

Feb. 10, 1959

G. E. GARD

2,873,345

ARC MINIMIZERS

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FIG. 1.

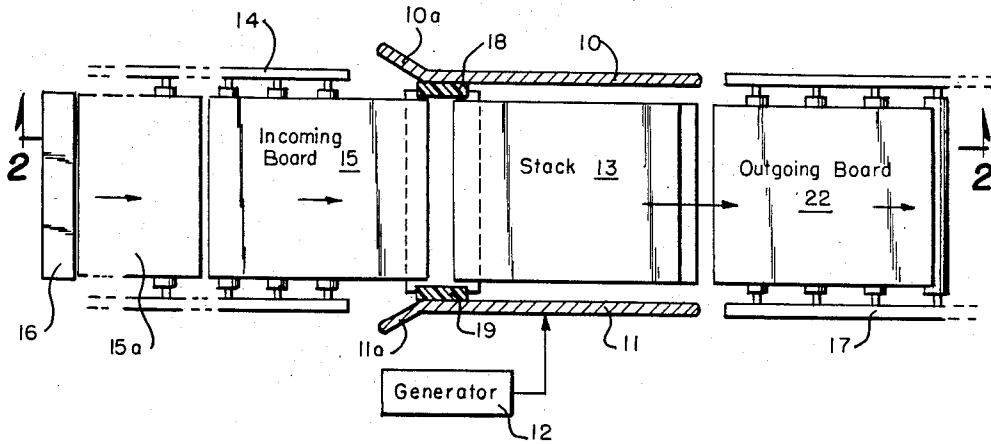
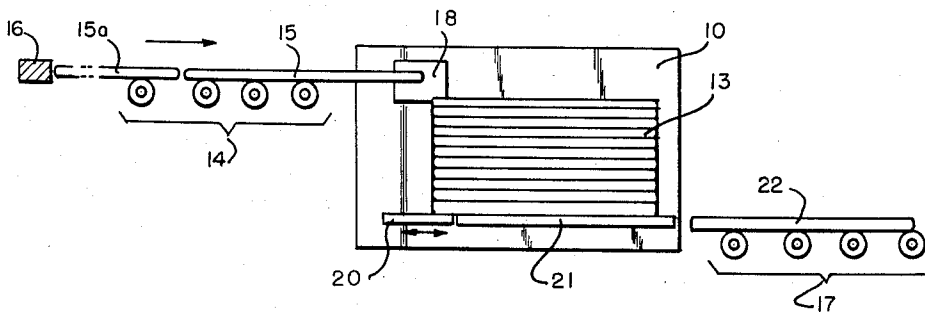


FIG. 2.



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2,873,345

ARC MINIMIZERS

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12 Claims. (Cl. 219—10.43)

The present invention relates to improved dielectric heating and drying structures; and is more particularly concerned with an improved electrode arrangement for use in such systems, whereby the tendency for arcs to form is appreciably reduced.

Various structures are known at the present time for the dielectric heating and/or drying of dielectric workpieces. In general, such structures take the form of one or more electrodes coupled to an appropriate source of high frequency energy, thereby to effect an oscillatory field adjacent the electrode; and dielectric articles to be dried may be disposed or fed into the said field thereby to be heated or dried in accordance with well known principles. In certain structures of the general types described above, it is often desirable to heat a plurality of articles simultaneously; and such systems may be further associated with appropriate feeding structures for moving new articles to be heated into the field and for concurrently moving other articles, which have been sufficiently heated, out of said field.

It has been found that in such systems wherein plural articles are heated simultaneously, both the dielectric constant and dissipation factor of the plurality of articles being so heated tend to change during the heating thereof; and a new workpiece fed into the said field ordinarily exhibits a dielectric constant and a dissipation factor both of which may be appreciably higher than those of any of the articles already in the field. This disparity in dielectric constants and dissipation factors ordinarily causes a relatively large portion of total applied power to be consumed in the incoming workpiece to be heated and, in addition, ordinarily contributes substantially to field distortion adjacent the said incoming further workpiece to be heated, for it is recognized that field distortions are related to widely diverse dielectric constants of the material disposed within the field. This field distortion and high power concentration at a limited region of the total load is often accompanied by a situation wherein the dielectric strength of the incoming workpiece is, by reason of its moisture content for example, less than the dielectric strength of the other workpieces comprising the total load. By reason of these factors, i. e. excessive field distortion and lowered dielectric strength, it has been found that there is a considerable tendency for arcs to form between the electrode and the incoming article, with a resultant charring of the article.

