ projecting guideways (not shown) fixed on the inside of the tunnel for the frames, or other supports to move on.

Although I have shown a slidable frame with only two shrouded cross wires to support the articles, it is obvious that several shrouded wires of suitable cross section may be employed on the sliding frame and be arranged in any suitable way and at a suitable distance apart so as to allow free circulation of heat to the articles thereon when passing through the oven.

The oven or kiln may be fired by electricity, gas, or in any other suitable way.

What I claim as my invention and desire to secure by Letters Patent is:—

1. The combination, with a heating chamber provided with a series of guides at its side walls, said guides being arranged one above another in pairs, of slidable supports

for articles mounted one above another in the guides, each support comprising a series of frames arranged end to end in abutment with each other.

2. The combination, with a heating chamber provided with guides at its side walls, of a slidable support for articles mounted in and supported solely by the said guides and comprising a series of frames arranged end to end in abutment with each other.

3. The combination, with a heating chamber provided with guides at its side walls, of a slidable support for articles mounted in the guides and comprising a series of frames arranged end to end in abutment with each other, each frame comprising longitudinal side bars provided with cross holes, tubular crossbars arranged between the side bars, and clamping devices extending through the crossbars and cross holes, said side bars and crossbars being formed of heat resisting material.

4. The combination, with a heating chamber provided with guide grooves in its side walls, said guide grooves having vertical recesses, of a slidable support for articles mounted in the guide grooves and comprising a series of frames arranged end to end in abutment with each other, each frame having vertical projections or swellings which engage with the said recesses.

5. A combination of parts as set forth in claim 4, the side walls of the said chamber being formed of superposed blocks and having the said guide grooves formed between their opposed faces.

6. In a tunnel oven a series of guides arranged in superposed pairs in the walls of the oven, superposed supports for carrying articles to be treated by passing them through the oven, said supports being mounted slidably in said guides to enable alternate layers of articles to be slidden through the oven in one direction and the other layers to be slidden through the oven in the opposite direction.

In testimony whereof I have hereunto set my hand.

ARTHUR JOHN CAMPBELL.