The present invention serves to obviate this difficulty of known systems and provides an improved electrode arrangement which includes stationary dielectric means disposed within said field between the electrode and incoming workpiece, the said stationary dielectric means having a dielectric constant intermediate that of the incoming dielectric workpiece and air, thereby to smooth possible field distortions and reduce the tendency for arcs to form adjacent the said incoming workpiece. In this respect it should be noted that the word "intermediate" mentioned previously and to be employed in the subsequent description and appended claims, is not meant to charac-

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terize any particular ratio of the aforementioned stationary dielectric material to the dielectric constant of the incoming workpiece, but is meant to signify that the dielectric constant of the said stationary dielectric means is less than the dielectric constant of the incoming workpiece but is greater than the dielectric constant of other workpieces already in the field.

It is accordingly an object of the present invention to provide an improved electrode system for use in dielectric heating and drying applications.

A further object of the present invention resides in the provision of improved structures for reducing the tendency for arcs to form adjacent incoming workpieces in a dielectric heating and/or drying application; and in this respect it is a particular object of the present invention to provide such means which are extremely simple in construction, efficient in operation, and which may be incorporated in existing dielectric heaters without difficulty.

Still another object of the present invention resides in the provision of an improved dielectric heater of the type employed in the simultaneous heating of plural workpieces.

A still further object of the present invention resides in the provision of an improved arrangement of electrode and stationary dielectric means which is adapted to smooth and otherwise reduce extreme field distortions which may exist adjacent the said electrode under selected conditions of operation.

In providing for the foregoing objects and advantages, the present invention contemplates the provision of an improved electrode system preferably comprising a pair of spaced electrodes disposed in substantially parallel relation to one another and energized by an appropriate source of energy, thereby to effect a high frequency field therebetween. The said electrode arrangement is adapted to heat a plurality of dielectric workpieces simultaneously; and in accordance with a preferred embodiment of the present invention, the said dielectric workpieces may be stacked one upon the other within the aforementioned field, with dried workpieces being fed out of the said stack preferably from the bottom thereof and new workpieces to be heated being fed into the stack preferably at the top thereof.

As will be discussed in more detail subsequently, it has been found that in such a plural workpiece arrangement, both the dielectric constant and dissipation factor of the several workpieces being heated tends to decrease during the heating thereof, and the load within the heating field therefore comprises a plurality of workpieces which have widely different electrical properties. In practice, further workpieces fed into the said field exhibit both a dielectric constant and a dissipation factor which are appreciably higher than those of any of the workpieces already in the field; and the feed of such a workpiece into the field is therefore accompanied by an extreme field distortion whereby an appreciable percentage of the total power in the field is in fact dissipated in the incoming workpiece during movement thereof into said field. This factor, particularly when accompanied by a lowered dielectric strength of the incoming workpiece, often results in arc formation adjacent, and charring of, the incoming workpiece.

As will become apparent from the subsequent discussion, the said tendency for arc formation may be reduced somewhat by an appropriate shaping of the electrodes themselves adjacent the incoming workpiece. In accordance with the present invention, however, this field distortion and tendency for arc formation can be reduced even further by appropriately positioning stationary dielectric means of appropriate character between the electrode and incoming workpiece.

In practice, the said stationary dielectric means comprises a material having a dielectric constant intermediate that of the incoming workpiece and the air through which the field passes; and the dimensions and positioning of the said stationary dielectric means are so selected that it fills, insofar as is possible, the air space normally existing between the incoming dielectric workpiece and the aforementioned electrode, thereby to alter the dielectric constant of this normally existing air space to a value appreciably higher than that of air and less than that of the incoming workpiece. This alteration of dielectric constant in the space between the incoming workpiece and electrode has been found in practice to so smooth and otherwise reduce field distortion adjacent the said incoming workpiece that the tendency for arc formation is minimized to a commercially feasible level, notwithstanding the fact that the incoming workpiece may have a lower dielectric strength than other workpieces which are already in the field.

The foregoing objects, advantages, construction and operation of the present invention will become more readily apparent from the following description and accompanying drawing, in which:

Figure 1 is an illustrative top view of one form of electrode system constructed in accordance with the present invention; and

Figure 2 is a side view of the arrangement illustrated in Figure 1.

In order to appreciate the subsequent description, the improved structures of the present invention have been illustrated in the accompanying drawing in conjunction with an electrode, load, and feeding arrangement of the type employed in the drying of stacked porous dielectric boards such as "Travertone" boards manufactured and sold by Armstrong Cork Company, Lancaster, Pa. The particular electrode and feeding arrangement illustrated in Figures 1 and 2 does not, per se, comprise a portion of the present invention, and is in fact described at greater length in my prior copending applications, Serial No. 560,942, filed January 24, 1956, for: "Method and Apparatus for Dielectric Heating"; and Serial No. 560,943, filed January 24, 1956, for "Dielectric Heating." Inasmuch as these prior arrangements do comprise systems wherein a plurality of workpieces are heated simultaneously in conjunction with means feeding new workpieces into the heating field whereby the field distortion and arc formation problems discussed previously are present, the improvements comprising the instant invention will be described with particular reference to these prior arrangements. It must be understood, however, that various alternative electrode and feeding arrangements will be suggested to those skilled in the art, and the present invention finds equal utility in such other arrangements wherein the nature of the load and workpiece feed results in extreme field distortions adjacent the incoming workpiece.

Referring now to the figures, it will be seen that a typical plural workpiece heating arrangement, for instance of the types described in my prior copending applications identified above, may comprise a pair of stationary smooth electrodes 10 and 11 coupled by appropriate means to a generator 12 whereby a high frequency heating field is caused to exist between the said electrodes 10 and 11. When the electrode system is employed for drying dielectric workpieces such as the aforementioned "Travertone" boards, these boards or workpieces may be disposed in a stack 13 between the said electrodes 10 and 11.

The overall arrangement may further be associated with a feeding mechanism comprising, for instance, a roller conveyor 14 disposed adjacent the top of the stack 13; and a plurality of boards 15, 15a, etc. may be conveyed along the said conveyor 14, for instance from a preliminary dielectric heater stage, under the control of

a hydraulically operated in-feed pusher 16. The aforementioned in-feed arrangement is adapted to cooperate with a further out-feed arrangement comprising, for instance, an out-feed roller conveyor 17 disposed adjacent the bottom of stack 13 and cooperating with a hydraulically operated out-feed pusher 20 whereby boards such as 21, 22, etc., may be removed in succession from the bottom of stack 13 and thereafter conveyed in sequence via conveyor 17 to further utilization means, such as for example a further drying stage.

In practice, the incoming boards 15, 15a, etc. may be partially dried and may include a wet central streak which is to be further dried in the stage comprising electrodes 10-11. After incoming boards have been fed along conveyor 14 onto the top of stack 13, they are moved through the stack 13 by successive operation of the out-feed pusher 20; and, as a result, each incoming board is caused to progress through the stack 13 within the drying field between electrodes 10 and 11, whereby the moisture in the several boards, initially as the aforementioned wet central streak in each, is redistributed during progression of each board through the said stack 13 to the out-feed conveyor 17, and the boards are dried.

Certain characteristics of the overall system thus described should be noticed. The incoming boards, such as 15, 15a, each have appreciable moisture content concentrated for the most part in a relatively wet central streak. This moisture content of each incoming board causes the dielectric constant of each such incoming board to be relatively high, e. g. in the order of between ten and twenty. Moreover, it is generally recognized that the dielectric strength of a material, such as the "Travertone" boards mentioned previously, is greatly reduced as the moisture content increases; and as a result, each incoming board is not only subjected to a high field distortion due to the relatively high dielectric constant thereof as compared with the other boards in the stack, but is also subjected to said high field distortion at a time when its dielectric strength is relatively small.

As the incoming board is moved into the field existing between electrodes 10 and 11, it is partially dried; and as such an incoming board progresses through the stack 13, it is further dried. As a result, boards positioned at successively lower locations within stack 13 exhibit lower and lower dielectric constants and dissipation factors, with the lowermost such board having a dielectric constant for example of three as compared with a dielectric constant for example of three as compared with a dielectric constant of ten or twenty for the incoming board. In addition, boards positioned at successively lower locations within stack 13 exhibit higher and higher dielectric strengths as the moisture is redistributed from the wet central streaks and as it is removed from the boards. Accordingly, the tendency for arc formation, which is related principally to field distortion and dielectric strength, is greatest at the initial point of entry of an incoming board into the drying field; and this tendency reduces as the board progresses through the stack 13.

Since power density or field strength is related directly to dielectric constant and dissipation factors of the material disposed within the field, it is evident that differences in power densities within the successive boards indicate field distortions. The ratio of power densities witnessed within the successive boards may be used as a measure of relative field distortion. Power density is directly related to the weight of volatiles evaporated from the material, divided by the time of exposure to the field. These two factors therefore may be used to determine power density distribution within the incoming board and the boards in the stack. Actual field experiments establish that an appreciable percentage of the total applied power is consumed in the incoming board as it moves into position at the top of the stack, and that field distortion therefore is at its maximum in the region between the electrodes where the incoming board enters

the field. A brief discussion of factors observed in the operation of a drying system of the type illustrated in Figures 1 and 2 will illustrate this.

In a run actually analyzed, a "Travertone" board containing 3 lbs. 12 oz. of moisture was delivered from an initial drying station to a drying station generally of the type illustrated in Figures 1 and 2. The stack 13 contained a total of fourteen boards, including the incoming board, and the several boards were moved from one position to the next position in the stack every 81 seconds. The in-feeding stroke was 7.4 seconds and the return stroke of the feeding pusher was 7 seconds, so that each board being fed into the drying station on the top of the stack was disposed within the heating field for an average of 44 seconds (7 seconds while at rest during the return stroke plus one-half of the remaining 74 seconds). During this interval, the incoming board lost about 5 ounces of moisture. During each stroke of the overall apparatus (81 seconds) the second through the seventh boards lost three ounces of moisture, the eighth and ninth boards lost two ounces of moisture, and the tenth to fourteenth boards lost one ounce of moisture each. It must be emphasized that these figures represent rough calculations only, and that the moisture lost is in fact considerably more gradual than noted. However, these rough figures are entirely adequate to demonstrate the nature of the drying being effected.

Using these figures to determine power density by dividing the weight loss in ounces by the time in seconds to obtain a power density factor in terms of ounces per second, the first board had a factor of 0.114; the next six boards had a factor of 0.038; the next two boards had a factor of 0.025; and the final five boards in the stack had a factor of 0.012. The ratio of power density of the incoming board to the next six boards below it was .114 to .038, or 3 to 1; to the next two boards, about 4.5 to 1; and to the final five boards, about 9.5 to 1.

For convenience, these data are summarized in the following table:

Board No.	Weight Loss Per Stroke of Machine	Exposure Time in Seconds	Power Density Factor	Ratio of Power Density
1	5	44	.114	
2	3	81	.038	3 to 1
3	3	81	.038	3 to 1
4	3	81	.038	3 to 1
5	3	81	.038	3 to 1
6	3	81	.038	3 to 1
7	3	81	.038	3 to 1
8	2	81	.025	4.5 to 1
9	2	81	.025	4.5 to 1
10	1	81	.012	9.5 to 1
11	1	81	.012	9.5 to 1
12	1	81	.012	9.5 to 1
13	1	81	.012	9.5 to 1
14	1	81	.012	9.5 to 1

It will be obvious, of course, that during the first few seconds of movement of the incoming board (Board No. 1) into the field, the power density of the portion of the board disposed within the field will be substantially greater than the average power density which was determined on the basis of weight loss in a feeding interval of 44 seconds, as mentioned previously. The total weight loss in Board No. 1 was determined in this experiment because it was not practicable to make weight loss determinations on the incoming board before completion of the feeding cycle.

The figures of the foregoing chart indicate directly that the power dissipated in the incoming board represents a substantial portion of the total power applied to the load and that field distortion is at a maximum adjacent to the leading edge of the incoming board as it enters the field between electrodes 10 and 11.

Summarizing the foregoing, therefore, it will be appreciated that the stack 13, which comprises the load between electrodes 10 and 11, is composed of a plurality of dielectric workpieces having widely different electrical charac-

teristics, e. g. widely different dielectric constants and dielectric strengths; and, moreover, it will be appreciated that the very nature of the load being dried results in a fairly high percentage of the total applied power being consumed in the incoming board. Extreme field concentration and field distortion, therefore, exists in a relatively limited area of board entry, largely because of the geometry of the arrangement, as well as because of the widely different dielectric properties of the water-laden central streak in the incoming board, and the air space through which the field must pass adjacent such an incoming board; and this extreme field concentration and field distortion is moreover accompanied by the fact that the incoming relatively wet board ordinarily has a dielectric strength which is substantially less than that of the other boards already in the field.

The foregoing field distortion is smoothed to some extent by causing the electrodes 10 and 11 to be tapered outwardly, as at 10a and 11a, adjacent the point of entry of an incoming board 15. Even with this taper, however, it has been found that arcing adjacent the incoming board, with attendant charring of such an incoming board, may occur sufficiently frequently to introduce appreciably maintenance problems when the system is to be employed in large-scale mass production techniques. In order to make such mass production techniques economically feasible, therefore, it is desirable that the tendency for arc formation be reduced or minimized insofar as is possible, and the improvement of the present invention accomplishes this result in an extremely simple but efficient manner.

Thus, referring to the figures, it will be seen that the present invention contemplates the provision of a pair of stationary dielectric spacers 18 and 19 disposed within the field existing between electrodes 10 and 11 adjacent the initial point of entry of an incoming board 15 into said field. In practice, the spacers 18 and 19 may be attached to the electrodes 10 and 11 respectively, and the dimensions of the said spacers 18—19 are so chosen that they fill, insofar as is possible, the air gap which normally exists between an incoming board 15 and the spaced electrodes 10—11. The actual materials comprising dielectric spacers 18—19 are chosen to exhibit a dielectric constant intermediate that of the said incoming board 15 (particularly the dielectric constant of the wet central streak of the incoming board), and the adjacent air through which the field must pass to the said incoming board 15.

As mentioned previously, the incoming boards may exhibit a dielectric constant of between ten and twenty in the wet central section, while the dielectric constant of air, of course, is one; and under such conditions, a material suitable for use in the provision of spacers 18 and 19 may comprise a glass-bonded mica such as that sold under the trade name Mycalex, which has a dielectric constant of approximately seven or eight. To a lesser extent, another material suitable for use in the provision of spacers 18 and 19 may comprise a silicone glass cloth laminate.

By reason of the provision of spacers 18—19 adjacent the initial point of entry of an incoming board 15, the normally low dielectric constant air space existing between the incoming boards and electrodes 10 and 11 is raised in dielectric constant to one approaching the dielectric constant of the incoming board; and this modification of dielectric constant, in the vicinity adjacent the incoming board, minimizes extreme field distortion due to large gradients in dielectric constant, thereby reducing the tendency of arc formation in the precise region where such arcs are most likely to occur. It will be noted that the spacers 18 and 19 are relatively small and are disposed at a limited location along the path of movement of the incoming board 15, closely adjacent to the point of initial entry of said incoming board into the field existing between electrodes 10 and 11. As a practical matter, the spacers need not be increased in size and need

not, for instance, extend completely across the entire top of stack 13.

It should be noted that dielectric spacers 18 and 19 do not reduce the tendency for arc formation due to their insulating properties per se, i. e. the insertion of the spacers 18 and 19 in the manner described previously, is not meant to merely provide insulation thereby to increase resistance to voltage breakdown at critical points in the system. To the contrary, the dielectric spacers 18 and 19 effect field smoothing and reduce the tendency for arc formation, not so much by reason of their insulating properties as by reason of the fact that they modify the dielectric constant of spaces adjacent the incoming board, thereby to smooth the field and reduce high voltage gradients at the crucial point of entry. In this respect, therefore, the arrangement of the present invention differs appreciably from prior arrangements suggested heretofore wherein efforts were made to reduce voltage breakdown and arcing by merely increasing the resistance of the possible voltage breakdown path.

It should moreover be noted that the structure comprising the present invention is extremely simple but efficient in operation and lends itself to the ready modification of existing electrode systems wherein arcing problems may occur. The arrangement is particularly useful, as mentioned previously, in installations wherein a plurality of dielectric workpieces may be heated simultaneously; wherein the said plurality of workpieces exhibit widely different dielectric characteristics during the heating thereof; and wherein further workpieces introduced into the heating field exhibit such dielectric constants, dissipation factors, and/or dielectric strengths that field distortion and/or excessive power dissipation tends to occur adjacent the initial point of entry of such further workpieces into the field.

While I have thus described a preferred embodiment of the present invention, many variations will be suggested to those skilled in the art and certain such variations have already been discussed. In particular, it must be emphasized that the principles of the present invention find equal utility in any application wherein extreme field distortions, with the attendant possibility of arc formation, exist by reason of the loads employed. The foregoing description is therefore meant to be illustrative only, and all such modifications as are in accord with the principles described are meant to fall within the scope of the appended claims.

Having thus described my invention, I claim:

1. In a dielectric heating system, a pair of substantially planar electrodes disposed in spaced substantially parallel relation to one another, support means disposed substantially transverse to the planes of said electrodes for supporting a substantially planar dielectric workpiece to be heated, means cooperating with said support means for moving said substantially planar workpiece in said transverse plane from a first position external of said electrodes to a second position between said electrodes, and means for reducing the tendency of arc formation during movement of said workpiece toward said second position comprising a pair of dielectric members carried by said pair of electrodes respectively adjacent the paths of movement of the opposed edges of said moving workpiece, said pair of dielectric members being disposed at limited locations adjacent the initial point of entry of said moving workpiece between said electrodes as said workpiece moves between said electrodes toward said second position.

2. The combination of claim 1 wherein said pair of dielectric members comprise a material having a dielectric constant greater than air and less than the dielectric constant of said dielectric workpiece.

3. The combination of claim 2 wherein the edges of said substantially parallel electrodes are flared outwardly from one another adjacent said initial point of entry of said moving workpiece.

4. In a dielectric heating system, a pair of electrodes disposed in spaced substantially parallel relation to one

another, means for supporting a plurality of substantially planar dielectric workpieces, to be heated, in superposed stacked configuration between said electrodes with the planes of said workpieces being transverse to the planes of said electrodes, means for feeding a further substantially planar dielectric workpiece, to be heated, from a position external of said electrodes onto one end of said stack at a position between said electrodes, and means for reducing the tendency of arc formation during the feeding of said further workpiece onto said stack comprising dielectric means disposed adjacent said electrodes between said electrodes and said further workpiece, said dielectric means being positioned along the path of movement of said further workpiece at a limited location adjacent said one end of said stack at the initial point of entry of said further workpiece between said electrodes.

5. The system of claim 4 wherein said support means is disposed a plane transverse to the planes of said electrodes, said dielectric means comprising a pair of patches of dielectric material carried by said electrodes in opposed relation to one another at said limited location on each of said pair of electrodes respectively.

6. In a dielectric heating system, a pair of spaced stationary electrodes, means for moving a dielectric workpiece from a position external of said electrodes to a position between said electrodes, and stationary dielectric means positioned between each of said electrodes and said moving workpiece at a fixed location adjacent the initial point of entry of said moving workpiece between said electrodes, said stationary dielectric means substantially filling the spaces between said moving workpiece and said stationary electrodes at said initial point of entry of said workpiece between said electrodes, said stationary dielectric means having a dielectric constant greater than air and less than the dielectric constant of said moving workpiece.

7. In a dielectric heating system, a pair of spaced stationary electrodes, means for moving a dielectric workpiece from a position external of said electrodes to a position between said electrodes, and stationary dielectric means attached to said stationary electrodes and positioned between each of said electrodes and said moving workpiece at a fixed location adjacent the initial point of entry of said moving workpiece between said electrodes, said spaced electrodes being flared outwardly with respect to one another adjacent the position of said stationary dielectric means, said stationary dielectric means having a dielectric constant greater than air and less than the dielectric constant of said moving workpiece.

8. In a dielectric heating system, a pair of spaced stationary electrodes, means for moving a dielectric workpiece from a position external of said electrodes to a position between said electrodes, and stationary dielectric means comprising glass-bonded mica positioned between each of said electrodes and said moving workpiece at a fixed location adjacent the initial point of entry of said moving workpiece between said electrodes, said stationary dielectric means having a dielectric constant greater than air and less than the dielectric constant of said moving workpiece.

9. In a dielectric heating system, a smooth electrode, a source of energy coupled to said electrode for producing a high frequency energy field adjacent said electrode, means for supporting a stack of dielectric workpieces in said high frequency energy field whereby said stacked workpieces are heated by said field, means for feeding heated workpieces out of said field from the bottom of said stack, means for moving further workpieces to be heated into said field onto the top of said stack, and stationary dielectric means between said electrode and said stack adjacent said top of said stack for reducing distortions of said field due to entry of said further workpieces into said field adjacent the said top of said stack, said stationary dielectric means being supported in position adjacent said top of said stack by said electrode.

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10. In a dielectric heating system, means including a smooth substantially planar electrode for producing a high frequency energy field having a boundary, means for supporting a stacked plurality of dielectric workpieces to be heated within said field, means for moving a further workpiece to be heated across said boundary into said field and onto one end of said stack, and stationary dielectric means disposed in the region of said field boundary adjacent said one end of said stack for reducing field distortions adjacent said boundary due to said incoming further workpiece, said stationary dielectric means comprising a material having a dielectric constant intermediate the dielectric constant of air and the dielectric constant of said incoming further workpiece, said stationary dielectric means being attached to said electrode adjacent the path of movement of said incoming further workpiece.

11. In a dielectric heating system, means producing a high frequency energy field having a boundary, means for supporting a stacked plurality of dielectric workpieces to be heated within said field, means for moving a further workpiece to be heated across said boundary into said field and onto one end of said stack, said incoming workpiece comprising a porous dielectric board having a wet central streak whereby said incoming board has a relatively high dielectric constant, each of said stacked plurality of workpieces comprising porous dielectric boards which are successively drier from said one end of said stack to the other end of said stack whereby said stacked plurality of workpieces are of successively lower dielectric constant in said stack from said one end of said stack to said other end of said stack, means for moving relatively dry workpieces from said other end of said stack out of said field, and stationary dielectric means disposed in the region of said field boundary adjacent

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said one end of said stack for reducing field distortions adjacent said boundary due to said incoming further workpiece, said stationary dielectric means comprising a material having a dielectric constant intermediate the dielectric constant of air and the dielectric constant of said incoming workpiece.

12. In a dielectric heating system of the type wherein dielectric workpieces are heated and exhibit a decrease in dielectric constant during said heating, the combination which comprises a stationary electrode producing an electric heating field adjacent thereto, means for supporting a plurality of dielectric workpieces having differing dielectric constants, in said field, means for moving a further dielectric workpiece into said field adjacent said electrode, said further workpiece having a higher dielectric constant than any of said plurality of workpieces whereby movement of said further workpiece into said field distorts said field, and means for reducing the tendency of arcing due to said field distortion comprising stationary dielectric means disposed in said field between said electrode and said further workpiece adjacent the path of movement of said further workpiece into said field, said stationary dielectric means having a dielectric constant smaller than that of said further workpiece and higher than the smallest dielectric constant of said plurality of workpieces.

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642,662 Great Britain ----- Sept. 6, 1950

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,873,345

February 10, 1959

George E. Gard

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 25, for "acocrdance" read -- accordance --; line 34, for "Travertane" read -- "Travertone" --; column 4, lines 48 and 49, strike out "for example of three as compared with a dielectric constant"; column 6, line 23, for "appreciably" read -- appreciable --; column 8, line 18, after "disposed" insert -- in --; line 70, for "dieletric" read -- dielectric --.

Signed and sealed this 2nd day of June 1959.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents

UNITED STATES PATENT OFFICE
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